Operating Instructions

VEGASOURCE 85

Source holder

Document ID: 1008683

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Editing status: 2026-04-28

1 About this document

1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, safety and the exchange of parts. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This instruction manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used

Document ID
This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on **www.vega.com** you will reach the document download.

Information, note, tip: This symbol indicates helpful additional information and tips for successful work.

Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.

Caution: Non-observance of the information marked with this symbol may result in personal injury.

Warning: Non-observance of the information marked with this symbol may result in serious or fatal personal injury.

Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Disposal
This symbol indicates special instructions for disposal.

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2 For your safety

2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained and authorized personnel.

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:

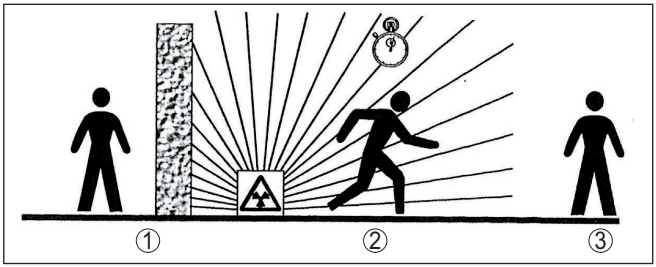

Fig. 1: Measures for protection against radioactive radiation

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.

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Radiation safety officer

The operating company 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.

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.

2.2 Intended use

When in operating mode, the source container VEGASOURCE 85 described in this document contains a radiactive source for radiometric level, interface and switching measurement as well as mass flow detection. 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*".

2.3 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.

2.4 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 operating company 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 operating company has to implement suitable measures to make sure the instrument is functioning properly.

During the entire duration of use, the operating company is obliged to determine the compliance of the necessary occupational safety

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measures with the 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.

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 us. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by us must be used.

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

2.5 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).
- 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.
- Always secure the switch position "*OFF*" with a lock.

The combination lock can be opened with the number combination **000** on delivery.

We recommend changing the number combination to a personal number sequence. Make a note of the number combination and keep it in a safe place.

2.6 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 (NEC - NFPA 70) (USA).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code (CEC Part I) (Canada).

2.7 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*"

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3 Product description

3.1 Configuration

Type label

The type labels contain the most important data for identification and use of the source holder and the source:

- **Source holder**
- Order code
- Serial number - Source holder
- Exit angle
- QR code
- Article number - Documentation

- **Source**
- Isotope contained
- Activity
- Country of origin
- Serial number - Source
- Loading date

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

Versions

There are several versions available with different options for opening or blocking the beam exit. Apart from the manual versions, there are also a version with pneumatic switching ON/OFF.

Features of the versions

	X Manually	C Manually	B Pneumatics
Manual switching ON/OFF	●	●	–
Pneumatic switching ON/OFF	–	–	●
Cover (optional)	●	●	–
Padlock for position "*ON/OFF*"	–	●	–
Padlock for position "*OFF*"	●	●	●
With electrical ON/OFF position switch (optionally)	●	●	●
With Interlock switch (optionally)	●	●	–

Tab. 1: Features of the instrument versions

Position of the type labels

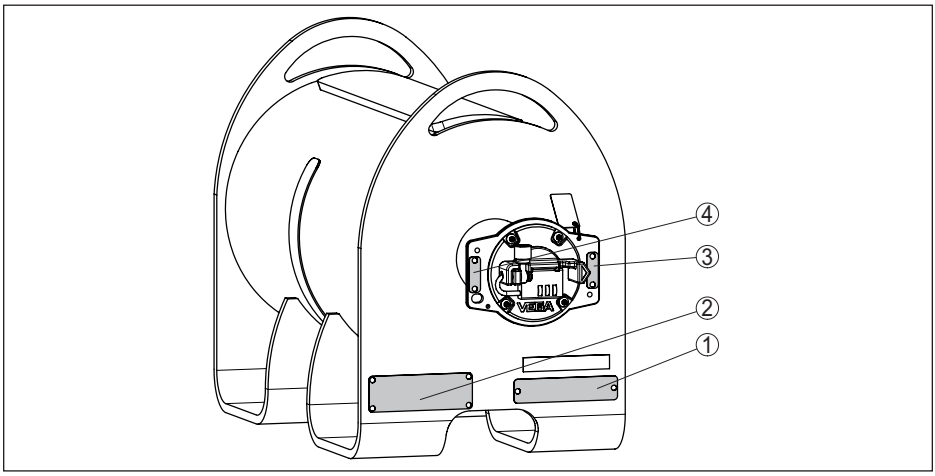

Fig. 2: Position of the type labels, e.g. version X, C - Manual switching ON/OFF

1 Type label - Source holder
2 Type label - Source
3 Position indication "OFF"
4 Position indication "ON"

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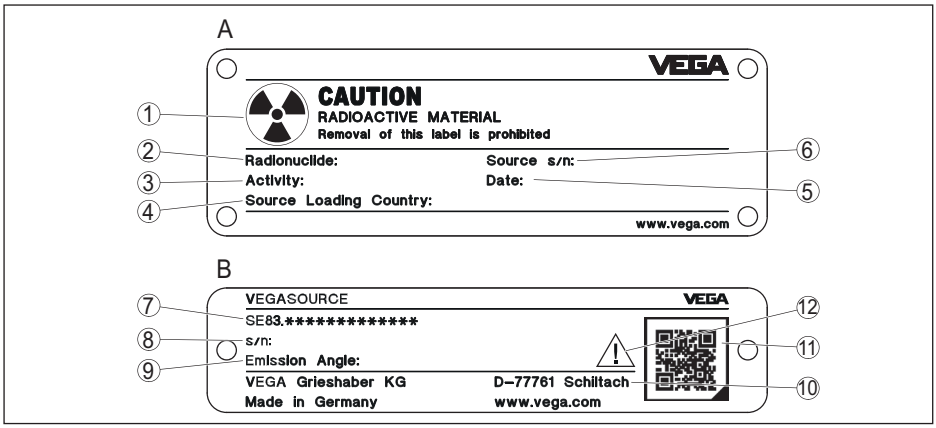

Fig. 3: Type label, e.g. version X, C - Manual switching ON/OFF

A Type label - Source
B Type label - Source holder
1 Warning - Radioactivity
2 Source: Co-60
3 Activity of the sources in MBq and mCi or GBq and mCi
4 Country of origin of the source
5 Loading date of the sources (MM/YYYY)
6 Serial number of the source capsule (for traceability of the source)
7 Order code - Source container
8 Serial number - Source holder
9 Beam exit angle
10 Manufacturer
11 QR code
12 Number of the corresponding operating instructions

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)
- Test certificate (PDF) - 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 QR-code on the type label of the device or
- Enter the serial number manually in the app

Scope of delivery

The scope of delivery typically consists of the following components.

- Source holder
- Documentation

- This operating instructions manual
- Certificate of the source (source capsule)
- If necessary, further certificates

3.2 Principle of operation

Application area

The VEGASOURCE 85 is a source holder for shielding radioactive sources Co-60.

The radioactive source in the source container emits gamma rays. The VEGASOURCE 85 is mounted on the vessel or the pipeline 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 VEGASOURCE 85 consists of the components:

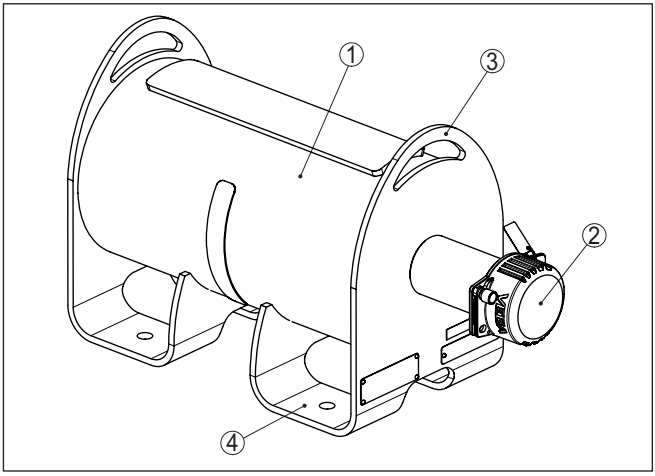

Fig. 4: Source holder VEGASOURCE 85

1 Source holder
2 Cover (optional)
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.

Local dose rate

Country	USA	Europe II	Europe	China II	China
Distance m (in)	0.3 m (1 ft)	1 m (3.3 ft)	0.3 m (1 ft)	0.05 m (0.16 ft)	0.05 m (0.16 ft)
Field (µSv/h)	50 µSv/h 5 mR/h	3 µSv/h 0.3 mR/h	3 µSv/h 0.3 mR/h	25 µSv/h 2.5 mR/h	2.5 µSv/h 0.25 mR/h
Max. activity - Co-60	500 mCi	300 mCi	100 mCi	100 mCi	10 mCi

Tab. 2: Local dose rate at standard distance

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

3.3 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The device packaging consists of wood. This material is environment-friendly and recyclable. Dispose of the packaging material via specialised recycling companies.

For transport, the source holder is fixed to the bottom plate of a wooden transport box.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

A seal is located on the outside of the transport packaging indicating that the packaging was not opened. Check the condition of this seal and record the intactness.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

According to the IAEA regulations, the source container serves adequately as type A packaging for the sources. For transport, the source holder is fixed on a transport board and protected by a wooden box.

Warning:
Check the hoisting equipment for sufficient lifting capacity. You can find the weight of the source holder in the "*Technical data*".

Persons must never stand beneath the loads.

When transporting, proceed according to the following illustrations.

We recommend using a lift truck or a fork truck for transport to the place of use.

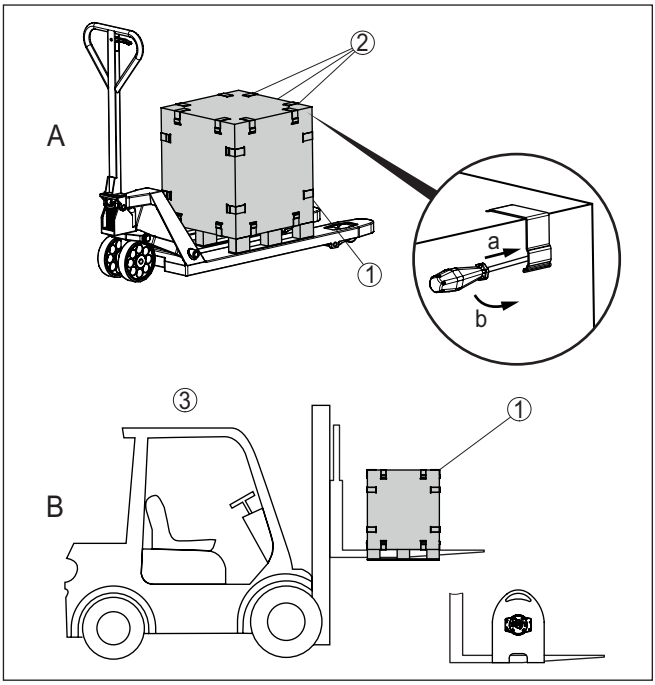

Fig. 5: Pallet transport of the type A packaging

A Transport with lift truck
B Transport with fork truck
1 Source holder in wooden box
2 Safety latches
3 Fork truck or other lifting vehicle
a Insert slotted screwdriver into the recess
b Lever the slotted screwdriver forward to release the tension lock

For the removal of the source holder, we recommend the use of suitable lifting equipment such as lifting bands, crane hooks, etc.

Note:
Additional equipment such as the ON/OFF position switches or a pneumatic switching ON/OFF change the centre of gravity of the source holder.

Please keep this mind while lifting the source holder out of the transport box.

- Open the tension locks of the box lid with a large slotted screwdriver as shown in the illustration.
- Remove the box lid and take loose accessories out of the box.
- Open the tension locks on the side walls of the box with a large slotted screwdriver
- Remove the side walls of the box down to the base plate
- Guide the lifting bands through the ring eyelets on the side of the source holder

- Remove the transport screw connections to the base plate
- Slowly lift the source holder upwards from the bottom plate using the lifting bands

Crane transport

Use the lifting lugs of the source holder for transport on a crane.

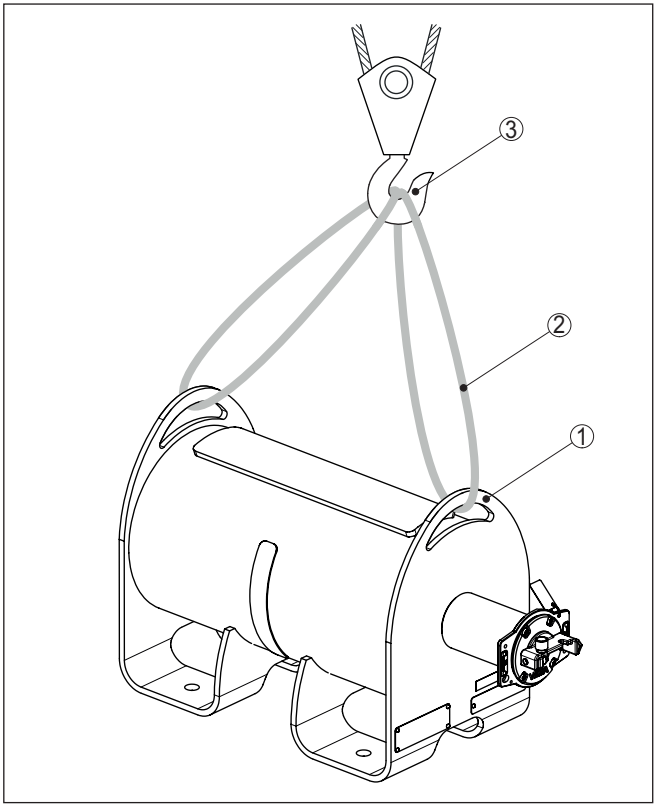

Fig. 6: Crane transport of the source holder

1 Lifting lugs
2 Lifting strap
3 Crane hooks

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Ambient temperature for storage and transport see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative moisture 20 … 85 %

3.4 Shipment

Transport regulations

Radioactive sources are subject to strict regulations. Therefore, when shipping the sources, we are bound to the respective regulations of the country where they will be used.

Germany

We are only allowed to ship radioactive sources when we have a copy of the handling permit in hand. We can assist you with the procurement of the necessary documents. If you need help, contact our responsible sales organisation.

For safety reasons and to save costs, we always ship the source holder with the source installed. If the operator needs the source holder in advance, the source has to be shipped separately at a later time. In such cases, the source is shipped in a transport drum.

Other countries

We are only allowed to ship radioactive sources when we have a copy of the import license in hand. We can assist you with the procurement of the necessary documents. If you need help, contact our responsible sales organisation.

We can only ship to foreign countries when the radioactive source is mounted in the source holder.

During shipment, the source holder is in switch position "*OFF*". This position is secured by a lock.

Transport of the loaded source holder is carried out by a company authorized by us, with official approval for such transports.

The transport is carried out in a type A packaging (source holder) in compliance with the European and international convention on the transport of dangerous goods (ADR and DGR/IATA regulations).

3.5 Accessories

Protective cap

To protect the switching mechanism of the VEGASOURCE 85 from dirt or contamination, a metallic protective cap is available.

This also allows the padlock to be permanently protected from dirt, moisture and corrosion.

The protective cap can only be used on the devices with manual switching ON/OFF.

The protective cap is available as an accessory and can also be retrofitted.

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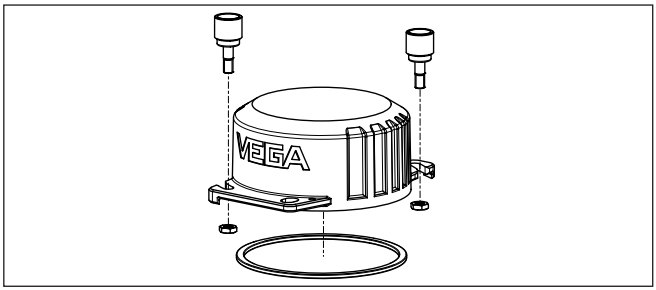

Fig. 7: Protective cap (optional) to protect against dirt and corrosion

Gamma modulator

In order to exclude external interference radiation, you can mount a gamma modulator in front of the source holder. This allows reliable measurement even when interference radiation occurs.

For ambient temperatures up to +120 °C (+248 °F) the gamma modulator is optionally available with water cooling.

Any number of devices can be synchronized. To synchronize several gamma modulators, you need a controller.

Set of labels

There is a special label set for the source holder which can be ordered as a spare part.

4 Mounting

4.1 General instructions

General information

- For mounting of VEGASOURCE 85 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.
- When mounting, take the weight of the source holder into account. The device weight can be found in chapter "*Technical data*".
- Depending on the version, the centre of gravity of VEGASOURCE 85 can vary. Keep this in mind during crane transport on the lifting lugs.

Mounting with a crane

Warning:
Check the hoisting equipment for sufficient lifting capacity.

You can find the device weight in the "*Technical data*".

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 lifting lugs of the source holder.

Use a suitable lifting tackle (lifting strap, etc.) to fasten the source holder to the crane hook.

Moisture

Versions with manual switching ON/OFF
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.

If you expect heavy soiling or dust on the source holder, use the optional protective cap.

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.

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

4.2 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 VEGASOURCE 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.

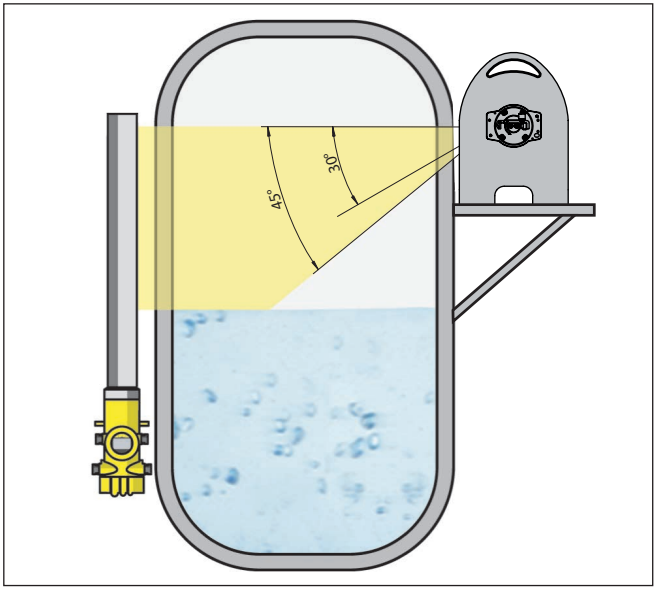

Fig. 8: Orientation - Source holder
Beam angle 30° and 45°

Screw locking device

The source holder must be included in the potential equalization of the plant. For this purpose, the mounting bracket must be electrically connected to ground potential.

To ensure a good electrical contact between the source holder and the mounting bracket, the lock washers must be used according to the following illustration.

Use the prescribed torque for the mounting screws. Make sure that the screws have electrical contact to the potential equalization.

Material	Strength class	Torque	Friction coefficient
Stainless steel	70	50 … 140 Nm	1.4
Steel	8.8	50 … 140 Nm	1.4

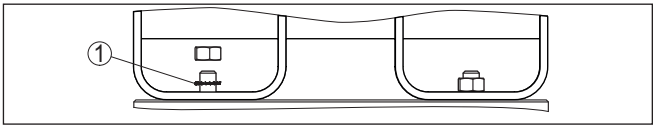

Fig. 9: Lock washers (customer side) as screw locking device and conductive connection to potential equalization

1 Lock washers (2 pieces)

Cover (optional)

To protect the switching mechanism of the VEGASOURCE 85 from dirt or contamination, a metallic protective cap is available.

This also allows the padlock to be permanently protected from dirt, moisture and corrosion.

The protective cap can only be used on the devices with manual switching ON/OFF.

1. Put on protective cap

   Turn the protective cap 180° if it does not fit correctly.
2. Turn the protective cap clockwise until the straps are below the fastening screws.
3. Tighten the fixing screws manually

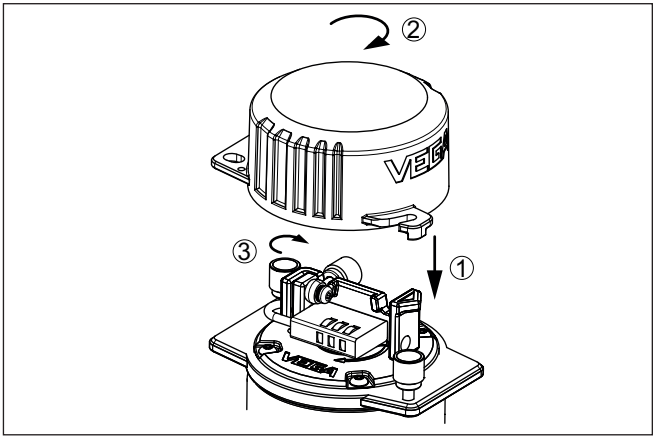

Fig. 10: Putting on the protective cap

1 Put on protective cap
2 Turn the straps of the protective cap under the fastening screws
3 Tighten fixing screws

The switching status of the source holder can also be seen when the protective cap is in place.

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Due to the special design, the lid can only be put on in such a way that the visible indication plate on the source holder shows the current switching status.

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 (mR/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.

5 Installation - Special equipment

5.1 Version B: Connection - Pneumatic switching ON/OFF

5.1.1 Connection of the ON/OFF position switches

These instructions apply to source holders VEGASOURCE 85 Versions B with pneumatic switching ON/OFF.

The ON/OFF position switches signal the switching status of the source holder. We recommend connecting ON/OFF position switches. They give reliable feedback, indicating if the switching ON/OFF has really reacted to the pneumatic switching impulse.

Safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed

Potential equalisation

The ON/OFF position switches are already mounting and connected in the terminal housing to the terminals.

Connect the ON/OFF position switches according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGASOURCE 85 to vessel ground (PA), or in case of plastic vessels, to the next ground potential.

The data for power supply are specified in chapter "*Technical data*".

Connection cable

The instrument is connected with standard two-wire cable without shielding.

Use cable with round cross-section. A cable outer diameter of 5 … 10 mm (0.2 … 0.39 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Electrical connection

Connect the ON/OFF position switches as shown in the figure below.

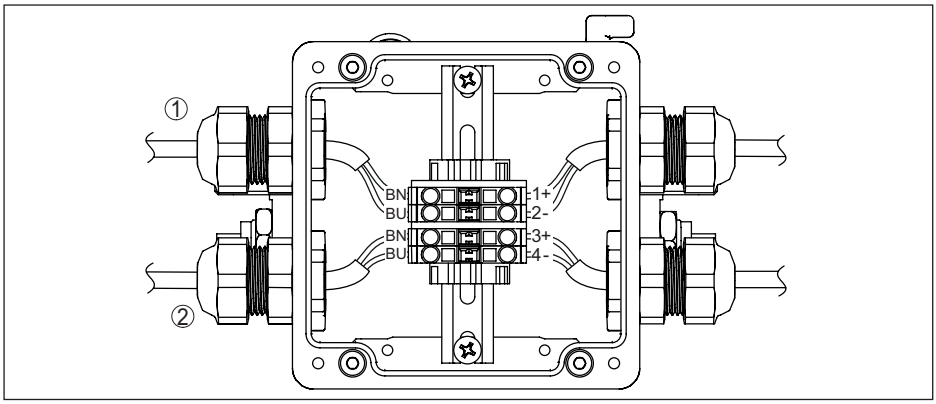

Fig. 11: Connection terminal housing of the ON/OFF position switch

1 ON/OFF position switch for switch position "ON" (terminals 1 and 2)
2 ON/OFF position switch for switch position "OFF" (terminals 3 and 4)

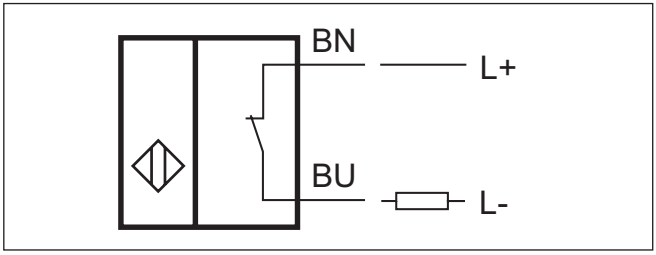

Fig. 12: Wiring plan - ON/OFF position switches

Switching amplifier

For signal processing you need a switching amplifier. We recommend the double channel switching amplifier VEGATOR 112.

5.1.2 Compressed air connection

These instructions apply to source holders VEGASOURCE 85 Versions B with pneumatic switching ON/OFF.

Note:
The pneumatic switching ON/OFF may only be put into operation after the source holder is mounted.

Connection of the pneumatic lines

The compressed air line is connected to the free ¼‘ NPT connection thread (7). An adapter is included in the scope of delivery to convert from ¼’ NPT to G¼

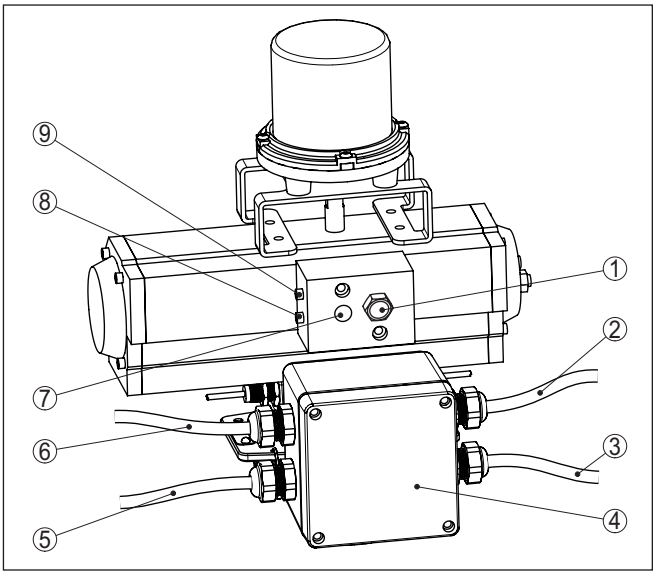

Fig. 13: Connection of the pneumatic lines on VEGASOURCE 85 - version B

1 *Ventilation filter/Sound absorber*
2 *Voltage supply*
3 *Voltage supply*
4 *Terminal housing for connection of the ON/OFF position switches*
5 *ON/OFF position switch for switch position "OFF" (terminals 3 and 4)*
6 *ON/OFF position switch for switch position "ON" (terminals 1 and 2)*
7 *NPT ¼" thread for connection of the compressed air*
8 *Adjusting screw - switching speed switch-on operation*
9 *Adjusting screw - switching speed switch-off operation*

Use an electrical switching valve in the pneumatic line (e.g. Festo CPE). With this, you can switch off the air supply.

Optionally you can install an additional hand-operated switching valve (e.g. Festo VHEM) in the pneumatic line. In emergencies you can then interrupt the pneumatic air supply on site and switch off the source holder. Mount this hand-operated switching valve in a safe position outside the radiated area.

5.2 Version X, C, B: Connection - Manual switching ON/OFF

5.2.1 Connection of the ON/OFF position switches

These instructions apply to source holder VEGASOURCE 85 version X, C with electrical ON/OFF position switches.

The ON/OFF position switches signal the switching position of the source holder. We recommend connecting the ON/OFF position switches. They provide reliable feedback on the condition of the source holder.

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Safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed
- Only for use in non-hazardous areas

Connection cable

The instrument is connected with standard two-wire cable without shielding.

Use cable with round cross-section. A cable outer diameter of 5 … 10 mm (0.2 … 0.39 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Electrical connection

The ON/OFF position switches are already mounting and connected in the terminal housing to the terminals.

Connect the ON/OFF position switches according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGASOURCE 85 to vessel ground (PA), or in case of plastic vessels, to the next ground potential.

The data for power supply are specified in chapter "*Technical data*".

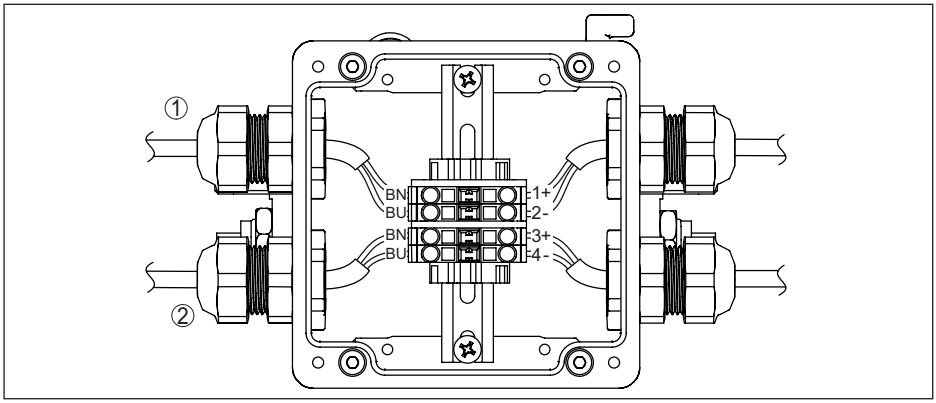

Fig. 14: Connection terminal housing of the ON/OFF position switch

1 ON/OFF position switch for switch position "ON" (terminals 1 and 2)
2 ON/OFF position switch for switch position "OFF" (terminals 3 and 4)

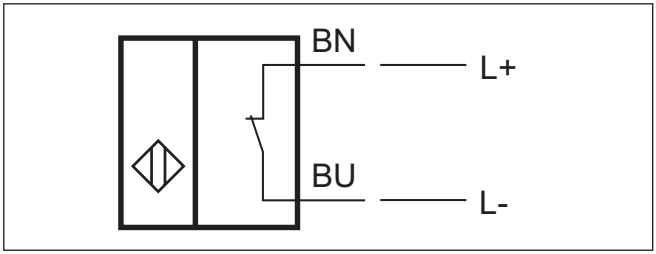

Fig. 15: Wiring plan - ON/OFF position switches - NAMUR

Switching amplifier

For signal processing you need a switching amplifier. We recommend the double channel switching amplifier VEGATOR 112.

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6 Setup

6.1 Adjustment - Version X, C - Manual switching ON/OFF

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.

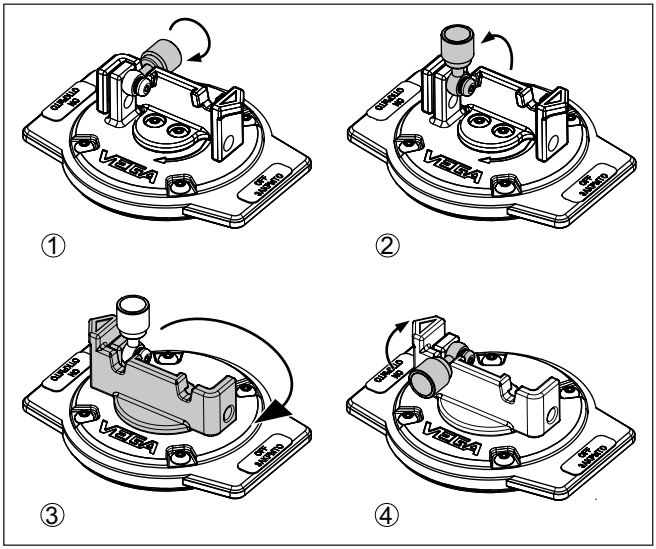

Fig. 16: Switching the radiation on - VEGASOURCE 85 version X, C

1 Loosen safety screw
2 Fold up the safety screw
3 Turn stirrup by 180°
4 Fold up and tighten safety screw.

1. Initial situation: Source holder is in position OFF
2. Open and remove padlock

Note:
The combination lock can be opened with the number combination **000** on delivery.

We recommend changing the number combination to a personal number sequence. Make a note of the number combination and keep it in a safe place.

3. Loosen safety screw (1)
4. Fold up the safety screw (2)
5. Turn the stirrup clockwise by 180° (3)

6. Fold up and tighten safety screw (4)
7. Put on the protective cap (optional), if available

Note:
The current switching status is indicated by the narrow-shaped arrow of the stirrup. The arrow of the stirrup points in the direction of the sign "*ON*".

Indication of the switching status

Radiation "ON"
The marking arrow of the stirrup points to "*ON*".

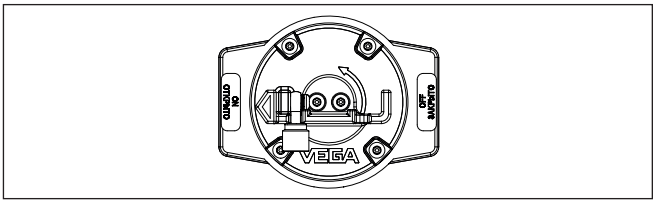

Fig. 17: Radiation "ON" - VEGASOURCE 85 Version X, C

Radiation "OFF"
The marking arrow of the stirrup points to "*OFF*".

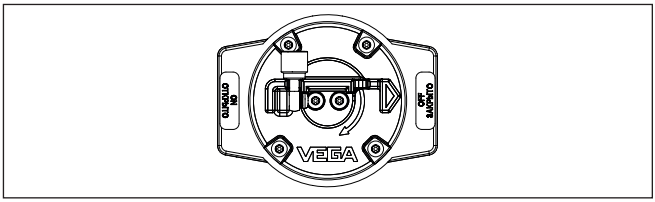

Fig. 18: Radiation "OFF" - VEGASOURCE 85 Version X, C

Switching the radiation off

Switching off the radiation is analogous to this procedure. To switch off the radiation, turn the stirrup 180° anticlockwise.

Position indication with protective cap

If a protective cap (optional) is fitted, then the protective cap cannot be placed on the source holder in any position.

The strap of the protective cap only shows the respective switching position.

If the protective cap cannot be put on in a certain position, turn the protective cap 180°.

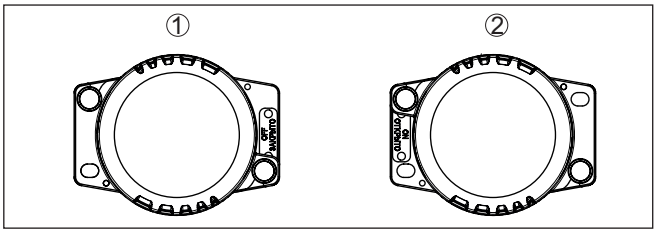

Fig. 19: Position indication with protective cap - VEGASOURCE 85 Version X, C

1 Radiation "OFF"
2 Radiation "ON"

Version X

With version X, the protective cap can be secured with a padlock in OFF position

Version C

With version C, the protective cap can be secured with a padlock in OFF or ON position

6.2 Adjustment - Version B - Pneumatic switching ON/OFF

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.

Note:
The pneumatic actuator must not be used under ambient conditions that can cause corrosion in and on the pneumatic actuator.

Switching the radiation on

Initial situation: Pneumatic switching ON/OFF is connected correctly. You can find the required pressure values under "*Technical data*" in the annex.

The source holder is in OFF position.

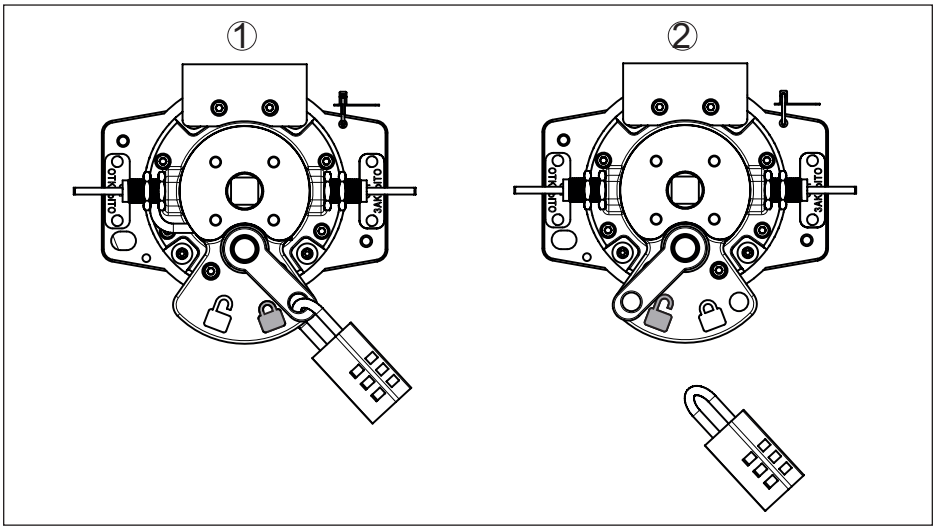

Fig. 20: Indication of the switching status with VEGASOURCE 85 - Version B - Pneumatic switching ON/OFF

1 Switching status "OFF" (symbol: closed padlock)
2 Switching status "ON" (symbol: open padlock)

- Remove padlock

Note:
The combination lock can be opened with the number combination **000** on delivery.

We recommend changing the number combination to a personal number sequence. Make a note of the number combination and keep it in a safe place.

Note:
The padlock must only be fitted again for inspection purposes (OFF position) and should be stored in a suitable place or outside the plant until then.

Do not hang the padlock during operation in the opening of the OFF switching position, because otherwise the pneumatic switching ON/OFF cannot switch to the end position.

- The pneumatic switching ON/OFF can now be operated

Warning:
Do not touch the operating lever when the drive is pressurized.

Indication of the switching status

Radiation "ON"
The operating lever is at the switching symbol "*ON*" (open padlock)

Radiation "OFF"
The operating lever is at the switching symbol "*OFF*" (closed padlock)

Switching the radiation off

Analogue to this procedure, the radiation is switched off via the compressed air controls.

When the pneumatic switching ON/OFF is unpressurized, the VEGASOURCE 85 switches back automatically to switch position "*OFF*".

7 Maintenance and fault rectification

7.1 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 ON/OFF) 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.

7.2 Maintenance

If the device is used properly, no special maintenance is required in normal operation.

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 insert, the lock, the lock washers
- Test of the mobility of the source insert (switching ON and OFF function)
- Assessment of the legibility of all labels and warning signs
- Stability and firm attachment of the source holder

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 resp. mR/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.

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Warning:
Source containers with corroded locking device or source insert must be replaced immediately.

7.3 Test of the switching ON/OFF

Test the function of the switching ON/OFF on the source holder at regular intervals.

Function test

Source holder with manual switching ON/OFF

1. Loosen the locking screw (version X and C) and remove the lock (if present) as described in chapter "*Setup*".
2. Move the source insert as described in chapter "*Setup*" several times from the ON to the OFF position and vice versa. The source insert should be easily movable and must have no traces of corrosion in the visible area.

   If the source insert 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 source insert 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 ON/OFF

1. Remove the padlock (see chapter "*Setup*")
2. Switch the source insert by means of compressed air from the position "*OFF*" to position "*ON*". The source insert should move without interruption to position "*ON*".

Caution:
Do not grasp into the display window of the indication plate while the pneumatic actuator is switching over.

3. Reduce the pressure to below 2.5 bar (36 psi). The source insert must move back to position "*OFF*.

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

   If the source insert 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*".

Measure the local dose rate

Measure the local dose rate of the source holder at regular intervals and document the measurement results.

The measurement data allow conclusions to be drawn about leaks and possible changes in radiation power.

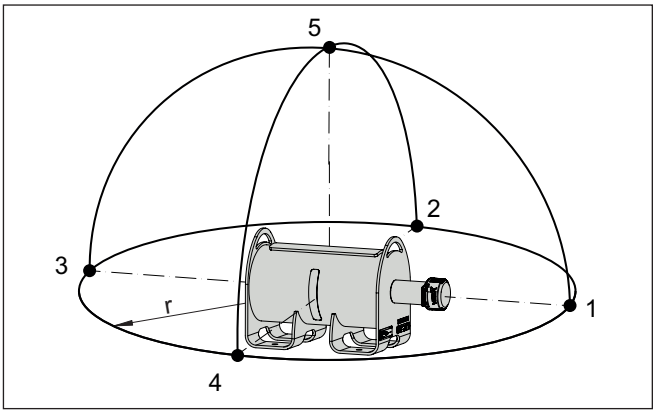

Fig. 21: Measuring points for the measurement of the local dose rate

r Distance to the source holder
1-5 Measuring points

Always use the same distance (r) from the source holder to the measuring points.

Document the measurement results.

Date of the measurement **Time of the measurement**	**dd/mm/yyyy** **hh:mm**	
Measuring distance r		
Value of the last measurement (µSv)	**Measuring point**	**Measured value (µSv)**
	1	
	2	
	3	
	4	
	5	

Tab. 4: Measurement protocol for the local dose rate

7.4 Leakage/contamination test

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

Note:
A contamination 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 contamination 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 contamination test must be carried out immediately after an incident.

The contamination 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

Contamination test procedure

The contamination test (also wipe test) must be carried out by an authorized person or organisation with a contamination test facility provided by an authorised organisation. Contamination test facilities 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 contamination test as follows:

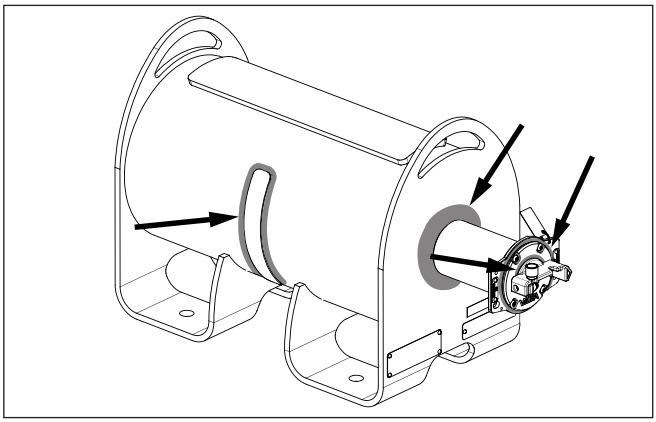

Fig. 22: Wiping surfaces for the contamination test - Version X, C

1. Take wipe samples from at least the following locations:

   Version X, C - Manual switching ON/OFF:

   Along the groove between the source insert and the housing

   Version B - Pneumatic switching ON/OFF:

   Along the thread of the ON/OFF position switches and the three ring-shaped grooves on the cylinder housing

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

   On source holders with pneumatic switching ON/OFF, the switch must be fixed with the lock in position "*OFF*" before starting the contamination test.
2. 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 contamination 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.

7.5 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.

7.6 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 (mR/h)

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- 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 or blind plate in front of the exit channel.

Persons may only stand behind the source holder. Never stay in front of the radiation exit channel.

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 radiation source may only be transported with tongs or a gripper as well shielded as possible and must be kept as far away from the body 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.

8 Dismount

8.1 Dismounting steps

As soon as a radiometric measuring system is no longer required, the radiation must be switched off on the source holder (position "*OFF*").

The source holder must be dismounted under consideration of all relevant regulations and stored in a lockable room without through traffic.

Inform the responsible authorities of this measure.

The access area for this storage room must be measured (µSv/h resp. mR/h) and marked. The radiation safety officer is responsible for implementing anti-theft measures.

Care must be taken that the source in the source holder is not scrapped together with the rest of the system.

Arrange for a return shipment as soon as possible.

Caution:
Dismounting 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 existing handling permit.

All local conditions must be taken into account.

All work must be carried out in the shortest possible time and at the largest possible distance (shielding). Also, the endangering of other persons must be avoided through suitable measures (e.g. safety fence, etc.).

The source holder may only be dismounted when the radiation is switched off. Make sure that the switch position "*OFF*" is secured by a lock.

Note chapters "*Mounting*" and "*Setup*" for dismounting and carry out the described steps in reverse order.

8.2 Return, transport

Federal Republic of Germany
Contact the responsible sales engineer to arrange for a return, to check on the possibility of reuse or disposal.

Other countries
Contact the responsible sales partner to arrange for a return, to check on the possibility of reuse or disposal.

Also inform the relevant authority.

If a return in your country is not possible, contact the respective sales partner to decide on further action.

The destination airport for a possible return shipment is Frankfurt a. M., Germany.

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Note:
Take pictures of the condition of the source holder for documentation purposes. This is recommended if the source holder or parts of it are corroded or damaged.

Note:
Prior to return, a *Recurring test before return shipment* must be carried out by an authorised person.

See also information on "*Autorised personnel*" in chapter "*For your safety*" and the test instructions in chapter "*Maintenance and fault rectification*".

Conditions for a return shipment
The following conditions must be fulfilled before return shipment. See also checklist in chapter "*Checklist Type A packaging*" (recurring test before return shipment)

- An inspection certificate of the contamination test (wipe test certificate) of the source, which is not older than three months, must be available at the time of return shipment.
- Keep specifications on the serial number of the source capsule, the type of source and the activity or type of source ready. These data are available in the documents supplied along with the source. Enclose a copy of the manufacturer's certificate of the source.
- No significant traces of corrosion on the source holder which could endanger the function or safe storage of the source.
- No serious damage due to fire or mechanical influences (deformations, dents, etc.)
- The switching mechanism of the source holder functions perfectly. Set the source holder to "*OFF*". and secure this position with a lock.
- The return shipment must be made in a type-tested type A packaging in accordance with the requirements of transport law rules (ADR/RID, IATA/DGR). The source holder VEGASOURCE 85 is suitable for return shipment. In case of doubt, your sales partner will provide you with suitable transport packaging.
- Label the package in accordance with the requirements of transport law (ADR/RID, IATA/DGR) and probable deviating national regulations. If necessary, carry out further control measurements in accordance with national and international regulations.

In case of doubt, talk to your relevant authority or an appropriately competent institution.

Re-shipment of a type A packaging
During the initial shipment, we ensure that the source holder meets the requirements of a type A shipping package for safe transport.

In the case of onward or return shipment, the responsibility for the condition of the source holder lies with the subsequent sender. This applies especially if the source holder has been installed in a facility for a longer period of time.

Before each shipment, check that the source holder still meets the specifications of a type A shipping package.

9 Checklist type A packaging

Recurring test for return shipment

Send the completely and correctly completed checklist to VEGA before return shipment.

Requirements for personnel	**OK**
The personnel for diagnosis, maintenance and disassembly must meet the following requirements:	
Trained personnel: has qualifications appropriate to this function and activity	
Instructed and authorised by the plant operator	
Familiar with national regulations	
Before starting work: Read and understand instructions in documentation as well as certificates (depending on the application)	

Company	
Name:	
Address:	
Test engineer name and function:	

Source holder	
Order code:	SE
Serial number of the source holder:	

Source	
Isotope: Cs-137	
Isotope: Co-60	
Serial number of the radioactive source	
Nominal activity (MBq/GBq):	
Manufacturing date:	

Tests	**OK**
Safety instructions in the operating manual of the source holder have been observed:	
An inspection certificate, which is not older than three months and confirms the leaktightness of the radiation source, is available to VEGA (wipe test certificate):	
The vessel does not show any corrosion, especially at the welding seams:	
The vessel does not show any damage:	
ON/OFF mechanism is corrosion-free and functions according to the operating instructions:	
Source holder is shipped in OFF position:	
For shipping, the source holder is placed in position "*OFF*" and secured with a lock:	
Transport index was determined:	
Package has been labelled in accordance with applicable transport regulations (ADR/RID, IATA/DGR) and applicable national rules:	
The return shipment is made in the type-tested type A packaging:	

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Tests	OK
The completely and correctly completed checklist is available to VEGA before return shipment:	

Source holder	
If the above conditions are met, the source holder VEGASOURCE can be returned as type A packaging; however, it must be relabelled.	
Date:	
Signature:	

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10 Supplement

10.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Instrument weight

- With manual switching ON/OFF — approx. 578 kg (1274 lbs)
- With pneumatic switching ON/OFF — max. 600 kg (1323 lbs)
- Protective cap — approx. 0.9 kg (2 lbs)

Process fitting — See figure under "*Dimensions*"

Torque - Mounting screws

Material	Strength class	Torque	Friction coefficient
Stainless steel	7	50 … 140 Nm	
Steel	8.8	50 … 140 Nm	> 1.4

Beam exit channel

- Position — Laterally
  The position of the exit channel is marked in colour.
- Exit angle — 5°, 30°, 40° (± 20°), 45°
  Details see illustration exit angle under "*Dimensions*" in the annex
- Width — 10°
- Attenuation of the useful beam[1] — Co-60: approx. 0.272 half-value layers (attenuation factor F_S 1.21)

Materials

- Process fitting - Mounting holder — 316L
- Outer housing — 316L or steel (1.0619) with PUR textured paint RAL 1018
- Tightness of the source insert — Silicone
- Shielding material — Lead
- Source holder — 316L
- Manual switching ON/OFF — 316L
- Pneumatic switching ON/OFF — 316L

[1] With open beam exit channel

Materials - Device version X, C - Manual switching ON/OFF

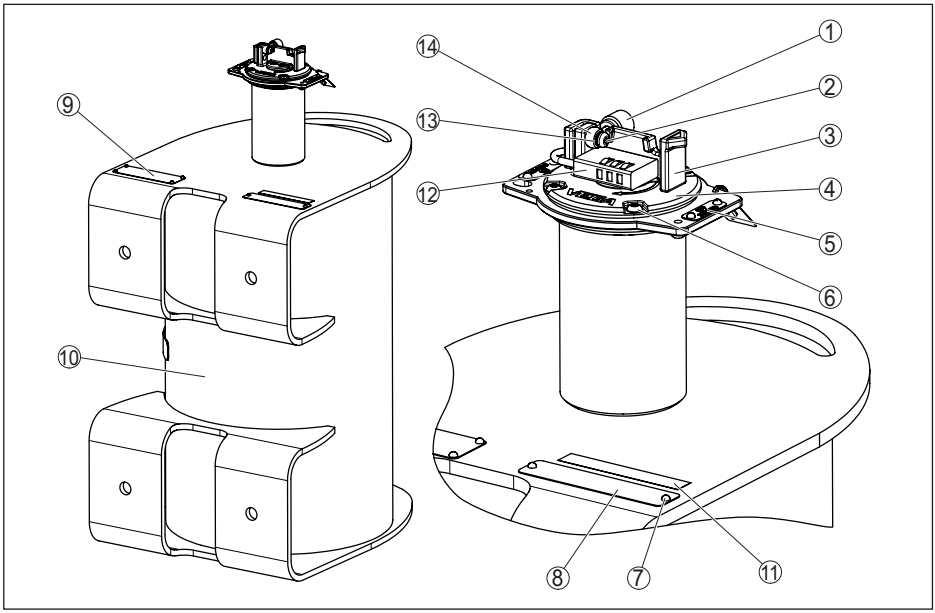

Fig. 23: Materials VEGASOURCE 85 - Version X, C

Position	Component	Material
1	Locking screw	316L
2	Collar screw	316L
3	Rotary handle	1.4408 (CF8M)
4	Closing plate	1.4408 (CF8M)
5	Label - ON/OFF	316L
6	Safety screw - Torx with pin	316L
7	Rivet	316L
8	Type label - Source holder	316L
9	Type label - Source	316L
10	Source holder	316L oder 1.0619
11	Label	Polyester
12	Padlock - Numerical code	Steel
13	Spring ring	1.4568 (17-7PH)
14	Eye-bolt	316L

Pneumatic switching ON/OFF (optional)	
Pivoting range	180°
Compressed air connection	G⅛

Switching pressure	3.5 … 6 bar (51 … 87 psi)
Reset of the switching ON/OFF	by spring force
Compressed air conditioning	Class 3 acc. to ISO 8573-1, pressure dew point 10 K below operating temperature, particle size 40 µm Notes for Europe: For compressed air (gas of group 2), the pneumatic actuator is excluded from the requirements of the Regulation on Pressure Equipment (PED) 97/23/EC based on Article 1, Clause 3.6 of the directive.
Connection data	
– Operating voltage	8 V
– Current consumption - Measuring plate not included	≥ 3 mA
– Current consumption - Measuring plate included	≤ 1 mA

ON/OFF position switch - Two-wire DC (optional)

Switching output	Two-wire DC
Type	Inductive proximity switch
Switching function	Normally closed (NC)
Output polarity	DC
Ambient temperature	-25 … +70 °C (-13 … +158 °F)
Material - Connection cable	PUR, 2 m (6.56 ft)
Connection data	
– Operating voltage	5 … 60 V DC
– Operating current I_L	2 … 100 mA
– Min. operating current I_m	2 mA
– Power in idle state I_r	0 … 0.5 mA (typ.)
– Reverse voltage protection	Integrated

ON/OFF position switch - NAMUR (optional)

Switching output	NAMUR - with safety function
Type	Inductive proximity switch
Switching function	Normally closed (NC)
Ambient temperature	-50 … +100 °C (-58 … +212 °F)
Material - Connection cable	Silicone, 2 m (6.56 ft)
Connection data	
– Operating voltage U_0	8,2 V (R_i ca. 1 kΩ)
– Switching current - open	≥ 3 mA
– Switching current - closed	≤ 1 mA

Source and vessel characteristics	
Number of half value layers of the source holder (Co-60)	11.5 (attenuation factor F_S 2800)
Max. activity of the source	
– Cs-137	370 GBq (10000 mCi)
– Co-60	37 GBq (1000 mCi)

Ambient conditions	
Ambient pressure	Atmospheric pressure
Ambient temperature (flange temperature)	
– VEGASOURCE 85 with manual switching ON/OFF	-50 … +200 °C (-58 … +392 °F)
– VEGASOURCE 85 with pneumatic switching ON/OFF	-20 … +80 °C (-4 … +176 °F)
Vibration resistance	DIN EN 60068-2-64 test Fh; 10 … 2000 Hz; 5 g^2/Hz
Flame resistance	
– Temperature resistance	821 °C (1510 °F) for 30 minutes
– Fire class	F according to IEC 62598

Protective measures	
Protection rating	IPx6 (NEMA Type 4)

10.2 Dimensions

VEGASOURCE 85, Version X, C - Manual switching ON/OFF

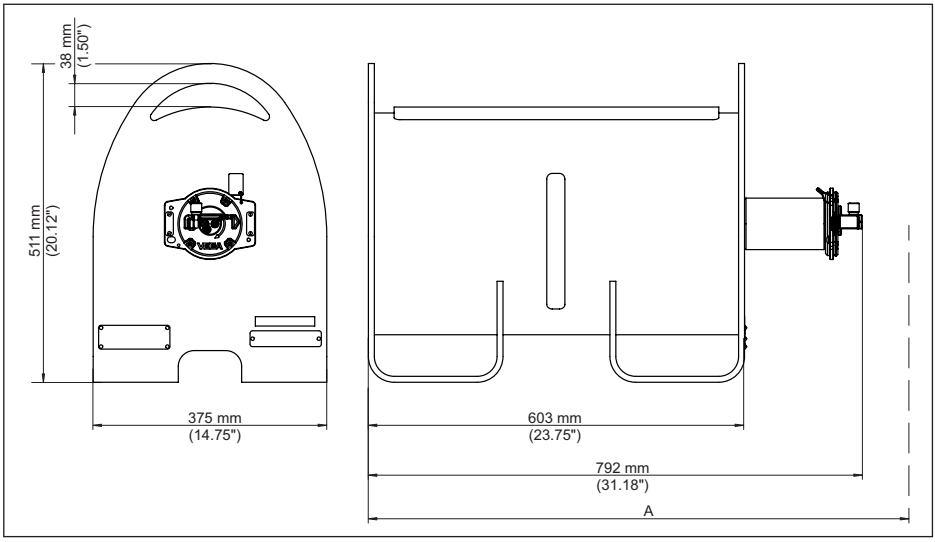

Fig. 24: Source holder VEGASOURCE 85, version X, C - Manual switching ON/OFF

1 Cover (optional)
A Free height for removal of the loading tube = 1250 mm (49 in)

Features

- Stirrup for manual switching ON/OFF
- Padlock for securing the switch position "*OFF*" or "*ON/OFF*"
- Cover (optional)

VEGASOURCE 85, beam exit channel

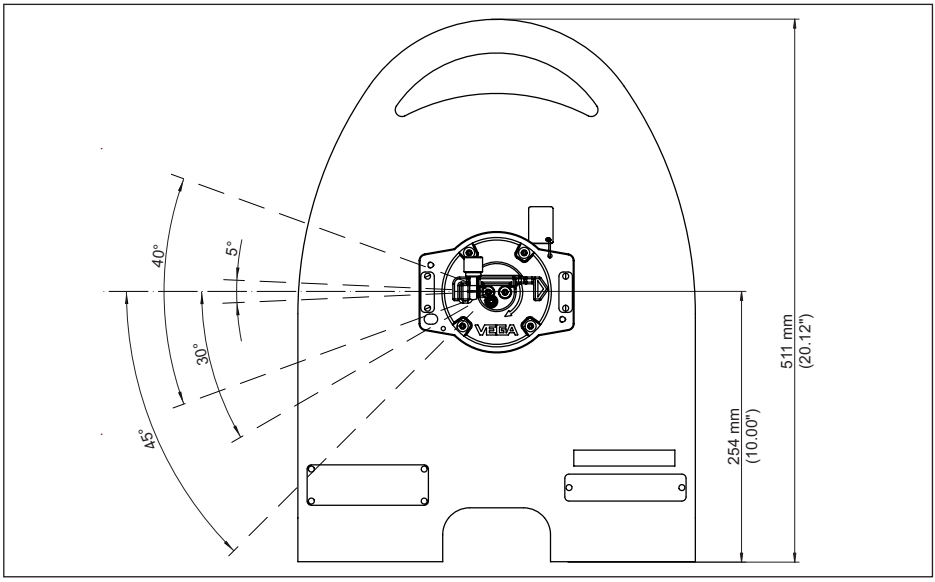

Fig. 25: Beam exit channel (e.g. version X, C)

VEGASOURCE 85, base plate

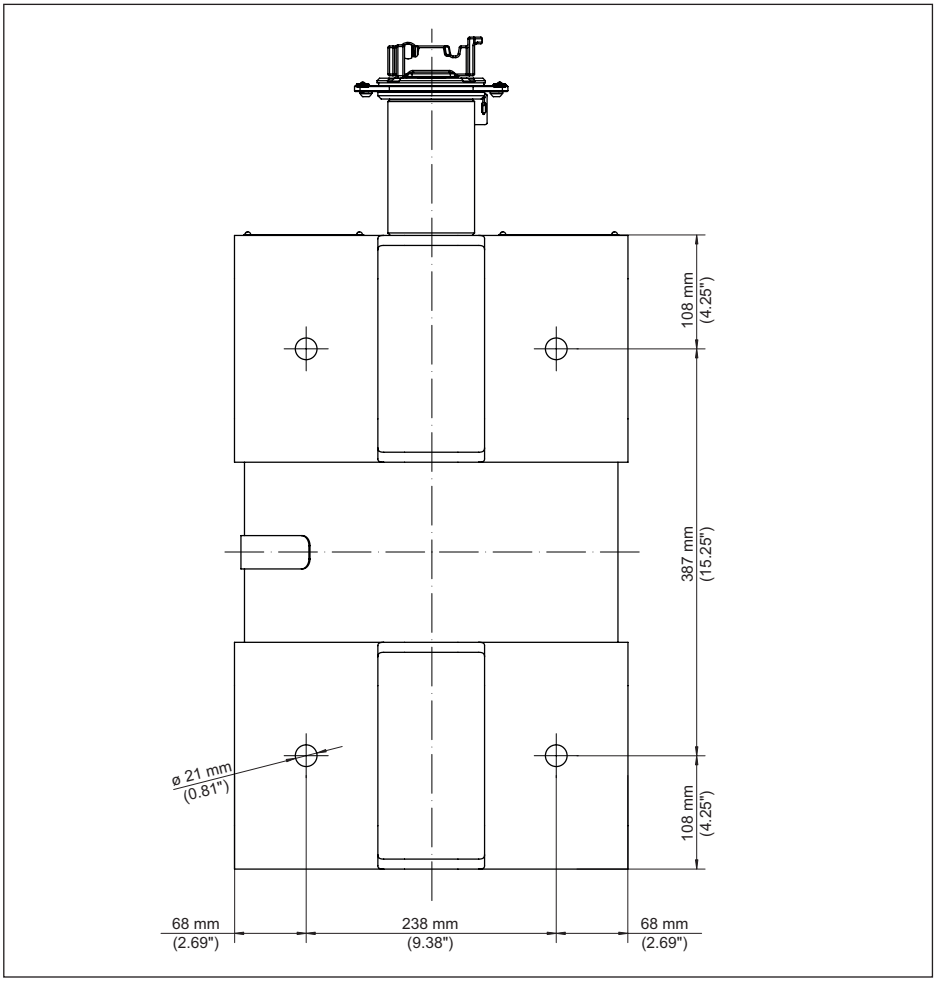

Fig. 26: Base plate with holes (e.g. version X, C)

Gamma modulator (optional)

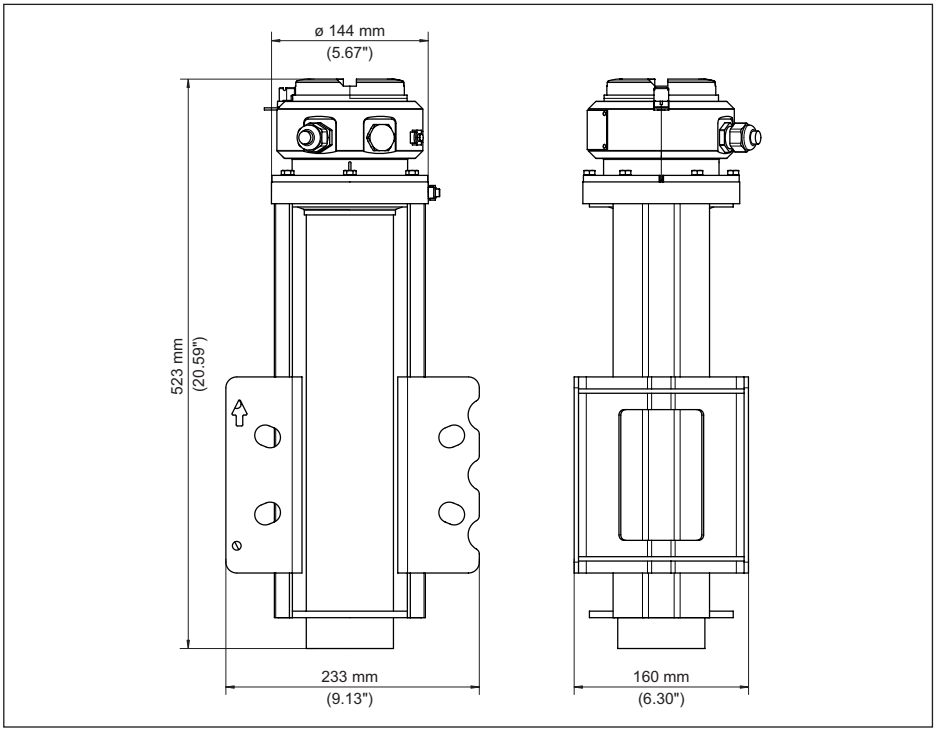

Fig. 27: Gamma modulator for uninterrupted measurement even with X-ray radiation

10.3 Manufacturer declaration

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VEGA Americas, Inc. Sealed Source Container Devices

Declaration of TYPE A Evaluation and Testing

Models: SH-F; SHD: SHGL; SHLG; SR; SHRD; MDTS; SHLM-B, BR, C, CR, CP, & MI; SHRM; SHLD, SE80

VEGA Americas, Inc. (VA) (previously Ohmart) being the manufacturer of the devices listed above confirms the requirements of international transportation of hazardous materials USA DOT 49CFR173.410 & 412, and IATA/DGR (2015) for TYPE A packaging. They are appropriate for transportation of special form radioactive material meeting the classification testing of ANSI/HPS N43.6-1997.

The requirements for qualification to be listed as TYPE A packaging was completed according to IAEA-SSR-6 (2012) section IV and documented by internal test reports.

VA designs and manufactures the device to meet the test conditions of the IAEA requirements for "TYPE A" radioactive package shipping container as outlined. These test requirements are adopted by the Nuclear Regulatory Commission (NRC), the USA Department of Transportation (US DOT), and International Air Transport Association Dangerous Goods Regulations (IATA DGR) and incorporated into their requirements for the radioactive TYPE A package. The development, design, review, and testing of the source containers at VEGA Americas is in accordance with VA ISO 9001:2008 certification and Quality Management System. It is outlined in the Engineering Product Development procedure, 230-01.

NOTE: VA cannot guarantee that the condition of the source holders will continue to meet these specifications after initial shipment to a customer and mounted for use. It will be the responsibility of any subsequent shipper to ensure the holder is in a condition to meet the requirements to be shipped as a "TYPE A" radioactive package.

Lee Dallman, PE, Director of Engineering

Gretchen Lisi, Quality Manager

450-02-009-R3
Ref: 450-02-009

Rev: 1
11/29/2021

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1008683-EN-260504

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Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
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1008683-EN-260504

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