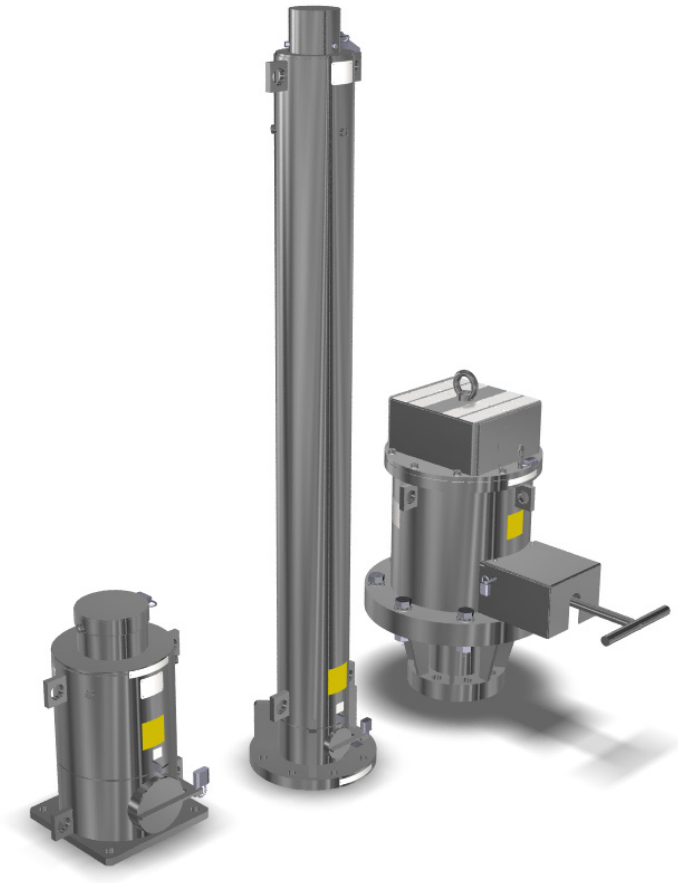

Shields for Flange Mounting

LB 8400 & LB 8401

Operating Manual
44192BA2
Rev. No.: 04, 07/2022

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Operating Manual

Technical Information

1 About this Operating Manual

1.1 Applicable Documents

This manual contains the following document:

- Technical Information, Mat. No. 44192TI (see appendix)

This operating manual does not contain the information required for pressure retentive shields operation. The following document must be used for this purpose:

- Supplement for operating manual. Mat. No. 66938BA2

1.2 Some Prior Remarks

The product is handed over to you by the manufacturer BERTHOLD TECHNOLOGIES GmbH & Co. KG (designated as Berthold in the following) in a complete and functionally reliable condition.

This operating manual illustrates how to:

- set up/install the product
- operate the product
- carry out maintenance on the product
- disassemble the product
- dispose of the product

Read these instructions thoroughly and completely before working with the product. We have tried to compile all the information for safe and proper operation for you.

However, should questions arise which are not answered in this manual, please contact Berthold. Store the instructions where they are accessible for all users at all times.

1.3 Storage

This operating manual as well as all product-related documentation relevant to the respective application must be accessible at all times during the life cycle near the device.

1.4 Target Group

The product may only be installed, operated, maintained and repaired by trained personnel.

This manual is directed at qualified specialist personnel who are familiar with handling radioactive sources and heavy system components.

Specialist personnel refers to those who can assess the work assigned to them and recognise possible dangers through their specialist training, knowledge and experience as well as knowledge of the relevant regulations.

1.5 Validity of the Manual

The manual is valid from the delivery of the Berthold product to the user until its disposal. Version and release date of this operating manual can be found in the bottom of each page. An alteration service is not provided by the manufacturer Berthold.

The manufacturer reserves the right to make changes to this operating manual at any time without stating reasons.

NOTICE

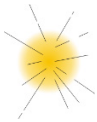
The current revision of this operating manual replaces all previous versions.

1.6 Structure of the Manual

This manual has been divided into chapters. The order of the chapters should help you to familiarise yourself quickly and properly with the operation.

1.7 Copyrights

1.8 Representation

Identifier	Meaning	Example
Round brackets	Image reference	Connect the plug (fig. 1, item 1)
	Prohibited actions, procedures or processes within a figure.	
	Representation of the ionizing radiation within an figure.	

1.9 Symbols Used

NOTICE

If this information is not observed, deterioration in the operation and/or property damage may occur.

IMPORTANT

Sections marked with this symbol point out important information on the product or on handling the product.

Tip

Provides tips on application and other useful information.

General warning symbol

Warning symbol Danger of crushing

Warning symbol heavy loads

Warning symbol suspended load

Warning of radioactive substances

Wear protective helmet

Wear safety shoes

Do not touch the surface

1.10 Definitions of Terms

Term	Meaning
Source	Sealed radioactive sources.
Ionizing radiation	Radiation from a radioactive substance.
Emergency	Event that immediately or later leads to a serious danger or to high property damage.

1.11 Structure of Warnings

⚠ Signal word

Source and consequence
Explanation, if required
▶ Measure
In case of emergency…

- **Warning symbols:** (warning triangle) draws attention to the hazard
- **Signal word:** states the severity of the hazard
- **Source:** states the type and source of the hazard
- **Consequence:** describes the consequences if warning is ignored
- **Measure:** states how one can avoid the hazard.
- **In case of emergency:** states how to react in case of direct danger.

Warning levels used

In this manual, warning instructions in front of instructions for action refer to risks of injury or damage to property. The hazard-prevention measures described must be observed.

⚠ DANGER

Indicates an **imminent**, major hazard, which will certainly result in serious injuries or even death if the hazard is not avoided.

⚠ WARNING

Indicates a **potential** hazard, which can result in serious injuries or even death if the hazard is not avoided.

⚠ CAUTION

Refers to a **potentially dangerous** situation, which can result in medium or minor physical injuries or damages to property, if it is not avoided.

1.12 Symbols used on the Device

Ionising radiation

The shield is equipped with a radioactive source. Please note the handling instructions. Please observe the transport instructions in this operating manual.

2 Safety

2.1 Proper Use

The source with shield is used in connection with a detector and a suitable evaluation unit provided by Berthold to measure the radiation intensity occurring during a radiometric measurement.

The shield was developed as shield/protective container for radioactive sources and may be used exclusively for this purpose.

Usually, the shield contains a radioactive source. The notes on radiation protection contained in the present manual as well as any statutory requirements in this respect are to be strictly adhered to.

The following constitutes proper use:

- Adhering strictly to the instructions and operation sequences and not undertaking any different, unauthorised practices which could put your safety and the operational reliability of the shield at risk!
- Observing the provided safety instructions!
- Carrying out the prescribed maintenance measures or having them carried out for you!

The following constitutes improper use and is to be avoided:

- Any non-compliance with the present operating manual for the supplied products
- Applying conditions and requirements which do not conform to those stated in the technical documents, data sheets, operation and assembly instructions and other specific guidelines of the manufacturer.
- Using the product after any repair carried out by employees who have not been authorized by Berthold.
- Using the product in a damaged or corroded condition.
- Dismounting the unit while the radiation beam outlet is open (except for situations in which the shutter is defective and the beam outlet can no longer be closed).
- Operation without the safety precautions provided by the manufacturer.
- Any modification to design and function, except for any activities provided for and described in the present manual.
- Restructuring or changing the system components.
- Manipulation or avoidance of existing safety equipment.

Berthold shall only accept liability for / guarantee the correspondence of the product to its publicised specifications.

If the product is used in a way which is not described in this manual, the product's protection is compromised and the warranty becomes void.

2.2 Ambient Conditions during Operation and Storage

The shield was specifically designed for use in rough ambient conditions. The compliance with the operating conditions specified below contributes to guaranteeing the permanent functionality of the shield and the prevention of damage.

Shields containing radioactive substances and sources are to be stored in a lockable storage room complying with the national requirements as regards the storage of radioactive substances.

The higher the humidity, as well as the dust and dirt content of the environment, the more likely stiffness or an entire blockage of the shutter is. For this reason, the functional test intervals (see chapter 7) should be adjusted to the ambient conditions.

Highly combustible or explosive substances must not be kept in the vicinity of shields in order to prevent a fire from spreading to the radioactive substances. Furthermore, the ambient conditions in the document “Technical Information” (see appendix) are to be observed.

2.3 Qualification of the Personnel

NOTICE

A minimum requirement for all work on or with the product would be employees with general knowledge who are instructed by an expert or authorised person.

At different parts in this manual, reference is made to personnel with certain qualifications who can be entrusted with different tasks during the installation, usage and maintenance.

The four groups this refers to are:

- Employees with general knowledge
- Experts
- Authorised persons
- Radiation Safety Officer

Employees with General Knowledge

NOTICE

Employees with general knowledge must always be guided by one expert at the very least. When dealing with radioactive substances, a radiation safety officer must also be consulted.

Employees with general knowledge are e.g. technicians or welders who can undertake different tasks during the transportation, assembly and installation of the product under the guidance of an authorised person. This may also refer to construction site personnel. The persons in question must have experience in handling the product.

Experts

Experts are persons who have sufficient knowledge in the required area due to their specialist training and who are familiar with the relevant national health and safety regulations, accident prevention regulations, guidelines and recognised technical rules.

Expert personnel must be capable of safely assessing the results of their work and they must be familiar with the content of this manual.

Authorised Persons

Authorised persons are those who are either designated for the corresponding task due to legal regulations or those who have been authorised by Berthold for particular tasks. When dealing with radioactive materials, a radiation safety officer must also be consulted.

Radiation Safety Officer

In order to ensure proper handling and compliance with the statutory requirements, the company has to appoint a radiation safety officer in accordance with the applicable national law (in Germany: Strahlenschutzverordnung [German radiation protection regulation]). The radiation safety officer must implement the statutory radiation protection requirements in order to protect employees against damage to their health caused by handling radioactive materials.

NOTICE

Dangerous goods officers must not perform any activities as radiation protection officers!

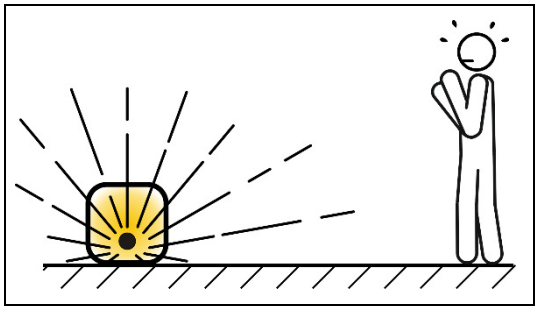
Radiation protection officers must have a special training with attendance of an officially recognized course and appropriate professional experience.

2.4 Radiation Protection

Basic Principles and Regulations

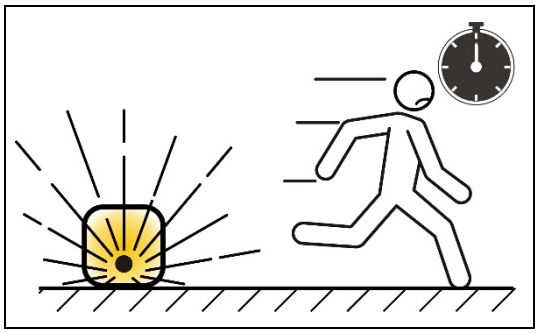
The amount of radiation absorbed by the body (exposure to radiation) is determined by three parameters from which the basic radiation protection regulations can be derived:

Distance



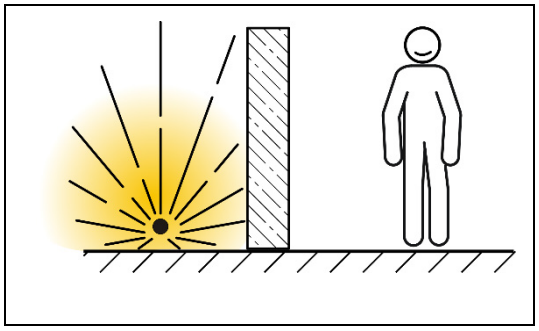
If work close to equipment containing radioactive substances is required, the largest distance possible is to be kept. In particular, this shall apply for employees which do not immediately participate in such work.

Time



Any work required in the vicinity of radiometric measuring systems is to be prepared carefully and to be organised in a way that the work can be executed as quickly as possible. Here, providing the correct tools and aids is particularly important.

Shield



When mounting and dismounting the shield, it is to be ensured in advance that the radiation beam outlet is closed.

Exposure of Employees to Radiation

During installation, maintenance and decommissioning of the shield, employees may be exposed to radiation.

In order to keep such exposure as low as possible, the shield with the source may only be mounted and/or dismounted by authorized employees. Such authorised staff is to be instructed as regards all rules of behaviour when handling radioactive substances in advance.

It is to be ensured that the shutter of the shield is closed and secured in order to prevent the emission of unshielded radiation. Modification or damage to the shield must be avoided at all times.

Work may only be executed according to the instructions and under the supervision of the radiation safety officer, who furthermore has to calculate or estimate the exposure of the employees to radiation in order to ensure that the statutory dose rate limits are not exceeded.

Theft Protection

Radioactive substances or equipment containing radioactive substances must be secured in a way that they are protected against access by unauthorized persons. In the case of firmly installed equipment containing radioactive substances, the protection against unauthorized access is generally provided by the firmly attached installation.

Shields with radioactive sources which are decommissioned for a certain period of time must be dismounted and securely stored in a storage room complying with the national regulations as regards the storage of radioactive substances.

Portable measuring systems must never be left unsupervised. When this equipment is out of use, it is to be protected against access by unauthorised persons.

In the Case of Fire

The shield material can melt and leak from the shield if exposed to very high temperatures for an extended period of time. During and after a fire, there is a risk of major long-time consequences for your health due to the incorporation of lead as well as a risk of increased radiation exposure.

When planning the use of radiometric measuring systems, constructional measures ensuring fire prevention are to be provided.

- In the case of fire, these measures limit the access to this area.
- Avoid the incorporation by keeping sufficient distance.
- In the event of a fire, further action must be agreed with the responsible authority.

2.5 Emergency Procedure

In case of serious operational trouble, such as fire or explosion, which could adversely affect the radiometric measuring facility, it cannot be ruled out that the function of the shielding lock, the shielding efficiency or the stability of the source capsule have been impaired. In this case, it is possible that persons in the vicinity of the shielding have been exposed to higher levels of radiation.

If you suspect such a severe malfunction, the Radiation Safety Officer has to be notified immediately. He will then investigate the situation immediately and take all necessary provisions to prevent further damage and to avoid more exposure of the operating staff to radiation.

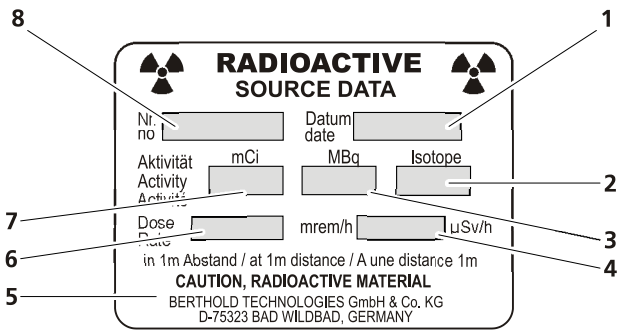
The Radiation Safety Officer has to make sure that the measuring system is no longer in operation and then take appropriate steps. He may have to inform the authorities or contact the manufacturer or supplier of the measuring system.

2.6 Operator's Obligations

The operator of the product must regularly train his personnel in the following topics:

- Observation and use of the operating manual and the legal provisions.
- Proper use of the product.
- Observation of the plant security instructions and the operating instructions of the operator

2.7 Type Plate of the Source



1 Date of manufacture of the source
2 Isotope
3 Activity [MBq]
4 Dose rate within 1 m distance [µSv/h]
5 Supplier of the source
6 Dose rate within 1 m distance [mrem/h]
7 Activity [mCi]
8 Source number

Fig. 1 Type plate of the source

3 System Description

Flange-mounted shields serve as shield and protective containers for radioactive sources. The radioactive substance is located in a tightly sealed source capsule within the shield. Flange mounting shields are available as shields for rod sources or point sources in various designs.

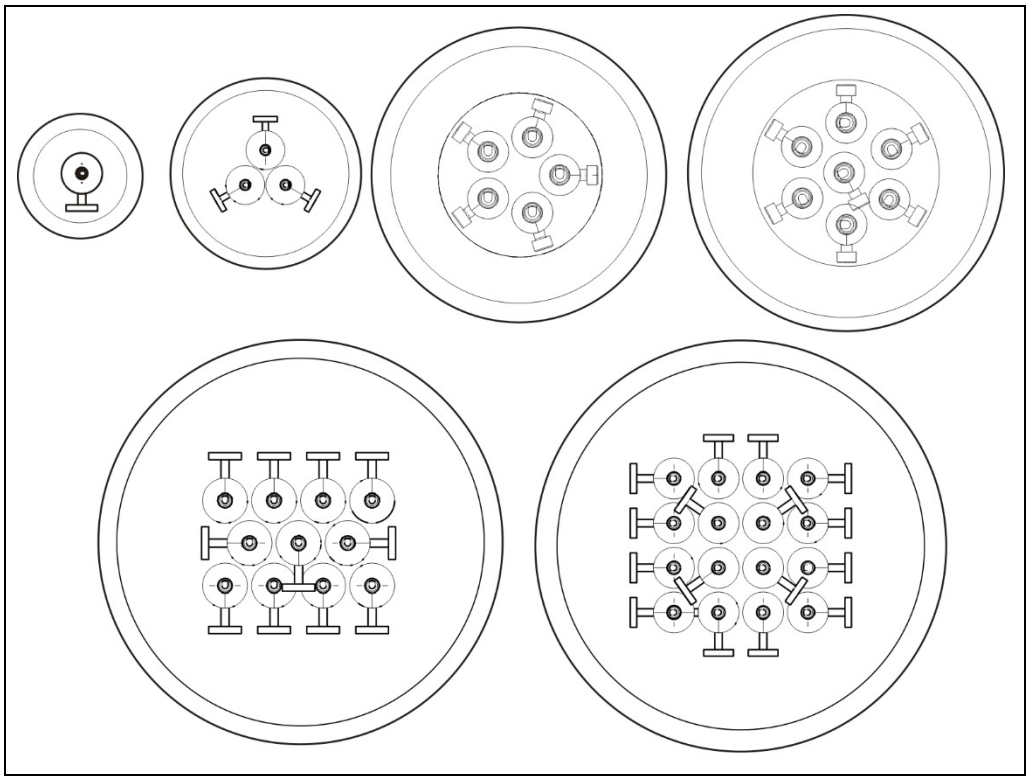


Fig. 2 Top view shield head, variants 1 ... 16

Shields for flange mounting are used with measurement arrangements for which the radioactive sources are stored inside a vessel during the measurement. The sources can be moved from the shield into the measuring position by means of a steel rope or a flexible shaft. Each source has its own suspension gear of different length to place it at the particular positions.

The shield is mounted at a dip pipe, which protrudes into the vessel from above, from below or at the side, depending on the constructive circumstances.

In addition to the sources and the shield, additional system components such as detectors and evaluation units are required for a complete measuring system. Usage of these system components is not subject of this operating manual. Please refer to the individual manuals of the respective system components.

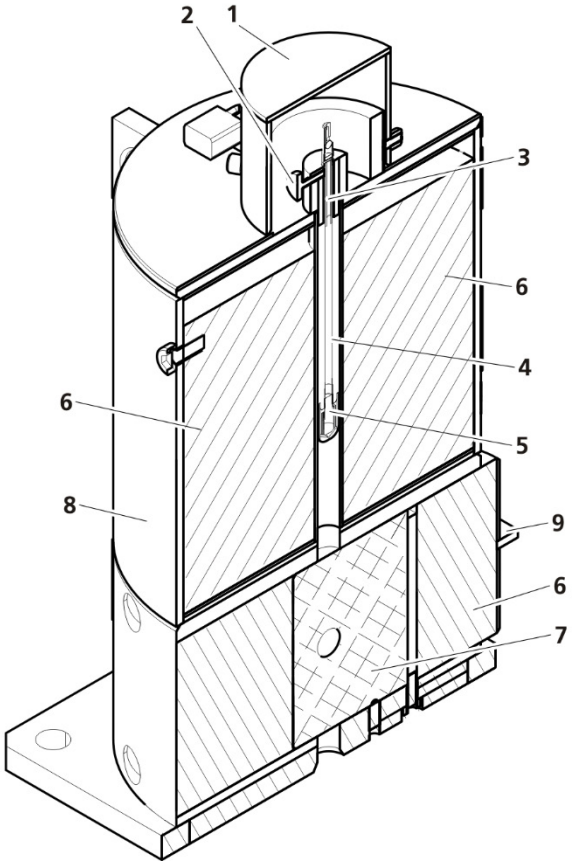
The shield vessel consists of a robust stainless steel housing filled with lead. In order to close the shield, a rotatable locking cylinder is installed. The locking cylinder can be rotated by means of a locking lever and be secured with a padlock.

The shield is mounted at the dip pipe by means of the fastening flange.

The shield has the following functions:

- Shield radiation to a level that is non-hazardous for the operating personnel
- Locking the radiation beam outlet channel for transport and during installation
- Protecting the integrated source capsule from mechanical damage and the effects of the surrounding environment

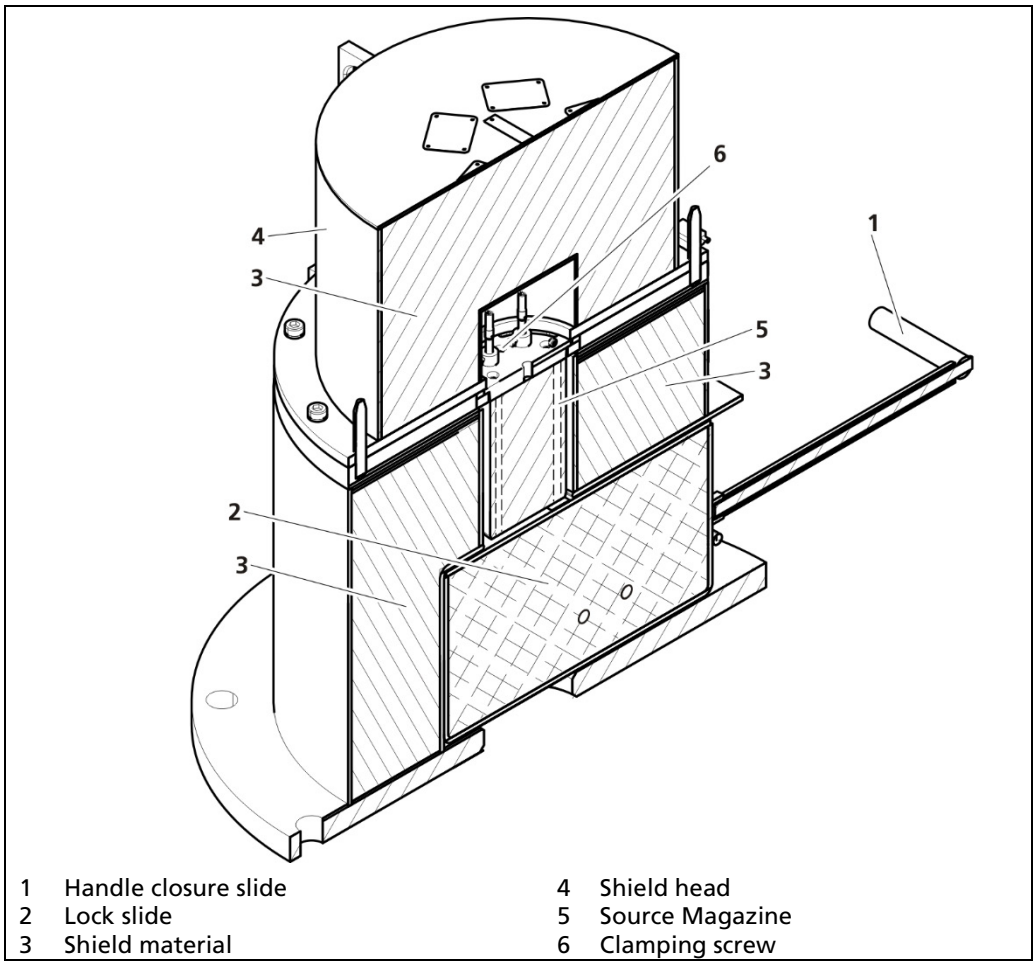
3.1 Variant Locking Cylinder



1 Shield head with cover
2 Clamping screw
3 Coupling part of the source holder
4 Source holder
5 Source
6 Shield material
7 Locking cylinder (*CLOSED* position)
8 Housing
9 Locking lever

Fig. 3 Sectional view of a variant source with locking cylinder

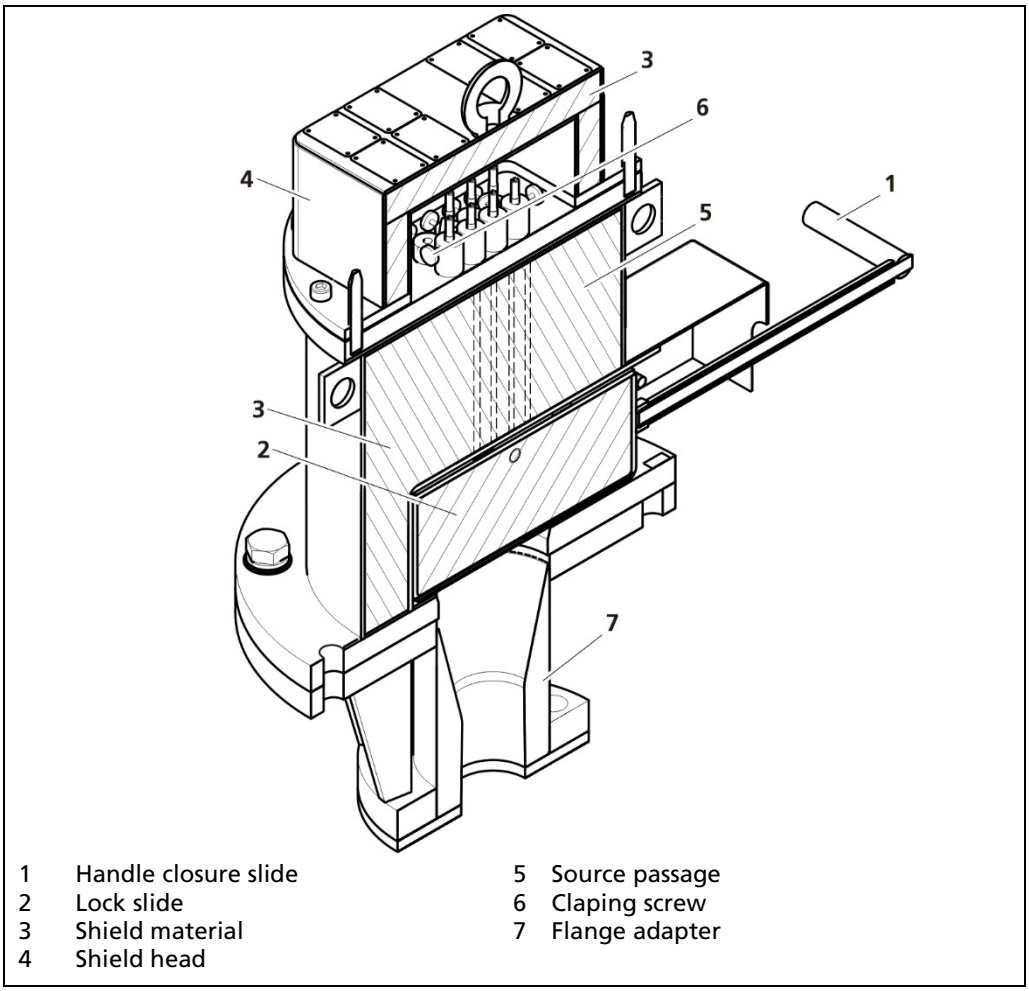
3.2 Variant Lock Slide with Magazine



1	Handle closure slide	4	Shield head
2	Lock slide	5	Source Magazine
3	Shield material	6	Clamping screw

Fig. 4 Sectional view of a variant point source with lock slide

3.3 Variant Lock Slide



1	Handle closure slide	5	Source passage
2	Lock slide	6	Claping screw
3	Shield material	7	Flange adapter
4	Shield head		

Fig. 5 Sectional view of a variant point source with lock slide

4 Transport

The shield may only be transported by competent persons (see 2.3 Qualification of the Personnel). Observe the national regulations applicable in the respective country of use. If necessary, note the marking of the center of gravity on the packaging.

4.1 Safety Instructions

⚠ WARNING




Danger of injury by falling loads!

Shields have built-in lead components increased weight.

- Exclusively use the provided fixing possibilities (lifting eyes) for attaching the sling gear.
- Only use tested sling gear components appropriate for the transport weight.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Wear head protection and safety shoes.

⚠ WARNING

Danger of injury caused by heavy and bulky system components!

- Heavy and bulky system components should only be handled using aids and by at least 2 persons.
- Observe the guidelines for safe handling of heavy loads.
- Ensure stability and use the provided fixing possibilities.

⚠ CAUTION

Danger caused by ionising radiation!

Shields usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Transport the source exclusively inside the closed and secured shield.
- The shutter must be in position *CLOSED* and secured during transport and assembly of the shield.

NOTE

The device may only be transported by competent persons (see 2.3 Qualification of the Personnel).

4.2 Packaging

The shield with the radioactive source represents a type A package, which corresponds to the regulations for the transport of radioactive substances.

Only the transport containers provided by the manufacturer are to be used for forwarding and returning. The specifications and requirements according to national and international dangerous goods regulations (Normal Conditions of Carriage) must be observed. The information in chapter 9 must be observed.

4.3 Intermediate Storage of the Source

If the source must be intermediately stored at the site of use between delivery and installation, please observe the following notes:

- Store the source exclusively inside a closed and secured shield.
- Store the shield in a lockable and properly marked room. The storage room must comply with the national requirements regarding the storage of radioactive substances.
- Accessible areas of increased radiation exposure must be marked and closed off, if required.

4.4 Scope of Delivery

Depending on the order, the product is configured and delivered. Check the delivery for completeness (material parts) and integrity. In the case of damage, immediately notify the forwarding agent and the manufacturer.

Check Delivery

Document any visible transport damage with photos on delivery. In case of damage contact the transport company and the manufacturer immediately.

4.5 Transport to Operation Site

The transportation to the operation site may only be executed by construction site personnel experienced in handling heavy components. The construction site personnel is to be instructed by at least by one authorised person. If the shields contains a radioactive source, the radiation protection officer is to be consulted, as well.

For lifting packages or shields weighing more than 25 kg, suitable aids (e.g. forklift truck) are to be used. If shields are lifted without transport packaging (wooden box or pallet), the provided fixing possibilities (lifting eyes) are to be used exclusively for attaching the sling gear.

Please observe the radiation protection regulations for the transportation of radioactive substances.

5 Installation

The shield may only be installed and mounted by competent persons (see 2.3 Qualification of the Personnel). Possibly the radiation protection officer is to be consulted, as well.

5.1 Safety Instructions

⚠ WARNING




Danger of injury by falling loads!

- The ring nut or lifting eyes on the shield head must not be used to lift the complete shield.
- Exclusively use the provided fixing possibilities (lifting eye) for attaching the sling gear.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Observe the marking for the centre of gravity on the outer packaging, if applicable.
- Wear head protection and safety shoes.

⚠ WARNING

Danger of injury caused by heavy and bulky system components!

- Heavy and bulky system components should only be handled using aids and by a at least 2 persons.
- Observe the guidelines for safe handling of heavy loads.
- Ensure stability and use the provided fixing possibilities.

⚠ CAUTION

Danger caused by ionising radiation!

Shields usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Transport the source exclusively inside the closed and secured shield.
- The shutter must be in position *CLOSED* and secured during transport and assembly of the shield.

IMPORTANT

The applicable national regulations of the country of use have to be observed.

5.2 Preparing the Installation

NOTE

The shutter must be turned or pushed and secured in position *CLOSED* during transport and assembly of the shield.

IMPORTANT

Size and position of the applicable measuring range are specified in the project planning phase and determined by means of drawings, sketches or written notes. During installation, these specifications must be strictly observed since deviations may lead to malfunction of the measuring system.

To avoid an unnecessary exposure to radiation, the handling period of the source (even if it is shielded) must be kept as short as possible during installation. It is therefore recommended to perform the following steps prior to delivery of the source:

- Installation planning (incl. estimation of radiation exposure)
- Instruction of the employees
- Organising and cleaning the installation site
- Preparing the required tools and hoisting devices
- Removing all obstacles which might hinder the installation of the shield or the source.

5.3 Installation of the Shield

NOTE

Malfunctions and / or damage to the shield due to impermissible ambient conditions!

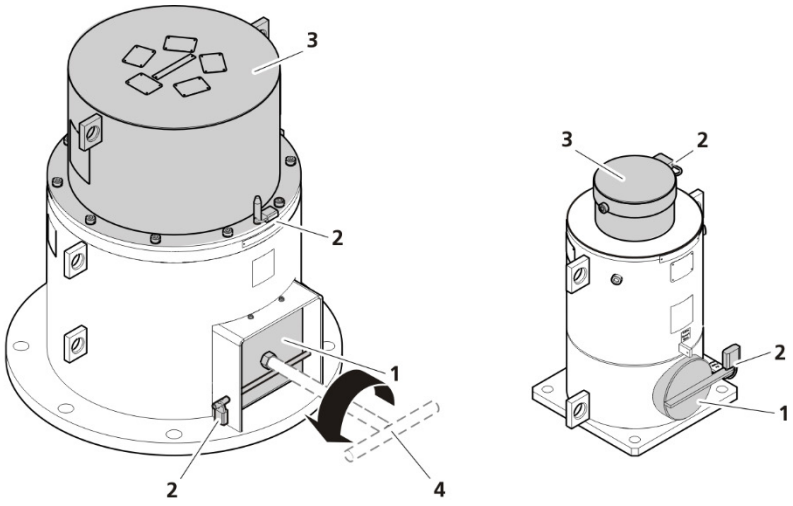
The mounting location and mounting position are determined during the project planning and defined by drawings, sketches or written instructions. These instructions must be observed strictly during assembly.

- Also note the information in chapter 1 Technical Data and chapter 2 Mounting Layouts in the document "Technical Information" (see appendix).

To avoid unnecessary exposure to radiation, install the shield as final system component.

Tip

If the shield contains a radioactive source, the measurement of the background count rate of the detector should take place before the shield is installed.



1 *CLOSED* position (lock slide or locking cylinder)
2 Padlock
3 Shield head
4 Handle (only lock slide vaiants)

Fig. 6 Shield closed (*CLOSED* position)

1. Check if the shield is closed and secured.

   - The locking cylinder or the lock slide is turned or pushed in position *CLOSED*.
   - The shield head and the padlock are mounted.
   - The handle should be removed for safe transport to the flange.

⚠ WARNING

Danger of injury by falling loads!

Falling loads can endanger people.

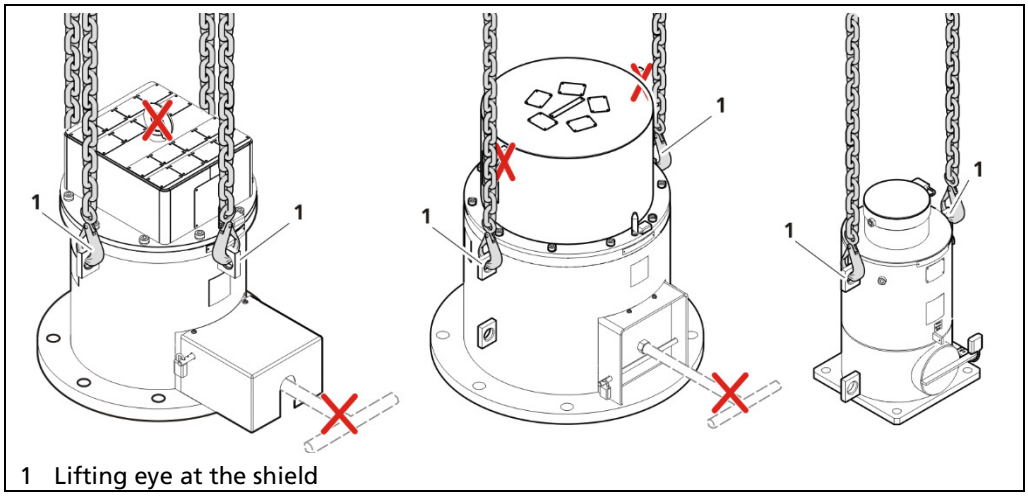
- Exclusively use the provided (lifting eyes) for attaching the sling gear.
- **The ring nut or lifting eyes on the shield head must not be used to lift the complete shield.**
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Cordon off the danger zone with barrier tape.

⚠ WARNING

Danger of crushing by moving the shields!

Due to the high weight of the shield, there is a risk of injury.

- Heavy and bulky system components should only be handled using aids and by a at least 2 persons.
- Do not reach between the shield and the flange or mounting base.



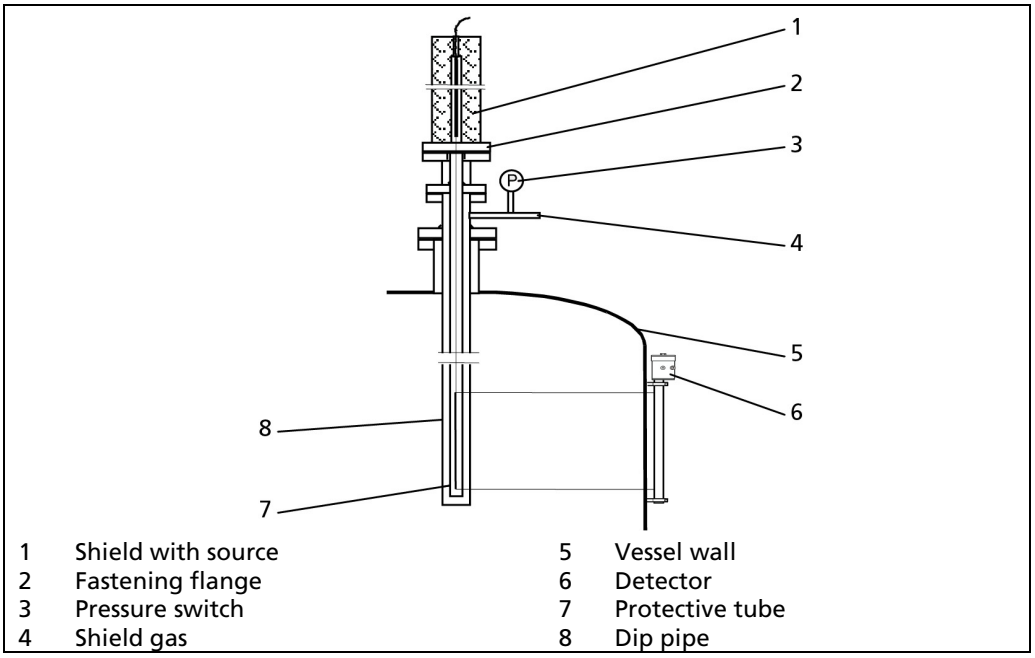
1 Lifting eye at the shield

Fig. 7 Attach the shield

2. Attach the shield to the lifting eyes with adequately dimensioned and tested slings (Fig. 7, item 1).
   Do not attach to the ring nut or lifting eyes on the shield head!
3. Lift shield and bring to mounting position.
4. Carefully lower or flare shield.

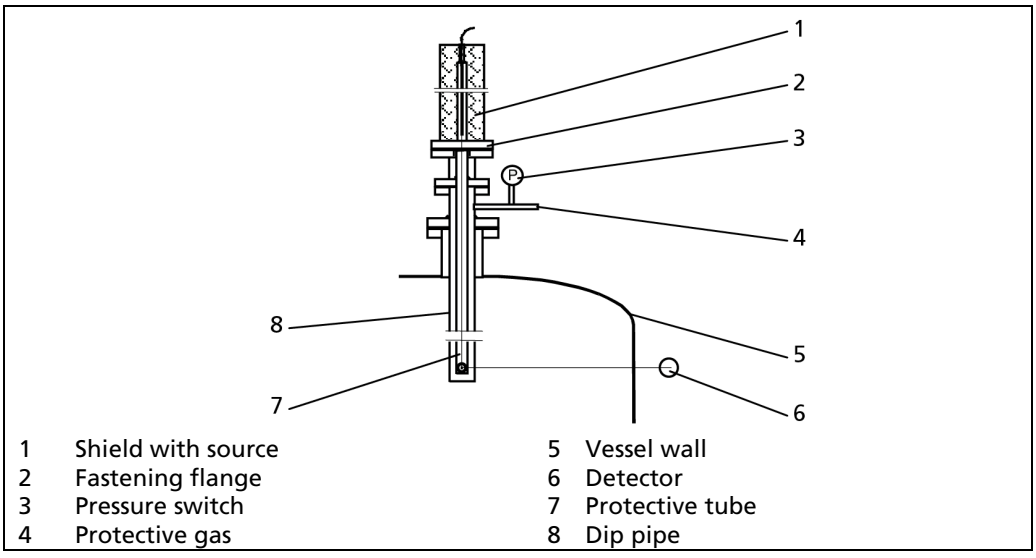
IMPORTANT

For some specific applications, it is important to identify any damage to the dip pipe in order to secure the radioactive source before it is damaged. Fig. 8 and Fig. 9 show installation proposals which meet the most stringent safety requirements. For this purpose, a double-walled protection tube whose interspace is filled with shield gas is used. Via a pressure switch, any damage or leak is recognized immediately.



1	Shield with source	5	Vessel wall
2	Fastening flange	6	Detector
3	Pressure switch	7	Protective tube
4	Shield gas	8	Dip pipe

Fig. 8 Dip pipe installation with rod source shield



1	Shield with source	5	Vessel wall
2	Fastening flange	6	Detector
3	Pressure switch	7	Protective tube
4	Protective gas	8	Dip pipe

Fig. 9 Dip pipe installation with point source shield

⚠ WARNING

Incorrect assembly may result in accidents!

An incorrect selection of the fastening elements endangers the stability of the shield.

- ▶ Use correctly sized and approved mounting elements (mounting base, anti-tilt, screw connections, screw locks).

5. Position the shield (Fig. 8, Fig. 9, item 1) in its installation position at the fastening flange (Fig. 8, Fig. 9, item 2) on the dip pipe (Fig. 8, Fig. 9, item 8) of the vessel. The operator has to attach the dip pipe to the vessel from above or from below or on the side, depending on the constructive circumstances.
6. Note the project-specific requirements and all informations in chapter 1 Technical Data and chapter 2 Mounting Layouts in the document "Technical Information" (see appendix).

Tip

Various versions of flange adapters are available from Berthold.

NOTICE

The shield as well as the sources **must not be** subjected to process pressure!

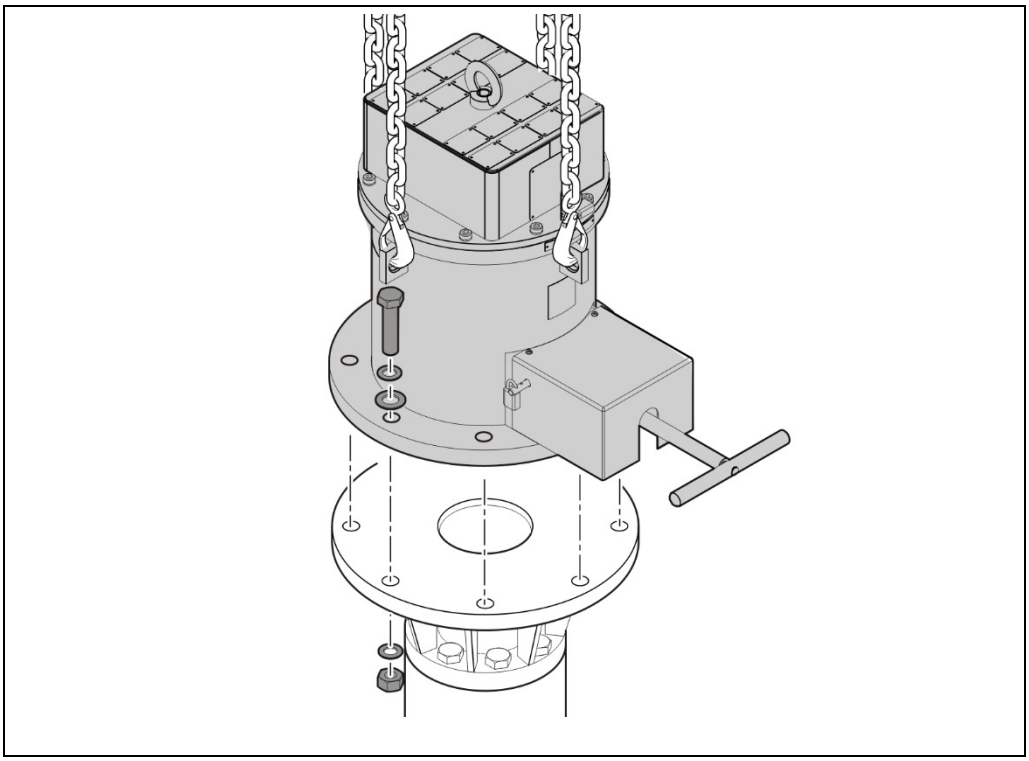


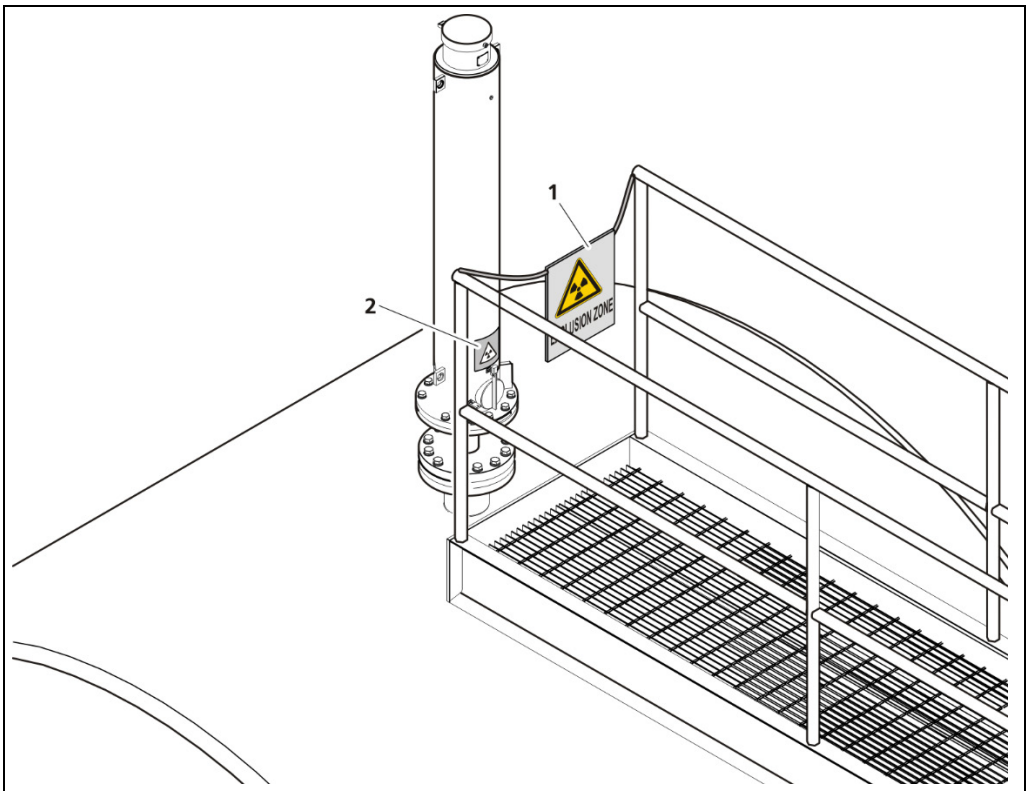
Fig. 10 Mounting the shield

7. Install the shield in the final position using the fastening screws.
   - ▶ The assembly of the shield is completed.

5.4 Marking

The warning sign (Fig. 11, item 1) indicates the beginning of the control area as long as the control area is outside the shield.

If the control area is within the shield, then the radiation warning sign (Fig. 11, item 2) already applied to the shield is sufficient. Fig. 11 shows an exemplary identification of the control area according to German law. Please observe the local legislation of the country of employment.



1 Warning sign exclusion zone
2 Warning sign rod source shield

Fig. 11 Example marking

6 Usage

The shield may only operate by competent persons (see 2.3 Qualification of the Personnel). When operating the shield, unexpected changes at the process control system can occur. Before moving the sources or removing the sources from the measuring position, the guidelines of the system operator must be observed.

6.1 Safety Instructions

⚠ WARNING

Danger of injury due to heavy shield head!

In order to operate the shield, the shield head must be removed.

- Only use the lifting eyes provided on the shield head (cover) to attach the sling gear components.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Cordon off the danger zone with barrier tape.
- Wear head protection and safety shoes.

⚠ CAUTION

Danger caused by nuclear radiation!

Shields usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Ensure that the shield does not show any signs of damage or functional limitations.
- Please observe the instructions on regular maintenance.

NOTICE

Damage to the steel rope / flexible shaft! Falling down of the sources!

- Never operate the lock when the sources are in measuring position.
- Secure all sources with the fixing screw / clamping screw before releasing the cable or the flexible shaft.

NOTICE

The positioning of the sources and the opening / closing of the shutter may only be carried out with installed shields!

- Mount the shield on the flange, see chapter 5 Installation.

6.2 Commissioning

Moving the Source into its Measurement Position

Depending on the respective measurement arrangement, either a steel rope or a flexible shaft is included in the scope of delivery of each source. By means of the steel rope or the flexible shaft, the radioactive source can be moved into its measurement position within the dip pipe in the vessel. The shutter is used for opening and closing the beam path.

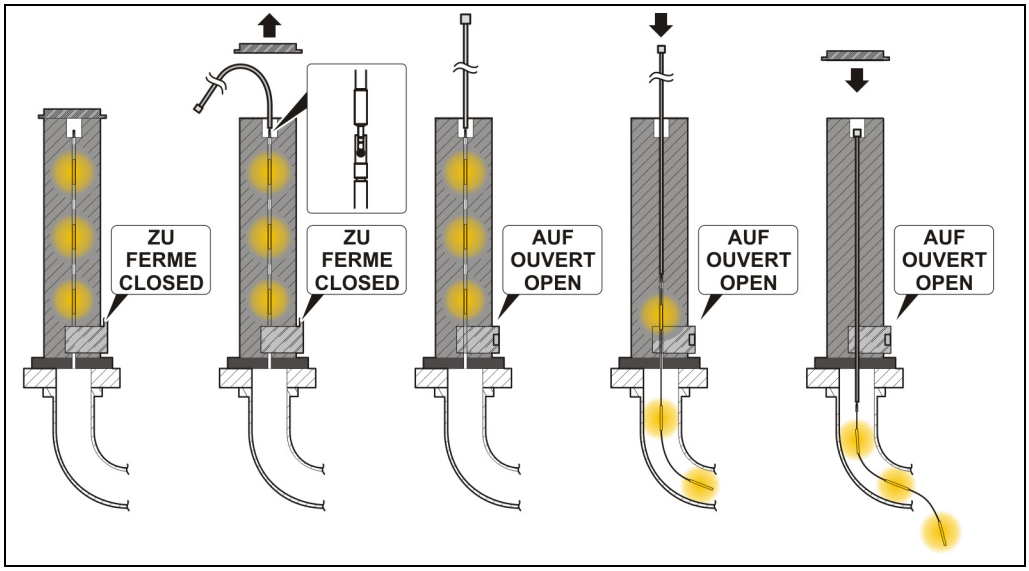
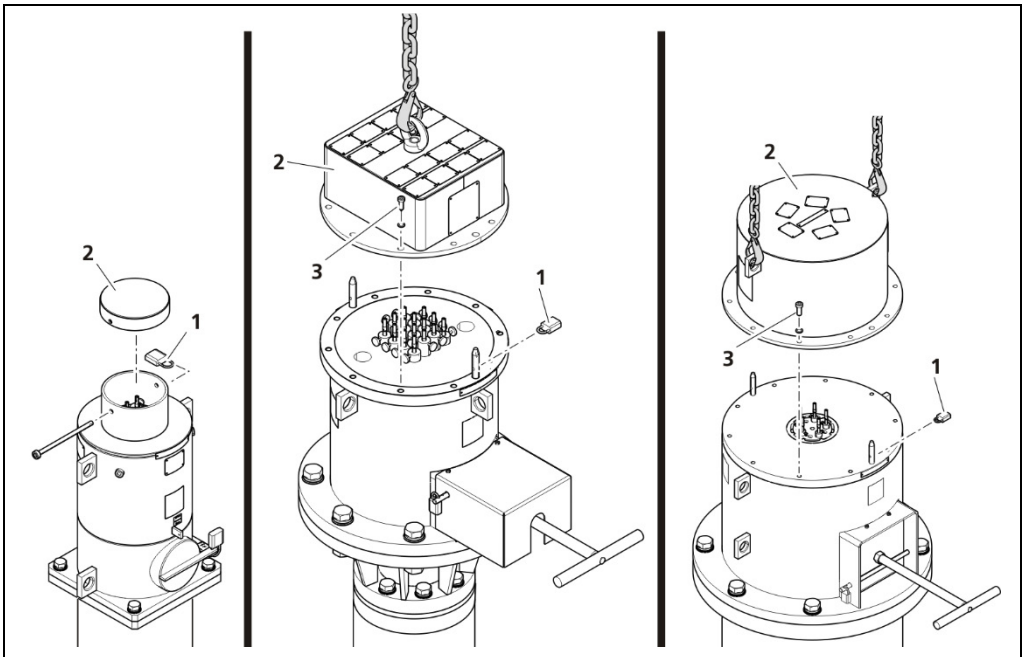


Fig. 12 Schematic procedure for inserting (example: shield with locking cylinder)

Latching the Steel Rope or Flexible Shaft into Place



1 Padlock
2 Cover / shield head
3 Screws shield head

Fig. 13 Remove cover / shield head

⚠ WARNING

Danger of injury by falling loads!

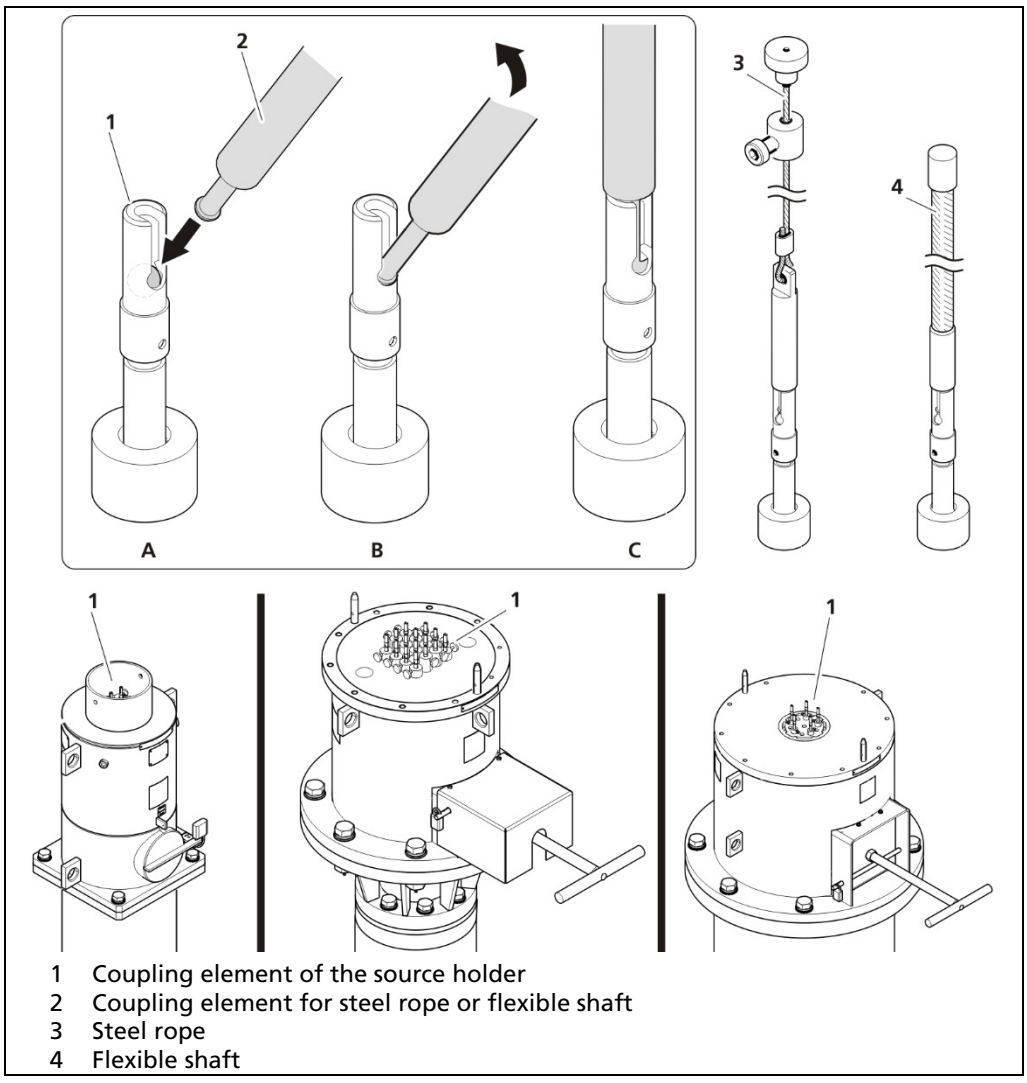
- Assemble and disassemble the shield head with a crane and exclusively use the lifting eyes for attaching the sling gear.

1. Remove the padlock (Fig. 13, item 1) on the cover / shield head (Fig. 13, item 2).
2. If necessary, remove the screws at the cover / shield head.
3. Lift the shield head vertically upwards or remove the cover by pulling it upwards.
   - The coupling element of the source holder and the clamping screw becomes accessible.

NOTICE

The sources are secured in the delivery state with clamping screws in the shield.

- **With the shutter open, open the clamping screw only when every source is attached to the steel rope or to the flexible shaft!**



1 Coupling element of the source holder
2 Coupling element for steel rope or flexible shaft
3 Steel rope
4 Flexible shaft

Fig. 14 Latching the steel rope or the flexible shaft into the source holder

4. Latch (Fig. 14, item 1) one steel rope or one flexible shaft (Fig. 14, item 2) at each source holder.
5. Ensure that all steel ropes or flexible shafts are correctly latched in place.
   - ▶ A quick-link mechanism prevents the connection from detaching on its own.
   - ▶ The shutter, the clamping screw can be opened (see chapter 6.2.1) and the sources successively placed in the respective measuring position (see chapter 6.2.2).

IMPORTANT

The shutter may only be operated by persons who are at least employees with general knowledge and were instructed by an expert or authorized person. If the shield includes a radioactive source, the responsible radiation safety officer must be consulted.

IMPORTANT

In some countries, securing the shield in the open position is prohibited for reasons of radiation protection.

- ▶ The applicable national regulations of the country of use have to be observed.

6.2.1 Open the Shutter

NOTICE

Ensure that all sources are secured by means of the clamping screws and that all steel ropes or flexible shafts are latched in place!

- ▶ Unsecured sources will fall into the dip pipe.

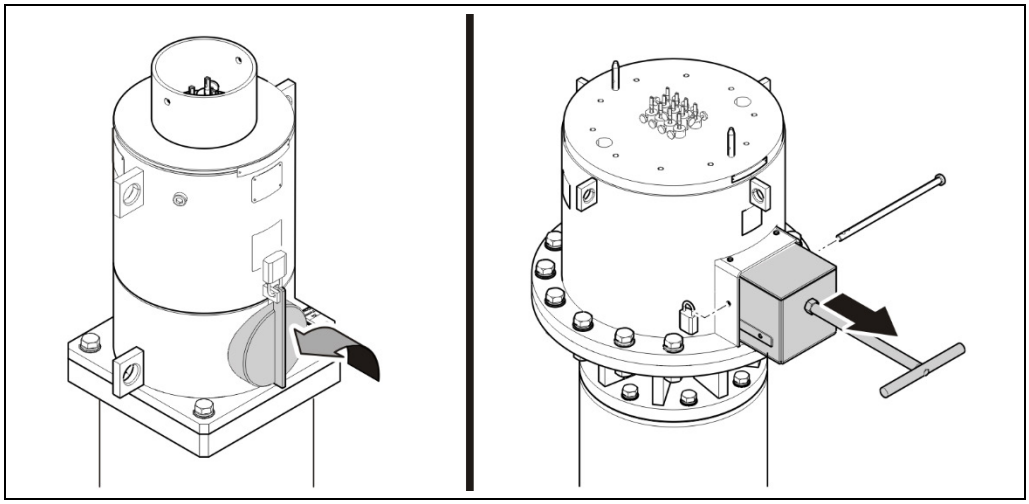


Fig. 15 Shutter open (*OPEN* position); left: locking cylinder, right: slide shutter

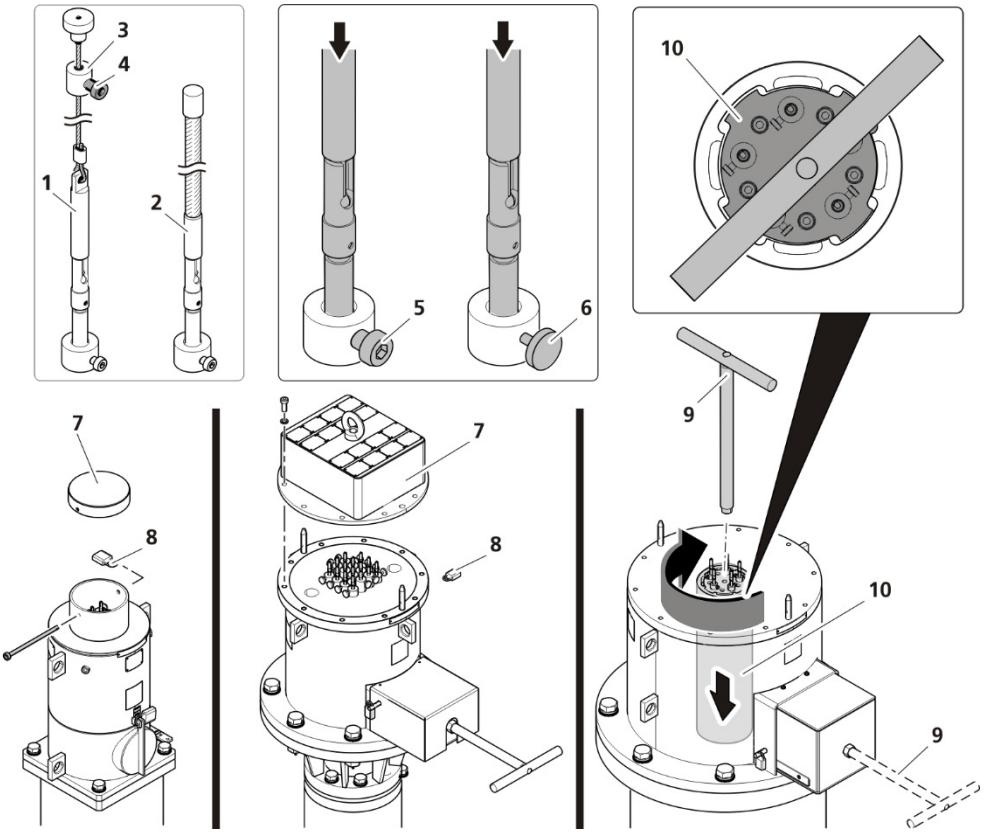
1. Make sure that all sources are secured with the clamping screws and that all steel ropes or flexible shafts are suspended.
2. Remove the padlock.
3. Manually move the shutter to the *OPEN* position.
   - ▶ The source passage is open.

4. Secure the Shutter in the new position with the padlock (only with slide shutters).

   ▶ The sources can now be brought individually into the measuring position, see chapter 6.2.2.

6.2.2 Inserting the Source into the Dip Pipe

The sources are marked with numbers. Pay attention to the numbering to ensure the order in which you insert the individual sources into the dip pipe.



1	Coupling element with steel rope	6	Clamping screw (knurled head screw)
2	Coupling element with flexible shaft	7	Shield head / cover
3	Positioning stopper	8	Padlock
4	Fixing screw (hex socket screw)	9	Handle bar
5	Clamping screw (hex socket screw)	10	Source magazine

Fig. 16 Inserting the sources / source magazine

1. Use the steel rope or the flexible shaft to move all sources into the desired measurement position subsequently.

NOTICE

Insert the source with the lowest measuring position into the dip pipe first.

When using a steel rope (Fig. 16, item 1): Via the positioning stopper (Fig. 16, item 3) at the steel rope, set the desired depth of immersion into the dip pipe. Tighten the fixing screw (Fig. 16, item 4) on the stopper to 2 Nm. Open the respective clamping screw (Fig. 16, item 5; item 6) and lower the source on the steel rope until it reaches the set depth of immersion into the dip pipe.

When using a flexible shaft (Fig. 16, item 2): Open the respective clamping screw (Fig. 16, item 5; item 6) and move the source into the desired measurement position. Via the clamping screw, set the desired depth of immersion into the dip pipe.

When using a source magazine (Fig. 16, item 10): Remove the handle bar (Fig. 16, item 9) from the shutter and screw it in the centre of the magazine. Turn the magazine to the next position segment which allows you to release the magazine into the dip pipe adapter.

IMPORTANT

Proceed to the next section when using a source magazine shield for dip pipe adapter (grayloc tubes).

⚠ WARNING

Danger of injury by falling loads!

- Assemble and disassemble the shield head with a crane and exclusively use the lifting eyes for attaching the sling gear.

2. Attach and screw the shield head / cover (Fig. 16, item 7).
3. Secure the shield head / cover with the padlock (Fig. 16, item 8).
   - Commissioning is complete.

Shield with Source Magazine for Dip Pipe Adapters

IMPORTANT

The magazine is located inside the dip pipe adapter!

5. Remove the handle bar (Fig. 16, item 9) and attach it to the shutter again.
6. Slide the shutter in position *CLOSED* and lock it.
7. Close the cover (shield head: Fig. 13, item 2) of the shield, screw and lock it. Store the handle bar at it intended storing position.

NOTICE

To close the dip pipe adapter, observe the instructions of the plant operator.

8. Remove the shield and store in a proper way. Note all information in chapter 5 Installation.
9. Close the cover of the dip pipe adapter.
   - Commissioning is complete.

7 Maintenance and Repair

7.1 Safety Instructions

⚠ CAUTION

Danger caused by nuclear radiation!

Shields usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Ensure that no one is in the radiation beam during operation.
- Longer repair and maintenance work on shields must not be carried out with the source installed. If a removal of the source is not possible, please contact the manufacturer.

IMPORTANT

The applicable national regulations of the country of use have to be observed.

Document the results of the tests you conducted using the check list in the appendix. This documentation as well as the seal test certificates must be kept during the entire life cycle of the shield.

NOTICE

Take environmental conditions into account!

Adjust the intervals of the visual inspection and the functional check to the ambient conditions. If the ambient conditions are especially rough, the atmosphere is corrosive and / or there is a serious threat of contamination, the intervals should be shortened accordingly.

The atmosphere inside the dip pipe may cause corrosion on the source, source holder, quick-link connector and steel rope or flexible shaft.

NOTICE

If damage affecting the secure function of the shield is detected during handling, maintenance or regular checks, the damage must be repaired after consultation with Berthold before the system is used again. Only spare parts specified by Berthold may be used and required repair work may be carried out exclusively by authorized persons.

Stickers and signs must always be legible. Replace damaged or illegible stickers.

7.2 Visual Inspection of the Source Holder and Connections

The visual inspection of the source, source holder, quick-link connection, steel rope or flexible shaft must be carried out by persons who are at least employees with general knowledge at the following intervals:

- before initial commissioning
- with every repair that may be required
- regularly at least every six months
- before dispatch

When determining the intervals for the visual inspection, the following conditions are to be considered:

- ambient conditions (outdoors, rain, sunlight, wind, salt, sand, chemicals).
- operating conditions (degree of utilisation of the plant, the atmosphere inside the dip pipe, misuse)

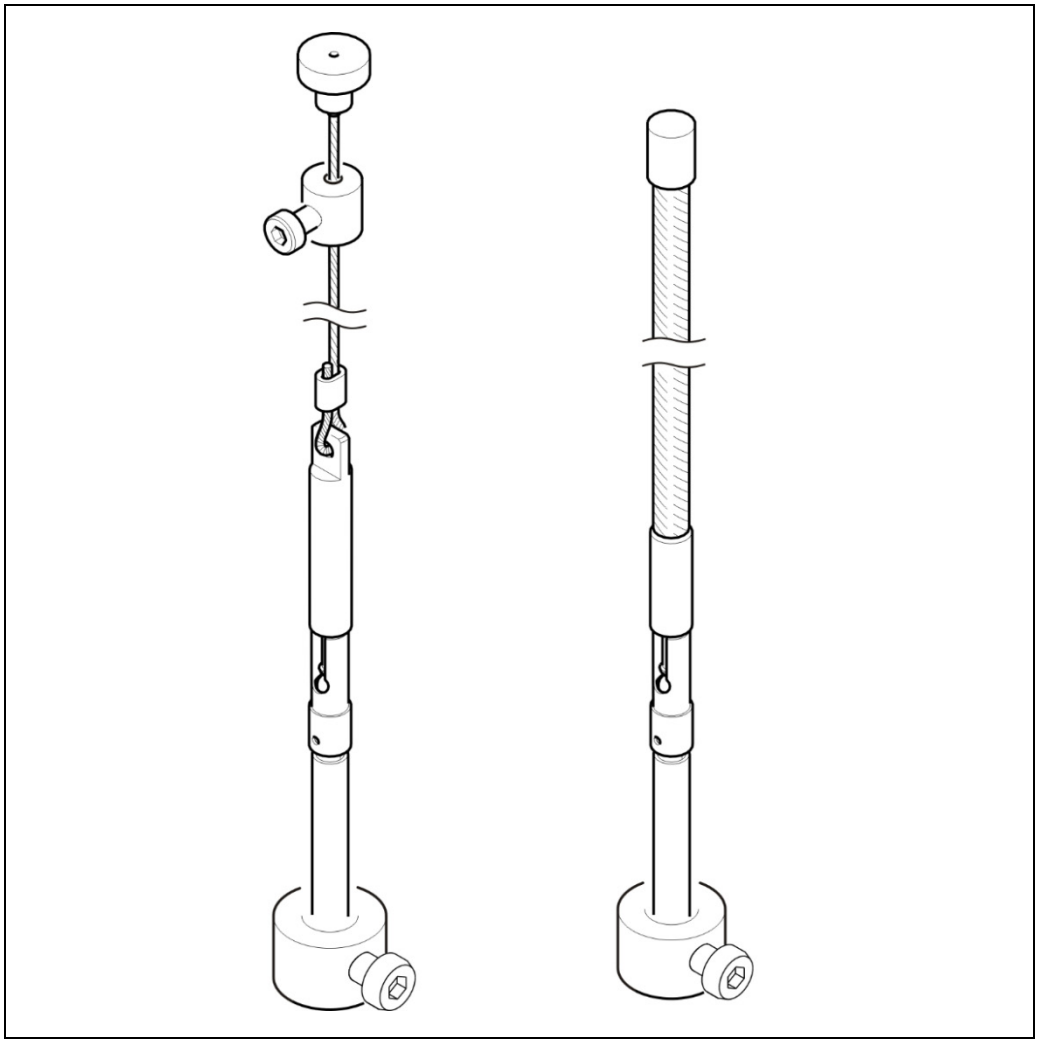


Fig. 17 Visual inspection source holder

1. Check all visible parts of the source holder and quick-link mechanism (Fig. 17) for corrosion by pulling out the flexible shaft or steel cable maximum up.
2. Check the flexible shaft or steel cable for damage and corrosion over the entire length.
3. Only before dispatch: Check if the shutter is in CLOSED position and if the padlock as well as the transport securing device are installed.

Tip

If there is any doubt regarding the actual position of the shutter: Check the dose rate at the shield using a dose rate measuring device. If the shield is closed, the dose rate in the direction of the beam may not be significantly higher than at other parts of the shield.

4. If any defects are identified during visual inspection, inform the radiation safety officer who will initiate the measures required for repairing the defects.

   ▶ The visual inspection is complete. For further information, please contact Berthold.

7.3 Leak Test

Depending on the supervisory authority responsible for the area where the source is used, regular leak tests must be carried out. These tests are to be carried out at the discretion of the competent supervisory authority either by an authorized expert or by the manufacturer. For this test, the corresponding source documentation must be made available.

Required Documents

- Inventory list of the sources to be tested including indication of previous leak tests.
- **Source certificate containing the following information:** Nuclide, activity, procurement date, physical/chemical form, description of the enclosure and type of sealing, resistance against mechanical and thermal influences or classification of the source design. The source certificate is provided together with the source.
- Information on the location, application as well as on the maximum customary mechanical and thermal strains.
- If the source is installed in a device, a drawing is to be provided. In the drawing, the position of the source and of all parts intended to protect the source against external influences must be clearly indicated. Recommendations regarding the most appropriate test method should be given, e.g. by indicating alternative test areas. If required, recommendations should be given on how the necessary test can be conducted without affecting the functionality of the system or device.

Alternative Test Areas:

Alternative test areas are areas of a shield which will most likely be contaminated if a source is leaking.

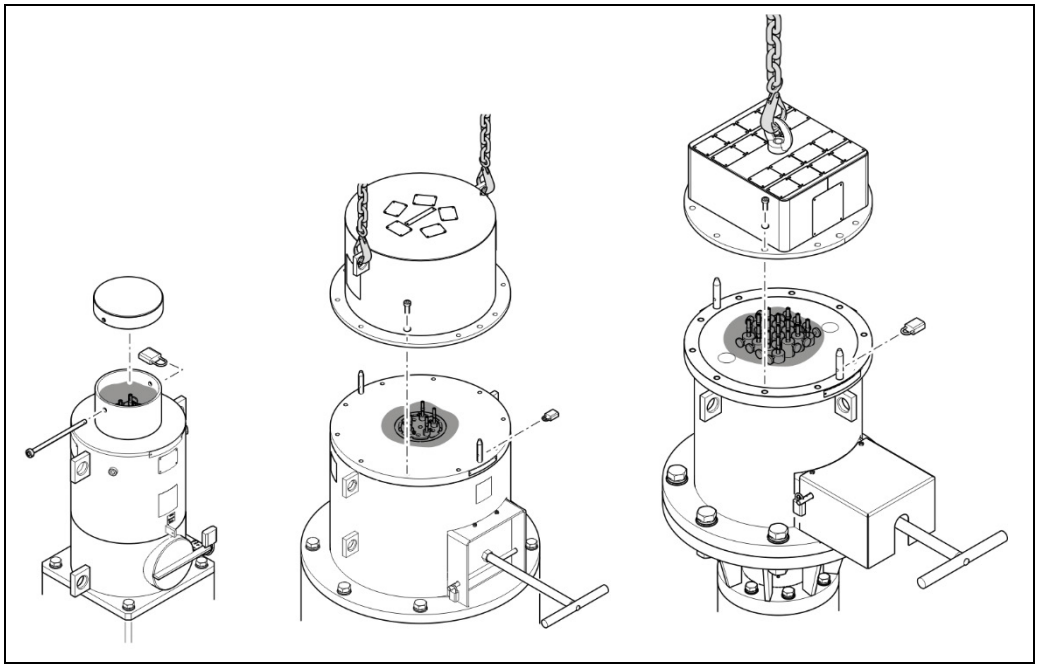


Fig. 18 Alternative test area

The following alternative test area of the shield can be used:

- the area marked in grey in Fig. 18.

IMPORTANT

During the leak test, it is to be taken into consideration that the normal operating position of the radioactive sources is the measurement position outside of the shield in the dip pipe.

⚠ WARNING

Danger of injury by falling loads!

- Assemble and disassemble the shield head with a crane and exclusively use the lifting eyes for attaching the sling gear.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Cordon off the danger zone with barrier tape.
- Wear head protection and safety shoes.

1. Remove the padlock on the cover / shield head.
2. If necessary, remove the screw connections of the cover / shield head.
3. Pull the cover / shield head upwards.
4. Perform the contamination measurement on the replacement test area.
   - The contamination measurement may only be carried out by radiation protection officers. If contamination is detected, appropriate decontamination measures must be taken.
   - The leak test is completed.

7.4 Checking the Source Position and Shutter

NOTICE

Only close the shutter when all the sources are pulled back into the shield and secured with the clamping screws!

- If there are still sources in the measuring position, the steel rope is cut through (sheared) off when closing the shield and the source falls into the dip pipe.

The functional test of the shutter must be carried out by a person who is at least an employee with general knowledge. We recommend conducting the test of the shutter at the same intervals as the visual inspection if the operating condition of the system allows.

1. Ensure that no employees are present in the direction of the radiation beam outlet. Otherwise, these persons will be exposed to the radiation beam when the shutter is opened.
2. Open and close the shutter several times (see chapter 6) while observing the measuring signal of the corresponding measurement system.
   The shutter works properly if the measured value approximately corresponds to the maximum value when the shutter is closed (*CLOSED* position).

NOTICE

Only open the shutter when all sources are attached to the steel rope or the flexible shaft and secured with clamping screws!

- Unsecured sources fall into the dip pipe when the shield is opened.

Tip

Alternatively, you can measure the dose rate in the beam path. In this case, the dose rate in the *CLOSED* position must be clearly lower than in the *OPEN* position. At the same time, the dose rate in the *CLOSED* position may not be significantly higher than at other parts of the shield.

3. Return the locking cylinder to its starting position (*OPEN* position or *CLOSED* position).
4. If applicable, reinstall the fixing screws and/or the padlock.
5. Immediately report any malfunction or stiffness of the shutter to the competent radiation safety officer.
   - The functional test is completed.

7.5 Removing and Installing the Source

Before conducting extended maintenance work at the shield, you have to remove the source. After the maintenance work is finished, you can reinstall the source. This does require the direct handling of the unshielded source.

You must clarify with the responsible supervisory authority in advance whether your license for handling radioactive substances comprises handling unshielded sources.

In any case, the source may only be installed/removed by authorised persons. The competent radiation safety officer is responsible for planning and monitoring the work.

NOTICE

In order to keep the exposure to radiation during the removal / installation of the source as low as possible, all persons involved should familiarise themselves with the exact procedure in advance.

NOTICE

Only remove / install the source in areas with closed floors. Any apertures which are larger than the external diameter of the source (7 mm for rod sources, 15 mm for point sources) are to be covered before commencing any work.

7.5.1 Removing the Source

The sources can only be removed on the flange side, this requires disassembly of the complete shield.

To install the source, the following tools are required:

- Various wrenches for disassembly on the flange
- Allen key SW 3 to SW 10 for the cover of the shield
- A pair of pliers to hold the source securely
- Rod for pushing the source, diameter 7 mm

Dismantle Shield

⚠ WARNING

Danger of injury by falling loads!

- Assemble and disassemble the shield head with a crane and exclusively use the lifting eyes for attaching the sling gear.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Cordon off the danger zone with barrier tape.
- Wear head protection and safety shoes.

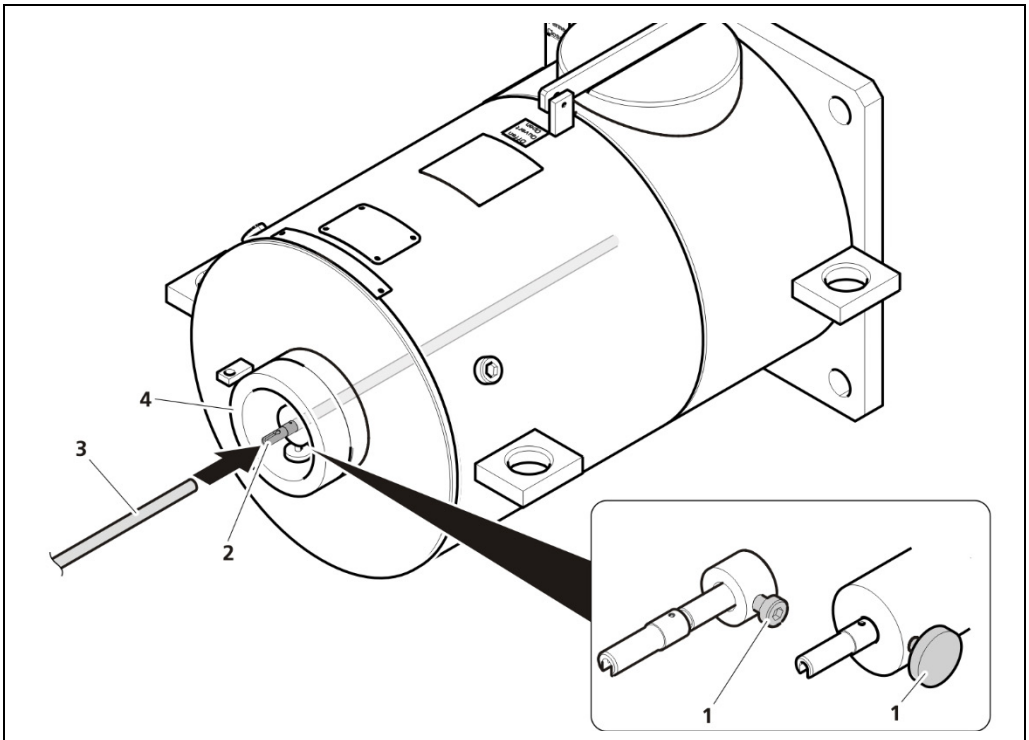
1. Provide the transport shield for the sources and open the transport shield.
2. Remove the padlock from the cover / shield head.
3. If necessary, remove the screw connection of the cover / shield head.
4. Pull the cover / shield head upwards.

NOTICE

In the case of shields with multiple sources, the source with the highest measuring position must first be brought into the shield.

5. Pull all sources on the rope or on the flexible shaft as far as possible into the shield.
6. Tighten all clamping screws.
7. Place the shutter in the *CLOSED* position and attach the padlock.
8. Disassemble the complete shield from the flange.
9. Lay the shield on a flat surface.
10. Lay the shield in which the sources are to be removed so that the underside of the mounting flange is accessible.
    - The sources can be removed.

Slide the Source up to the Fastening Flange



1 Clamping screw
2 Coupling element of the source holder
3 Rod
4 Shield head

Fig. 19 Dismounting the source from the shield, example graphic: Point source shield with 1 source

1. Remove the cover from the shield head.
   - ▶ The source holders and the clamping screws become accessible.
2. Disconnect the steel rope or the flexible shaft at the source holder.
3. If necessary, open the clamping screw (Fig. 19, item 1).
4. Push the source on the coupling part of the source holder (Fig. 19, item 2) with a rod (Fig. 19, item 3) out of the shield until it protrudes down from the mounting flange.
   - ▶ The source can now be completely pulled out of the shield from the flange side.

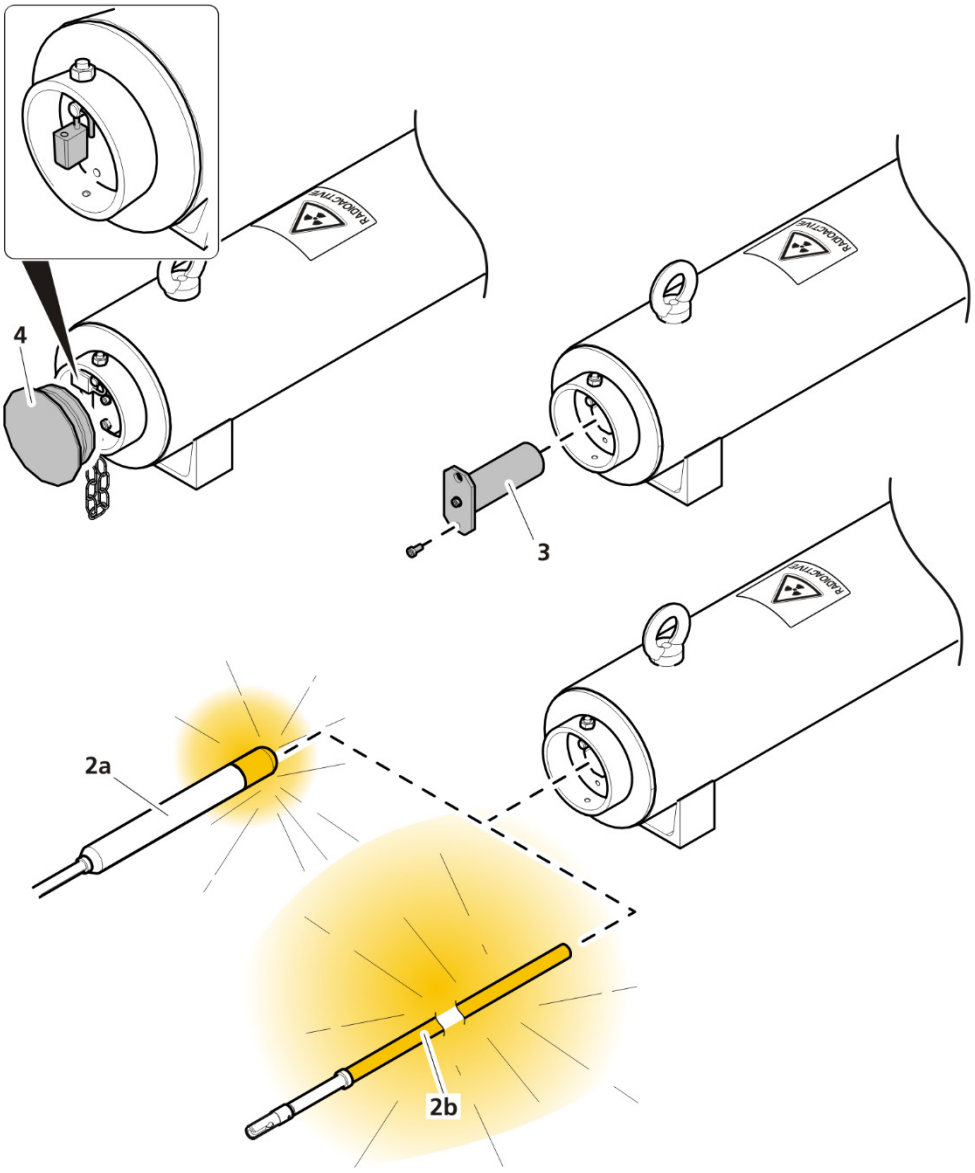
⚠ CAUTION

Danger caused by ionising radiation!

When the source is removed, the unshielded source must be handled at short time. An increased exposure to radiation may lead to damage to health.

- ▶ Hold the source only with pliers.
- ▶ Keep the source far from the body.
- ▶ Ensure that no persons are in the field of radiation during the work.

Inserting the Source into the Transport Shield



1 Transport shield
2a Source holder with point source
2b Source holder with rod source
3 Plugs
4 Protective cover

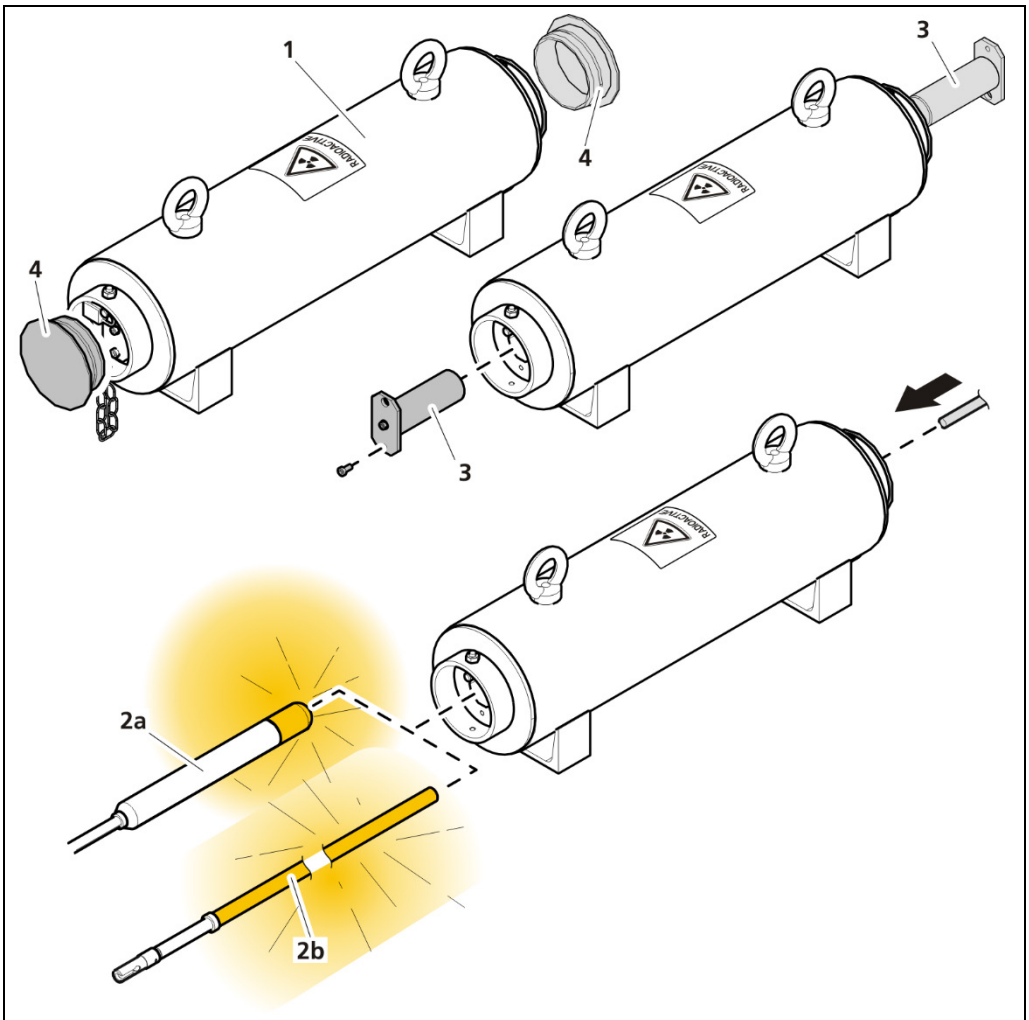
Fig. 20 Insert the source in the transport shield

1. Use the pliers to pull the source completely out of the shield from the flange side.
2. Insert the source into the prepared transport shield as quickly as possible.
3. Close the transport shield.
   - ▶ The source is inserted in the transport shield.

7.5.2 Installing the Source

The following tools are required for installation:

- A pair of pliers to hold the source securely
- Rod for pushing the source (diameter 7 mm for rod sources, 15 mm for point sources)



1 Transport shield
2a Source holder with point source
2b Source holder with rod source
3 Plugs
4 Protective cover

Fig. 21 Remove the source from the transport shield

⚠ CAUTION

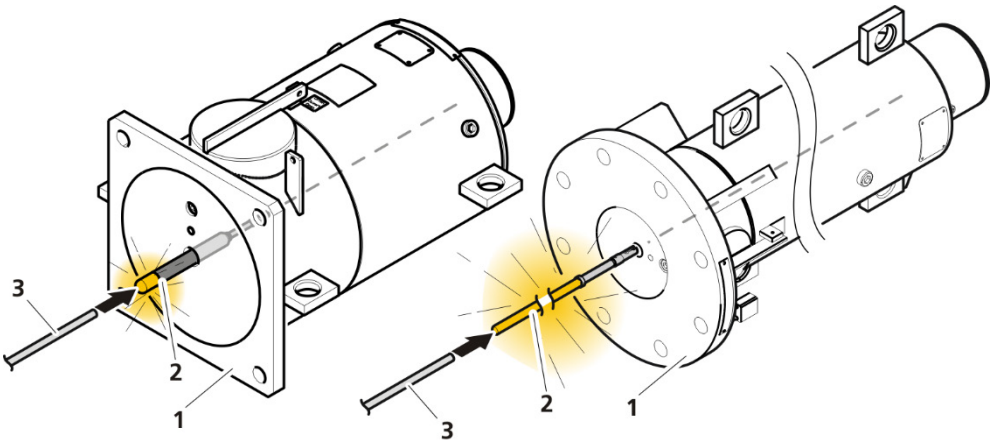
Danger caused by ionising radiation!

When the source is removed, the unshielded source must be handled at short time. An increased exposure to radiation may lead to damage to health.

- ▶ Hold the source only with pliers.
- ▶ Keep the source far from the body.
- ▶ Ensure that no persons are in the field of radiation during the work.

1. Lay the shield into which the source is to be installed so that the bottom of the mounting flange is accessible and open the shutter.

2. Provide the transport shield with the source to be installed.
3. Open the transport shield.
4. Use the pliers to pull the source out of the transport shield.



1 Mounting flange
2 Source
3 Rod for pushing the point source or rod source

Fig. 22 Installing the source in the shield (left: point source, right: rod source)

5. Insert the source into the shield as quickly as possible with the coupling part of the source holder.
6. Carefully push the source with a rod further in the direction of the shield head until it stops.
7. Secure the source with the corresponding clamping screw.
8. Close the shutter.
9. Mount the shield again on the dip pipe, see chapter 5.3 Installation of the Shield.
10. Bring the source into the measuring position, see chapter 6.2 Commissioning.

▶ The removal and installation of the source is completed.

7.6 Source Replacement

When to Replace the Source

Generally, the radioactive source used enables a service life between 5 and 10 years. A replacement of the source is only required if the statistical fluctuations of the output signal are inadmissibly large and compensation by increasing the time constant is no longer possible, e.g. for control-technical reasons.

Manufacturer's Number for Reordering

When reordering, always indicate the manufacturer's number of the source used since the new source must correspond to the original version. The manufacturer's number can be found on the type plate of the shield as well as on the individual seal test certificate of each source.

Replacing the Source

Replacing the source does require the direct handling of the unshielded source. You must clarify with the responsible supervisory authority in advance whether your license for handling radioactive substances comprises handling unshielded sources.

In any case, the source may only be installed/removed by authorised persons. The competent radiation safety officer is responsible for planning and monitoring the work.

NOTICE

In order to keep the exposure to radiation during the removal / installation of the source as low as possible, all persons involved should familiarise themselves with the exact procedure in advance.

NOTICE

Only remove / install the source in areas with closed floors. Any apertures which are larger than the external diameter of the source (7 mm rod sources, 15 mm point sources) are to be covered before commencing any work.

To replace the source, the following tools are required:

- pliers to securely grip the source
- Rod for pushing the source (diameter 7 mm for rod sources, 15 mm for point sources)

1. Prepare the transport shield and open it.
2. Remove the old source from the shield and insert the old source in the transport shield, see chapter 7.5.1.
3. Check the shield for damage and wear and repair it if required (see chapter 7.2).
4. Remove the type plate of the old source from the shield and rivet on the new type plate.
5. Install the new source in the shield, see chapter 7.5.2.

▶ The source replacement is complete.

8 Decommissioning

Decommissioning may only be carried out by competent persons (see 2.3 Qualification of the Personnel). Possibly the radiation protection officer is to be consulted, as well.

8.1 Safety Instructions

⚠ WARNING

Danger of injury by falling loads!

Due to the heavy weight of the shield there is a risk of injury.

- The ring nut or lifting eyes on the shield head must not be used to lift the complete shield.
- Exclusively use the provided fixing possibilities (lifting eye) for attaching the sling gear.
- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Wear head protection and safety shoes.
- Heavy and bulky system components should only be handled using aids and by a at least 2 persons.
- Do not reach between the shield and the container or mounting base.

⚠ CAUTION

Danger of injury caused by heavy and bulky system components!

- Heavy and bulky system components should only be handled using aids and by at least 2 persons.
- Observe the guidelines for safe handling of heavy loads.
- Ensure stability and use the provided fixing possibilities.

⚠ CAUTION

Danger caused by nuclear radiation!

Shields usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

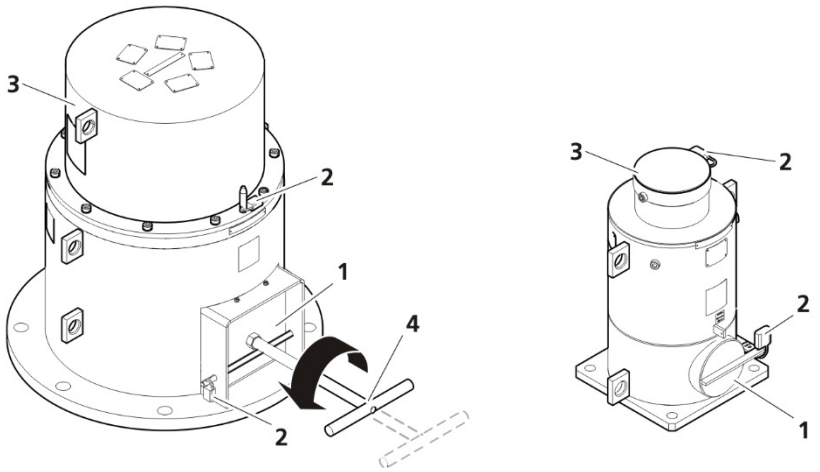
- Consult the radiation safety officer responsible for your company.
- Transport the source exclusively inside the closed and secured shield.

IMPORTANT

The applicable national regulations of the country of use have to be observed.

8.2 Disassemble the Shield

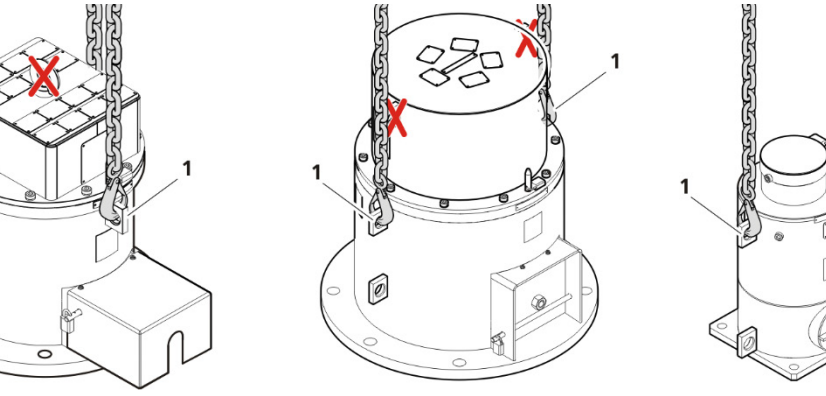
Before decommissioning, it must be ensured that all sources are correctly inserted into the shield and fixed, see chapter 7.5.1 Removing the Source, section "Dismantle Shield".



1 Position CLOSED (lock slide or locking cylinder)
2 Padlock
3 Shield head
4 Handle bar (only slide lock variants)

Fig. 23 Dissasemble the shield

1. Ensure that the shield has been closed and secured.
   - The locking cylinder is set to the CLOSED position (Fig. 23, item 1).
   - The padlock is installed (Fig. 23, item 2).
2. Remove the handle bar (Fig. 23, item 4).



1 Lifting eye

Fig. 24 Attach shield and set down

3. Attach the shield to the lifting eyes with adequately dimensioned and tested slings (Fig. 24, item 1).
4. Remove all screwed connections on the flange.
5. Carefully remove the shield and carefully drop off the shield.
   - ▶ The decommissioning is completed.

8.3 Disposal of Radioactive Substances

NOTICE

Should you have any questions regarding the transportation or disposal of radioactive substances, please contact the manufacturer.

Generally, each country has a depot where radioactive material is accepted and can be disposed of.

8.4 Shipment of Radioactive Substances

If you wish to dispatch radioactive material, you must observe the international regulations for the transport of dangerous goods and for radiation protection as well as any applicable national regulations. It is the full responsibility of the sender to comply with these regulations.

Please also note the following:

- Dose rate at the surface of the packaging must be lower than 2000 µSv/h.
- Dose rate at a distance of 1m from the surface of the packaging must be lower than 100 µSv/h.
- The packaging must be marked with a reference for dangerous goods in accordance with the applicable regulations with the UN number.
- Furthermore, transport documents with the correct description of the content as well as an accident procedures sheet according to the ADR regulations are required.
  - With regard to transport by air, the IATA DGR.
  - IAEA as the basis for all regulations.
- Packaging must comply with the current ADR regulations (for example European Agreement concerning the International Carriage of Dangerous Goods by Road).
- The cargo must be secured in the transport vehicle according to the applicable national and international regulations.
- Before dispatch, each shield containing a source must be subjected to a visual inspection by the user (chapter 7.2). The shields may only be dispatched if the test requirements are met.
- At the time of dispatch, a valid certificate concerning the leak proofness of the source must be available.

Preconditions for Returning Shields to Berthold

- Radioactive substances and their shields must not be damaged in any way and a respective, valid seal test certificate must be provided. The seal test certificate issued before the arrival of the radioactive substances in Germany may not be older than 6 months.
- If radioactive sources with isotope Am-241 or Cm-244 are returned, the special form certificate must be attached.
- At all times, any radioactive material sent to us must be sufficiently labelled with your name and address. If we have sent you a quotation in advance, our quotation number must be indicated, as well.
- Radioactive substances may only be returned after the respective approval by Berthold. We are pleased to send you a quotation regarding the costs.
- Radioactive substances must be sent to Bad Wildbad, Germany, carriage paid. Berthold will not assume any costs for customs clearance or transportation.
- Berthold is to be informed about any return transport in advance. Berthold will reject any radioactive substances sent to Berthold without prior notice. Any storage costs accrued in such case shall be borne by the sender.
- A notification of the radioactive sources you wish to send to Berthold We will be pleased to send you the current version of the message form.
- Berthold is to be informed about any return transport in advance. Berthold will reject any radioactive substances sent to Berthold without prior notice. Any storage costs accrued in such case shall be borne by the sender.

NOTICE

Observe the observance of the current regulations when taking them out of operation and disposal.

9 Appendices

9.1 Check Lists for Tests

Visual Inspection

Requirement	met	not met
The shield must be free from damage.		
The type plates must be legible.		
If there is corrosion, it must not affect the function and stability of the shield.		
Only before dispatch: The beam path must be closed.		
Only before dispatch: The locking plate must be mounted and secured.		
Only before dispatch: The transport securing device(s) must be installed.		
Name of inspector:	Date:	Signature:

Checking the Functions of the Shutter

Requirement	met	not met
It must be possible to move the shutter completely back and forth between the two positions (*OPEN* / *CLOSED*).		
The measuring signal of the measurement system must approximately correspond to the maximum value in the *CLOSED* position.		
If alternatively a dose rate measurement device is used, the dose rate in the *CLOSED* position must be clearly lower than in the *OPEN* position.		
It must be possible to turn the locking cylinder using one hand and the lever rod.		
Name of inspector:	Date:	Signature:

Modifications due to technical advancement reserved.

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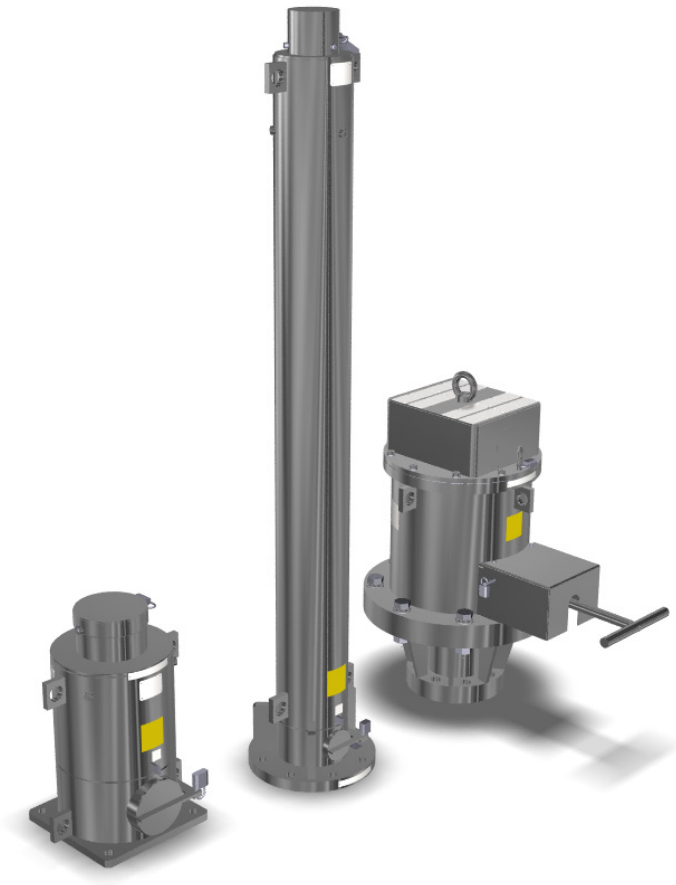
Mat No. 44192BA2



Shields for Flange Mounting LB 8400 & LB 8401

Abschirmungen zur Flanschmontage LB 8400 & LB 8401

Technical Information

Technische Information

44192TI
Rev. No.: 02, 07/2022

1. Technical Data

1. Technische Daten

If negative environmental conditions or unfavorable combinations occur, such as moisture, sand, dust, chemicals, gases, extreme temperatures, temperature fluctuations, etc., the condition of the shield, the source and the safety devices must be checked regularly. The atmosphere inside the dip pipe may cause corrosion on the source, source holder, quick-link connector and steel rope or flexible shaft.

Beim Auftreten von erschwerten Umweltbedingungen bzw. ungünstigen Kombinationen wie Nässe, Sand, Staub, Chemikalien, Gase, extreme Temperaturen, Temperaturschwankungen, etc. muss der Zustand der Abschirmung, des Strahlers und der Sicherheitseinrichtung regelmäßig überprüft werden. Die Atmosphäre im Tauchrohr kann Korrosion am Strahler, dem Strahlerhalter, dem Kupplungsstück, dem Stahlseil oder der flexiblen Welle verursachen.

Technical Data *Technische Daten*	
Housing material *Gehäusematerial*	Steel 1.4301 *Stahl 1.4301*
Temperature range *Temperaturbereich*	-40 ... +200 °C
Dimensions *Abmessungen*	See dimension drawings (following pages) *Siehe Maßzeichnungen (folgende Seiten)*
Working materials *Betriebsstoffe*	lithium soap grease* *Lithiumseifenfett**

NOTICE / HINWEIS

Damage due to vibration!

In the event of suspicion or occurrence of occasional and / or permanent vibration at the installation site, the shield must be inspected with shortened inspection and maintenance intervals.

- In the event of damage and / or loose fasteners, the measures listed in the flange shield operating manual must be carried out.

Beschädigung durch Vibration!

Beim Verdacht oder Auftreten von gelegentlicher und/oder permanenter Vibrationen am Montageort, muss die Abschirmung mit verkürzten Inspektions- bzw. Wartungsintervallen geprüft werden.

- *Bei Beschädigungen und/oder losen Befestigungselementen, müssen die in der Betriebsanleitung der Flanschabschirmung aufgeführten Maßnahmen durchgeführt werden.*

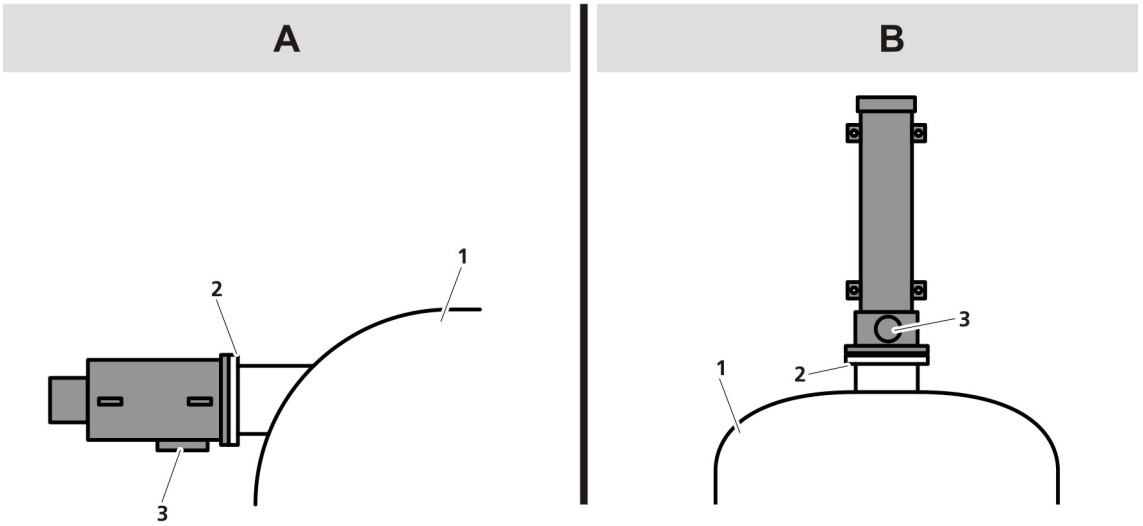
IMPORTANT / WICHTIG

The lithium soap grease used has a service temperature range of -30 to 130 °C. The grease serves only to prevent rubbing from metal to metal. The application is purely static, exceeding the operating temperature does not lead to a failure of the safety device. At extreme temperatures of the specified temperature range, a sluggishness of the closure may occur.

Das verwendete Lithiumseifenfett hat einen Einsatztemperaturbereich von -30 bis 130 °C. Das Schmierfett dient lediglich dazu, um eine Reibung von Metall auf Metall zu verhindern. Da die Anwendung rein statisch ist, führen Überschreitungen der Einsatztemperatur nicht zu einem Ausfall der Sicherheitseinrichtung. Bei Extremtemperaturen des angegebenen Temperaturbereichs kann eine Schwergängigkeit des Verschlusses auftreten.

2. Mounting Layouts

2. Montageanordnungen



1 Vessel
Behälter
2 Flange
Flansch
3 Shutter
Verschlussmechanismus

TI-Fig. 1 Mounting Layouts A and B
Montageanordnungen A und B

NOTICE / HINWEIS

The shield must be installed so that the shutter mechanism is directed down not exposed to any liquids or chemicals. Otherwise, premature failure of the shutter mechanism may occurs.
Die Abschirmung muss so installiert werden, dass der Verschlussmechanismus nach unten zeigt und keine Flüssigkeiten oder Chemikalien ausgesetzt wird. Andernfalls kann es zu einem vorzeitigen Ausfall des Verschlusses kommen.

3. Maximum permissible Activities during Transport

3. Zulässige Maximalaktivitäten für den Transport

The activities indicated here are the maximum activities with which the individual shields can be loaded according to the following table. National dose rate limits for the operation of measurement systems are usually significantly lower and only allow loading with significantly lower activities. The national provisions must be complied with.

Bei den hier angegebenen Aktivitäten handelt es sich um die maximalen Aktivitäten, mit denen die jeweiligen Abschirmungen beladen werden dürfen, siehe nachfolgende Tabelle. Nationale Dosisleistungsgrenzwerte für den Betrieb von Messsystemen sind üblicherweise deutlich geringer und erlauben somit nur die Beladung mit deutlich geringeren Aktivitäten. Die nationalen Bestimmungen sind unbedingt einzuhalten.

Shield model *Abschirmungsmodell*	Maximum activity (Co-60) *Maximalaktivität (Co-60)*	Maximum activity (Cs-137) *Maximalaktivität (Cs-137)*
Rod source shield DN xxx (sources) *Stabstrahlerabschirmungen DN xxx (Strahler)*		
DN 100 (1)	1.48 MBq / 0.04 mCi per mm *1,48 MBq / 0,04 mCi pro mm*	85 MBq / 2.3 mCi per mm *85 MBq / 2,3 mCi pro mm*
DN 127 (3)	0.925 MBq / 0.025 mCi per mm *0,925 MBq / 0,025 mCi pro mm*	37 MBq / 1 mCi per mm *37 MBq / 1 mCi pro mm*
DN 140 (1)	5.55 MBq / 0.15 mCi per mm *5,55 MBq / 0,15 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 160 (5)	2.22 MBq / 0.06 mCi per mm *2,22 MBq / 0,06 mCi per mm*	166.5 MBq / 4.5 mCi per mm *166,5 MBq / 4,5 mCi per mm*
DN 160 (1)	11.1 MBq / 0.3 mCi per mm *11,1 MBq / 0,3 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 200 (5)	18.5 MBq / 0.5 mCi per mm *18,5 MBq / 0,5 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 200 (3)	22.2 MBq / 0.6 mCi per mm *22,2 MBq / 0,6 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 200 (1)	55.5 MBq / 1.5 mCi per mm *55,5 MBq / 1,5 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 270 (5)	92.5 MBq / 2.5 mCi per mm *92,5 MBq / 2,5 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*
DN 270 (3)	129.5 MBq / 3.5 mCi per mm *129,5 MBq / 3,5 mCi pro mm*	592 MBq / 16 mCi per mm *592 MBq / 16 mCi pro mm*

Shield model *Abschirmungsmodell*	Maximum activity (Co-60) *Maximalaktivität (Co-60)*	Maximum activity (Cs-137) *Maximalaktivität (Cs-137)*
Point source shield *Punktstrahlerabschirmungen*		
LB 8115-01	555 MBq / 15 mCi *555 MBq / 15 mCi*	24 GBq / 650 mCi *24 GBq / 650 mCi*
LB 8115-02	555 MBq / 15 mCi *555 MBq / 15 mCi*	24 GBq / 650 mCi *24 GBq / 650 mCi*
LB 8115-20	222 MBq / 6 mCi *222 MBq / 6 mCi*	7.4 GBq / 200 mCi *7,4 GBq / 200 mCi*
LB 8120-01	5.9 GBq / 160 mCi *5,9 GBq / 160 mCi*	133 GBq / 3.6 Ci *133 GBq / 3,6 Ci*
LB 8120-02	5.9 GBq / 160 mCi *5,9 GBq / 160 mCi*	133 GBq / 3.6 Ci *133 GBq / 3,6 Ci*
LB 8120-20	2.9 GBq / 80 mCi *2,9 GBq / 80 mCi*	37 GBq / 1.0 Ci *37 GBq / 1,0 Ci*
LB 8120-30	2.9 GBq / 80 mCi *2,9 GBq / 80 mCi*	37 GBq / 1.0 Ci *37 GBq / 1,0 Ci*
LB 8120-70	2.9 GBq / 80 mCi *2,9 GBq / 80 mCi*	37 GBq / 1.0 Ci *37 GBq / 1,0 Ci*
LB 8125-01	399 GBq / 10,8 Ci *399 GBq / 10,8 Ci*	600 GBq / 16 Ci *600 GBq / 16 Ci*
LB 8125-30	244 GBq / 6,6 Ci *244 GBq / 6,6 Ci*	600 GBq / 16 Ci *600 GBq / 16 Ci*
LB 8125-70	14.8 GBq / 2.8 Ci *14,8 GBq / 2,8 Ci*	600 GBq / 16 Ci *600 GBq / 16 Ci*

4. Shields

4. Abschirmungen

4.1. Variant DN 100

4.1. *Variante DN 100*

Variant *Variante*	Flange *Flansch*	Nominal diameter *Nenn-durchmesser*	Shield *Abschirmung*	Max. source length *Max. Strahlerlänge*	Weight *Gewicht*
40876-01	DN 125 / PN 16	100 mm	44 mm lead *44 mm Blei*	640 mm	85 kg
40876-02				840 mm	104 kg
40876-03				1040 mm	122 kg
40876-04				1240 mm	142 kg
40876-05				1440 mm	164 kg
40876-06				1640 mm	182 kg
40876-07				1840 mm	201 kg

Dimension drawings see chapter 5.1Dimensions Variant DN 100.
Maßzeichnungen siehe Kapitel 5.1 Abmessungen Variante DN 100.

4.2. Variant DN 127

4.2. *Variante DN 127*

Variant *Variante*	Flange *Flansch*	Nominal diameter *Nenn-durchmesser*	Shield *Abschirmung*	Max. source length *Max. Strahlerlänge*	Weight *Gewicht*
40864-01	DN 125 / PN 16	127 mm	37 mm lead (3 source tubes) *37 mm Blei (3 Strahlerrohre)*	640 mm	127 kg
40864-02				840 mm	154 kg
40864-03				1040 mm	181 kg
40864-04				1240 mm	207 kg
40864-05				1440 mm	234 kg
40864-06				1640 mm	261 kg
40864-07				1840 mm	288 kg
39673				1240 mm	211 kg

Dimension drawings see chapter 5.2 Dimensions Variant DN 127.
Maßzeichnungen siehe Kapitel 5.2 Dimensions Variant DN 127.

4.3. Variant DN 140
4.3. *Variante DN 140*

Variant *Variante*	Flange *Flansch*	Nominal diameter *Nenn-durchmesser*	Shield *Abschirmung*	Max. source length *Max. Strahlerlänge*	Weight *Gewicht*
40325-01	DN 125 / PN 16	140 mm	59 mm lead *59 mm Blei*	640 mm	158 kg
40325-02				840 mm	173 kg
40325-03				1040 mm	204 kg
40325-04				1240 mm	250 kg
40325-05				1440 mm	283 kg
40325-06				1640 mm	316 kg
40325-07				1840 mm	

Dimension drawings see chapter 5.3 Dimensions Variant DN 140.
Maßzeichnungen siehe Kapitel 5.3 Abmessungen Variante DN 140.

4.4. Variant DN 160
4.4. *Variante DN 160*

Variant *Variante*	Flange *Flansch*	Nominal Ø *Nenn-Ø*	Shield *Abschirmung*	Max. source length *Max. Strahlerlänge*	Weight *Gewicht*
40975-01	DN 125 / PN 16	160 mm	5 sources = 48 mm lead / 1 source = 69 mm lead *5 Strahler = 48 mm Blei / 1 Strahler = 69 mm Blei*	640 mm	196 kg
40975-02				840 mm	238 kg
40975-03				1040 mm	280 kg
40975-04				1240 mm	316 kg
40975-05				1440 mm	365 kg
40975-06				1640 mm	407 kg
40975-07				1840 mm	450 kg

Dimension drawings see chapter 5.4 Dimensions Variant DN 160.
Maßzeichnungen siehe Kapitel 5.4 Abmessungen Variante DN 160.

4.5. Variant DN 200
4.5. *Variante DN 200*

Variant *Variante*	Flange *Flansch*	Nominal Ø *Nenn-Ø*	Shield *Abschirmung*	Sources *Strahler*	Max. source length *Max. Strahlerlänge*	Weight *Gewicht*
58458-01	DN 125 / PN 16	200 mm	97 mm lead *97 mm Blei*	1	640 mm	372 kg
58458-02					840 mm	457 kg
58458-03					1040 mm	532 kg
58458-04					1240 mm	607 kg
58458-05					1440 mm	692 kg
58458-06					1640 mm	792 kg
58458-07					1840 mm	873 kg
59051-01			81 mm lead *81 mm Blei*	3	640 mm	372 kg
59051-02					840 mm	457 kg
59051-03					1040 mm	532 kg
59051-04					1240 mm	607 kg
59051-05					1440 mm	692 kg
59051-06					1640 mm	792 kg
59051-07					1840 mm	873 kg
43215-01			76 mm lead *76 mm Blei*	5	640 mm	372 kg
43215-02					840 mm	457 kg
43215-03					1040 mm	532 kg
43215-04					1240 mm	607 kg
43215-05					1440 mm	692 kg
43215-06					1640 mm	792 kg
43215-07					1840 mm	873 kg
51994-01					640 mm	372 kg
51994-02					840 mm	457 kg
51994-03					1040 mm	532 kg
51994-04					1240 mm	607 kg
51994-05					1440 mm	692 kg
51994-06					1640 mm	792 kg
51994-07					1840 mm	873 kg
56142-01					640 mm	372 kg
56142-02					840 mm	457 kg
56142-03					1040 mm	532 kg
56142-04					1240 mm	607 kg
56142-05					1440 mm	692 kg
56142-06					1640 mm	792 kg
56142-07					1840 mm	873 kg

Dimension drawings see chapter 5.5 Dimensions Variants DN 200.
Maßzeichnungen siehe Kapitel 5.5 Abmessungen Varianten DN 200.

4.6. Variant DN 270
4.6. *Variante DN 270*

Variant *Variante*	Flange *Flansch*	Nominal Ø *Nenn-Ø*	Shield *Abschirmung*	Sources *Strahler*	Max. source length *Max. Strahlerlänge*	Weight (approx.) *Gewicht (ca.)*
42075-01	DN 125 / PN 16	270 mm	126 mm lead *126 mm Blei*	1	640 mm	606 kg
42075-02					840 mm	736 kg
42075-03					1040 mm	864 kg
42075-04					1240 mm	993 kg
42075-05					1440 mm	1121 kg
42075-06					1640 mm	1249 kg
42075-07					1840 mm	1378 kg
42075-21					100 mm	267 kg
48102-01			104 mm lead *104 mm Blei*	5	640 mm	601 kg
48102-02					840 mm	730 kg
48102-03					1040 mm	858 kg
48102-04					1240 mm	988 kg
48102-05					1440 mm	1116 kg
48102-06					1640 mm	1244 kg
48102-07					1840 mm	1373 kg
41652-21	DN 125 / PN 16	270 mm	110 mm lead *110 mm Blei*	3	70 mm	300 kg

Dimension drawings see chapter 5.6 Dimensions Variants DN 270.
Maßzeichnungen siehe Kapitel 5.6 Abmessungen Varianten DN 270.

4.7. Variant LB 81xx (Point Source Shields)
4.7. Variante LB 81xx (Punktstrahlerabschirmungen)

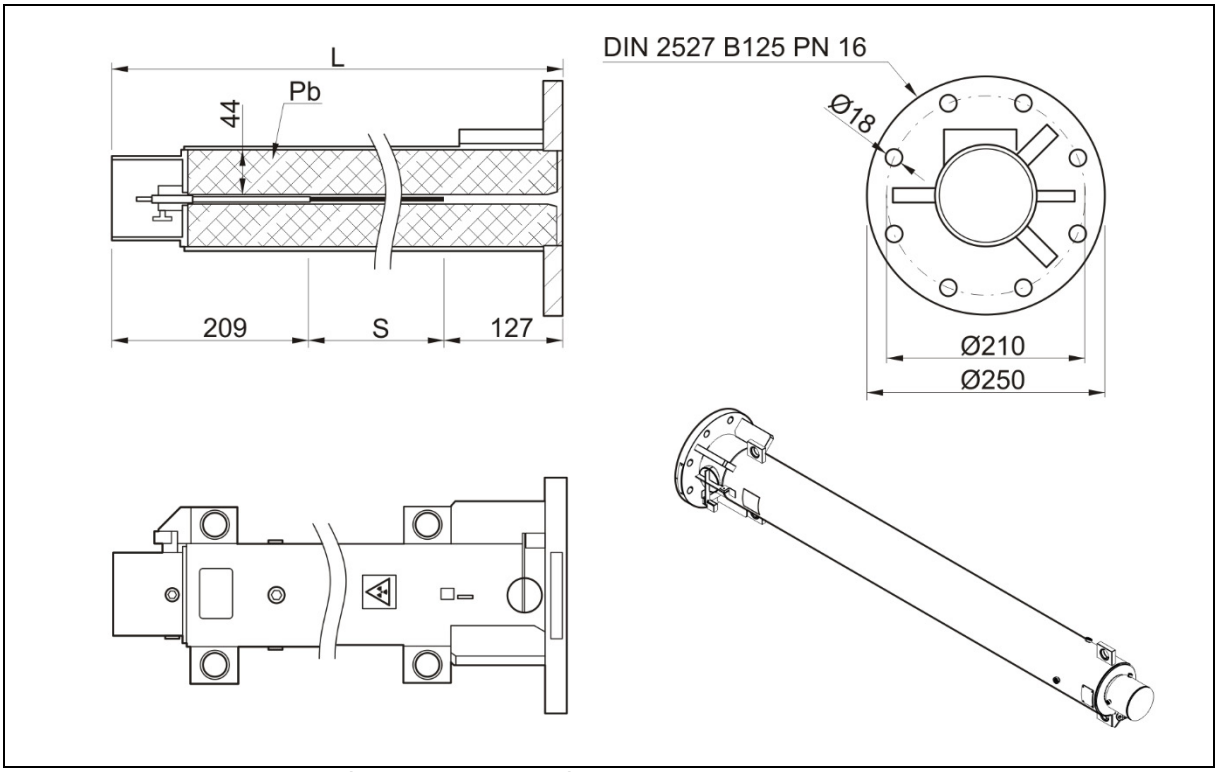
Variant *Variante*	Nominal ø *Nenn-ø*	Shield *Abschirmung*	Sources *Strahler*	Weight (approx.) *Gewicht (ca.)*
LB 8115-01 Mat. No.: 44192	150 mm	69 mm lead *69 mm Blei*	1	60 kg
LB 8115-02 Mat. No.: 47052	150 mm	69 mm lead *69 mm Blei*	1	60 kg
LB 8115-20 Mat. No.: 54025	150 mm	50 mm lead *50 mm Blei*	2	60 kg
LB 8120-01 Mat. No.: 44173	200 mm	99 mm lead *99 mm Blei*	1	137 kg
LB 8120-02 Mat. No.: 47057	200 mm	99 mm lead *99 mm Blei*	1	137 kg
LB 8120-20 Mat. No.: 58569	200 mm	80 mm lead *80 mm Blei*	2	137 kg
LB 8120-30 Mat. No.: 61655	200 mm	79 mm lead *79 mm Blei*	3	137 kg
LB8120-70 Mat. No.: 73885	200 mm	72 mm lead *72 mm Blei*	7	137 kg
LB 8125-01 Mat. No.: 45859	300 mm	151 mm lead *151 mm Blei*	1	334 kg
LB8125-30 Mat. No.: 62725	300 mm	133 mm lead *133 mm Blei*	3	334 kg
LB8125-70 Mat. No.: 73892	300 mm	126 mm lead *126 mm Blei*	7	334 kg

5. Drawings Rod Source Shields

5. Zeichnungen Stabstrahlerabschirmungen

5.1. Dimensions Variant DN 100

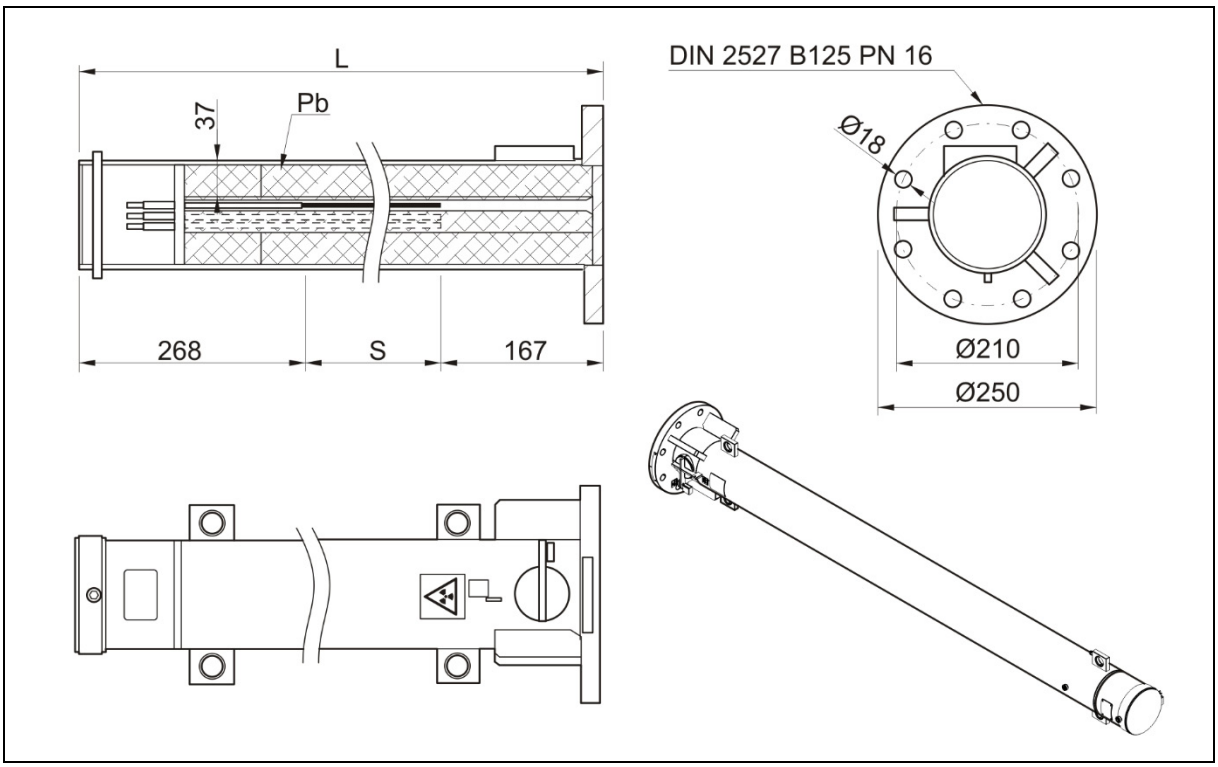
5.1. *Abmessungen Variante DN 100*



TI-Fig. 2 40876-0x, 1 source (dimension in mm)
40876-0x, 1 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	976	1	only "B" (see chapter 2 Mounting Layouts)) *nur "B" (siehe Kapitel 2 Montageanordnungen)*
840	1176		
1040	1376		
1240	1576		
1440	1776		
1640	1976		
1840	2176		

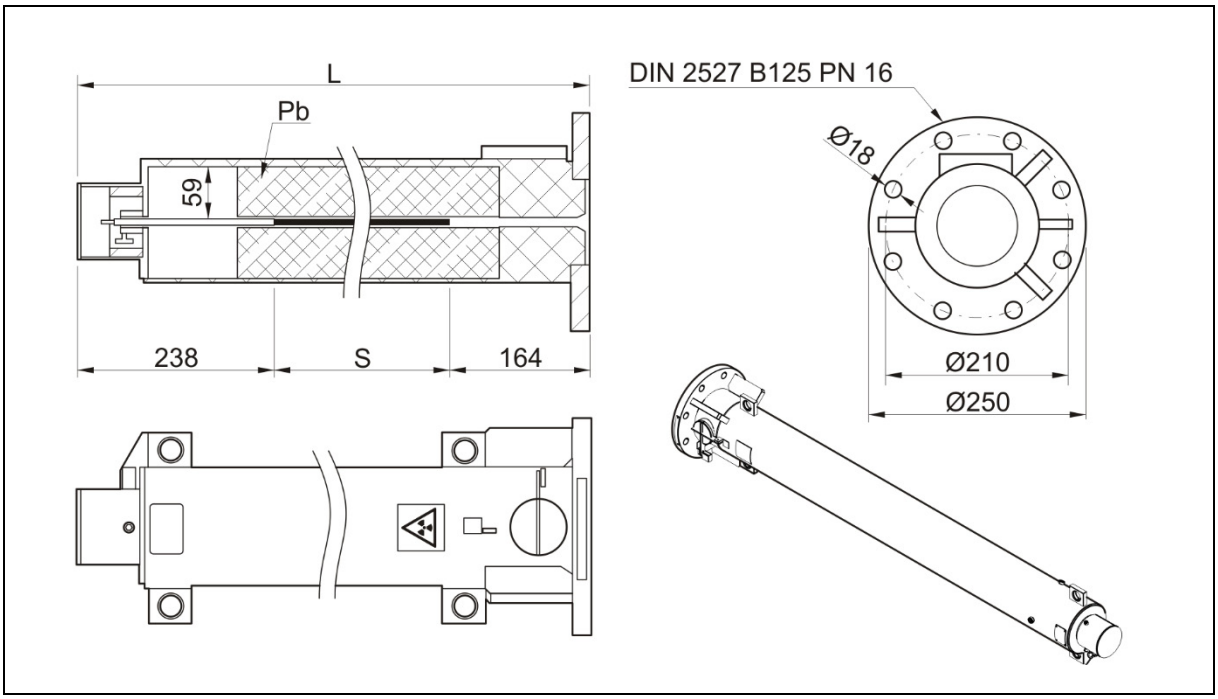
5.2. Dimensions Variant DN 127
5.2. *Abmessungen Variante DN 127*



TI-Fig. 3 40864-0x, 3 sources (dimensions in mm)
40864-0x, 3 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1075	3	only "B" (see chapter 2 Mounting Layouts)) *nur "B" (siehe Kapitel 2 Montageanordnungen)*
840	1275		
1040	1475		
1240	1675		
1440	1875		
1640	2075		
1840	2275		

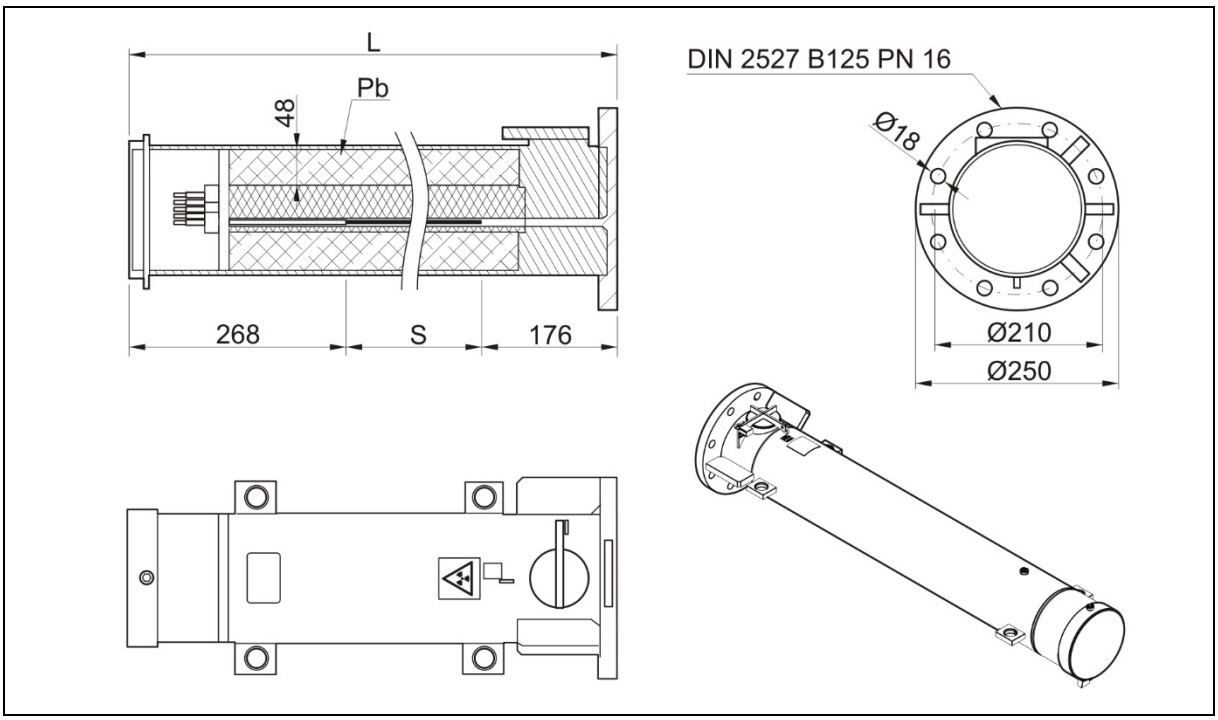
5.3. Dimensions Variant DN 140
5.3. *Abmessungen Variante DN 140*



TI-Fig. 4 40325-0x, 1 source (dimensions in mm)
40325-0x, 1 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1042	1	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1242		
1040	1442		
1240	1642		
1440	1842		
1640	2042		
1840	2242		

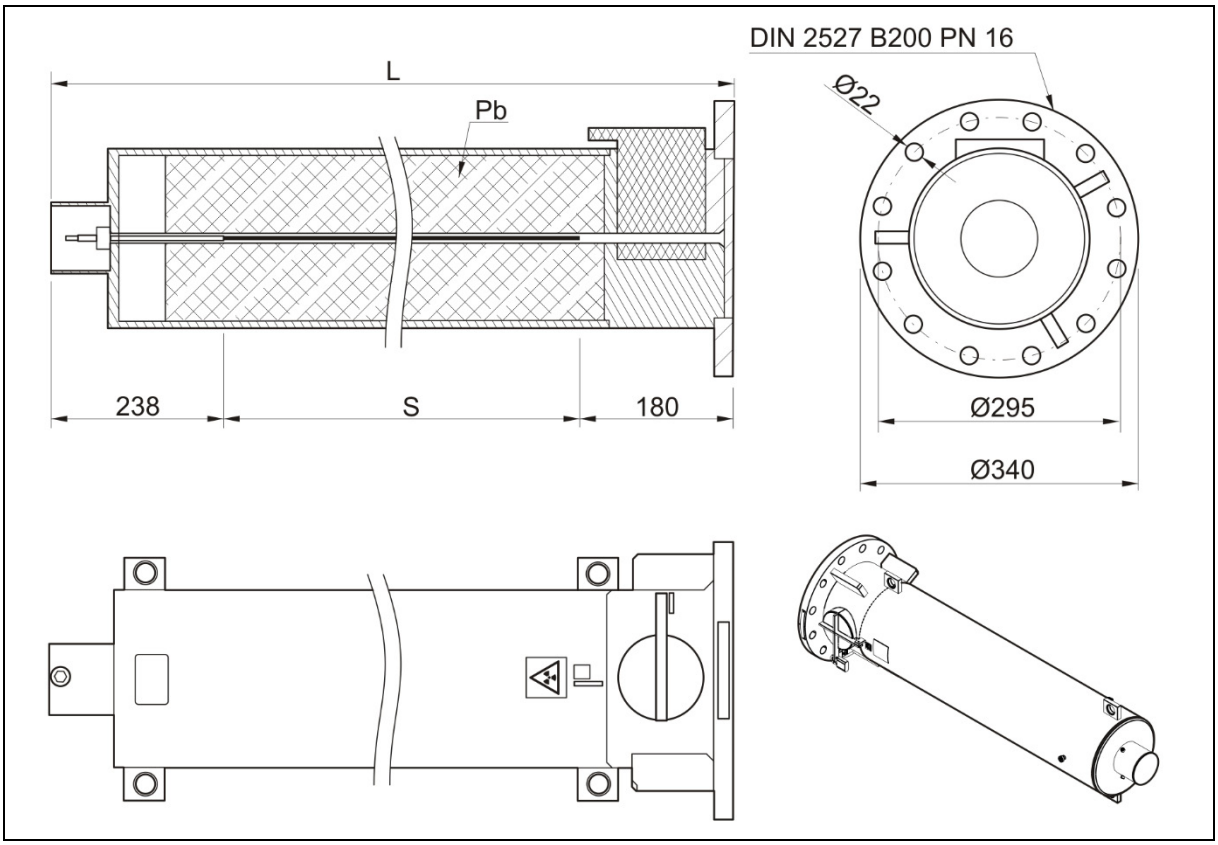
5.4. Dimensions Variant DN 160
5.4. *Abmessungen Variante DN 160*



TI-Fig.5 40975-0x, 5 sources (dimensions in mm)
40975-0x, 5 Strahler (Abmessungen in mm)

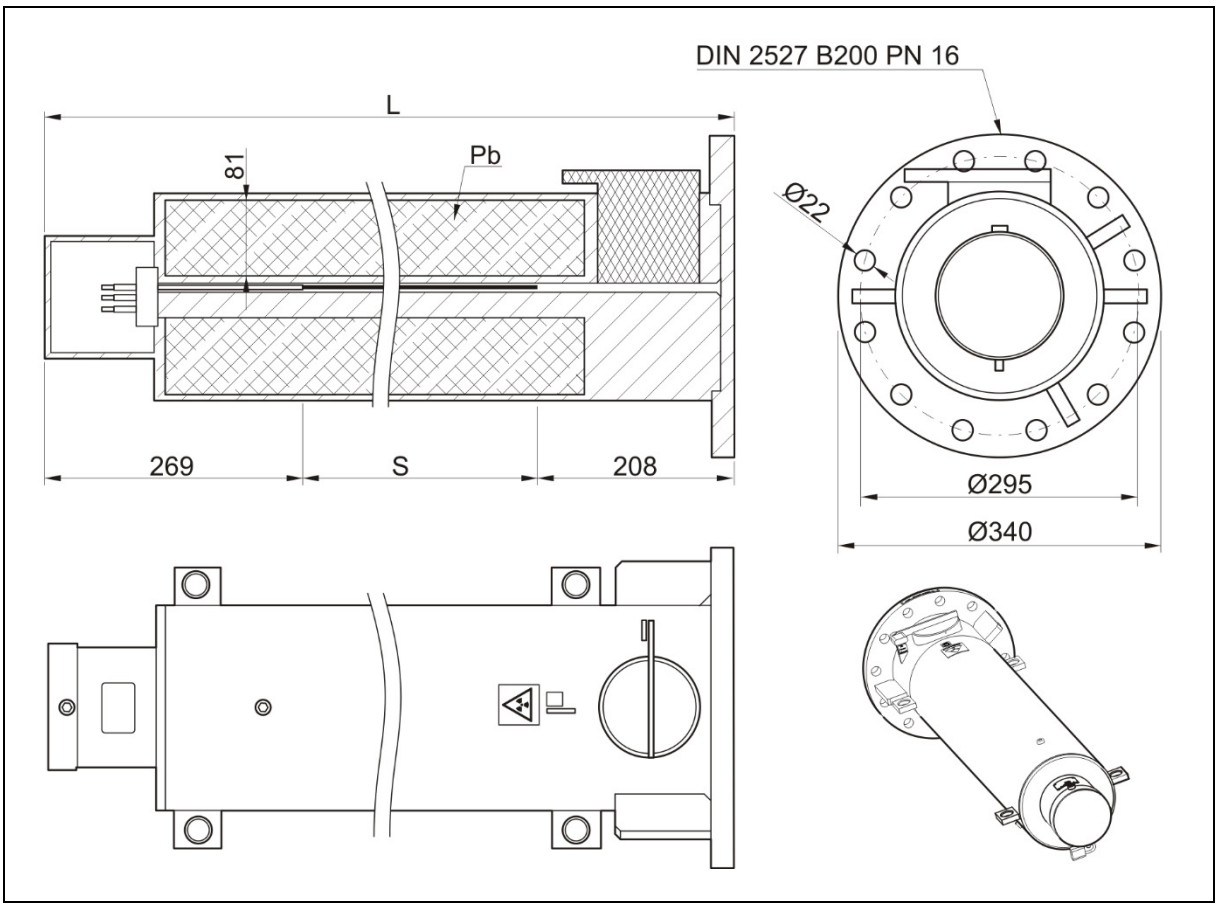
Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1085	5	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1285		
1040	1485		
1240	1685		
1440	1885		
1640	2085		
1840	2285		

5.5. Dimensions Variants DN 200
5.5. *Abmessungen Varianten DN 200*



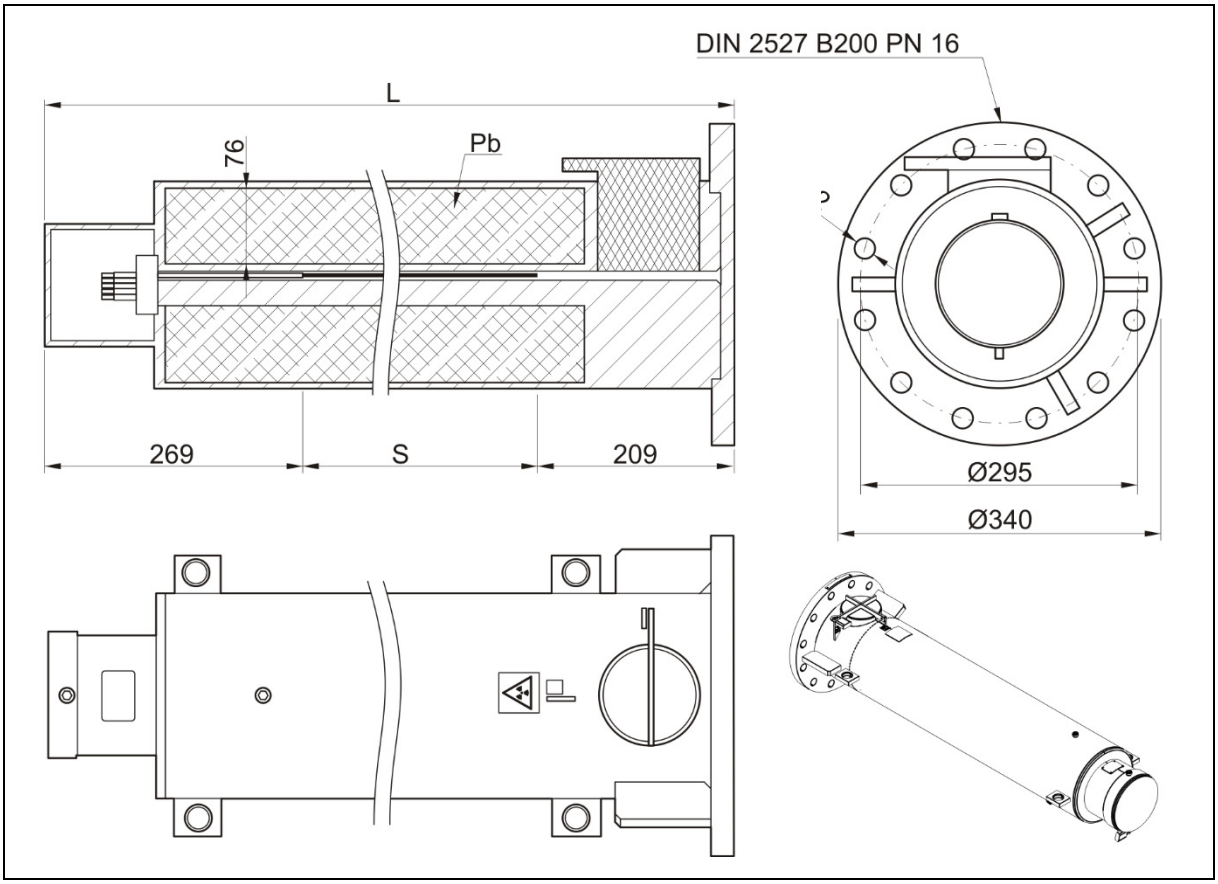
TI-Fig.6 58458-0x, 1 source (dimensions in mm)
58458-0x, 1 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1059	1	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1259		
1040	1459		
1240	1659		
1440	1859		
1640	2059		
1840	2259		



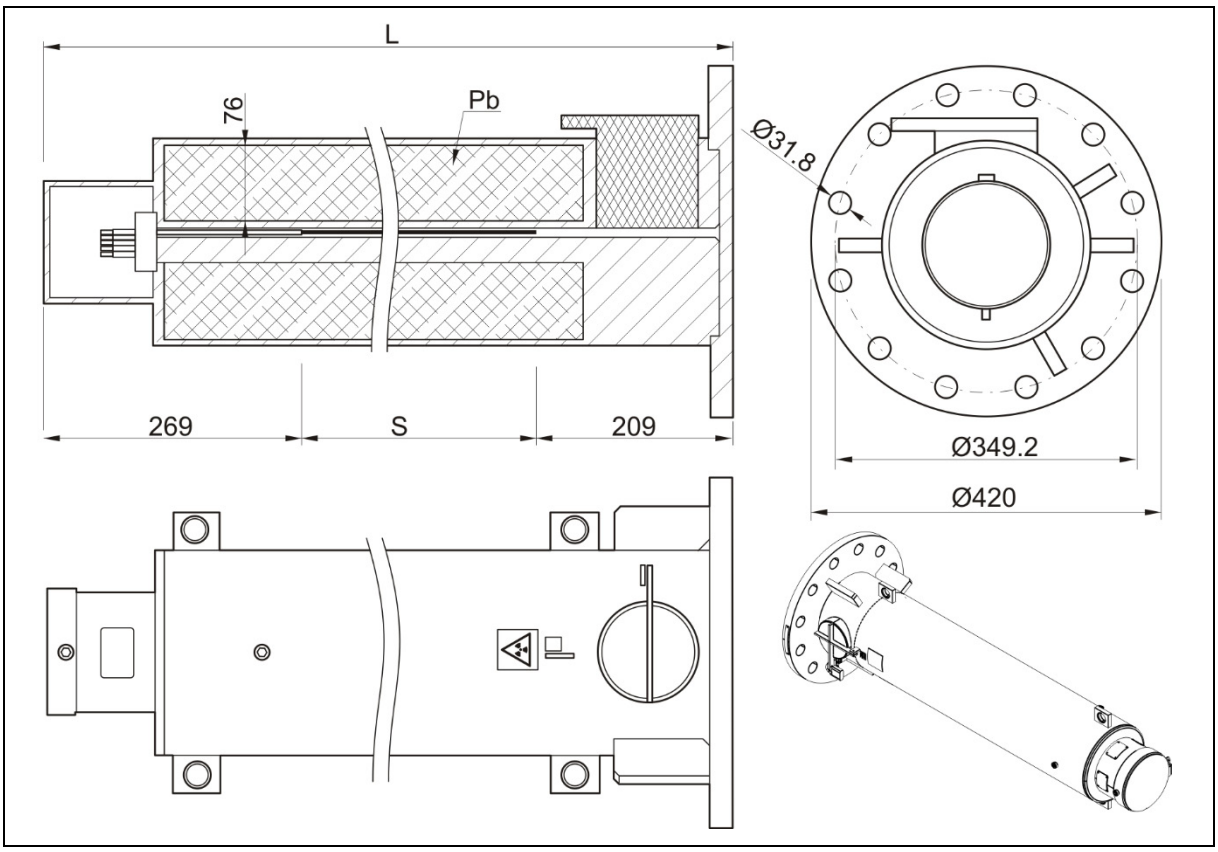
TI-Fig.7 59051-0x, 3 sources (dimensions in mm)
59051-0x, 3 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1118	3	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1320		
1040	1520		
1240	1720		
1440	1920		
1640	2120		
1840	2320		



TI-Fig.8 43215-0x, 5 sources (dimensions in mm)
43215-0x, 5 Strahler (Abmessungen in mm)

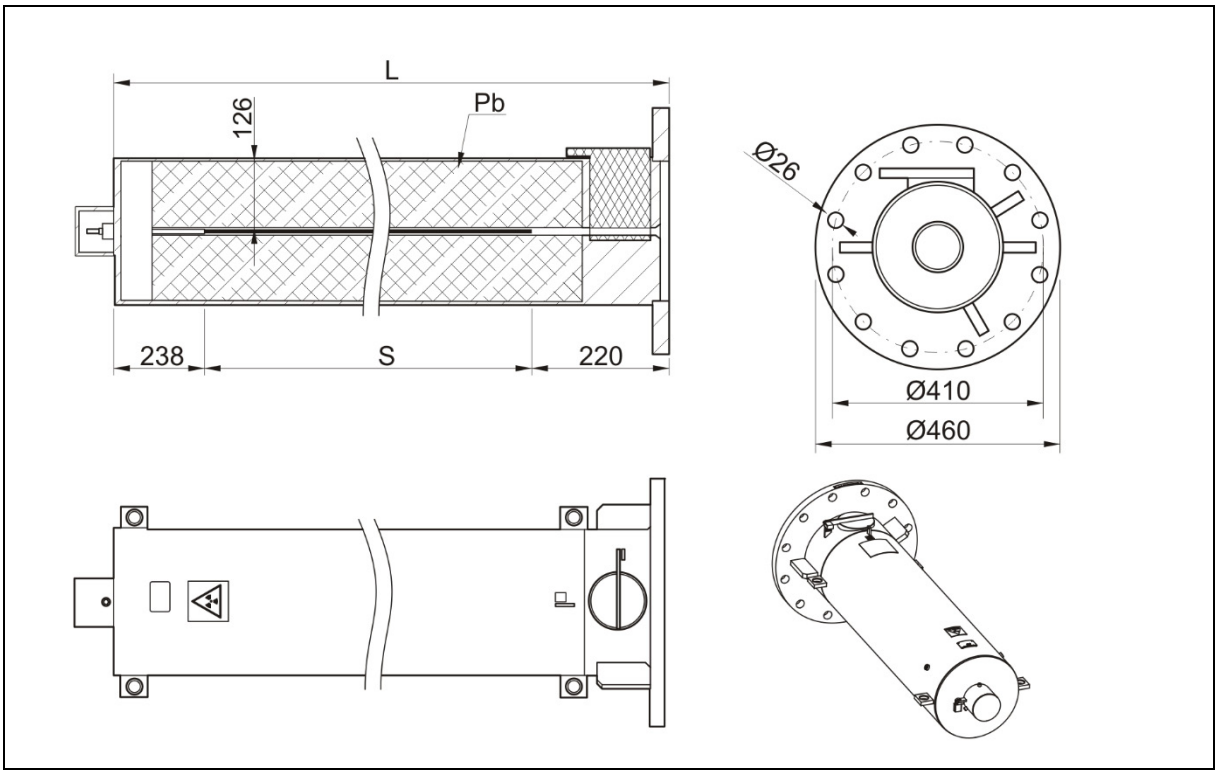
Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1118	5	only “B” (see chapter 2 Mounting Layouts)) *nur “B”* *(siehe Kapitel 2 Montageanordnungen)*
840	1318		
1040	1518		
1240	1718		
1440	1918		
1640	2118		
1840	2318		



TI-Fig.9 56142-0x, 5 sources (dimensions in mm)
56142-0x, 5 Strahler (Abmessungen in mm)

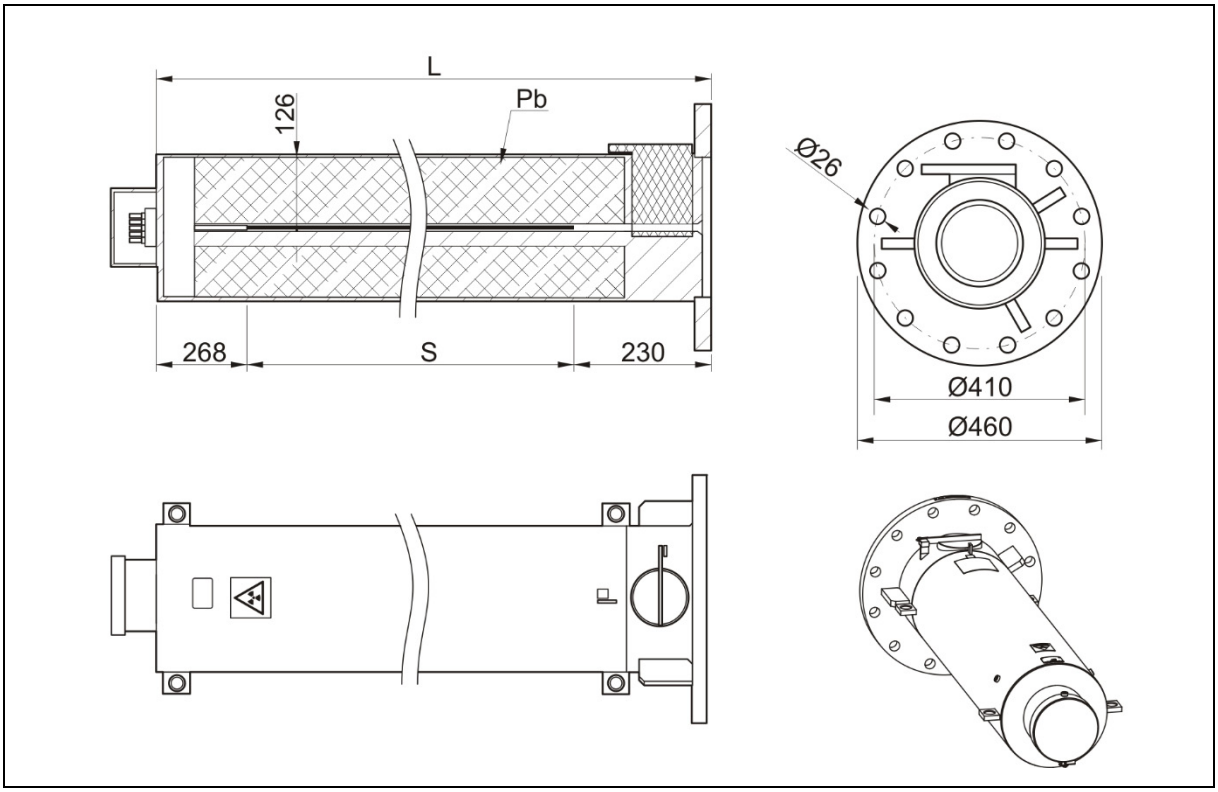
Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1118	5	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1318		
1040	1518		
1240	1718		
1440	1918		
1640	2118		
1840	2318		

5.6. Dimensions Variants DN 270
5.6. *Abmessungen Varianten DN 270*



TI-Abb.10 42075-0x, 1 source (dimensions in mm)
42075-0x, 1 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1100	1	only “B” (see chapter 2 Mounting Layouts)) *nur “B” (siehe Kapitel 2 Montageanordnungen)*
840	1300		
1040	1500		
1240	1700		
1440	1900		
1640	2100		
1840	2300		



TI-Fig.11 48102-0x, 5 sources (dimensions in mm)
48102-0x, 5 Strahler (Abmessungen in mm)

Source length S *Strahlerlänge S*	Total length L *Gesamtlänge L*	max. Number of sources *max. Anzahl Strahler*	Mounting Direction *Montagerichtung*
640	1139	5	only "B" (see chapter 2 Mounting Layouts)) *nur "B"* *(siehe Kapitel 2 Montageanordnungen)*
840	1539		
1040	1739		
1240	1939		
1440	2139		
1640	2339		
1840	2539		

6. Drawings Point Source Shields

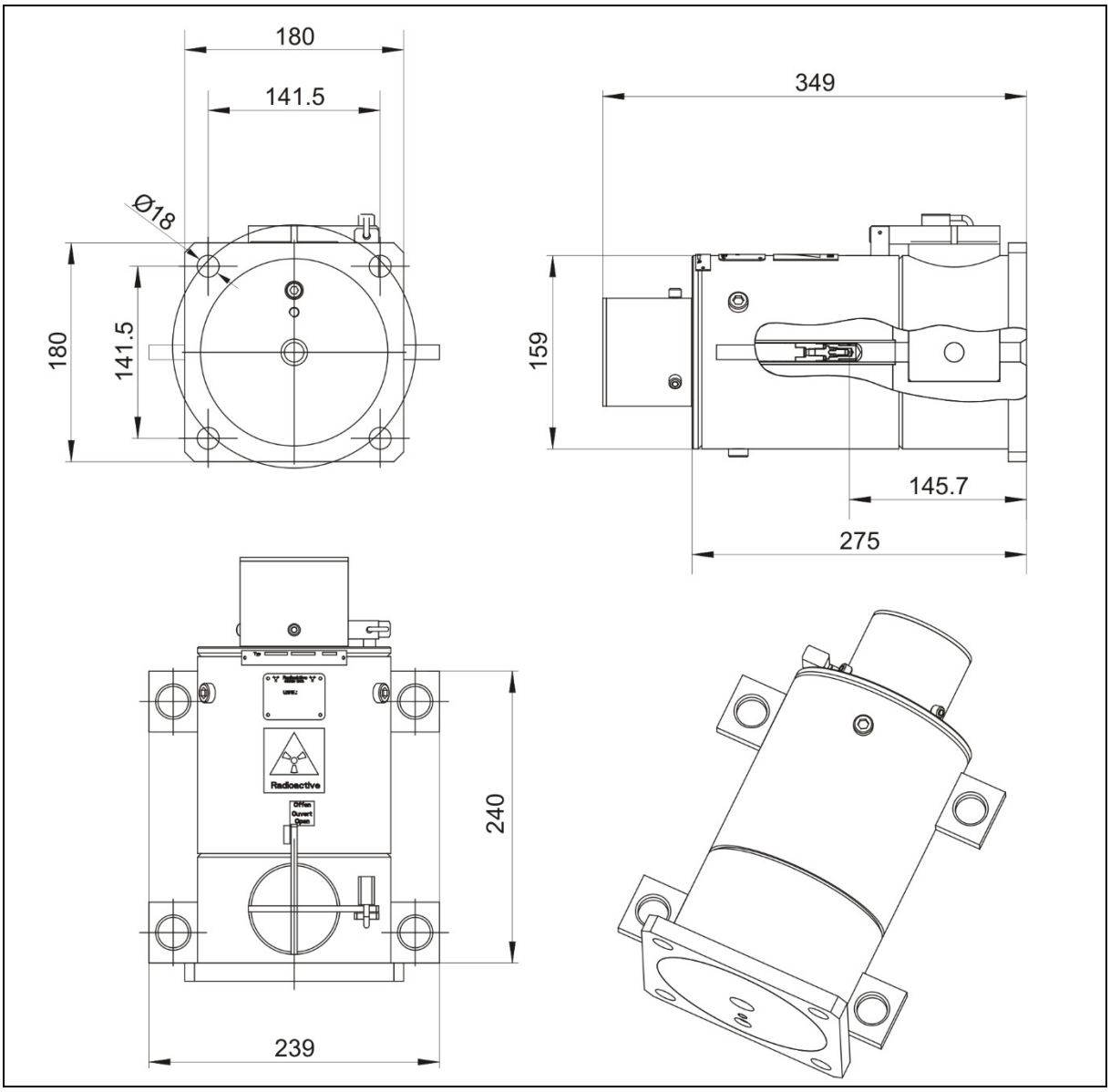
6. Zeichnungen Punktstrahlerabschirmungen

6.1. Dimensions LB 8115-01

6.1. *Abmessungen LB 8115-01*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



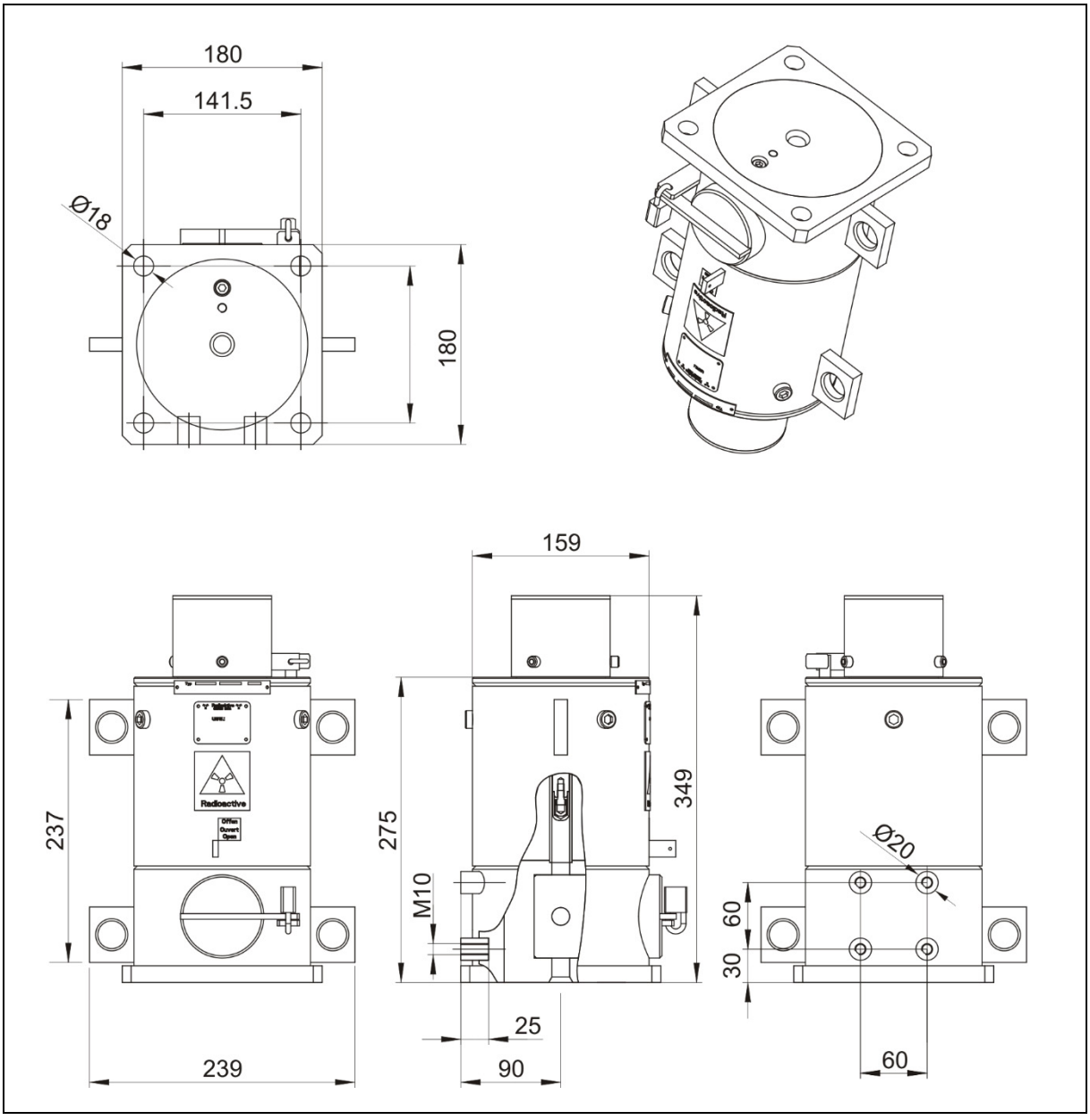
TI-Fig.12 44192, 1 source (dimensions in mm)
44192, 1 Strahler (Abmessungen in mm)

6.2. Dimensions LB 8115-02

6.2. *Abmessungen LB 8115-02*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



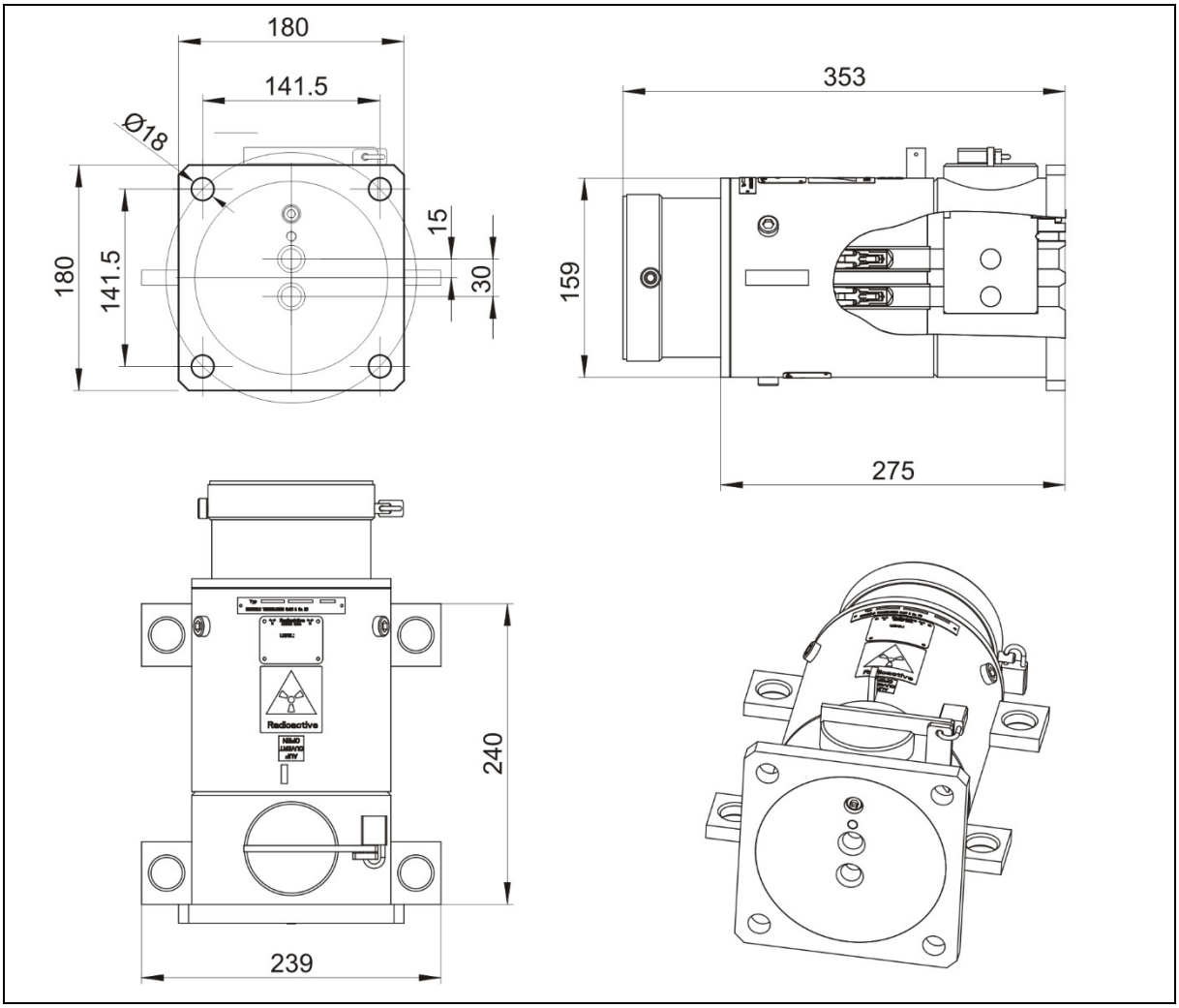
TI-Fig.13 47052, 1 source (dimensions in mm)
47052, 1 Strahler (Abmessungen in mm)

6.3. Dimensions LB 8115-20

6.3. *Abmessungen LB 8115-20*

Mounting direction “A“ and “B“ (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



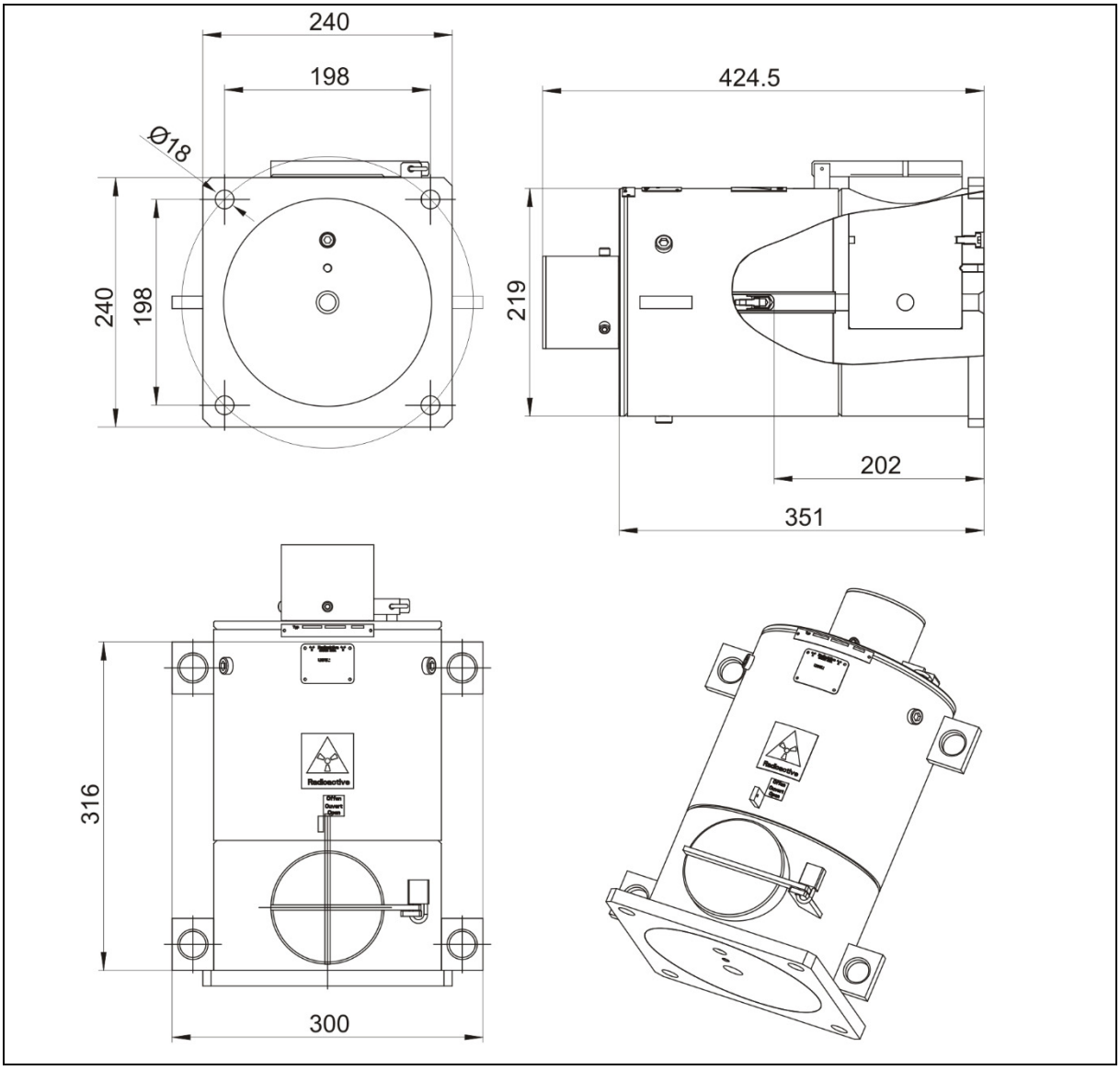
TI-Abb.14 54025, 2 sources (dimensions in mm)
54025, 2 Strahler (Abmessungen in mm)

6.4. Dimensions LB 8120-01

6.4. *Abmessungen LB 8120-01*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



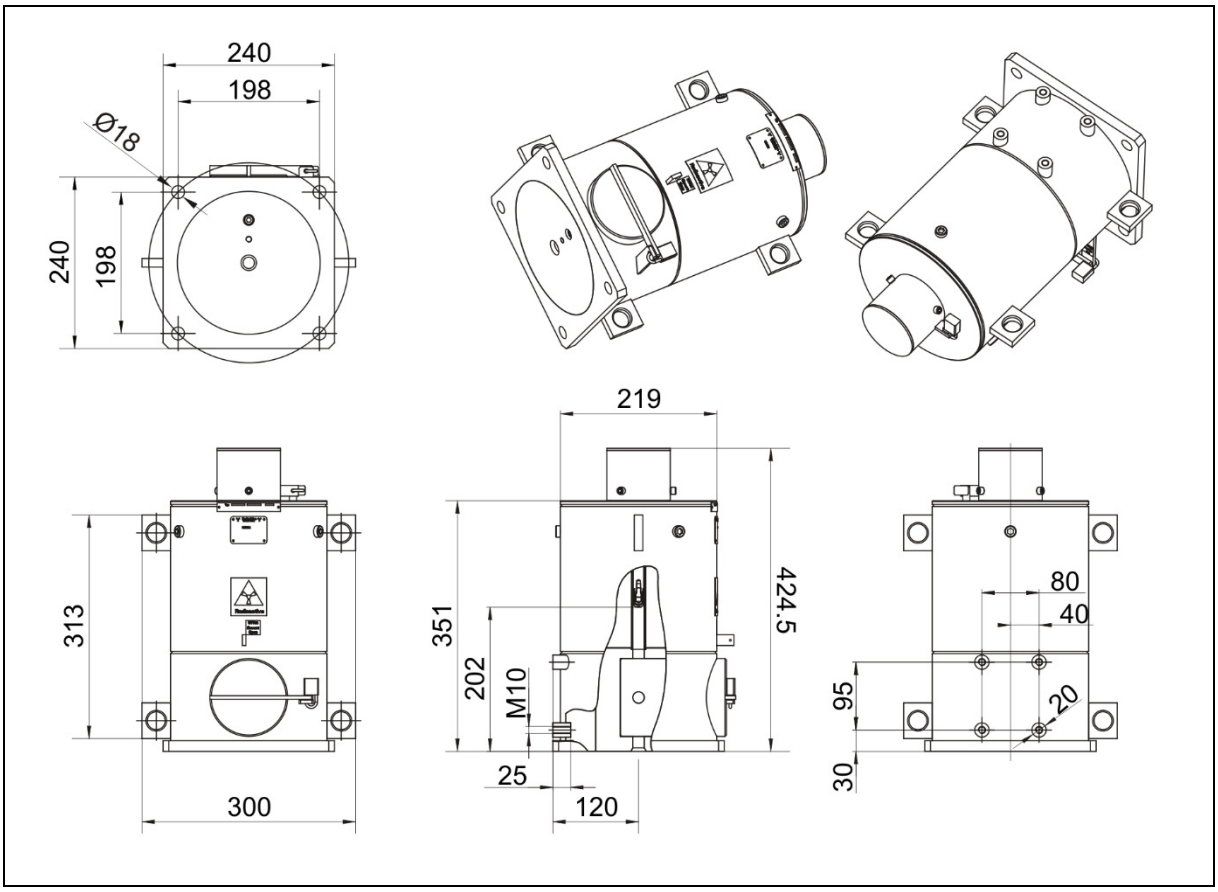
TI-Fig.15 44173, 1 source (dimensions in mm)
44173, 1 Strahler (Abmessungen in mm)

6.5. Dimensions LB 8120-02

6.5. *Abmessungen LB 8120-02*

Mounting direction “A“ and “B“ (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).

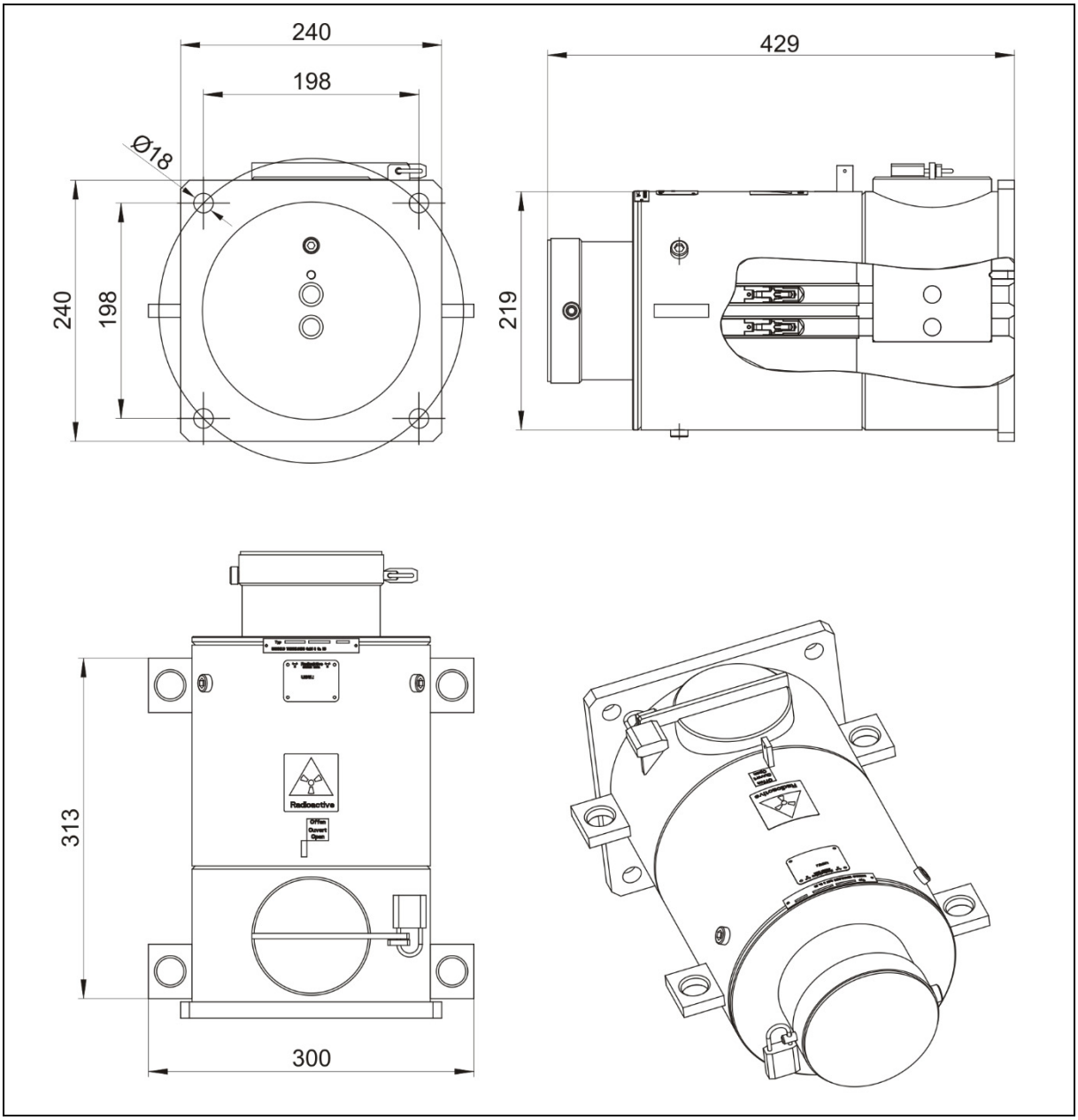


TI- Fig.16 47057, 1 source (dimensions in mm)
47057, 1 Strahler (Abmessungen in mm)

6.6. Dimensions LB 8120-20
6.6. *Abmessungen LB 8120-20*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



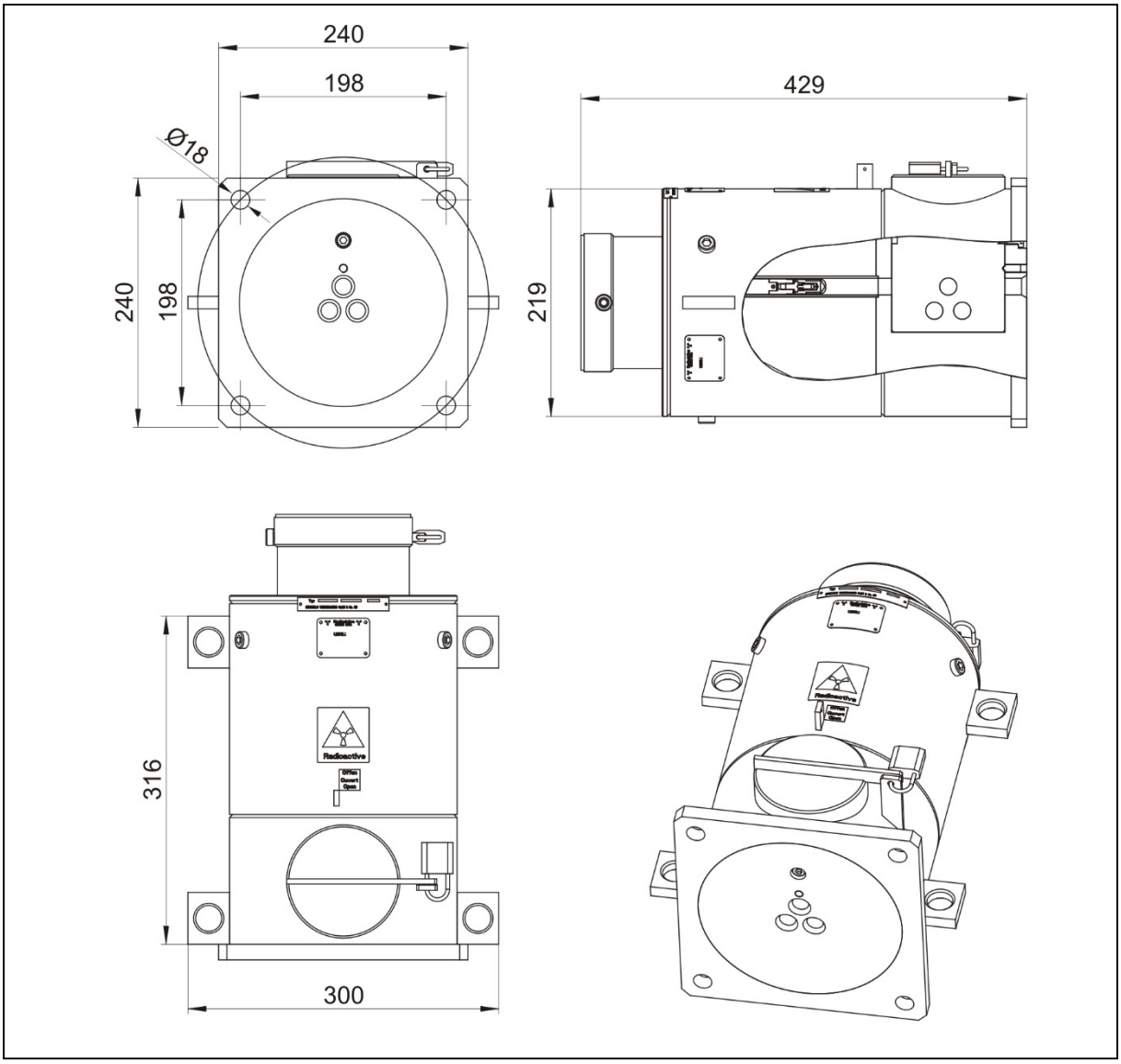
TI-Fig.17 58569, 2 sources (dimensions in mm)
58569, 2 Strahler (Abmessungen in mm)

6.7. Dimensions LB 8120-30

6.7. Abmessungen LB 8120-30

Mounting direction “A“ and “B“ (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).

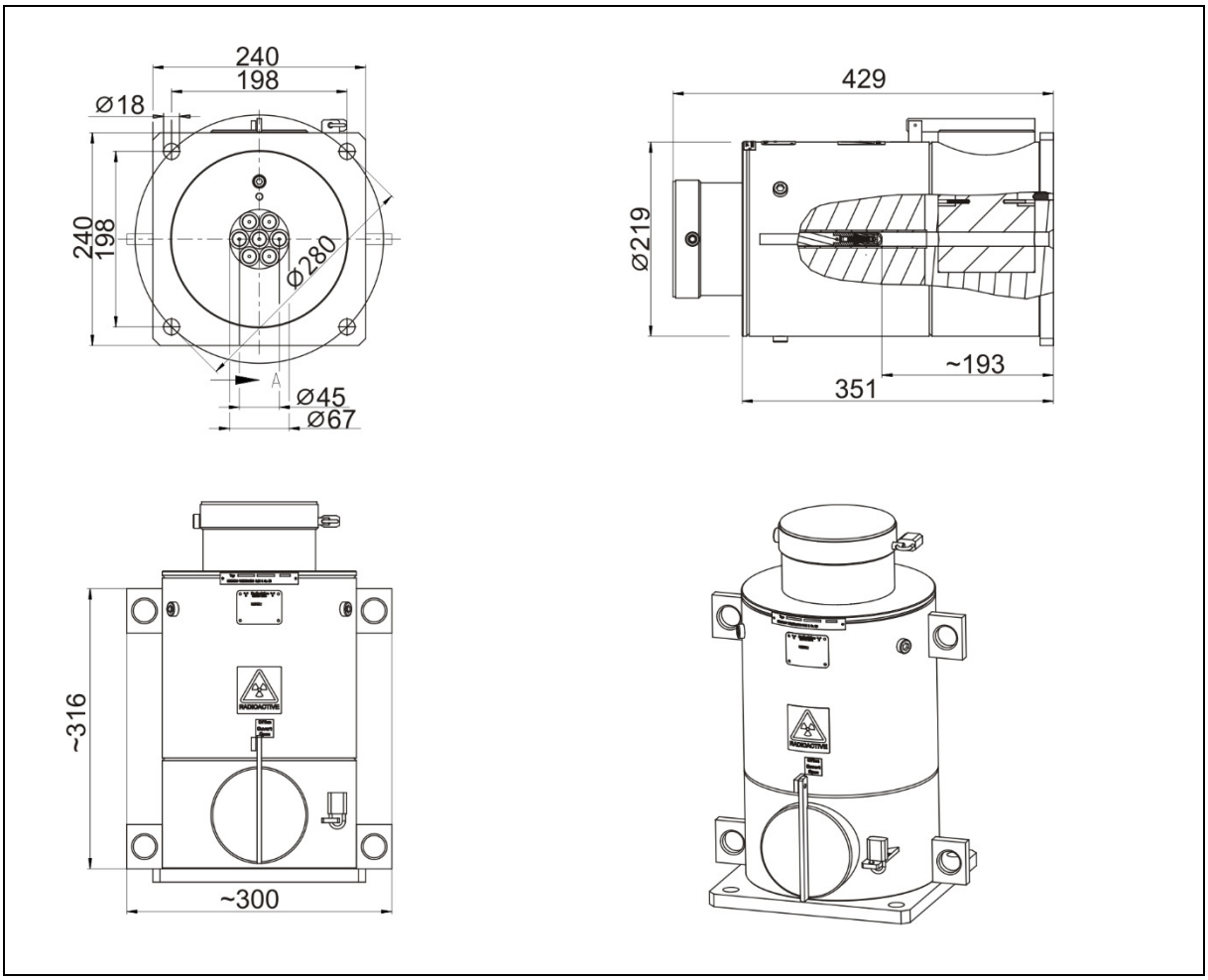


TI-Fig.18 61655, 3 sources (dimensions in mm)
61655, 3 Strahler (Abmessungen in mm)

6.8. Dimensions LB 8120-70
6.8. *Abmessungen LB 8120-70*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



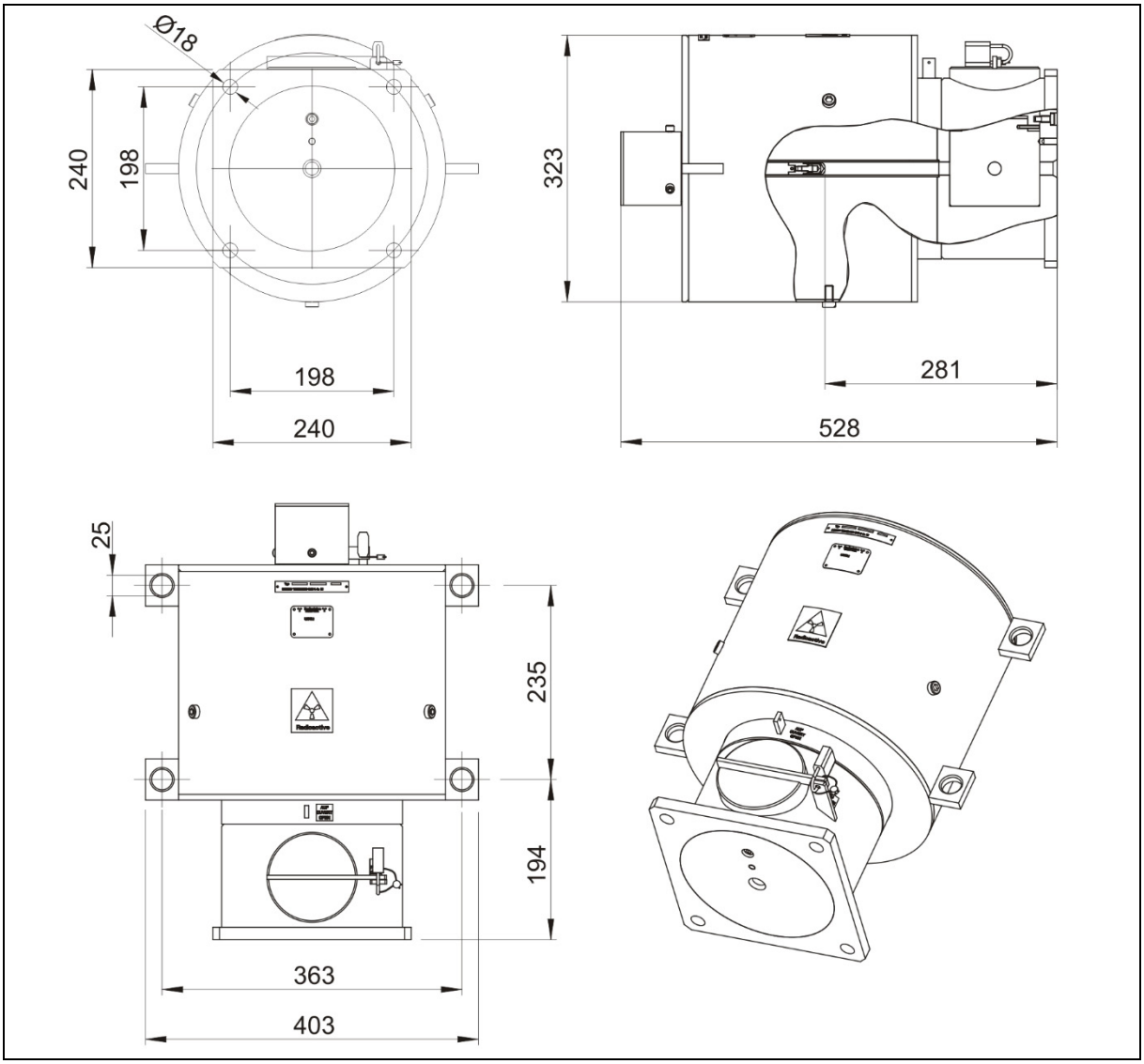
TI-Fig.19 73885, 7 sources (dimensions in mm)
73885, 7 Strahler (Abmessungen in mm)

6.9. Dimensions LB 8125-01

6.9. *Abmessungen LB 8125-01*

Mounting direction “A“ and “B“ (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



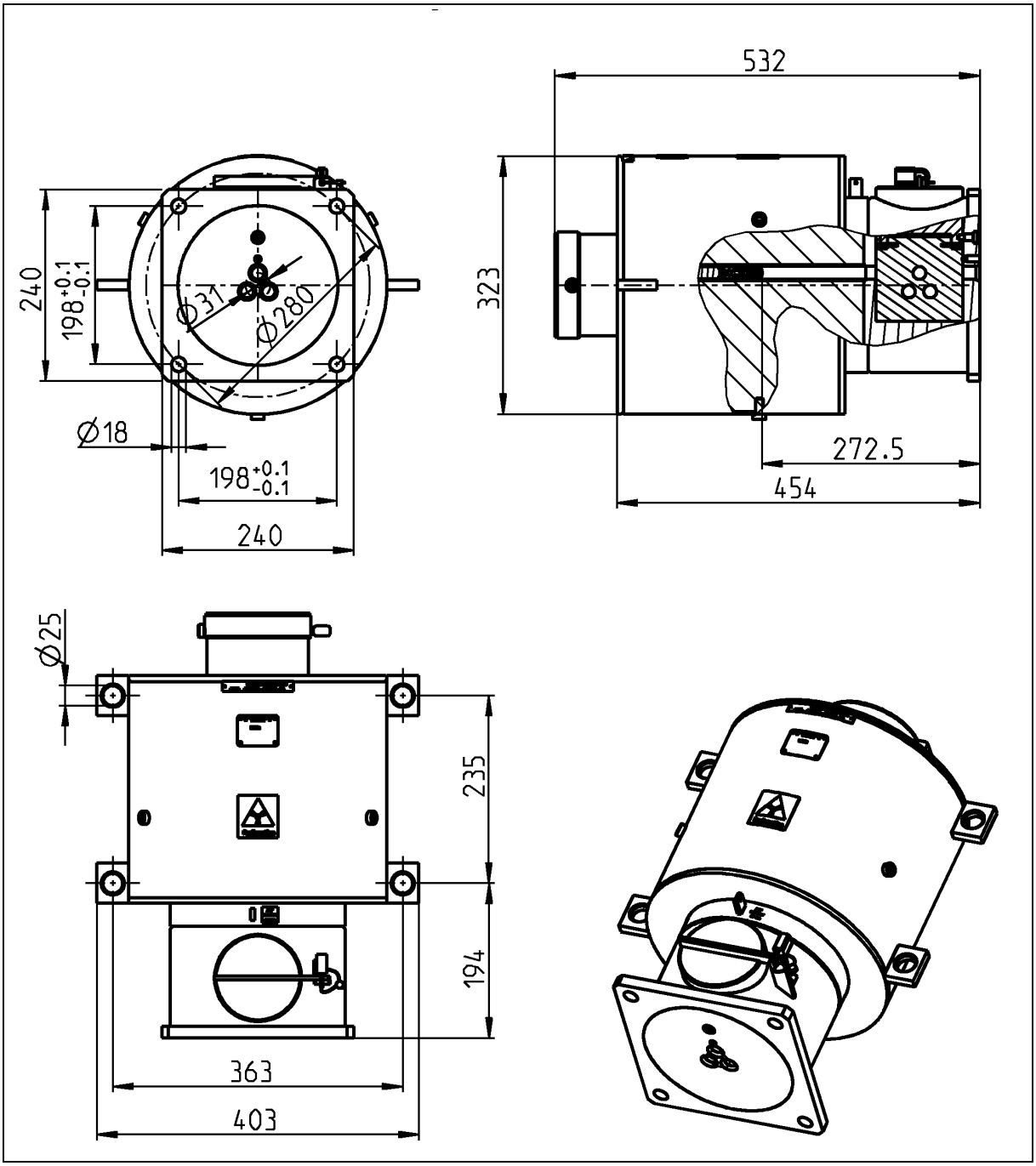
TI-Fig.20 45859, 1 source (dimensions in mm)
45859, 1 Strahler (Abmessungen in mm)

6.10. Dimensions LB 8125-30

6.10. *Abmessungen LB 8125-30*

Mounting direction “A“ and “B” (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).



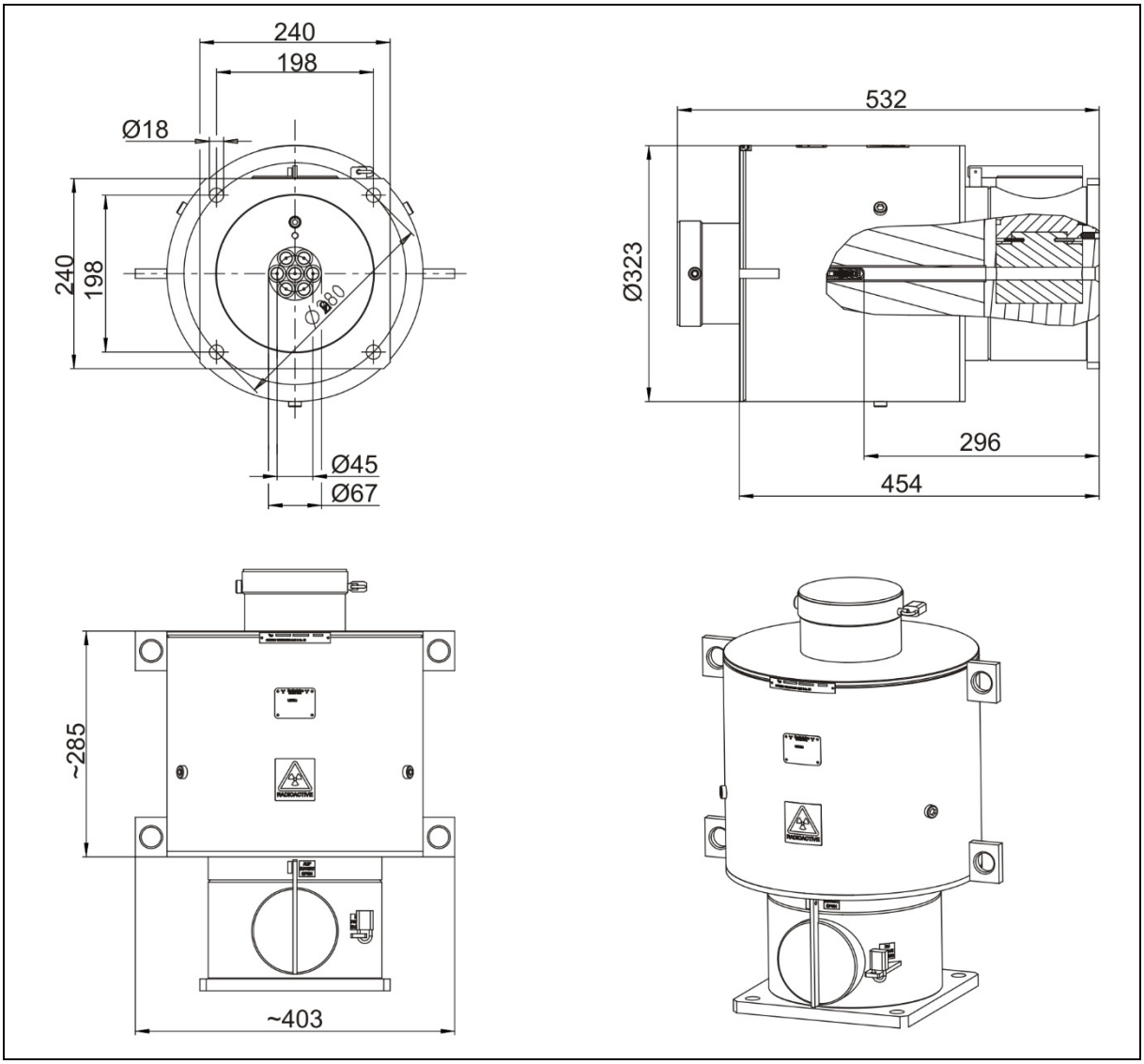
TI-Fig.21 62725, 3 sources (dimensions in mm)
62725, 3 Strahler (Abmessungen in mm)

6.11. Dimensions LB 8125-70

6.11. *Abmessungen LB 8125-70*

Mounting direction “A“ and “B“ (see chapter 2 Mounting Layouts).

Montagerichtung “A” und “B” (siehe Kapitel 2 Montageanordnungen).

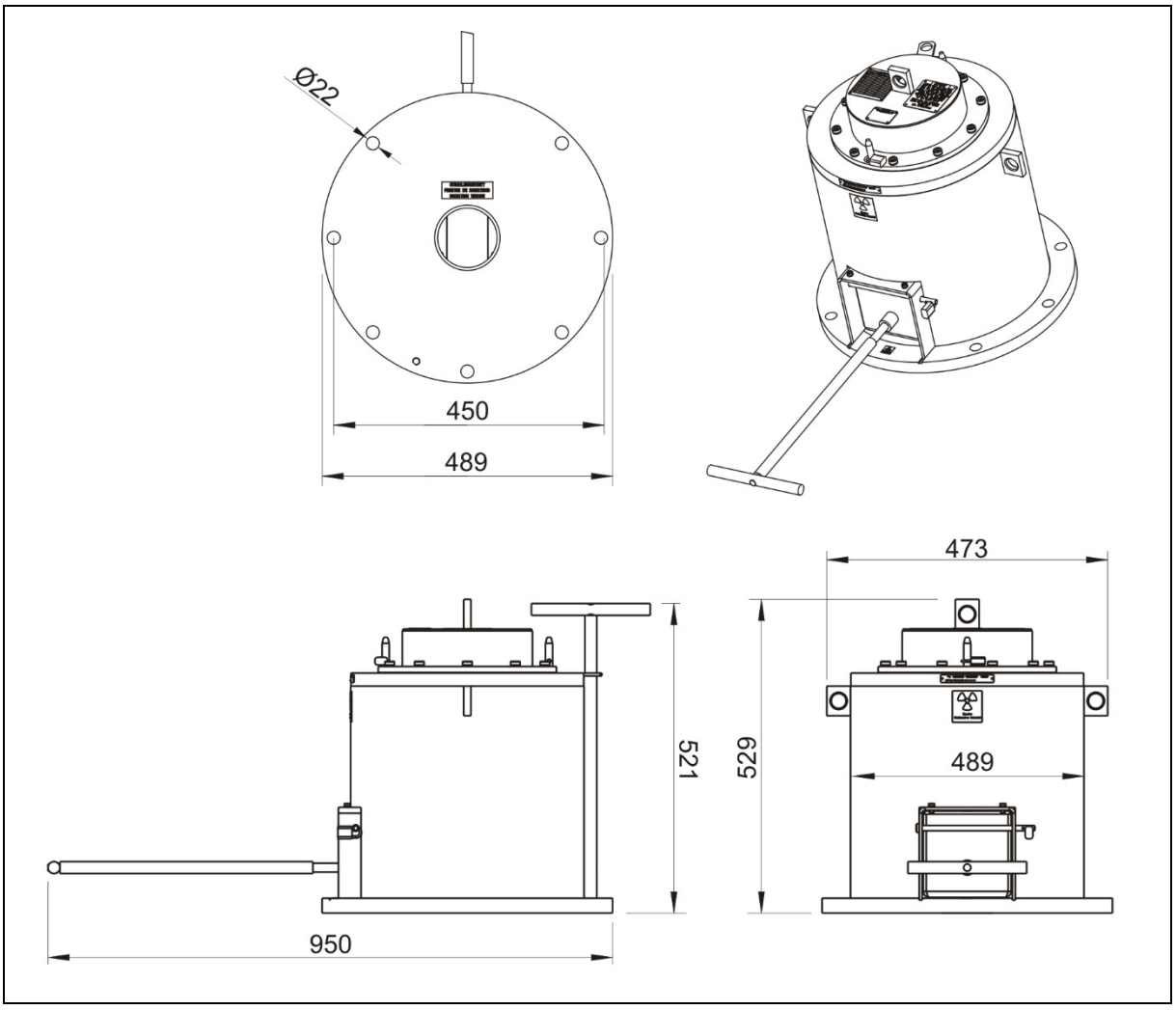


TI-Fig.22 73892, 7 sources (dimensions in mm)
73892, 7 Strahler (Abmessungen in mm)

7. Shield with Lock Slide and Magazine

7. Abschirmung mit Verschlussschieber und Magazin

Mounting direction only “B” (see chapter 2 Mounting Layouts)
Montagerichtung nur “B” (siehe Kapitel 2 Montageanordnungen)



TI-Fig.23 68890 (dimensions in mm)
68890 (Abmessungen in mm)