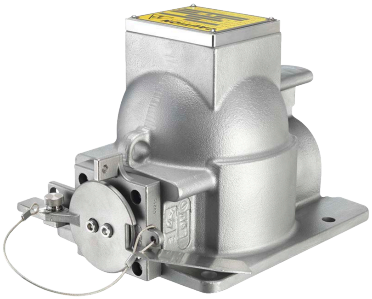
Quick setup guide

SHLD1

Source holder



Document ID: 62092

Contents

Information:
This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available on our homepage.

Operating instructions SHLD1: Document-ID 52899
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1 For your safety

1.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

The handling of radioactive substances is regulated by law. The radiation protection rules of the country in which the system is operated apply first and foremost.

In Germany the current radiation protection ordinance (StrlSchV) based on the Atomic Energy Law (AtG) is applicable.

The following points are important for measurement with radiometric methods:

Handling permit

A handling permit is required for operation of a system using gamma rays. This permit is issued by the respective state government or the responsible authority (offices for environmental protection, trade supervisory boards, etc.)

We would be pleased to assist you in applying for the permit.

General instructions for radiation protection

When handling radioactive sources, unnecessary radiation exposure must be avoided. An unavoidable radiation exposure must be kept as low as possible. Take note of the following three important measures:

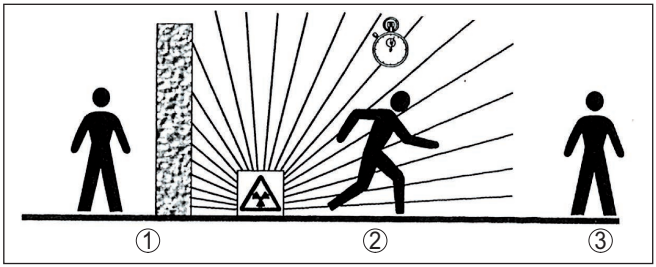

Fig. 1: Measures for protection against radioactive radiation

1 Shielding
2 Time
3 Distance

Shielding: Provide good shielding between the source and yourself as well as all other persons. Special source containers as well as all materials with high density (e.g. lead, iron, concrete, etc.) provide effective shielding.

Time: Stay as short a time as possible in radiation exposed areas.

Distance: Your distance to the source should be as large as possible. The local dose rate of the radiation decreases in proportion to the square of the distance to the radiation source.

Radiation safety officer

The plant operator must appoint a radiation safety officer with the necessary expert knowledge. He is responsible for ensuring that the radiation protection ordinance is complied with and for implementing all radiation protection measures.

We offer appropriate training that imparts the necessary qualification in this field.

You can also find certified course providers on the homepage of the Federal Office for Radiation Protection: **www.bfs.de**.

Control area

Control areas are areas in which the local dose rate exceeds a certain value. Only persons who undergo official dose monitoring are allowed into these control areas. You can find the respectively valid limit values for control areas in the radiation protection ordinance.

We are at your disposal for further information concerning radiation protection and regulations in other countries.

1.2 Appropriate use

When in operating mode, the source container SHLD1 described in this document contains a radiactive source for radiometric level, interface, switching and density measurement. The source container shields the radiation off from the surroundings and only allows it to exit, practically unhindered, in the direction of measurement.

To ensure the shielding effect and exclude damage to the radioactive source, all instructions in this operating instructions manual and the legal radiation protection regulations must be observed during installation and operation.

Operational reliability is ensured only if the instrument is used properly. We are not liable for damages caused by improper use.

You can find detailed information about the area of application in chapter "*Product description*".

1.3 Warning about incorrect use

Inappropriate or incorrect use of this instrument can give rise to hazards, e.g. risk to persons through exposure to gamma radiation. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

Take note of the respective safety instructions.

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the

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current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

1.5 Application reference

- Take note of the applicable regulations and national/international standards.
- Take note of the radiation protection ordinance when using, storing and working with the radiometric measuring system.
- Take note of the warning instructions and safety zones.
- Install and operate the instrument according to the documentation and the respective official regulations.
- The instrument must not be operated and stored outside the specified parameters.
- Protect the instrument against extreme influences (e.g. chemical products, weather, mechanical shock, vibration, etc.) during operation and storage. Especially when loaded with a source, the instrument may not be destroyed for any reason (e.g. for scrapping).
- Always secure the switch position OFF with a lock.
- Before switching on the radiation, make sure that no persons are in the radiation area (also not outside the vessel). The radiation must only be switched on by trained personnel.
- Do not use a corroded or damaged instrument. Inform the responsible radiation safety officer as soon as damage or corrosion appears and follow his instructions.
- Carry out the necessary tightness test according to the applicable rules and instructions.
- If there are doubts about the proper condition of the measuring system, check if there is radiation in the environment of the instrument and inform the responsible radiation safety officer.

1.6 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code.

1.7 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

2 Product description

2.1 Configuration

Type label

The type label contains the most important data for identification and use of the instrument:

- Order code
- Serial number
- Source holder
- Source contained
- Activity
- Local dose rate
- Article number - Documentation
- Note: "Highly radioactive source" (if necessary)

The serial number allows you to access the delivery data of the instrument via "www.vega.com", "*VEGA Tools*" and "*Instrument search*".

Note:
The local dose rate stated on the type label at a defined distance is safety-oriented and includes production-related fluctuations of the emitters as well as tolerances of the measuring instruments. There can thus be deviations in the local dose rate calculated with the specified attenuation factors. See also "*Principle of operation/Source*".

Versions

There are several versions available with different options. Apart from the manual versions, there are also versions with pneumatic switchover.

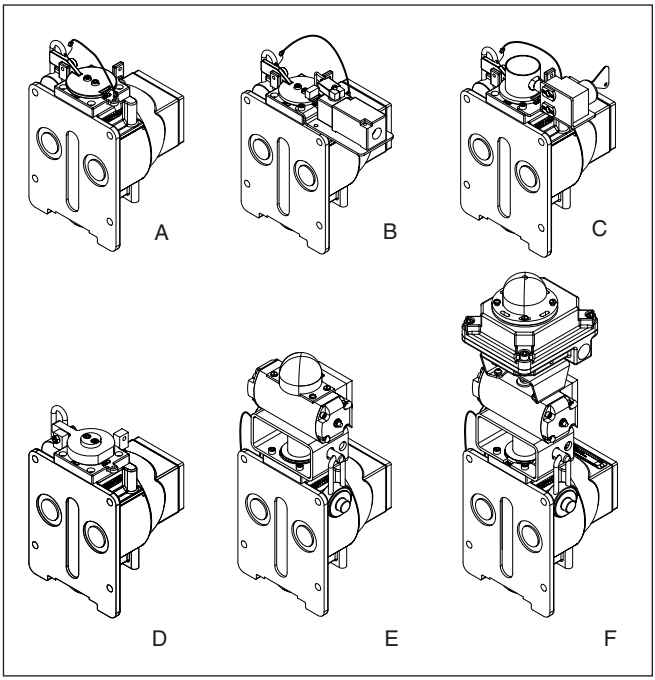

Fig. 2: Versions SHLD1 (Overview)

Version A: Standard version
Version B: with position switch
Version C: with Interlock safety switch
Version D: Heavy Duty version
Version E: version with pneumatic switching mechanism
Version F: version with pneumatic switching mechanism and position switch

Type labels

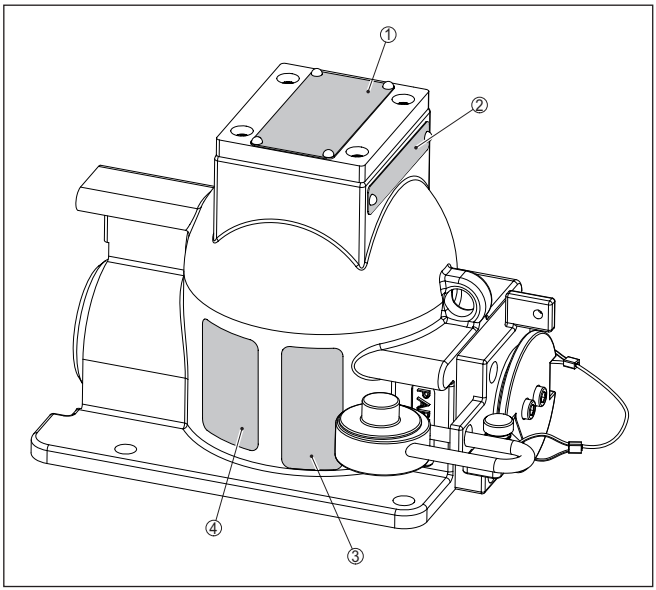

Fig. 3: Position of the type labels

1 Type label - Source
2 Type label - Source holder
3 Shipping information USA (optional)
4 Warning USA (optional)

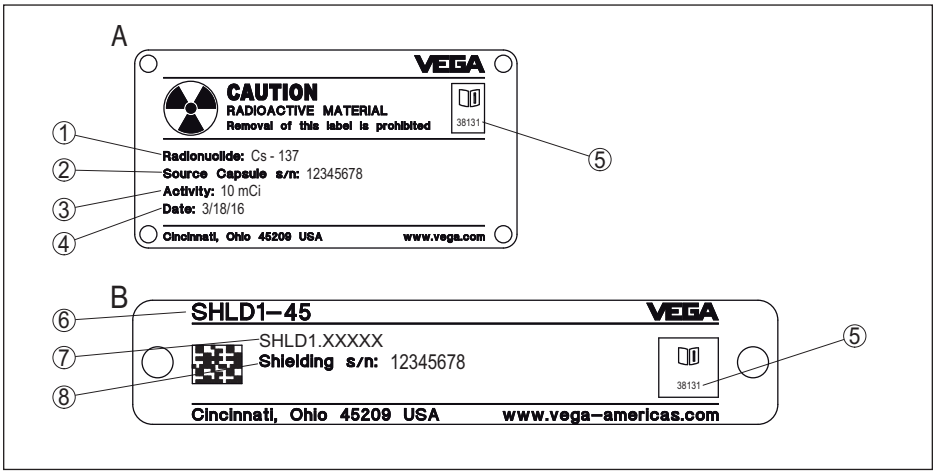

Fig. 4: Type label

A Type label - Source
B Type label - Source holder
1 Source: Cs-137
2 Serial number of the source capsule (for traceability of the source)
3 Activity of the sources in MBq and mCi or GBq and mCi
4 Date (dd/mm/yyyy)
US version: (mm/yy)
5 Number of the corresponding operating instructions
6 Source holder type
7 Order code of the source holder
8 Serial number of the source holder

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Certificate of the source capsule (optional)

Move to "www.vega.com" and enter in the search field the serial number of your instrument.

Alternatively, you can access the data via your smartphone:

- Download the VEGA Tools app from the "*Apple App Store*" or the "*Google Play Store*"
- Scan the DataMatrix code on the type label of the instrument or
- Enter the serial number manually in the app

2.2 Principle of operation

Application area

The SHLD1 is a source holder for shielding radioactive sources such as e.g. Cs-137.

The radioactive source in the source container emits gamma rays. The SHLD1 is mounted on the vessel, the pipeline or on a conveyor belt/spiral conveyor directly opposite the sensor.

The source holder shields the environment against gamma radiation and protects the radioactive source from mechanical damage or chemical influences. In case of large measuring ranges (e.g. with high vessels) two or more source holders are used.

The SHLD1 consists of the components:

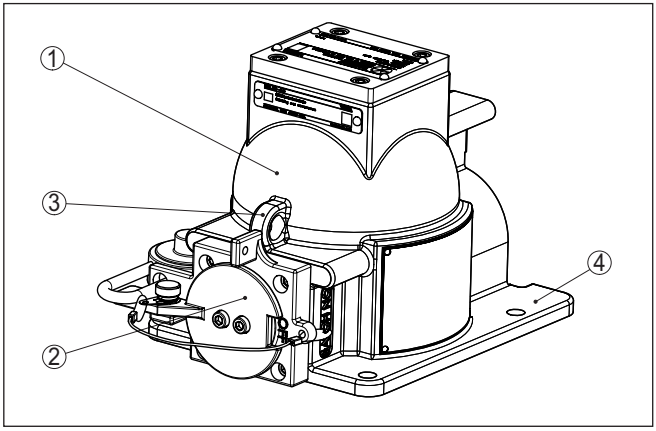

Fig. 5: Source holder SHLD1

1 Source holder
2 Switchover/locking mechanism
3 Transport lug
4 Mounting surface

Functional principle

The rays emitted by the gamma source are damped when penetrating the medium. The sensor detecting the attenuated radiation on the opposite side of the vessel calculates the measured value from the intensity of the radiation.

Source

Max. activity of the sources

The following table states the max. activity of the sources. Production-related fluctuations of the radiation activity and tolerances of the measuring instruments are not taken into account.

	Cs-137
Activity	max. 3.7 GBq (100 mCi)

Tab. 1: Max. activity of the sources

Caution:

The max. permissible activity of the source can be further limited by a country-specific approval.

Attenuation factor and half-value layers

	Cs-137
Attenuation factor	46
Number of the half-value layers	5.5

Tab. 2: Attenuation factor and half-value layers

3 Mounting

3.1 General instructions

General information

- For mounting of SHLD1 you need a special handling permit.
- Mounting may only be carried out by authorized, qualified personnel who are monitored for radiation exposure according to local laws or the handling permit. Take note of the specifications in the handling permit. Also take the local conditions into account.
- Carry out all work within the shortest possible time and at the largest possible distance. Provide suitable shielding
- Avoid risk to other persons by taking suitable measures (e.g. safety fence, etc.)
- All mounting and dismounting work must only carried out with the switch in position OFF, secured with a lock.
- Keep the weight of the source holder in mind when mounting (up to 100 kg or 220 lbs)
- Depending on the version, the centre of gravity of SHLD1 can vary. Keep this in mind during crane transport on the lug

Mounting with a crane

Warning:
Check the hoisting equipment for sufficient lifting capacity, approx. 110 kg (244 lbs).

Persons must never stand beneath the loads.

The source holder is screwed onto a transport board. Loosen the screws and lift the source holder from the transport board. For this purpose you have to use the lug of the source holder.

Use a suitable lifting tackle (shackle, snap hook, etc.) to fasten the source holder to the crane hook. Keep in mind that the source holder will tilt sidewards while lifting.

Moisture

Versions with manual switchover
Protect the source holder against moisture and hence against corrosion. If the source holder is exposed directly to the elements, you should cover it with a roof or a suitable protective bonnet.

To maintain the housing protection, make sure that the housing lid is closed during operation and locked, if necessary.

Make sure that the degree of contamination specified in chapter "*Technical data*" meets the existing ambient conditions.

Version with position switches
Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable gland. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

Version with pneumatic switching mechanism
The pneumatic actuator must not be used under ambient conditions that can cause corrosion in and on the pneumatic actuator.

3.2 Mounting instructions

Orientation - Level measurement

For continuous level measurement the source holder must be mounted slightly above or at the height of the max. level. The radiation must be directed exactly towards the detector mounted on the opposite side.

The source holder SHLD 1 should be mounted as close as possible to the vessel.

However, with large measuring ranges and small vessel diameters, a gap can often not be avoided.

If there are gaps or empty spaces around the installation, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

Align the source holder according to its beam exit angle.

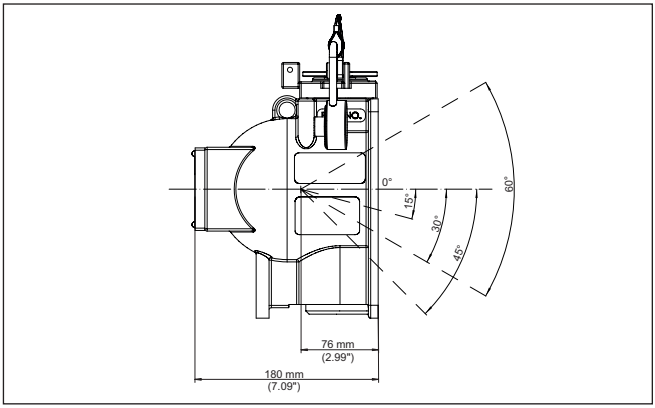

Fig. 6: Orientation - Source holder

a Beam exit angle (0°, 15° 30°, 45°, 60°)

Orientation - Mass flow determination

For continuous mass flow determination the source holder must be mounted above a conveyor belt or a discharge screw conveyor. The radiation must be directed exactly towards the detector mounted on the opposite side.

Mount the source holder SHLD 1 on the measuring frame (optional).

There are large spacings and gaps between measuring frame and conveyor belt.

If there are gaps or empty spaces around the installation, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

The arrangement of the source holders depends on the width and the loading height of the conveyor belt. In case of wide conveyor belts,

the use of two sources holders can be advantageous. See following illustration.

Make sure that the total width of the conveyor belt as well as the complete loading height are in the detection range of the measuring system.

If you are not sure, contact our specialists.

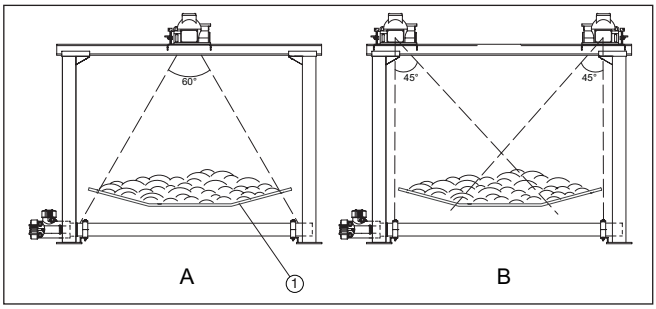

Fig. 7: Measurement setup, measuring frame with different width

A Measurement setup with a source holder - Beam angle 60°
B Measurement setup with two source holders - Beam angle 45°
1 Conveyor belt

Make sure when planning the measuring system that the sensor electronics is easily accessible. For this reason, mount the sensor in such a way that the sensor housing is on the same side as the catwalk.

Mount the source holder with symmetrical radiation orientation (60°) so that the manual switchover mechanism is also accessible from the catwalk side.

Orientation - Limit level measurement

The version of the source container with a beam exit angle of 0° is the one best suited for point level detection. The radiation must be directed exactly towards the detector mounted on the opposite side.

If you want to use larger exit angles (15°, 30°, 45° or 60°), you have to make sure the beam is horizontal. To do this you have to mount the source holder so that the implied opening of the exit channel is in a horizontal position.

The source holder SHLD 1 should be mounted as close as possible to the vessel.

However, with large measuring ranges and small vessel diameters, a gap can often not be avoided.

If there are gaps or empty spaces around the installation, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

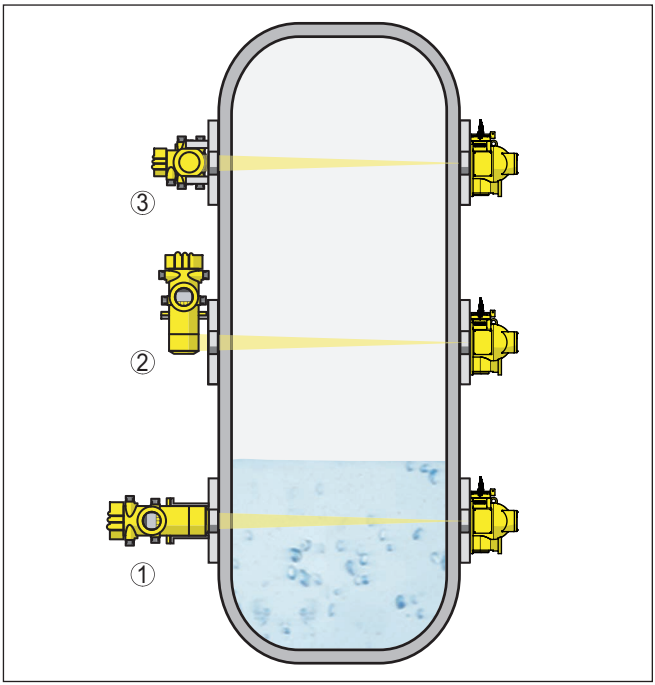

Fig. 8: Installation positions - Point level detection with MINITRAC 31

1 Horizontal mounting
2 Vertical mounting
3 Mounting horizontally, at right angles to container

Orientation - Density measurement

The optimum and most constant conditions for density measurement in pipes can be achieved if you mount the measuring equipment on vertical pipelines or conveyors. The radiation must be oriented directly towards the detector mounted on the opposite side.

To extend the distance the beam travels through the medium and thus achieve a better measuring effect, the tube can be radiated diagonally or a measuring track can be used.

You can find the required mounting accessories in chapter "*Technical data*".

The source holder SHLD 1 should be mounted as close as possible to the vessel.

However, with large measuring ranges and small vessel diameters, a gap can often not be avoided.

If there are gaps or empty spaces around the installation, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

The ideal measurement setup for density measurement is installation on a vertical pipeline. The pipe diameter should be at least 50 mm (1.97 in). Flow direction should be from bottom to top.

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Mounting brackets, angled attachments as well as mounting clamps are available for mounting.

Vertical pipeline, 30° inclined, diameter 50 … 100 mm (1.97 … 3.94 in)

For small pipe diameters 50 … 100 mm (1.97 … 3.94 in), a diagonal radiation path is recommended. The distance of the beam through the medium is thus longer and an improved measuring effect is achieved. In such cases, the optional lead shielding for the detector is recommended in order to avoid influence from secondary radiation sources.

Fig. 9: 30° measurement setup on a pipeline with diameter 50 … 100 mm (1.97 … 3.94 in)

Vertical pipeline, diameter 50 … 600 mm (1.97 … 23.62 in)

For pipe diameters 50 … 600 mm (1.97 … 23.62 in), a straight radiation path is possible. The radiometric sensor can be mounted either horizontally or vertically.

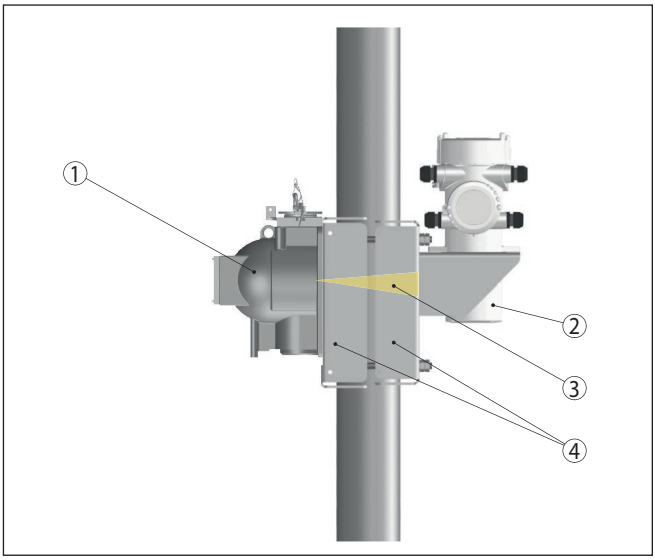

Fig. 10: Measurement setup on a pipeline with a diameter of 50 … 600 mm (1.97 … 23.62 in), detector mounted vertically

1 Source holder (SHLD 1)
2 Radiometric sensor (MINITRAC)
3 Radiated area
4 Mounting bracket

Avoiding stray radiation - Vertical pipeline, diameter 50 … 600 mm (1.97 … 23.62 in)

When mounting the radiometric sensor horizontally, the optional lead shielding is recommended in order to avoid influence from secondary radiation sources.

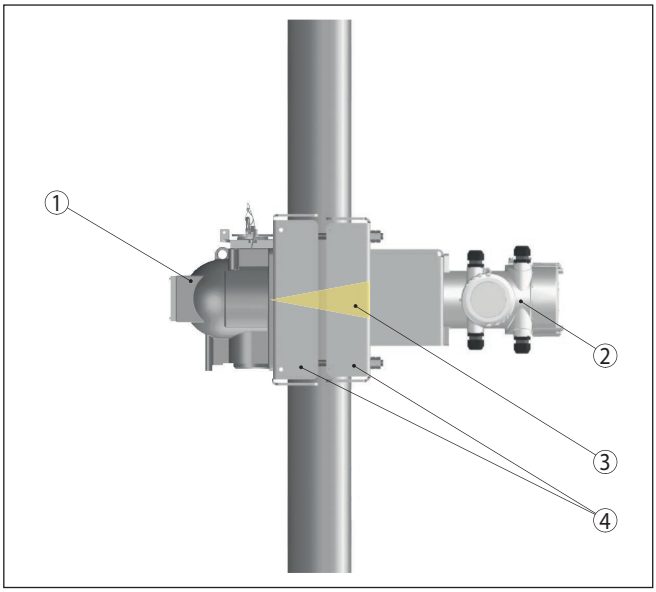

Fig. 11: Measurement setup on a pipeline with a diameter of 50 … 600 mm (1.97 … 23.62 in), detector mounting horizontal

1 Source holder (SHLD 1)
2 Radiometric sensor (MINITRAC)
3 Radiated area
4 Mounting bracket

Horizontal pipeline

On a horizontal pipeline, the radiation should be directed horizontally to avoid interference from air pockets.

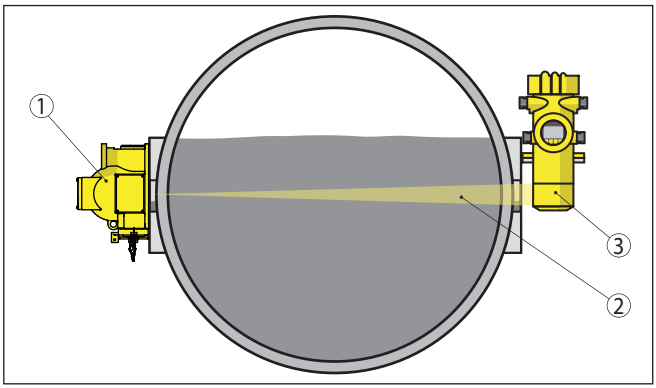

Fig. 12: Measurement setup on a horizontal pipeline

1 Source holder (SHLD 1)
2 Radiated area
3 Detector (MINITRAC)

Installation control

Measurement of the local dose rate

After mounting, i.e. as soon as the radioactive emitter is mounted in the source holder, the local dose rate in the area of the source holder and the detector must be measured in µSv/h.

Caution:
Depending on the respective installation, radiation can also leak out of the beam exit channel due to scattering. Such stray radiation must be shielded off with additional lead or steel sheets. All control and off-limit areas must be rendered inaccessible and provided with warning signs.

Behaviour with empty vessel

Caution:
After technically correct mounting, the control area around an empty vessel must be measured for radioactivity and if there is any, the area must be cordoned off and marked. Possible ways of access to the inside of the vessel must be reliably closed off and marked with a warning sign "Radioactive".

The responsible radiation safety officer can allow access after having checked the safety measures with switched-off source holder.

If work must be carried out in and on the vessel, it is absolutely necessary to switch off the radiation on the source holder.

4 Setup

4.1 Operation of SHLD1

Warning:
Before switching on the radiation, make sure that no persons are inside the radiated areas (also not inside the vessel).

Radiation must only be switched on by trained personnel.

Switching the radiation on

The figures in brackets refer to the following illustration.

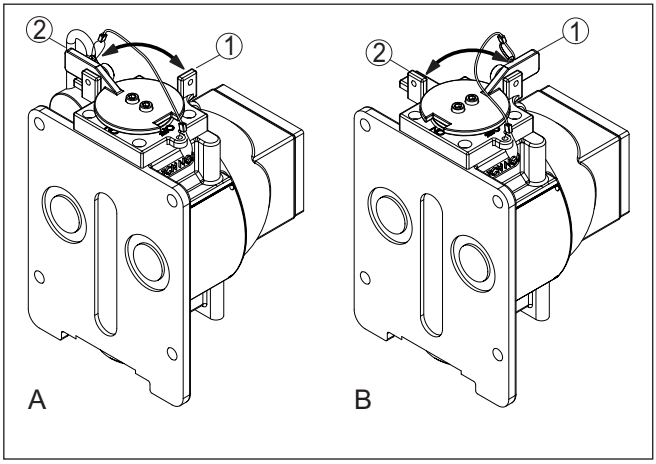

Fig. 13: Switching on the radiation with the manual operating lever - example: SHLD1 standard version

A Source holder switched off - operating lever in position "OFF" (2)
B Source holder switched on - operating lever in position "ON" (1)
1 Switching position "ON"
2 Switching position "OFF"

Initial situation: Source holder is in position "OFF" (2)

1. Open and remove padlock.

   The radiation safety officer gets a separate notification with the code for the padlock. Contact our responsible sales organisation.

   Keep the padlock near by the source holder. Do not insert the padlock into the opening of the "OFF" position because otherwise the source holder cannot be switched off completely in case of emergency.
2. Screw out safety screw (3) (screw is undetachably fixed to the safeguard cable)
3. Turn the operating lever 90° clockwise up to the stop.

   "ON" (1) will then appear in the position recess of the operating lever.
4. Secure the operating lever in position "ON" (1).

Screw in the safety screw (3) according to the following illustration.

Vibrations or other external influences can otherwise cause uncontrolled movement of the operating lever

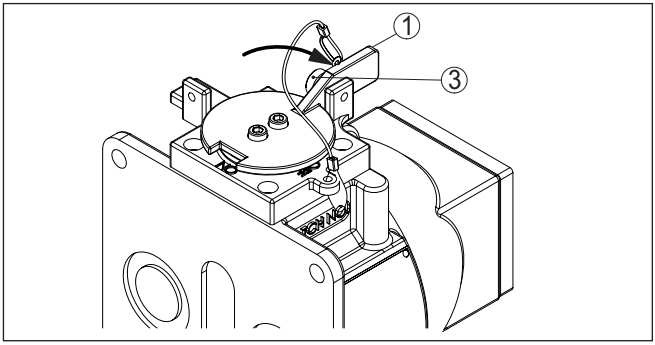

Fig. 14: Safety screw for securing the switching position

1 Operating lever in switching position "ON"
3 Safety screw

5. The radiation in the source holder is thus switched on.

Indication of the switching status

Radiation "ON" (1)
In the position recess of the operating lever the lettering "ON" is visible.

Radiation "OFF" (2)
In the position recess of the operating lever the lettering "OFF" is visible.

Switching the radiation off

Switching off the radiation is analogous to this procedure. To switch off the radiation, turn the operating lever 90° anticlockwise to position "OFF" (2).

Interlock safety switch

The version with interlock safety switch allows switches, actuators, valves, doors or safety fences to be secured.

To reach, for example, the key to an access door or safety fence, the source holder must necessarily be switched off. Only then can the access point to the radiation hazardous area be opened.

The requirements on function and design of the safety switch are, however, extremely different, making it impossible to mount a certain switch version in advance.

For that reason there is only a mounting plate for the interlock safety switch. The safety switch itself must be provided by the customer.

The safety bolt of the interlock switch must have a diameter of 16 mm (e.g. Superior Interlock type B-4003).

The mounting plate has the following holes:

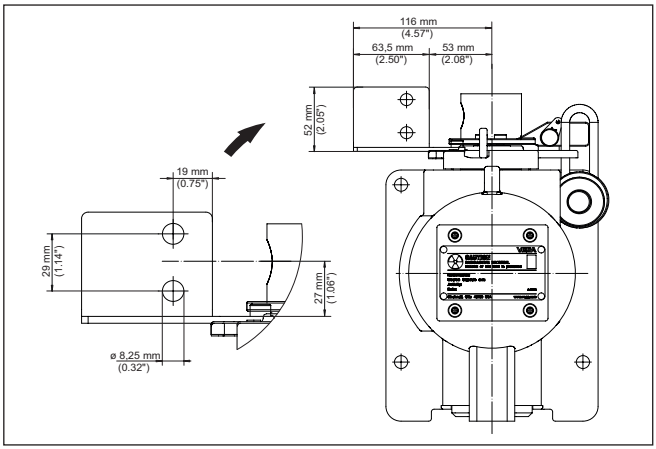

Fig. 15: Drilling template of the interlock safety switch

A Mounting plate for the interlock safety switch

5 Maintenance and fault rectification

5.1 Cleaning

Clean the instrument in regular intervals. Note the following points:

- Clean the instrument of substances that can impair the safety function
- Remove deposits of medium or other substances that could impair or prevent the source holder from switching over
- Take care that the lettering remains legible
- Clean the adhesive labels and the connection box (version with pneumatic switching mechanism) only with water (e.g. with slightly damp rag)
- Avoid creating electrostatic charges on the instrument. Never rub with dry cloth when cleaning

Warning:
Take note of all safety instructions in this operating instructions manual when cleaning.

5.2 Maintenance

If used properly and if the specified ambient and operating conditions are maintained, SHLD1 requires no special maintenance.

Inspection

Along with the regular inspections of the system, we recommend the following checks:

- Visual check for corrosion on the housing, the weld joints, the outer parts of the source holder, the lock, the lock washers
- Test of the mobility of the operating lever (switching on and off function)
- Assessment of the legibility of all labels and warning signs
- Stability and firm attachment all parts and screw connections

Caution:
If you are not sure of the proper functioning or condition of the instrument, contact immediately the responsible radiation safety officer for further instructions.

Caution:
Repairs or maintenance work beyond the scope of the usual inspection may only be carried out by the manufacturer, the supplier or specially authorized persons.

Measures in case of corrosion

If there are clear traces of corrosion on the source container, the local dose rate (µSv/h) must be measured in the surroundings. If the rate is clearly above the values during normal operation, then the area must be cordoned off and the responsible radiation safety officer informed.

Corroded instruments and lock washers must be exchanged as soon as possible.

Warning:
Source holders with corroded or stiff locking device or operating lever must be replaced immediately.

5.3 Test of the switching mechanism

Test the function of the switching mechanism on the source holder at regular intervals. We recommend carrying out this test every six months.

Measurement of the local dose rate

Source holder with manual switching mechanism

1. Remove the padlock as described in chapter "*Setup*".
2. Move the operating lever as described in chapter "*Setup*" several times from the "ON" to the "OFF" position and vice versa. The operating lever should be easily movable and must have no traces of corrosion in the visible area.

   If the operating lever cannot be moved from "ON" to "OFF" position, follow the instructions in paragraph "*What to do in case of emergency*".

   If it is hard to move the operating lever or if there are other signs of a malfunction, the source insert must be locked in position "OFF" and the responsible radiation safety officer informed.

   In case of corrosion: Follow the instructions in chapter "*Maintenance/Measures in case of corrosion*".

Source holder with pneumatic switching mechanism

1. Remove the padlock (see chapter "*Setup*")
2. Pull out the safety bolt.
3. Switch the operating lever by means of compressed air from the position "OFF" to position "ON". The operating lever should move without interruption to position "ON".

Caution:
Do not grasp any mechanical parts of the pneumatic drive while the pneumatic actuator is switching over.

4. Reduce the pressure to below 4 bar (58 psi). The operating lever must move back to position "OFF".

   If the operating lever does not move smoothly or shows signs of a possible malfunction, the operating lever must be locked in position "OFF" and the responsible radiation safety officer informed.

   If the operating lever cannot be moved from "ON" to "OFF" position, follow the instructions in paragraph "*What to do in case of emergency*".

   In case of corrosion: Follow the instructions in chapter "*Maintenance/Measures in case of corrosion*".

5.4 Tightness test

The tightness of the source capsule must be checked at regular intervals. The frequency of the tightness test (wipe test) must correspond to the specifications of the authorities or the handling permit.

Note:
A tightness test is not only required as a regular test but must be carried out after each incident that could impair the shielding of the source. In such case, the tightness test must be prescribed by the responsible radiation safety officer under consideration of the applicable regulations and comprise, apart from the source holder itself, all other affected parts of the process vessel.

The tightness test must be carried out immediately after an incident.

The tightness test described below is specified:

- For regular testing during operation
- For when the source holder is stored for longer periods
- For when the source container is put into operation after a longer storage period

Sequence of the tightness test

The tightness test (also wipe test) must be carried out by an authorized person or organisation with a wipe test kit provided by an authorised organisation. Wipe test kits must be used according to the instructions of the manufacturer. Reports on the test results must be kept.

If no other instructions are specified, carry out the tightness test as follows:

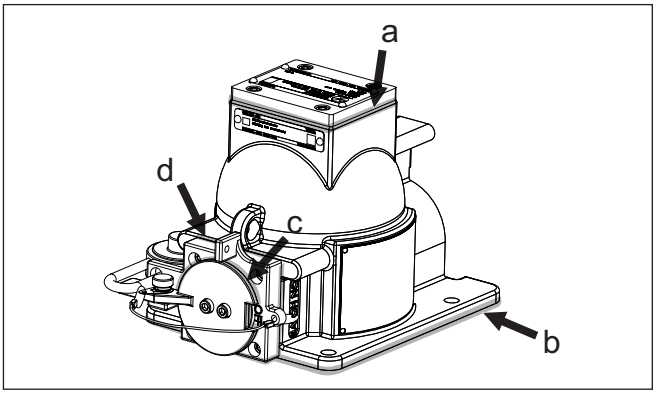

Fig. 16: Wiping surfaces for the tightness test - manually operated source holder

a On the groove beneath the cover plate
b On the lower edge of the mounting surface
c Along the groove between operating lever and housing
d On the groove beneath the bearing flange

Manually operated source holder
With manually operated source holders, the tightness test can be carried out when the source holder is in position "ON" or "OFF"

Take wipe samples from at least the following locations:

- On the groove beneath the cover plate
- On the lower edge of the mounting surface
- Along the groove between operating lever and housing
- On the groove beneath the bearing flange

Pneumatically operated source holder
On source holders with pneumatic switching mechanism, the switch must be fixed with the lock in position "OFF" before starting the tightness test.

Take wipe samples from at least the following locations:

- On the groove beneath the cover plate
- On the lower edge of the mounting surface
- Along the groove between operating lever and housing
- On the groove beneath the bearing flange
- Along the thread of the position switches

Have the samples analyzed by an authorized organisation. A radiation source is judged to be leaky if more than 185 Bq (5 nCi) are detected in the sample of the tightness test.

Note:
The specified value is valid for the USA. National regulations of other countries may prescribe other limit values.

If the source is possibly leaky, carry out the following steps:

- Inform the radiation safety officer
- Take suitable measures to avoid contamination of the environment by the source. Secure the source.
- Inform the responsible authority that a leaky source was detected.

5.5 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

The radiation safety officer is responsible for all matters having to do with radiation protection, especially ensuring that the radiation protection ordinance is observed, and can prescribe appropriate measures if problems or malfunctions occur.

24 hour service hotline

For help with urgent technical problems, call the VEGA service hotline number **+49 1805 858550**.

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Telephone hotline USA
A special telephone hotline is available for the USA:

1-800-367-5383

Outside normal working hours, please leave a message on the answering machine.

The engineer on duty will call you back.

5.6 What to do in case of emergency

Immediate measures

The emergency procedure described here must be applied immediately in the interest of the safety of the staff, in order to secure an area in which an unshielded radiation source exists or is assumed to exist.

An emergency situation exists if a radioactive source is no longer inside the source holder, if the source holder cannot be switched to "OFF" position or if an increased local dose rate has been detected in the proximity of the source holder.

The emergency procedure protects the affected persons until the responsible radiation safety officer arrives and prescribes further measures.

The person charged with the supervision of the radiation source (i.e. the person stipulated and authorized by the plant operator) is responsible for implementing this procedure.

- Determine the dangerous area on site by measuring the local dose rate in µSv/h
- Generously cordon off the affected area with yellow marking tape or rope and mark the area with the international radiation warning symbol

The source holder cannot be brought into position "OFF"

In this case, the source holder must be dismounted. The radiation safety officer has to prescribe dismounting.

Direct the exit channel towards a thick wall (e.g. of steel or lead) or mount a blind flange in front of the exit channel.

Persons may only stand behind the source holder. Never stay in front of the radiation exit channel (flange or mounting surface of SHLD1).

The transport lug on the housing facilitates safe handling.

The source is no longer in the source holder

In this case, the source must be kept secure in another place or an additional shielding must be provided.

The source may only be transported with pliers or a gripper and the distance to the body must be kept as large as possible.

The time required for transport should be estimated and optimized in advance through tests and training.

Informing the responsible authority

- Pass all necessary information immediately on to the responsible local and national authorities
- After a thorough investigation of the situation on site, the responsible radiation safety officer must agree, together with the local authorities, on appropriate corrective measures for the existing problem

Note:
National regulations can prescribe deviating procedures and notification requirements.

6 Supplement

6.1 Technical data

Source and vessel characteristics

Source	Cs-137
Attenuation factor F_S of the source holder	46
Number of half value layers of the source holder	5.5
Max. activity of the source	max. 3.7 GBq (100 mCi)

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