



Product information

Radiation-based

Level measurement and level detection

FIBERTRAC
SOLITRAC
MINITRAC
POINTRAC



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Take note of safety instructions for Ex applications



Please note the Ex specific safety information that you can find at www.vega.com and that comes with each instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

1 Measuring principle

Measuring principle

Gamma rays can penetrate matter. During the transit, part of the radiation is absorbed depending on the density and thickness of the medium. In radiometric level measurement or level detection, this physical property is used to measure contactlessly through closed vessels from the outside.

A detector detects the intensity of the gamma rays from a radiation source. If medium is between detector and radiation source, a corresponding portion of the radiation is absorbed. The measurement is performed contactlessly from outside the vessel and hence suitable for extreme applications, for example in very corrosive, aggressive and abrasive products.

Source holder

A Caesium source with low radiating intensity is enclosed in a source holder. The container consists of a lead-filled steel mantle that absorbs the gamma rays of the radioactive source, lowering them to permissible limit values. The focused radioactive rays can escape through a defined radiation channel. Through a 180° rotation of the insert, the radiation channel is opened and the radiating source is swivelled into the radiation channel. The radioactive rays can thus escape.

The switch position (ON or OFF) is clearly visible from outside. The switch position "OFF" can be secured with a padlock.

A fire-proof version with an expansion tank is optionally available. In case of fire, the liquefied lead can spread into the expansion tank.

Sensor

The source holder with the source and a detector of type FIBERTRAC or SOLITRAC are usually mounted on opposite sides of a vessel at the height of the requested measuring range. The strength of the received radiation is inversely proportional to the filling in the vessel. From this the detector calculates the level or the height of an interface.

The radiometric sensor of type SOLITRAC is especially suitable for cylindrical vessels as well as small tanks. Its robust PVT detector reliably and accurately detects levels as well as interfaces. The max. measuring length is up to 3 m. For larger measuring ranges, as many sensors as required can be mounted one after the other (cascading).

The radiometric sensor type FIBERTRAC is especially suitable for round and conical vessel shapes as well as tall vessels. Its flexible plastic detector fits perfectly to the vessel geometry. The max. measuring range is up to 7 m. As many sensors as required can be cascaded.

The radiometric sensor type MINITRAC is suitable for level detection as well as residue detection in vessels. The source holder with source and detector of type MINITRAC are usually mounted at the opposite sides of a vessel at the height of the requested measuring range. The detector converts the received radiation intensity into a switching command.

The radiometric sensor type POINTRAC is suitable for level detection in vessels. The source holder with source and detector of type POINTRAC are usually mounted at the opposite sides of a vessel at the height of the requested switching point. The detector converts the received radiation intensity into a switching command.

Medium and vessel

The vessel or the medium itself does not become radioactive when penetrated by gamma rays. Matter cannot become radioactive in this way. The implemented vessel is not radioactively contaminated and can be used further.

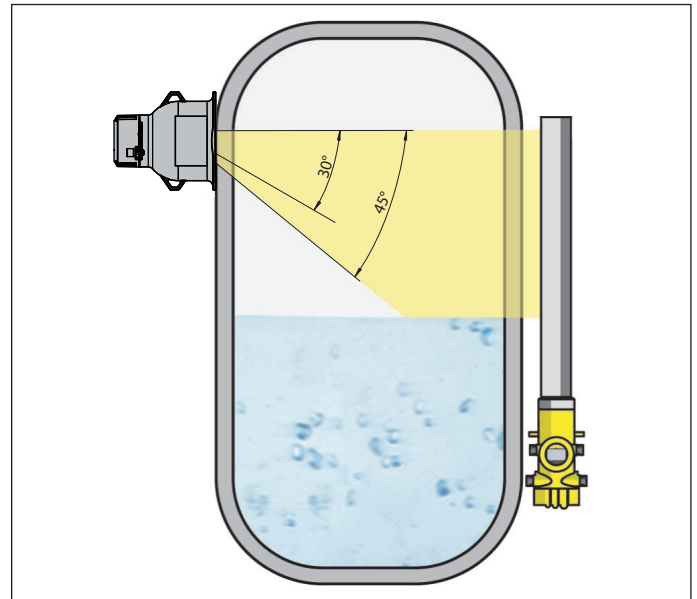


Fig. 1: Typical level measurement with SOLITRAC in a cylindrical vessel

2 Type overview

FIBERTRAC 31



FIBERTRAC 32



SOLITRAC 31



Applications	Continuous level measurement	Continuous level measurement	Continuous level measurement
Measuring range	1000 ... 7000 mm	1000 ... 7000 mm	500 ... 3000 mm
Measuring range cascading mode	any	any	any
Version	Flexible plastic detector for round and conical vessel shapes (ø 42 mm)	Flexible plastic detector for round and conical vessel shapes (ø 60 mm)	PVT rod detector for cylindrical vessel shapes
Mounting	Mounting from outside on the vessel	Mounting from outside on the vessel	Mounting from outside on the vessel
Process temperature	any	any	any
Ambient temperature	-40 ... +50 °C	-40 ... +50 °C	-40 ... +60 °C
Process pressure	any	any	any
Non-repeatability	±0.5 %	±0.5 %	±0.5 %
Voltage supply	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz
Signal output	<ul style="list-style-type: none"> ● 4 ... 20 mA/HART ● Profibus PA ● Foundation Fieldbus 	<ul style="list-style-type: none"> ● 4 ... 20 mA/HART ● Profibus PA ● Foundation Fieldbus 	<ul style="list-style-type: none"> ● 4 ... 20 mA/HART ● Profibus PA ● Foundation Fieldbus
Indication/Adjustment	<ul style="list-style-type: none"> ● PLICSCOM ● PACTware ● VEGADIS 81 	<ul style="list-style-type: none"> ● PLICSCOM ● PACTware ● VEGADIS 81 	<ul style="list-style-type: none"> ● PLICSCOM ● PACTware ● VEGADIS 81
Approvals	<ul style="list-style-type: none"> ● ATEX ● IEC ● FM ● CSA ● GOST 	<ul style="list-style-type: none"> ● ATEX ● IEC ● FM ● CSA ● GOST 	<ul style="list-style-type: none"> ● ATEX ● IEC ● FM ● CSA ● GOST

MINITRAC 31



POINTRAC 31



Applications	Continuous level measurement Point level detection	Point level detection
Measuring range	-	45, 152, 304 mm
Measuring range cascading mode	-	-
Version	NaI detector integrated in the sensor housing	NaI detector integrated in the sensor housing
Mounting	Mounting from outside on the vessel	Mounting from outside on the vessel
Process temperature	any	any
Ambient temperature	-40 ... +60 °C	-40 ... +60 °C
Process pressure	any	any
Non-repeatability	±0.1 %	±0.1 %
Voltage supply	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz
Signal output	<ul style="list-style-type: none"> ● 4 ... 20 mA/HART ● Profibus PA ● Foundation Fieldbus ● Relay output ● Transistor output 	<ul style="list-style-type: none"> ● 4 ... 20 mA/HART ● Profibus PA ● Foundation Fieldbus ● Relay output ● Transistor output
Indication/Adjustment	<ul style="list-style-type: none"> ● PLICSCOM ● PACTware ● VEGADIS 81 	<ul style="list-style-type: none"> ● PLICSCOM ● PACTware ● VEGADIS 81
Approvals	<ul style="list-style-type: none"> ● ATEX ● IEC ● FM ● CSA ● GOST 	<ul style="list-style-type: none"> ● ATEX ● IEC ● FM ● CSA ● GOST

VEGASOURCE 31



VEGASOURCE 35



SHLD 1



Applications	Continuous level and interface measurement, density measurement	Continuous level and interface measurement, density measurement	Continuous level and interface measurement, density measurement
Number of the half-value layers typ.	Cs-137: 8.2 Co-60: 5.2	Cs-137: 8.6 Co-60: 7.5	Cs-137: 8.2
Max. activity of the source	Cs-137: 18.5 GBq (500 mCi) Co-60: 0.74 GBq (20 mCi)	Cs-137: 7.4 GBq (300 mCi) Co-60: 3.7 GBq (100 mCi)	Cs-137: 3.7 GBq (100 mCi)
Exit angle	5° 20° 40°	5° 20° 40°	5° 15° 30° 45° 60°
Beam width	6°	6°	6°
Vessel material	Steel C22.8 (1.0460), 404, 316L	Steel C22.8 (1.0460), 404, 316L	Steel C22.8 (1.0460), 404, 316L
Shielding material	Lead	Lead	Lead
Weight	approx. 42 kg	approx. 86 kg	approx. 30 kg
Process fitting	Flange DN 100, PN 16 ASME 4", 150 lbs All process fittings are unpressurized and not in contact with the measured product	Flange DN 100, PN 16 ASME 4", 150 lbs All process fittings are unpressurized and not in contact with the measured product	Hole size: 152.4 x 152.4 mm (7.09 x 7.09 in) All process fittings are unpressurized and not in contact with the measured product
Process temperature	any	any	any
Process pressure	any	any	any
Ambient temperature	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-50 ... +105 °C (-58 ... +221 °F)
Pneumatic remote operation	Version K, N - according to ISO 7205, IEC 60405 (additional weight approx. 10 kg)	Version K, N - according to ISO 7205, IEC 60405 (additional weight approx. 10 kg)	acc. to ISO 7205, IEC 60405 (additional weight approx. 10 kg)
Flame resistance	+821 °C (+1510 °F) for 30 minutes	+821 °C (+1510 °F) for 30 minutes	+538 °C (+1000 °F) for 30 minutes
Transport packaging	Is deemed to be type A packaging according to the IATA directives	Is deemed to be type A packaging according to the IATA directives	Type A packaging necessary

VEGASOURCE 81



VEGASOURCE 82



VEGASOURCE 83



Applications	Continuous level and interface measurement, density measurement	Continuous level and interface measurement, density measurement	Continuous level and interface measurement, density measurement
Number of the half-value layers typ.	Cs-137: 4.9	Cs-137: 8.6	Cs-137: 11.5
Max. activity of the source	Cs-137: 0.74 GBq (20 mCi)	Cs-137: 11.1 GBq (300 mCi)	Cs-137: 185 GBq (5000 mCi)
Exit angle	5° 30° 40° (± 20°) 45° 60° (± 30°)	5° 30° 40° (± 20°) 45° 60° (± 30°)	5° 30° 40° (± 20°) 45° 60° (± 30°)
Beam width	10°	10°	10°
Vessel material	316L or steel (1.0619) with PUR textured paint RAL 1018	316L or steel (1.0619) with PUR textured paint RAL 1018	316L or steel (1.0619) with PUR textured paint RAL 1018
Shielding material	Lead	Lead	Lead
Weight	approx. 11 kg (24.3 lbs) (with pneumatic changeover approx. 20 kg)	approx. 34 kg (75 lbs) (with pneumatic changeover approx. 46 kg)	approx. 82 kg (180 lbs) (with pneumatic changeover approx. 96 kg)
Process fitting	Mounting plate All process fittings are unpressurized and not in contact with the measured product	Mounting plate All process fittings are unpressurized and not in contact with the measured product	Mounting plate All process fittings are unpressurized and not in contact with the measured product
Process temperature	any	any	any
Process pressure	any	any	any
Ambient temperature	-50 ... +200 °C (-58 ... +392 °F)	-50 ... +200 °C (-58 ... +392 °F)	-50 ... +200 °C (-58 ... +392 °F)
Pneumatic remote operation	Pneumatic changeover acc. to ISO 7205, IEC 60405 (additional weight approx. 10 kg) Temperature range: -20 ... +80 °C (-4 ... +176 °F)	Version K, N - according to ISO 7205, IEC 60405 (additional weight approx. 10 kg) Temperature range: -20 ... +80 °C (-4 ... +176 °F)	acc. to ISO 7205, IEC 60405 (additional weight approx. 10 kg) Temperature range: -20 ... +80 °C (-4 ... +176 °F)
Flame resistance	+821 °C (+1510 °F) for 30 minutes	+821 °C (+1510 °F) for 30 minutes	+821 °C (+1510 °F) for 30 minutes
Transport packaging	Is deemed to be type A packaging according to the IATA directives	Is deemed to be type A packaging according to the IATA directives	Is deemed to be type A packaging according to the IATA directives

3 Instrument selection

Application area

Overview

The measuring system PROTRAC comprises the radiometric sensors FIBERTRAC, SOLITRAC and MINITRAC as well as the source holder VEGASOURCE with integrated radioactive source. The sensors consist of an active measuring component, the detector, as well as an electronics module. They have different designs and are suitable for many different application areas and uses.

A radiometric measuring system consists generally of the following components:

- Radioactive source
- Source holder
- Radiometric sensor

The selection of the radioactive source and the radioactive activity as well as the sensor depends on the dimensions of the vessel or the pipeline, the wall thicknesses, the density of the medium, installations in the path of the beam as well as the measuring range.

FIBERTRAC

The radiometric sensor FIBERTRAC has a flexible detector with a scintillator of special plastic for continuous level and interface measurement. It is used on round vessels and on vessels with conical outlet and is suitable for measurement of liquids, solids, sludges and suspensions.

Through its thin, flexible scintillator cross-section, the price-favourable FIBERTRAC 31 can be well adapted to round vessels. Due to its bigger cross-section, FIBERTRAC 32 has a higher sensitivity and accuracy.

SOLITRAC

The radiometric sensor SOLITRAC has a rod detector with an organic scintillator of Polyvinyltoluene (PVT) for continuous level and interface measurement. It is used on cylindrical and conical vessels and is suitable e.g. for reactors, autoclaves, separators and mixers. SOLITRAC offers maximum sensitivity and accuracy over the complete measuring range.

MINITRAC

The radiometric sensor MINITRAC has a point-shaped detector with an anorganic scintillator of sodium iodide (NaI) for non-contact level detection and density measurement. This scintillator is characterized by a high sensitivity. The sensor is used on vessels with any geometry and on pipelines.

POINTRAC

The radiometric sensor POINTRAC has a short rod detector with an anorganic scintillator of Polyvinyltoluene (PVT) for non-contact level detection. This scintillator is characterized by a high sensitivity. The sensor is used on vessels with any geometry and on pipelines.

VEGASOURCE 31, 35

The source holders VEGASOURCE 31, 35 are used to hold the radioactive source. They are available in three sizes. Sources are Cs-137 or Co-60 with selectable radioactive activity. The size used depends on the respective radioactive activity.

VEGASOURCE 81, 82, 83

The source holders VEGASOURCE 81, 82, 83 are used to hold the radioactive source. They are available in three sizes. Sources are Cs-137 with selectable radioactive activity. The size used depends on the respective radioactive activity.

SHLD1

The source holder SHLD1 serves as a receptacle for the radioactive source. Source Cs-137 is used as radioactive source. Universal use of SHLD1 through the large exist angle up to 60°.

Applications

Level measurement with round or conical vessels

FIBERTRAC is used for level measurement on round or conical vessels.

The flexible plastic detector adapts to the vessel geometry and can be easily mounted.

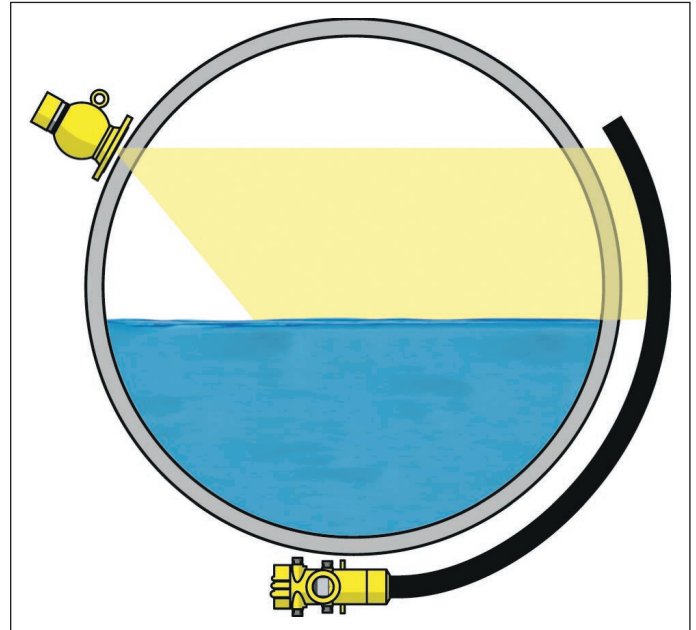


Fig. 2: Level measurement on round vessels

The FIBERTRAC has a selectable detector length. Hence very economic solutions can be realized with an electronics for large measuring ranges up to 7000 mm.

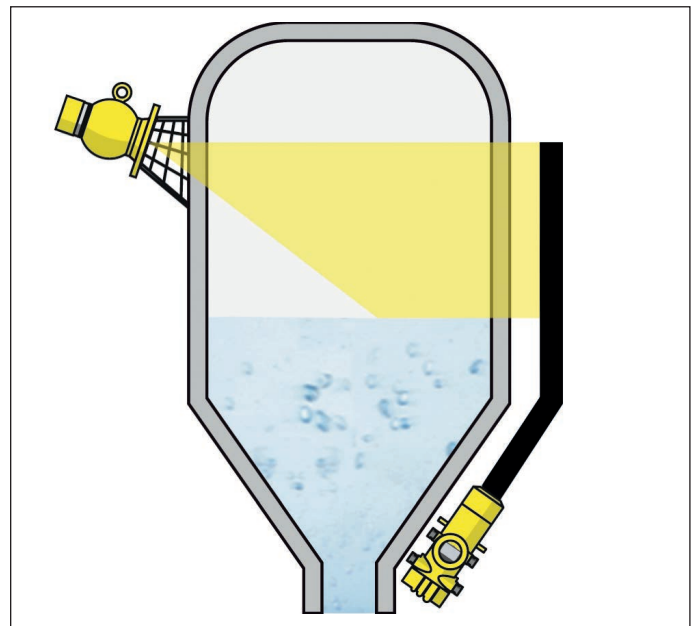


Fig. 3: Level measurement on conical vessels

Level measurement on cylindrical vessels

SOLITRAC is used for level measurement in cylindrical vessels. The solid rod detector is available for measuring ranges up to 3000 mm. Larger measuring ranges can be realized by cascading.

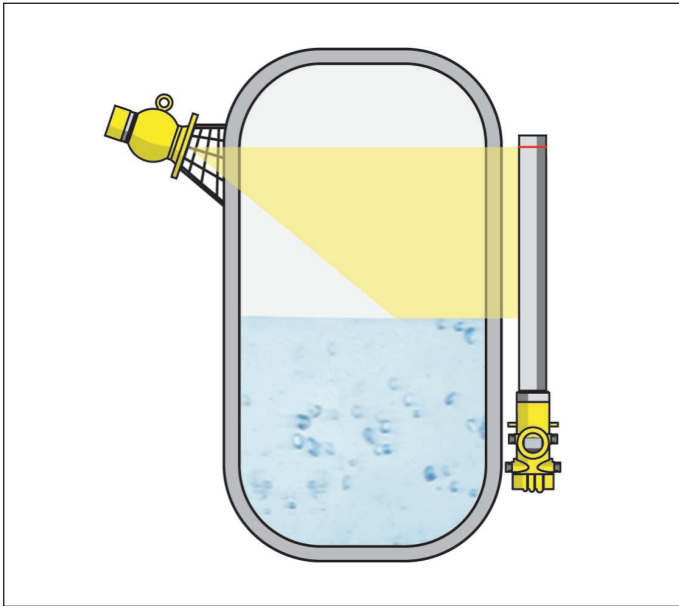


Fig. 4: Level measurement on cylindrical vessels

SOLITRAC has a selectable detector length. Larger measuring ranges can be realized by cascading several sensors. The individual electronics are linked via bus communication.

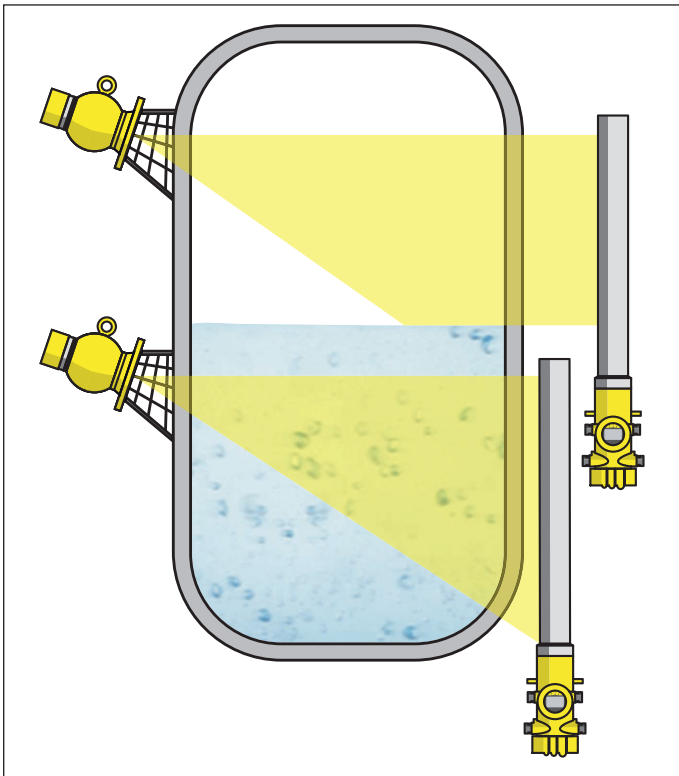


Fig. 5: Level measurement on cylindrical vessels with cascading

Level measurement with small levels

MINITRAC is used for measurement of small levels. Measuring ranges up to 500 mm can be realized.

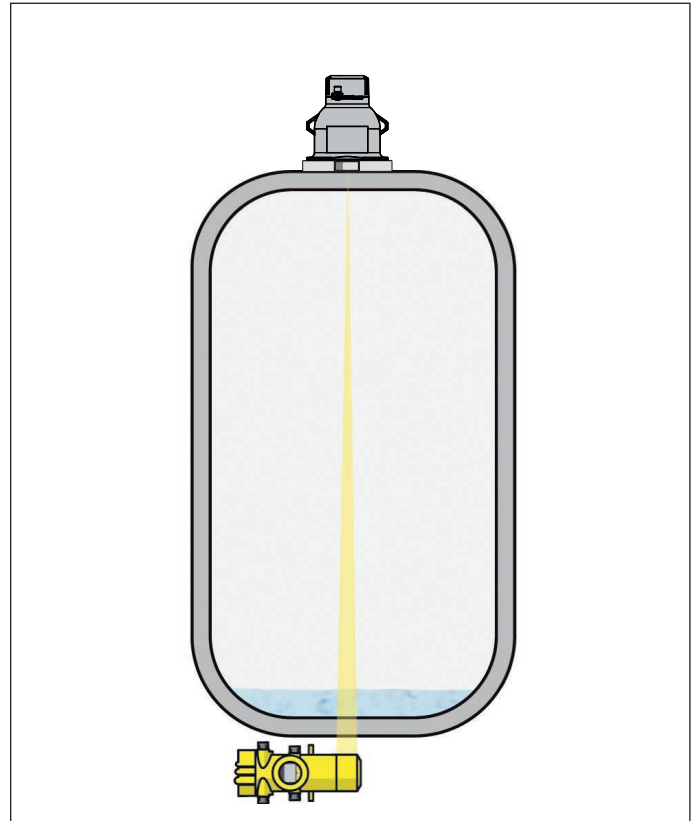


Fig. 6: Level measurement with small levels

Point level detection

MINITRAC is used for level detection in liquids and bulk solids. A max. detection (overflow protection) or a min. detection (dry run protection) can be realized with it.

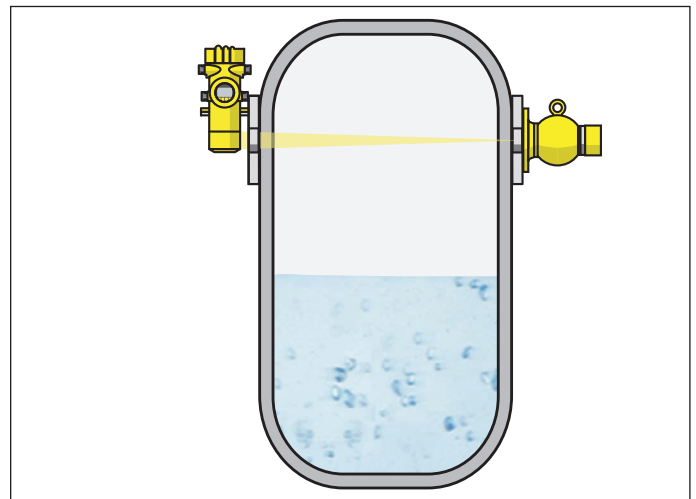


Fig. 7: Level detection - MINITRAC as max. detection (overflow protection)

4 Selection criteria detector

		FIBERTRAC 31	FIBERTRAC 32	SOLITRAC	MINITRAC	POINTRAC
Mode of measurement	Level measurement	●	●	●	○	-
	Point level detection	-	-	○	●	●
Current output	4 ... 20 mA	●	●	●	●	-
	Switching output: 8/16 mA	-	-	-	-	●
Vessel geometry	Straight	●	●	●	●	●
	Conical outlet	●	●	-	●	●
	Cylindrical tanks	●	●	-	●	●
Process	Level measurement in high vessels	●	●	○	-	-
	Vessel with thick walls	○	●	●	-	-
Mounting	Mounting bracket	●	●	●	●	●
	Tube mounting - mounting bracket	-	-	-	●	●
Measuring ranges	Small levels up to 500 mm	○	○	●	●	-
	Measuring ranges up to 3000 mm	●	●	●	-	-
	Measuring ranges up to 7000 mm	●	●	-	-	-

- not possible / not recommended

○ possible with limitations

● optimum suitability

5 Selection criteria source holder

	Version	VEGASOURCE 31	VEGASOURCE 35	SHLD1
Source	Cs-137	●	●	●
	Co-60	●	●	-
Source activity	Cs-137: 3.7 GBq (100 mCi)	●	●	●
	Cs-137: 18.5 GBq (500 mCi)	●	●	-
	Co-60: 0.74 GBq (20 mCi)	-	●	-
	Cs-137: 111 GBq (3000 mCi) Co-60: 3.7 GBq (100 mCi)	-	●	-
Manual switching on/off	Insertable lock for securing the switch position " On/Off"	●	●	●
Stirrup for manual switching on/off	Padlock for securing the switch position " Off"	●	●	●
	Insertable lock for securing the switch position " On" or " Off"	●	●	-
	Insertable lock for securing the switch position " On" or " Off" Better protection against moisture and contamination	●	●	-
Pneumatic switching on/off	Padlock for securing the switch position " Off"	●	●	●
	Padlock for securing the switch position " Off" Better protection against moisture and contamination	●	●	-
Fire-proof version	821 °C for 30 minutes	●	●	-

	Version	VEGASOURCE 81	VEGASOURCE 82	VEGASOURCE 83
Source	Cs-137	●	●	●
Source activity	Cs-137: 0.74 GBq (20 mCi)	●	●	●
	Cs-137: 11.1 GBq (300 mCi)	-	●	●
	Cs-137: 185 GBq (5000 mCi)	-	-	●
Manual switching on/off	Padlock for securing the switch position " Off"	●	●	●
	Insertable lock for securing the switch position " On" or " Off"	●	●	●
Pneumatic switching on/off	optional	●	●	●
Electrical ON/OFF position switch	optional	●	●	●
Interlock switch	optional	●	●	●
Protective cap	optional	●	●	●

6 Housing overview

Housing configuration

The housing is divided into the following chambers:

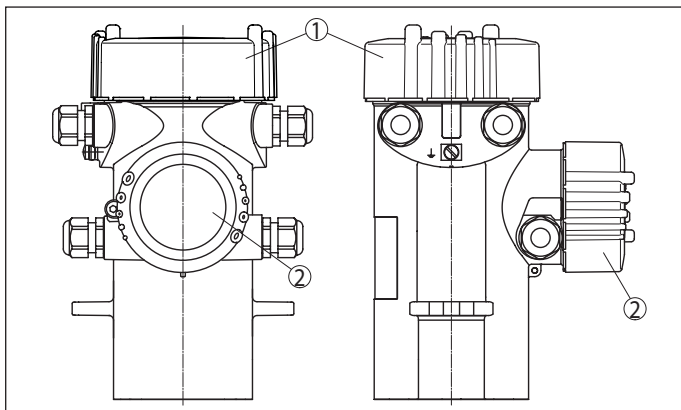




Fig. 8: Instrument housing

- 1 Electronics and connection compartment (top)
- 2 Adjustment and connection compartment (lateral)

Aluminium	
Protection rating	IP66/IP67, IP66/IP68 (1 bar)
Version	Double chamber
Application area	Industrial environment with increased mechanical stress

Stainless steel 316L	
Protection rating	IP66/IP67, IP66/IP68 (1 bar)
Version	Double chamber, precision casting
Application area	Aggressive environment, extreme mechanical stress

7 Mounting

Installation position

Mounting instructions - FIBERTRAC

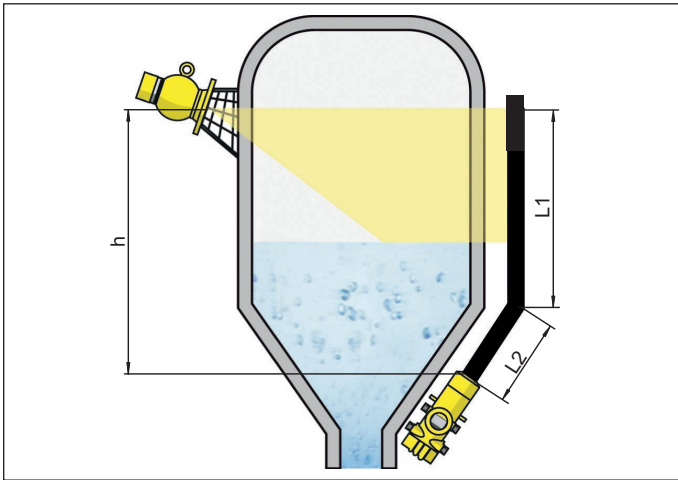


Fig. 9: Installation position - FIBERTRAC 31

h Measuring range
 L1 Partial length 1
 L2 Partial length 2

- FIBERTRAC can be mounted with the housing head to the top or bottom. Preferred mounting should be with the housing head to the bottom.
- The exit angle of the source container must be directed towards FIBERTRAC.
- The source holder should be mounted as close as possible to the vessel. If there are gaps, secure the area with a safety fence and protective grating so that no one can reach into the dangerous area.
- To mount FIBERTRAC very close to the vessel, the flexible detector can be adapted perfectly to the vessel form.
- If several FIBERTRAC are cascaded, the measuring ranges of the individual detectors must directly join each other. The detectors must also slightly overlap.
- Fasten the sensors in such a way that they cannot fall out of the holder. If necessary, provide the sensor with a support from below.

Mounting instructions - SOLITRAC

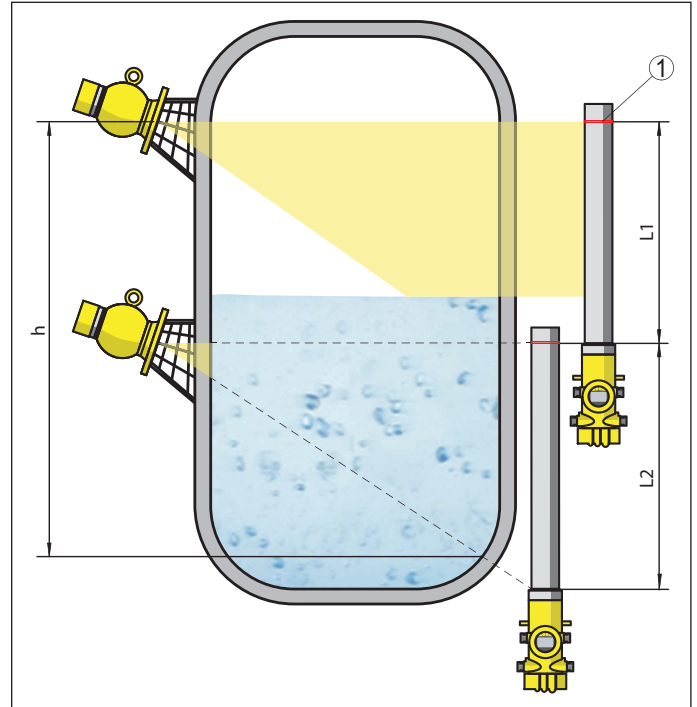


Fig. 10: Installation position - SOLITRAC 31 (cascading)

h Measuring range
 L Measuring length SOLITRAC (L1, L2)

- SOLITRAC can be mounted with the housing head to the top or bottom. Preferred mounting should be with the housing head to the bottom.
- The exit angle of the source container must be directed towards SOLITRAC.
- The source holder should be mounted as close as possible to the vessel. If there are gaps, secure the area with a safety fence and protective grating so that no one can reach into the dangerous area.
- If several SOLITRAC are cascaded, the measuring ranges of the individual detectors must directly join each other. The detectors must also slightly overlap.
- Fasten the sensors in such a way that they cannot fall out of the holder. If necessary, provide the sensor with a support from below.

Mounting instructions - level measurement with MINITRAC

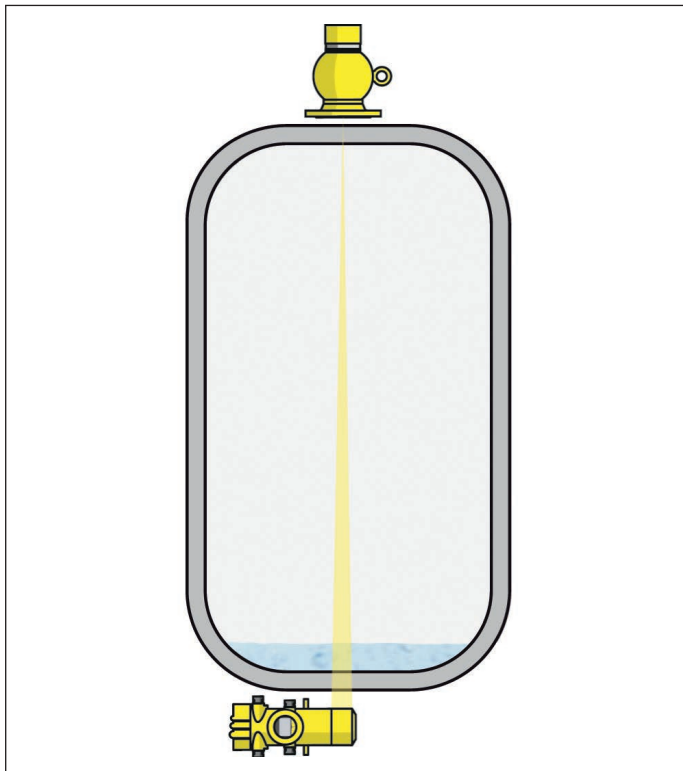


Fig. 11: Installation position - MINITRAC 31

- The exit angle of the source container must be directed towards MINITRAC.
- The source holder should be mounted as close as possible to the vessel. If there are gaps, secure the area with a safety fence and protective grating so that no one can reach into the dangerous area.
- Fasten the sensors in such a way that they cannot fall out of the holder. If necessary, provide the sensor with a support from below.

Mounting instructions - level detection with MINITRAC

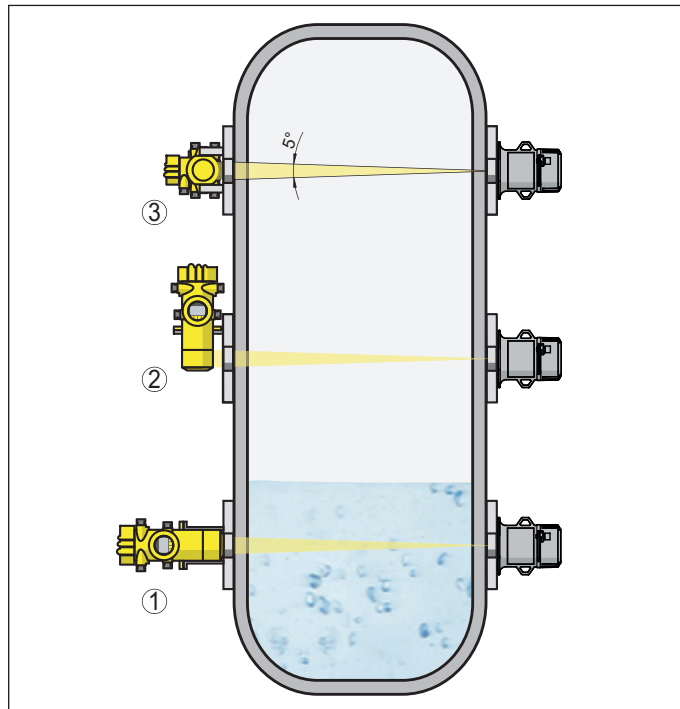


Fig. 12: Installation positions - Point level detection with MINITRAC 31

- 1 Horizontal mounting
 - 2 Vertical mounting
 - 3 Mounting horizontally, at right angles to container
- For level detection, the sensor is mounted horizontally at the height of the requested level.
 - The exit angle of the source holder must be directed exactly to the measuring range of MINITRAC.
 - The source holder and MINITRAC should be mounted as close as possible to the vessel. If there are gaps, secure the area with a safety fence and protective grating so that no one can reach into the dangerous area.
 - Fasten the sensors in such a way that they cannot fall out of the holder. If necessary, provide the sensor with a support from below.

Mounting instructions - source holder VEGASOURCE

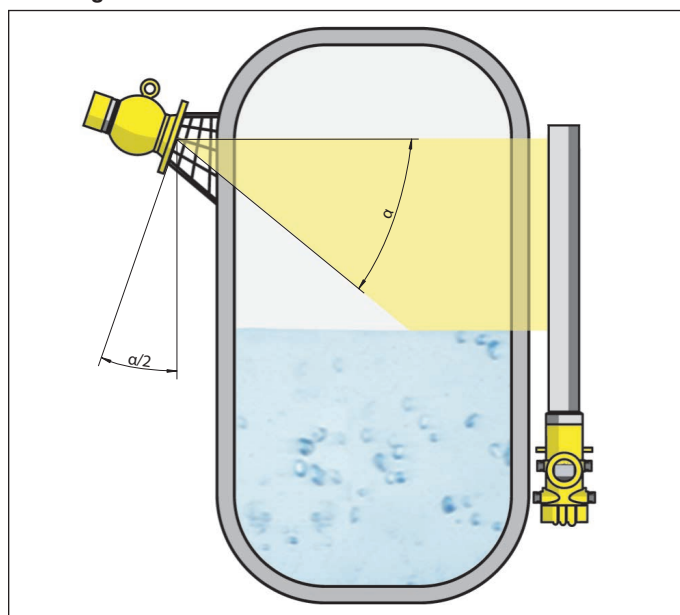


Fig. 13: Installation position - Source holder VEGASOURCE 31, 35

a Angle of aperture

- The exit angle of the source holder VEGASOURCE 31, 35 must be directed to the measuring range of the sensor mounted on the opposite side.
- The angle of orientation of the source holder corresponds to half of the exit angle.
- The source holder VEGASOURCE should be mounted close to the vessel. If there are gaps, protect the area by a safety fence and a grid against grasping into the dangerous area. Such areas should be marked respectively.

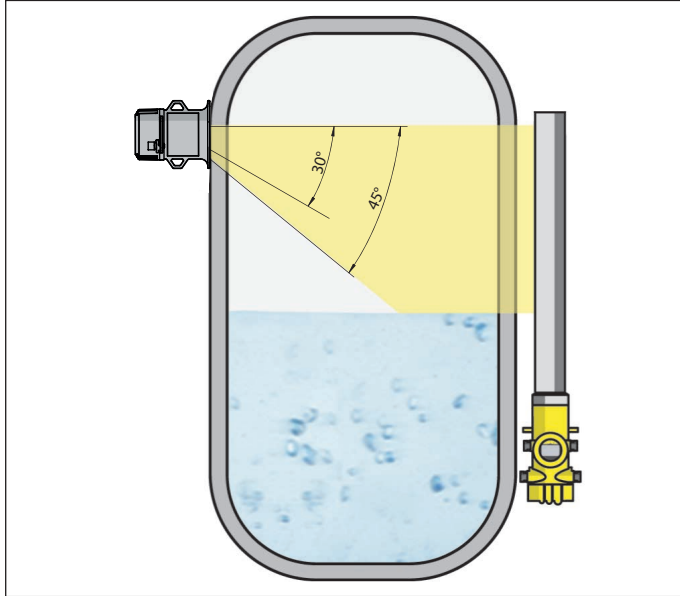


Fig. 14: Installation position - Source holder VEGASOURCE 81, 82, 83

- The exit angle of the source holder VEGASOURCE 81, 82, 83 must be directed to the measuring range of the sensor mounted on the opposite side.
- The source holder VEGASOURCE should be mounted close to the vessel. If there are gaps, protect the area by a safety fence and a grid against grasping into the dangerous area. Such areas should be marked respectively.

Mounting examples

The following illustrations show mounting examples and measurement setups.

Vessel with heat insulation

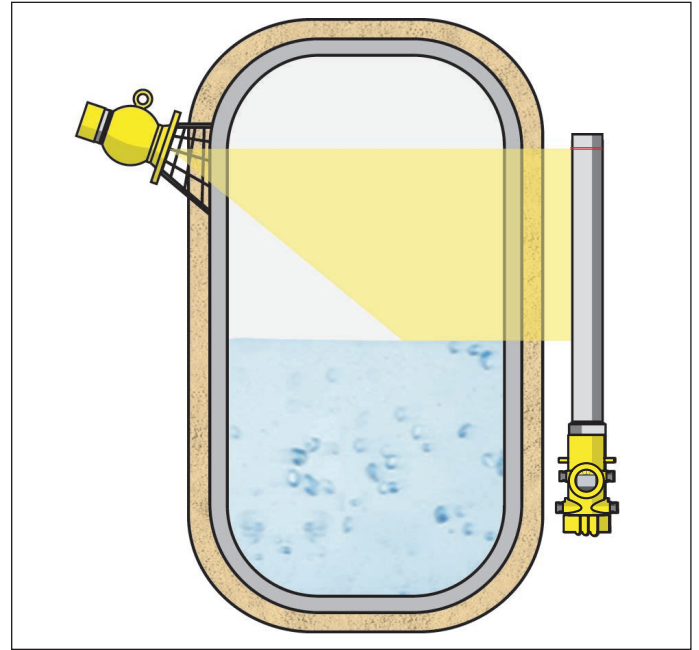


Fig. 15: Level measurement on a heated vessel with heat insulation

In case of vessels with temperature insulation, the sensor and the source holder should be mounted preferably outside the tank insulation. If this is not possible, make sure that there is a sufficient gap in the tank insulation to mount the sensor and the source holder.

Heel detection



Fig. 16: MINITRAC mounted from the bottom

To recognize remaining quantities in a vessel, MINITRAC can be used. This is useful in expensive products or to completely empty the vessel. MINITRAC is mounted from the bottom and can also detect small quantities at the vessel bottom.

Spherical tank

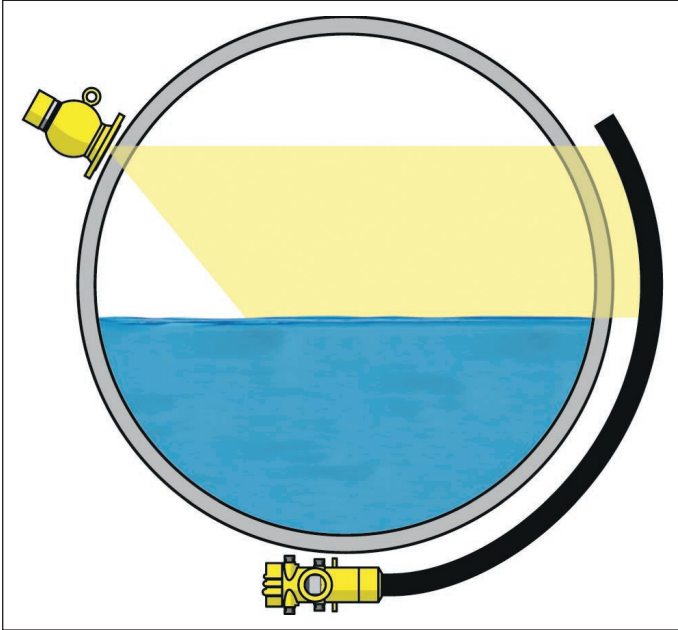


Fig. 17: Level measurement on a spherical tank

FIBERTRAC is particularly suitable for level measurement in a spherical tank. Due to its flexible detector it adapts perfectly to the vessel geometry. No expensive grids must be mounted.

Storage tank

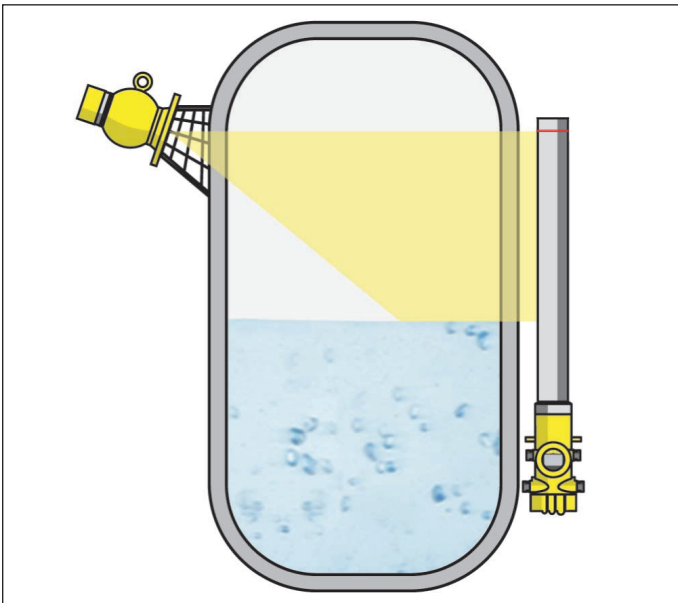


Fig. 18: Level measurement on a storage tank with SOLITRAC

For level measurement on cylindrical storage tanks, SOLITRAC is the ideal measuring system. The radiometric measurement delivers exact measurement results independent of the process conditions.

Level detection - max. detection

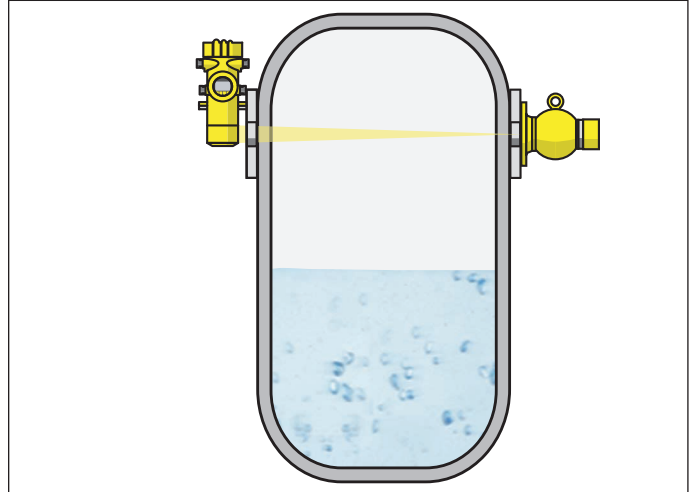


Fig. 19: MINITRAC as max. detection

MINITRAC is suitable for level detection in liquids or bulk solids. It is mounted at the height of the requested switching point.

Level detection - min. detection

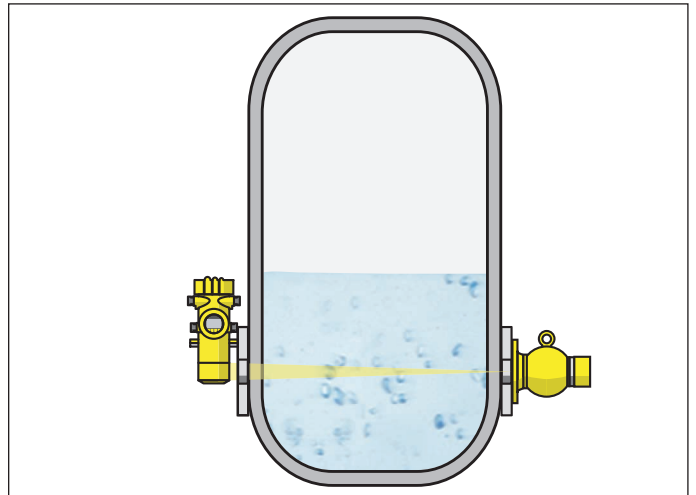


Fig. 20: MINITRAC as min. detection

MINITRAC is suitable for level detection in liquids or bulk solids. It is mounted at the height of the requested switching point.

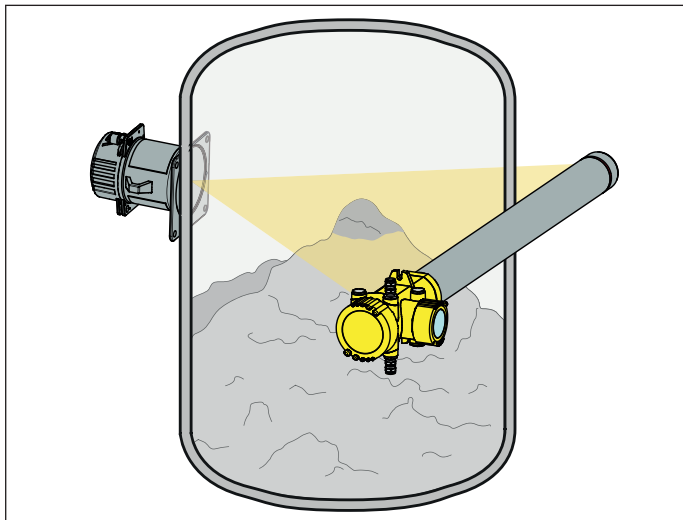
Level detection - bulk solids with low density

Fig. 21: SOLITRAC as point level detection

SOLITRAC is suitable for level detection of bulk solids with low density. It is mounted horizontally at the height of the requested switching point.

The source holder VEGASOURCE is mounted 90° rotated to get the widest possible radiation angle.

When covered by the medium, the damping of the radiation is considerably stronger - the switching point all the more reliable.

8 Electronics - 4 ... 20 mA/HART

Configuration of the electronics

The pluggable electronics is mounted in the electronics and connection compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply, measuring signal output as well as further analogue, digital and serial interfaces are located on the upper side of the electronics.

This output is located in the adjustment and connection compartment on instrument versions with intrinsically safe (IS) measuring signal output.

Voltage supply/Signal processing

If a reliable separation is required, the supply voltage and the measurement signal are transmitted over separate two-wire connection cables.

- Operating voltage
 - 20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz

Connection cable

The 4 ... 20 mA current output is connected with standard two-wire cable without shielding. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, shielded cable should be used.

For voltage supply, an approved installation cable with PE conductor is required.

Cable screening and grounding

If shielded cable is required, we recommend connecting the cable screening on both ends to ground potential. In the sensor, the cable screening must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the ground potential (low impedance).

Connection non-Ex instruments

Electronics and connection compartment

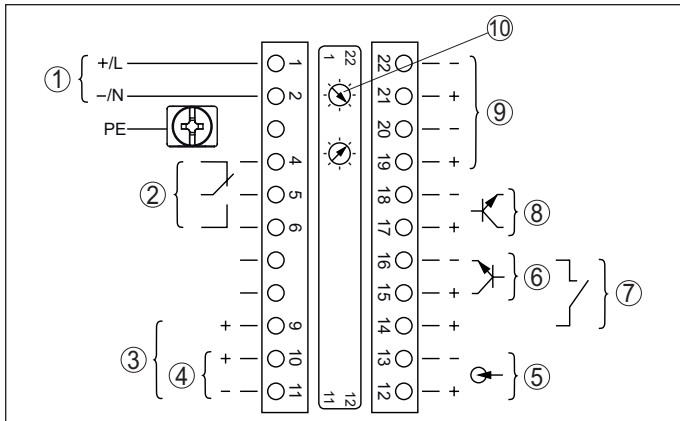


Fig. 22: Electronics and connection compartment with non-Ex instruments and instruments with non-intrinsically safe current output

- 1 Voltage supply
- 2 Relay output
- 3 Signal output 4 ... 20 mA/HART active
- 4 Signal output 4 ... 20 mA/HART passive
- 5 Signal input 4 ... 20 mA
- 6 Switching input for NPN transistor
- 7 Switching input floating
- 8 Transistor output
- 9 Interface for sensor-sensor communication
- 10 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

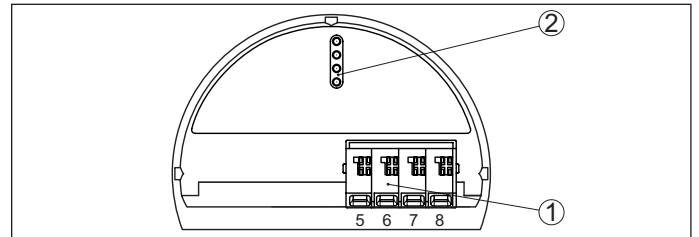


Fig. 23: Adjustment and connection compartment with non-Ex instruments and instruments with non-intrinsically safe current output

- 1 Terminals for the external display and adjustment unit
- 2 Contact pins for the display and adjustment module or interface adapter

Connection Ex instruments

Electronics and connection compartment

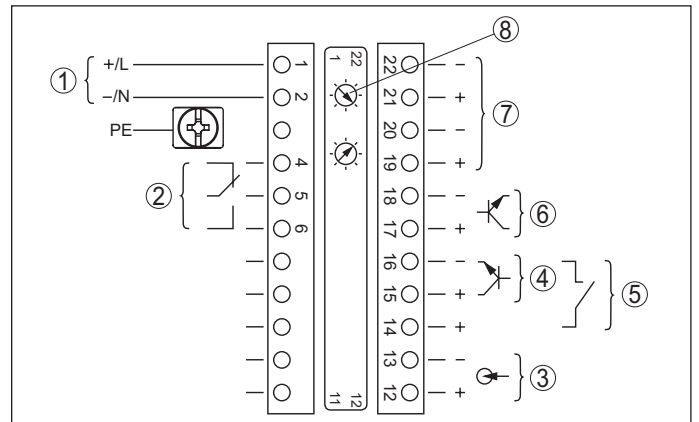


Fig. 24: Electronics and connection compartment with Ex instruments

- 1 Voltage supply
- 2 Relay output
- 3 Signal input 4 ... 20 mA
- 4 Switching input for NPN transistor
- 5 Switching input floating
- 6 Transistor output
- 7 Interface for sensor-sensor communication
- 8 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

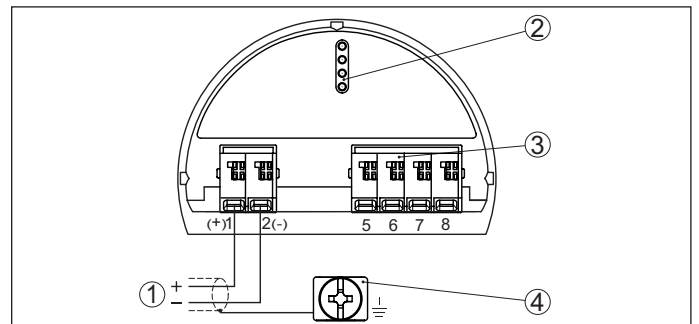


Fig. 25: Adjustment and connection compartment with Ex instruments with intrinsically safe current output

- 1 Terminals for intrinsically safe signal output 4 ... 20 mA/HART, active
- 2 Contact pins for the display and adjustment module or interface adapter
- 3 Terminals for external display and adjustment unit
- 4 Ground terminal for connection of the cable screening

9 Electronics - Profibus PA

Configuration of the electronics

The pluggable electronics is mounted in the electronics and connection compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply, measuring signal output as well as further analogue, digital and serial interfaces are located on the upper side of the electronics.

This output is located in the adjustment and connection compartment on instrument versions with intrinsically safe (IS) measuring signal output.

Voltage supply/Signal processing

If a reliable separation is required, the supply voltage and the measurement signal are transmitted over separate two-wire connection cables.

- Operating voltage
 - 20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz

Connection cable

Connection is carried out with shielded cable according to Profibus specification.

Make sure that the entire installation is carried out according to the Profibus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screening directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable shielding directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the shielding of the short stub to the sensor may not be connected to ground potential or to another cable screening.

Connection non-Ex instrument

Electronics and connection compartment

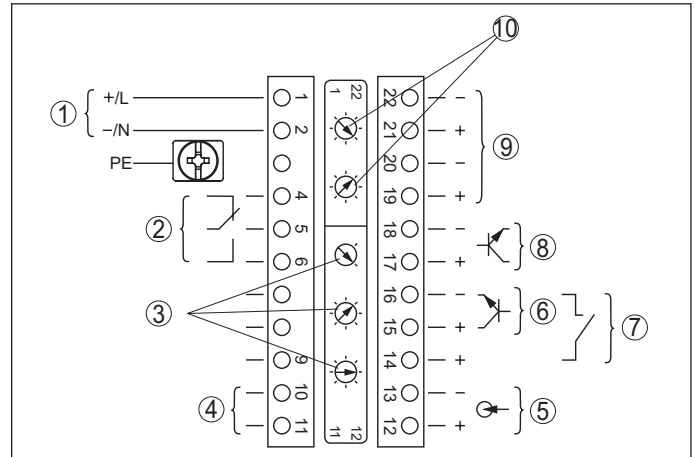


Fig. 26: Electronics and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 1 Voltage supply
- 2 Relay output
- 3 Adjustment bus address for Profibus PA
- 4 Signal output Profibus PA
- 5 Signal input 4 ... 20 mA (active sensor)
- 6 Switching input for NPN transistor
- 7 Switching input floating
- 8 Transistor output
- 9 Interface for sensor-sensor communication
- 10 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

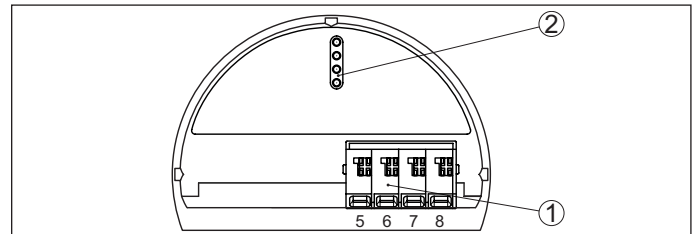


Fig. 27: Adjustment and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 1 Terminals for the external display and adjustment unit
- 2 Contact pins for the display and adjustment module or interface adapter

Connection Ex instrument

Electronics and connection compartment

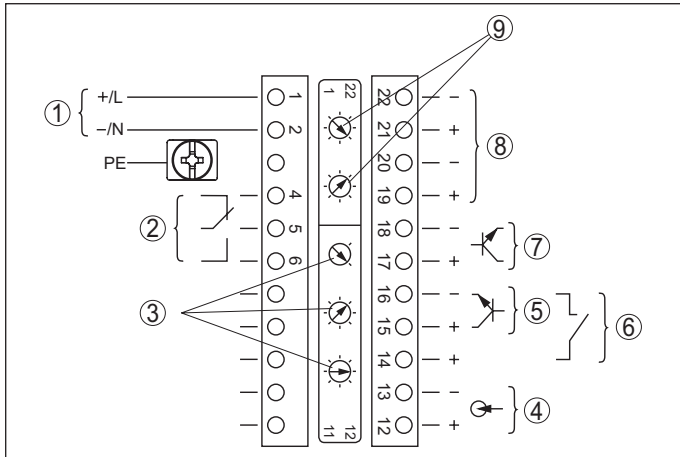


Fig. 28: Electronics and connection compartment (Ex d) with instruments with intrinsically safe signal output

- 1 Voltage supply
- 2 Relay output
- 3 Adjustment bus address for Profibus PA
- 4 Signal input 4 ... 20 mA (active sensor)
- 5 Switching input for NPN transistor
- 6 Switching input floating
- 7 Transistor output
- 8 Interface for sensor-sensor communication
- 9 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

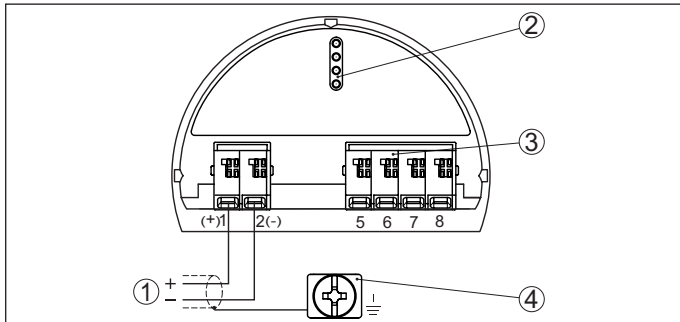


Fig. 29: Adjustment and connection compartment (Ex ia) with instruments with intrinsically safe signal output

- 1 Terminals - Signal output Profibus PA
- 2 Contact pins for the display and adjustment module or interface adapter
- 3 Terminals for the external display and adjustment unit
- 4 Ground terminal

10 Electronics - Foundation Fieldbus

Configuration of the electronics

The pluggable electronics is mounted in the electronics and connection compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply, measuring signal output as well as further analogue, digital and serial interfaces are located on the upper side of the electronics.

This output is located in the adjustment and connection compartment on instrument versions with intrinsically safe (IS) measuring signal output.

Voltage supply/Signal processing

If a reliable separation is required, the supply voltage and the measurement signal are transmitted over separate two-wire connection cables.

- Operating voltage
 - 20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz

Connection cable

Connection is carried out with shielded cable according to Fieldbus specification.

Make sure that the entire installation is carried out according to the Fieldbus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screening directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable shielding directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the shielding of the short stub to the sensor may not be connected to ground potential or to another cable screening.

Connection non-Ex instrument

Electronics and connection compartment

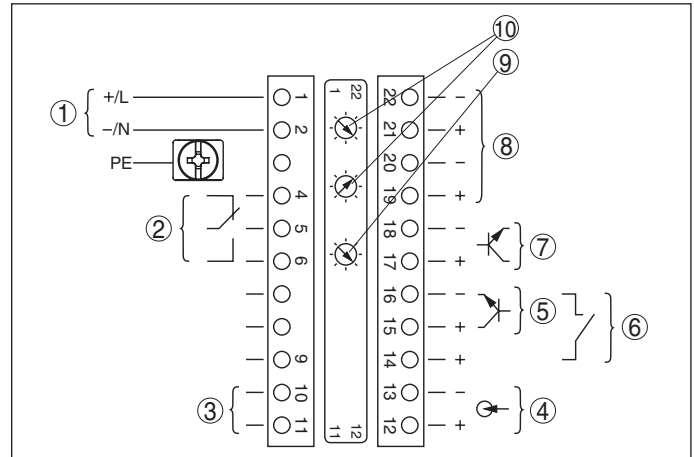


Fig. 30: Electronics and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 1 Voltage supply
- 2 Relay output
- 3 Signal output FF bus
- 4 Signal input 4 ... 20 mA (active sensor)
- 5 Switching input for NPN transistor
- 6 Switching input floating
- 7 Transistor output
- 8 Interface for sensor-sensor communication
- 9 Simulation switch (1 = simulation on)
- 10 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

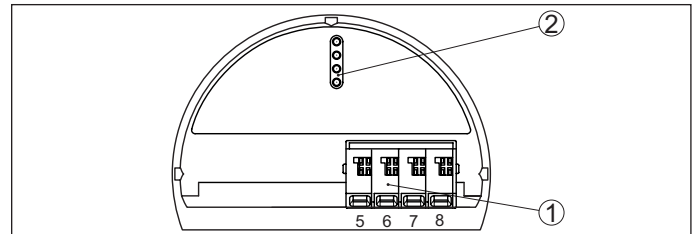


Fig. 31: Adjustment and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 1 Terminals for the external display and adjustment unit
- 2 Contact pins for the display and adjustment module or interface adapter

Connection Ex instrument

Electronics and connection compartment

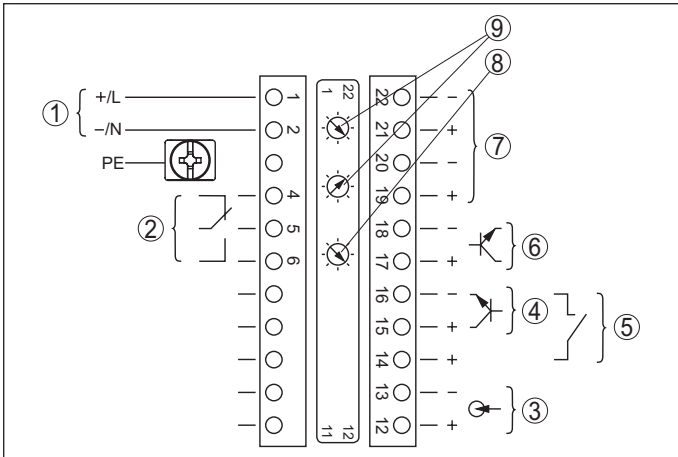


Fig. 32: Electronics and connection compartment (Ex d) with instruments with intrinsically safe signal output

- 1 Voltage supply
- 2 Relay output
- 3 Signal input 4 ... 20 mA (active sensor)
- 4 Switching input for NPN transistor
- 5 Switching input floating
- 6 Transistor output
- 7 Interface for sensor-sensor communication
- 8 Simulation switch (1 = simulation on)
- 9 Bus address setting for sensor-sensor communication

Adjustment and connection compartment

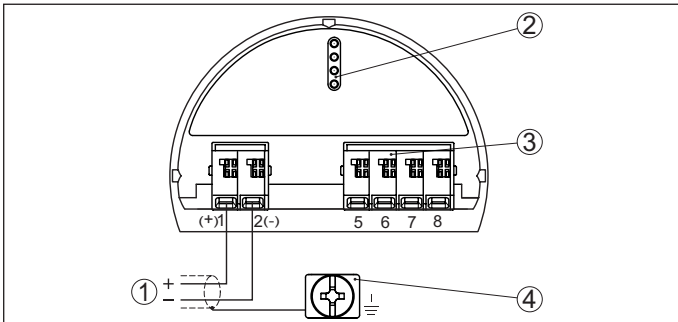


Fig. 33: Adjustment and connection compartment (Ex ia) with instruments with intrinsically safe signal output

- 1 Terminals for intrinsically safe signal output FF bus
- 2 Contact pins for the display and adjustment module or interface adapter
- 3 Terminals for the external display and adjustment unit
- 4 Ground terminal

11 Adjustment

11.1 Adjustment directly at the measuring point

Via the display and adjustment module through keys

The plug-in display and adjustment module is used for measured value indication, adjustment and diagnosis. It is equipped with an illuminated full dot matrix as well as four keys for adjustment.



Fig. 34: Display and adjustment module - Kay adjustment

Via the display and adjustment module through magnetic pen

With the Bluetooth version of the display and adjustment module, the sensor can also be adjusted with the magnetic pen. This is done right through the closed lid (with inspection window) of the sensor housing.

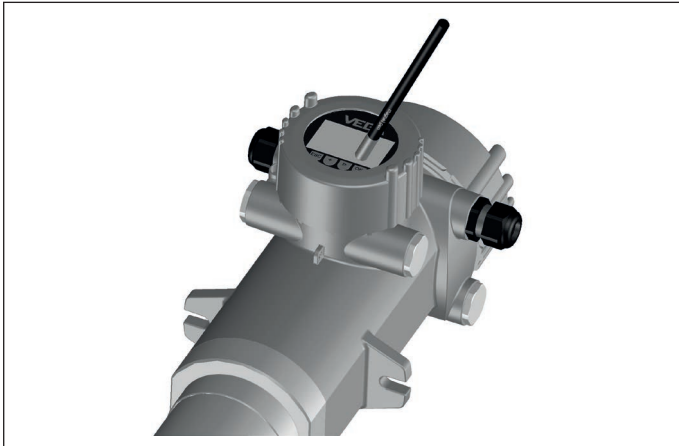


Fig. 35: Display and adjustment module - Adjustment via magnetic pen

Via a PC with PACTware/DTM

The interface adapter VEGACONNECT is required for connection of the PC. The converter is placed on the sensor instead of the display and adjustment module and connected to the USB interface of the PC.

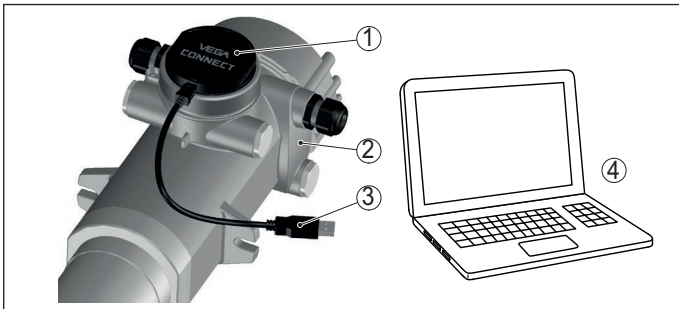


Fig. 36: Connection of the PC via VEGACONNECT and USB

- 1 Interface adapter VEGACONNECT
- 2 Sensor
- 3 USB cable to the PC
- 4 PC with PACTware/DTM

PACTware is an adjustment software for configuration, parameter adjustment, documentation and diagnosis of field devices. The corresponding device drivers are called DTMs.

11.2 Operation in the measurement loop environment - wireless via Bluetooth

Via a smartphone/tablet

The display and adjustment module with integrated Bluetooth functionality allows wireless connection to smartphones/tablets with iOS or Android operating system. The adjustment is carried out via the VEGA Tools app from the Apple App Store or Google Play Store.

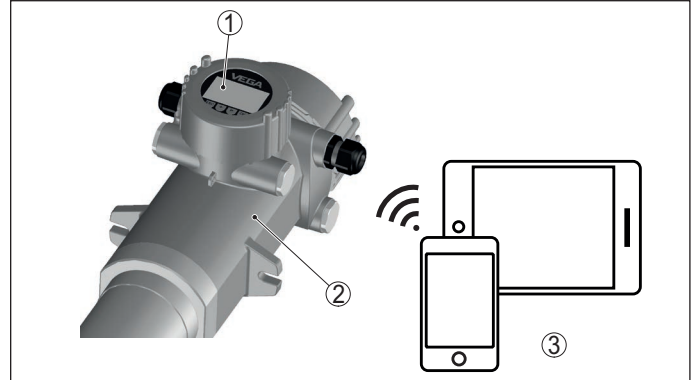


Fig. 37: Wireless connection to smartphones/tablets

- 1 Display and adjustment module
- 2 Sensor
- 3 Smartphone/Tablet

Via a PC with PACTware/DTM

The wireless connection from the PC to the sensor is carried out via the Bluetooth USB adapter and a display and adjustment module with integrated Bluetooth function. The adjustment is carried out via the PC with PACTware/DTM.

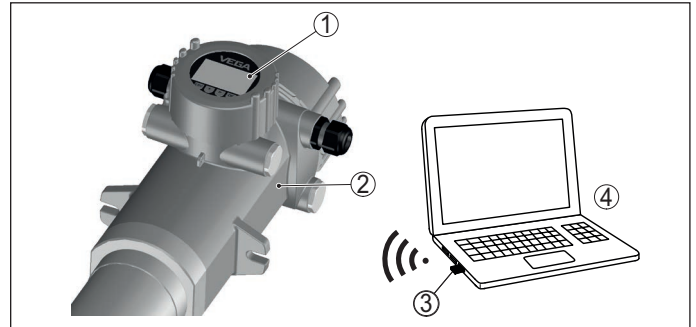


Fig. 38: Wireless connection of the PC via Bluetooth USB adapter

- 1 Display and adjustment module
- 2 Sensor
- 3 Bluetooth USB adapter
- 4 PC with PACTware/DTM

11.3 Adjustment carried out at position remote from the measuring point - wired

Via external display and adjustment units

The external display and adjustment unit VEGADIS 81 is available for this purpose. The adjustment is carried out via the keys of the display and adjustment module built-in or alternatively with the magnetic pen.

VEGADIS 81 is mounted up to 50 m away from the sensor and connected directly to the electronics of the sensor.

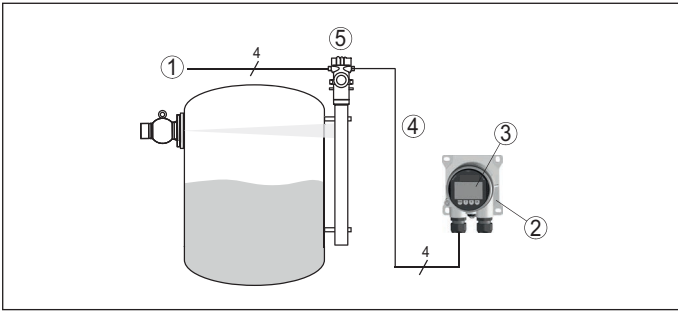


Fig. 39: Connection of VEGADIS 81 to the sensor

- 1 Voltage supply/Signal output sensor
- 2 External display and adjustment unit
- 3 Display and adjustment module
- 4 Connection cable sensor - external display and adjustment unit
- 5 Sensor

Via a PC with PACTware/DTM - Bluetooth

The sensor adjustment is carried out with a PC with PACTware/DTM via a Bluetooth connection.

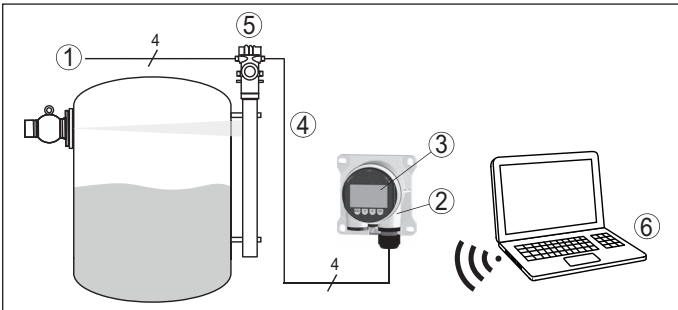


Fig. 40: Connection of VEGADIS 81 to the sensor, adjustment via PC with PACTware with Bluetooth

- 1 Voltage supply/Signal output sensor
- 2 External display and adjustment unit
- 3 Display and adjustment module
- 4 Connection cable sensor - external display and adjustment unit
- 5 Sensor
- 6 PC with PACTware/DTM

Via a PC mit PACTware/DTM - radiation through wire

The sensor adjustment is carried out with a PC with PACTware/DTM via a USB connection cable. For connection of the PC, the VEGACONNECT interface adapter is required.

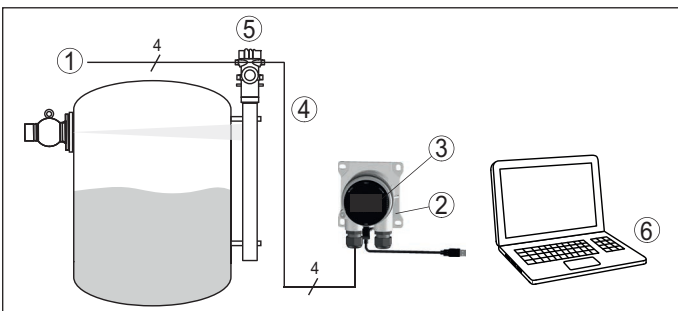


Fig. 41: Connection of VEGADIS 81 to the sensor, adjustment via PC with PACTware, radiation through wire

- 1 Voltage supply/Signal output sensor
- 2 External display and adjustment unit
- 3 Interface adapter VEGACONNECT
- 4 Connection cable sensor - external display and adjustment unit
- 5 Sensor
- 6 PC with PACTware/DTM

11.4 Alternative adjustment programs

DD adjustment programs

Device descriptions as Enhanced Device Description (EDD) are available for DD adjustment programs such as, for example, AMS™ and PDM.

The files can be downloaded at www.vega.com/downloads under "Software".

Field Communicator 375, 475

Device descriptions for the instruments are available as EDD for parameterisation with Field Communicator 375 or 475.

Integrating the EDD into the Field Communicator 375 or 475 requires the "Easy Upgrade Utility" software, which is available from the manufacturer. This software is updated via the Internet and new EDDs are automatically accepted into the device catalogue of this software after they are released by the manufacturer. They can then be transferred to a Field Communicator.

12 Dimensions - PROTRAC sensors

The listed drawings are only an excerpt of the available process fittings. You can find more drawings on our homepage www.vega.com » Downloads » Drawings.

Aluminium and stainless steel housing

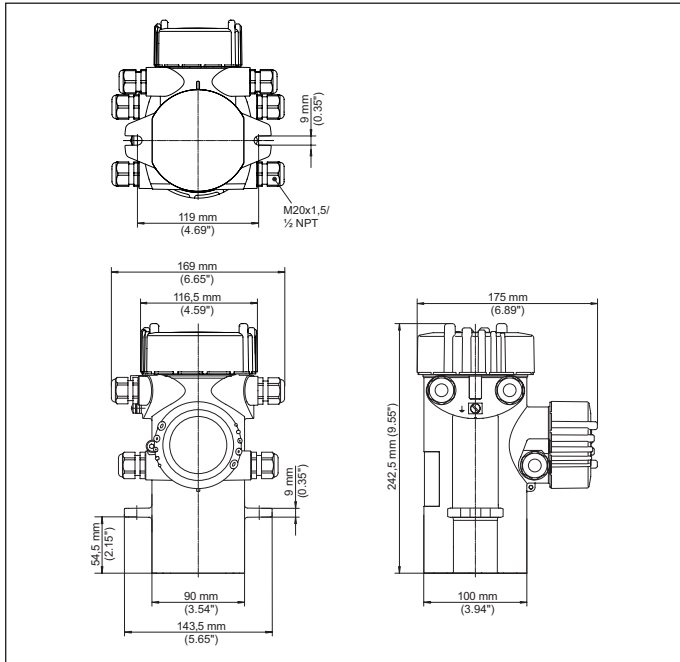
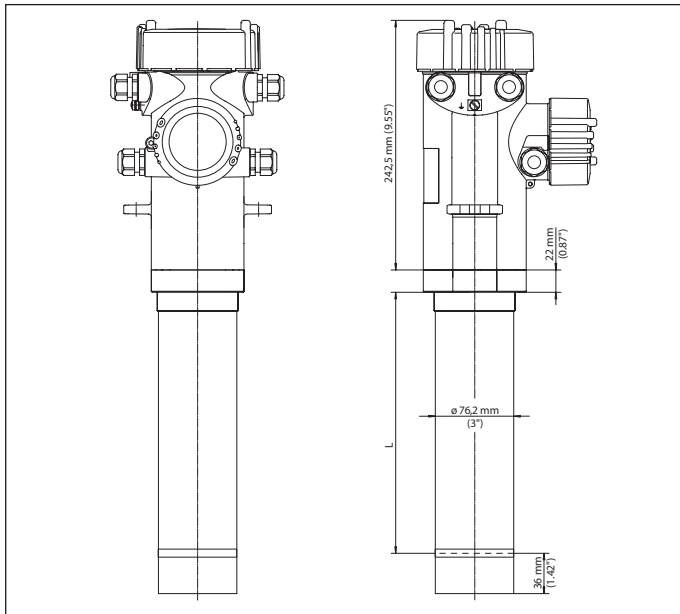


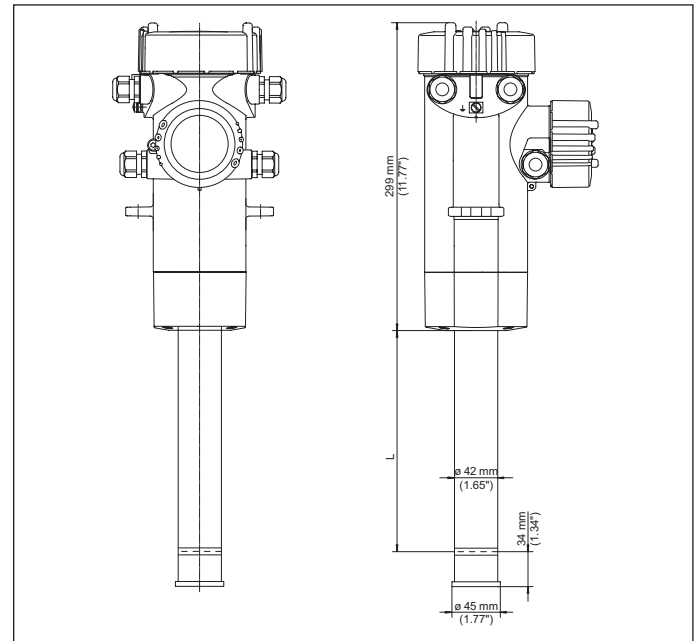
Fig. 42: Aluminium housing or stainless steel housing (precision casting)

SOLITRAC 31



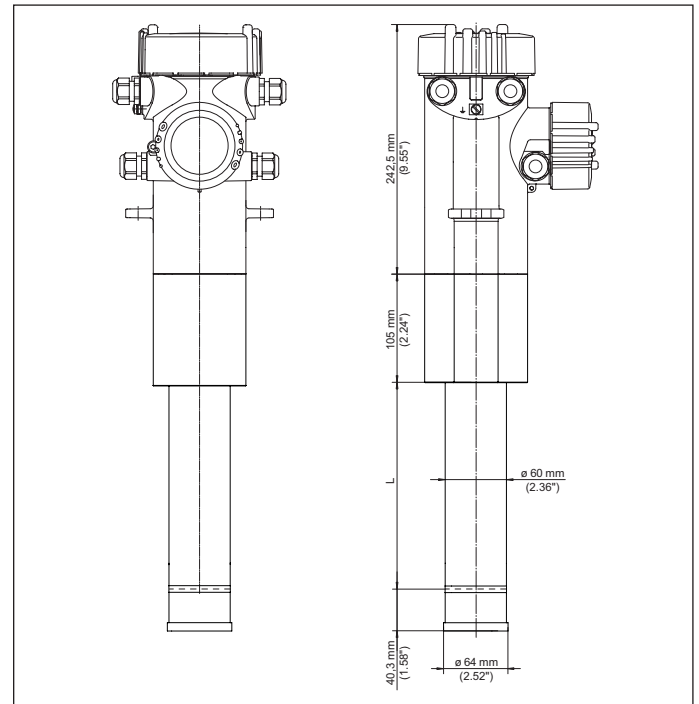
L Measuring range

FIBERTRAC 31



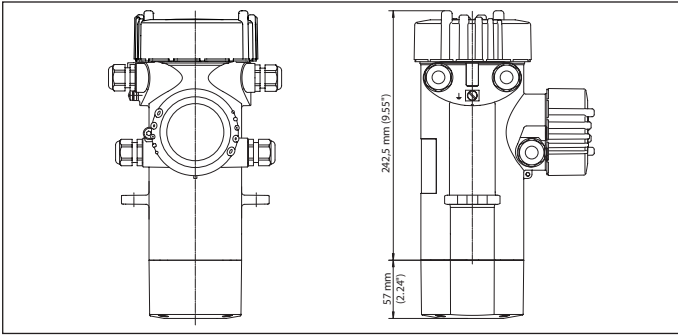
L Measuring range

FIBERTRAC 32

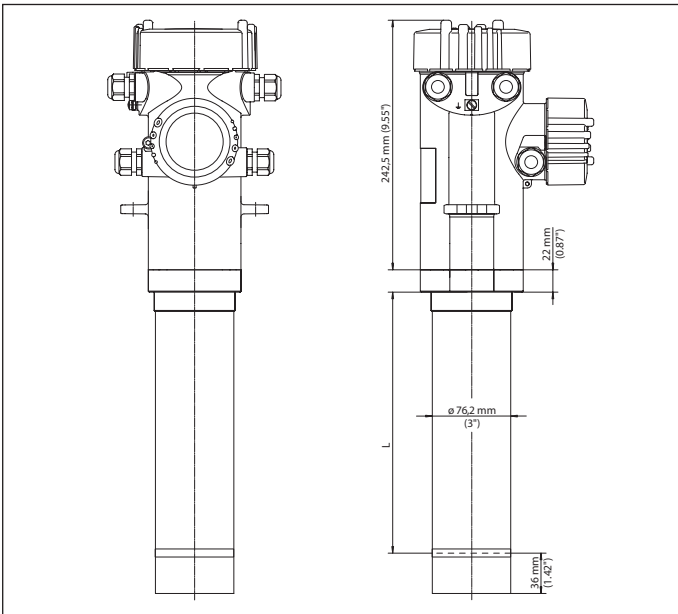


L Measuring range

MINITRAC 31



POINTRAC 31



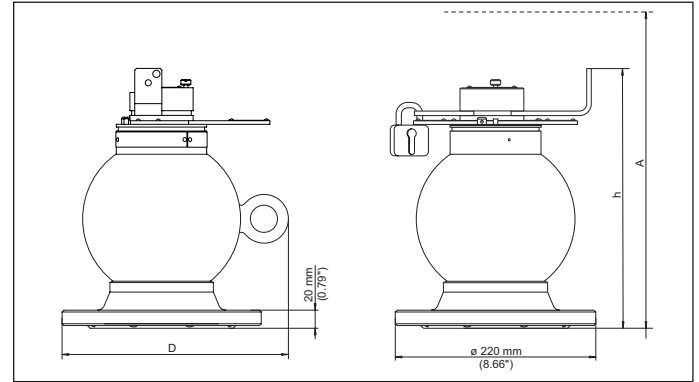
L Measuring range (50, 152, 304 mm)

13 Dimensions - Source holder SHLD1, VEGASOURCE 31, 35

Source holder VEGASOURCE 31, 35

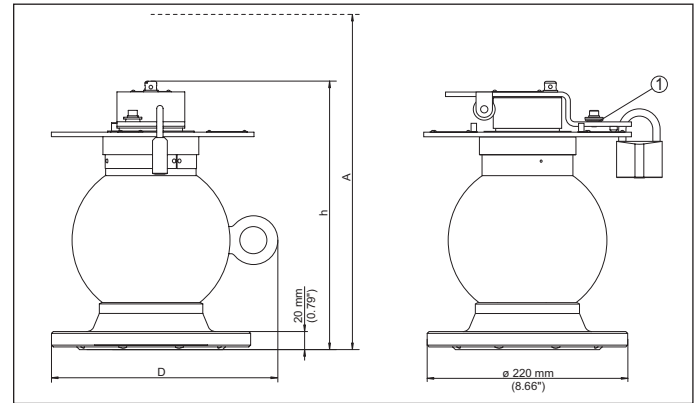
Version	Properties
A	Source insert for manual switching ON/OFF Insertable lock for securing the switch position ON/OFF Protective cover
B	Stirrup for manual switching on/off Fixing pin for securing the switch position ON Padlock for securing the switch position OFF
C	Stirrup for manual switching on/off Padlock for securing the switch position ON/OFF
D	Better protection against moisture and contamination Stirrup for manual switching on/off Padlock for securing the switch position ON/OFF
K	Pneumatic switching on/off
L	Padlock for securing the switch position OFF
M	Better protection against moisture and contamination
N	Pneumatic switching on/off Padlock for securing the switch position OFF

Source holder VEGASOURCE 31 C, 35 C



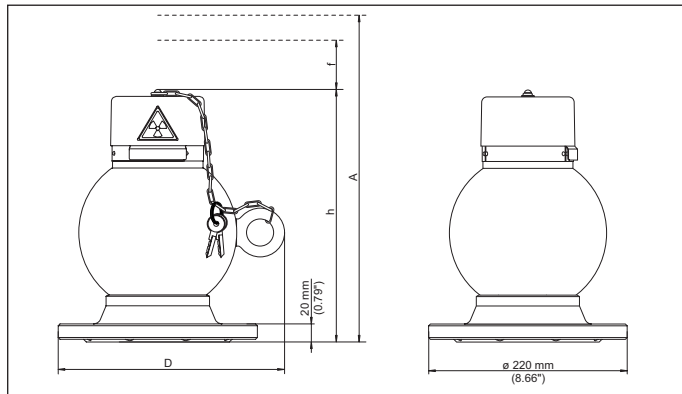
D VEGASOURCE 31: 251 mm, VEGASOURCE 35: 272 mm
 h VEGASOURCE 31: 287 mm, VEGASOURCE 35: 368 mm
 A VEGASOURCE 31: 450 mm, VEGASOURCE 35: 570 mm (clearance height for exchange of the radiating source)

Source holder VEGASOURCE 31 D, 35 D



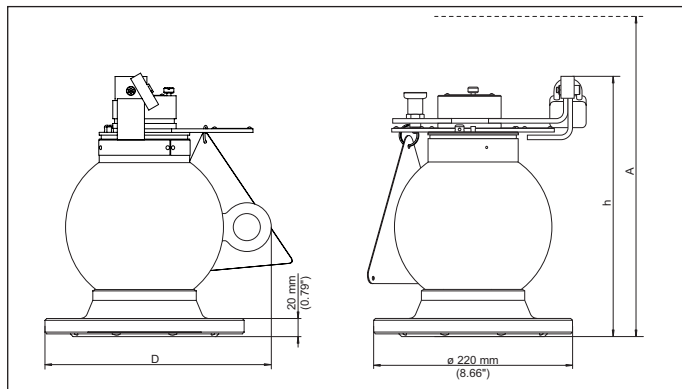
D VEGASOURCE 31: 251 mm, VEGASOURCE 35: 272 mm
 h VEGASOURCE 31: 297 mm, VEGASOURCE 35: 378 mm
 A VEGASOURCE 31: 497 mm, VEGASOURCE 35: 578 mm (clearance height for exchange of the radiating source)

Source holder VEGASOURCE 31 A, 35 A



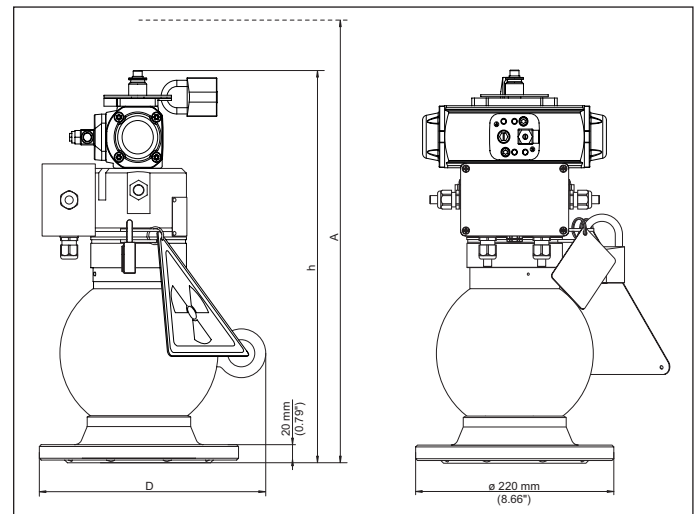
D VEGASOURCE 31: 251 mm, VEGASOURCE 35: 272 mm
 h VEGASOURCE 31: 279 mm, VEGASOURCE 35: 360 mm
 f 75 mm (free height for removing the cover)
 A VEGASOURCE 31: 479 mm, VEGASOURCE 35: 560 mm (clearance height for exchange of the radiating source)

Source holder VEGASOURCE 31 B, 35 B



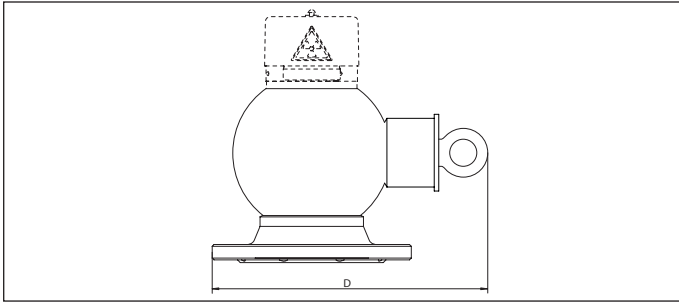
D VEGASOURCE 31: 251 mm, VEGASOURCE 35: 272 mm
 h VEGASOURCE 31: 287 mm, VEGASOURCE 35: 368 mm
 A VEGASOURCE 31: 450 mm, VEGASOURCE 35: 580 mm (clearance height for exchange of the radiating source)

Source holder VEGASOURCE 31 K, L, M, N; 35 K, L, M, N



D VEGASOURCE 31: 251 mm, VEGASOURCE 35: 272 mm
 h VEGASOURCE 31: 419 mm, VEGASOURCE 35: 500 mm
 A VEGASOURCE 31: 483 mm, VEGASOURCE 35: 602 mm (clearance height for exchange of the radiating source)

Source holder VEGASOURCE 31 C, 35 C, fire-proof version



D VEGASOURCE 31: 305 mm, VEGASOURCE 35: 362 mm

Source holder SHLD1, version - Standard

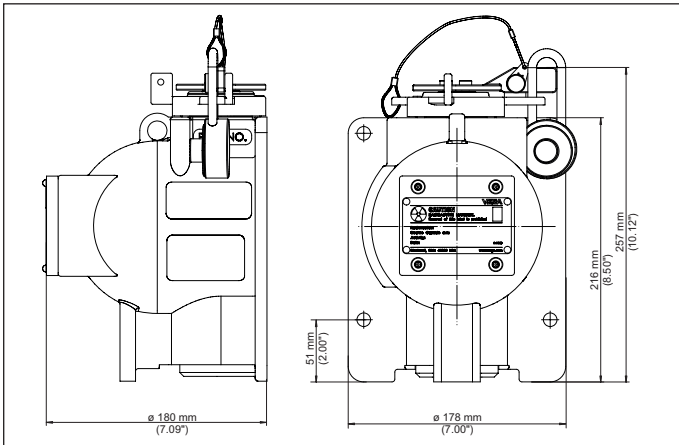


Fig. 43: Source holder SHLD1, standard version

Source holder SHLD1, version with position switch

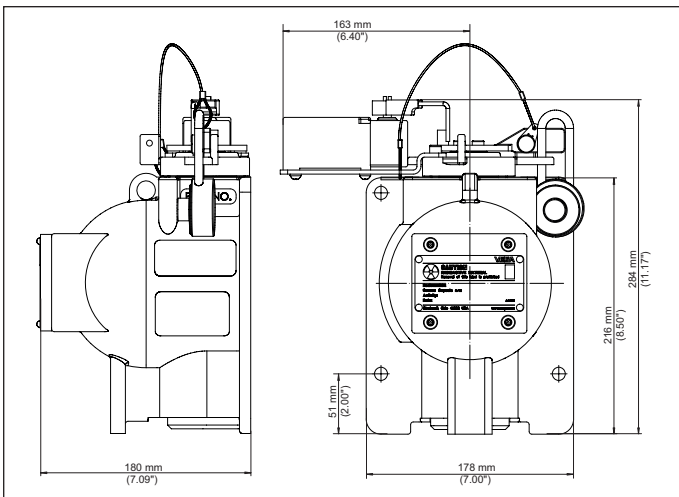


Fig. 44: Source holder SHLD1, version with position switch

Source holder SHLD1, version with Interlock safety switch

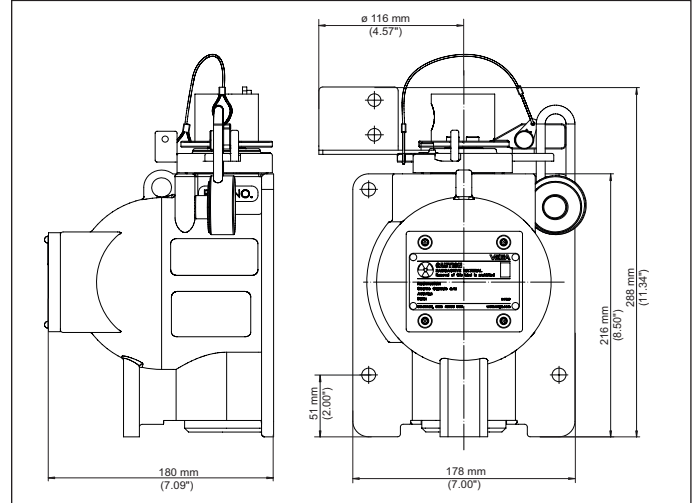


Fig. 45: Source holder SHLD1, version with Interlock safety switch

Source holder SHLD1, Heavy Duty version

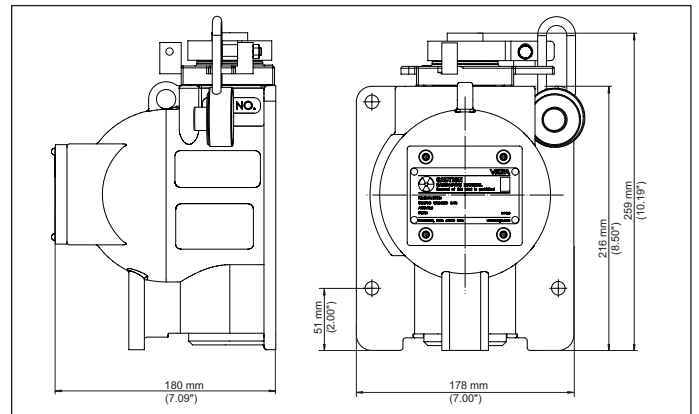


Fig. 46: Source holder SHLD1, Heavy Duty version

Source holder SHLD1, version with pneumatic switching mechanism

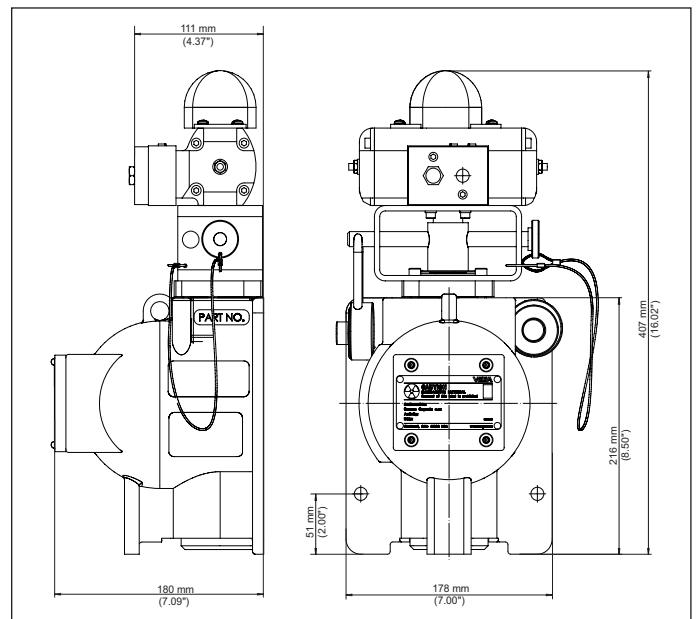


Fig. 47: Source holder SHLD1, version with pneumatic switching mechanism

Source holder SHLD1, version with pneumatic switching mechanism and position switch

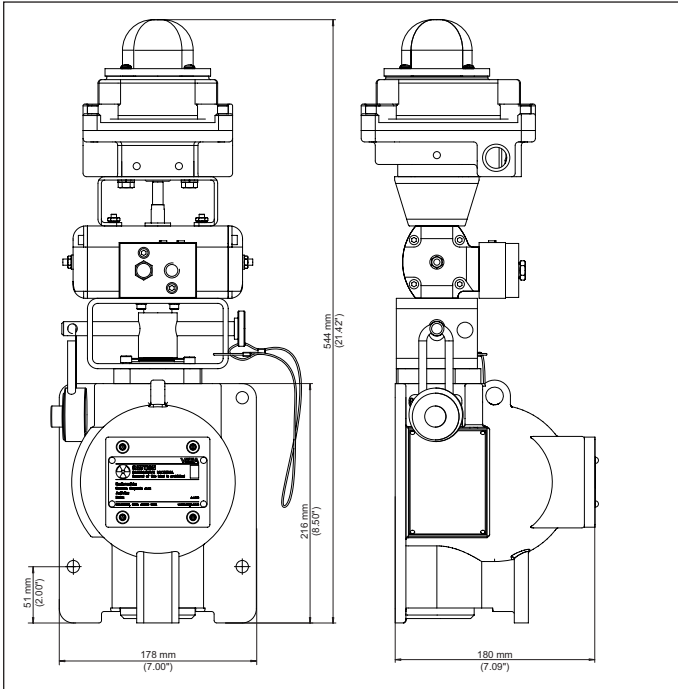


Fig. 48: Source holder SHLD1, version with pneumatic switching mechanism and position switch

14 Dimensions - Source holder VEGASOURCE 81, 82, 83

Source holder VEGASOURCE 81, version X, C - Manual changeover

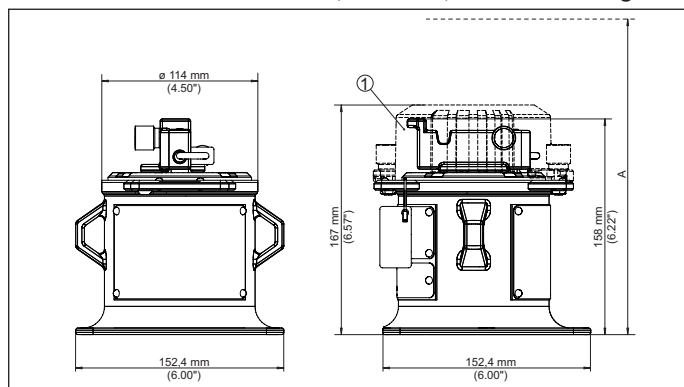


Fig. 49: Source holder VEGASOURCE 81, version X, C - Manual changeover

- 1 Cover (optional)
- A Free height for removal of the loading tube = 310 mm (12.21 in)

Source holder VEGASOURCE 82, version X, C - Manual changeover

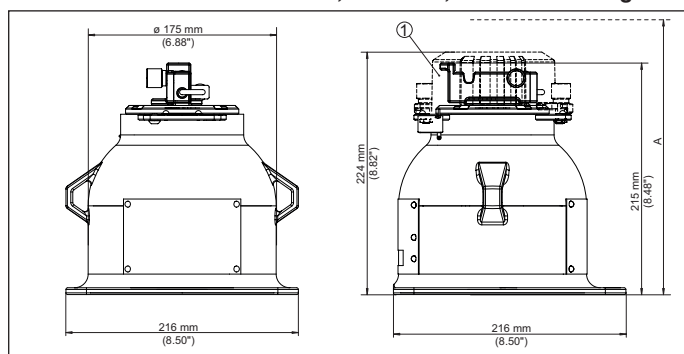


Fig. 50: Source holder VEGASOURCE 82, version X, C - Manual changeover

- 1 Cover (optional)
- A Free height for removal of the loading tube = 310 mm (12.21 in)

Source holder VEGASOURCE 83, version X, C - Manual changeover

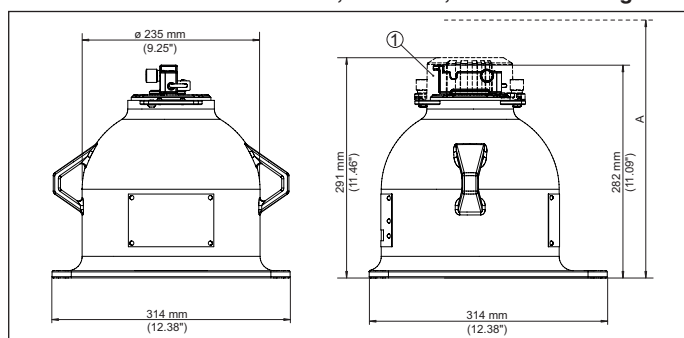


Fig. 51: Source holder VEGASOURCE 83, version X, C - Manual changeover

- 1 Cover (optional)
- A Free height for removal of the loading tube = 310 mm (12.21 in)

Optional versions - VEGASOURCE 81, 82, 83

The following optional accessories can be fitted to all series 80 source holders.

The optional accessories on a VEGASOURCE 82 are shown as an example.

Source holder VEGASOURCE 82, version X, C - Manual changeover with ON/OFF position switches

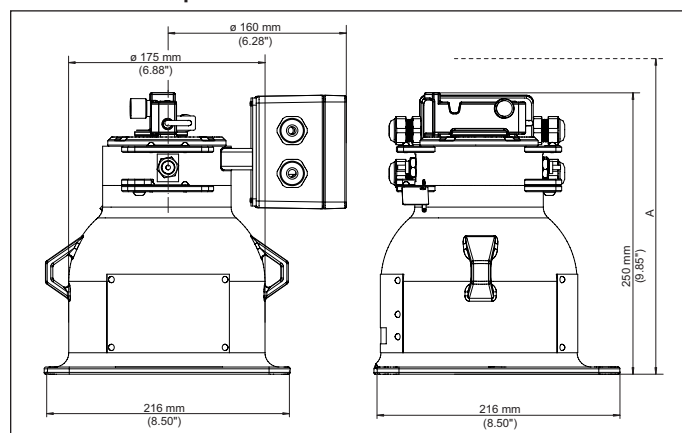


Fig. 52: Source holder VEGASOURCE 82, version X, C - Manual changeover with ON/OFF position switches

- A Free height for removal of the loading tube = 335 mm (13.19 in)

Source holder VEGASOURCE 82, version X, C - Manual changeover with Interlock switch

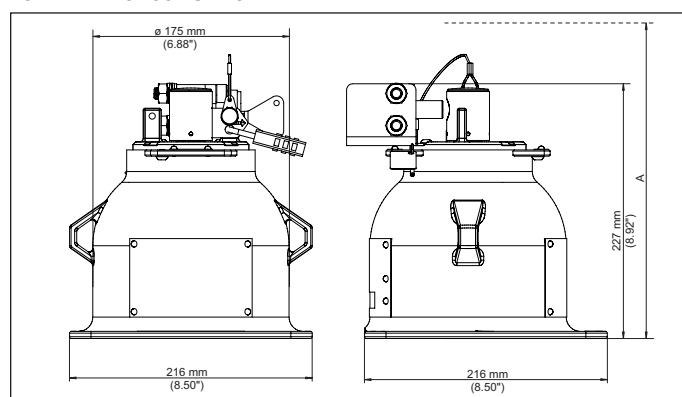


Fig. 53: Source holder VEGASOURCE 82, version X, C - Manual changeover with Interlock switch

- A Free height for removal of the loading tube = 335 mm (13.19 in)

Source holder VEGASOURCE 82, version B - Pneumatic changeover

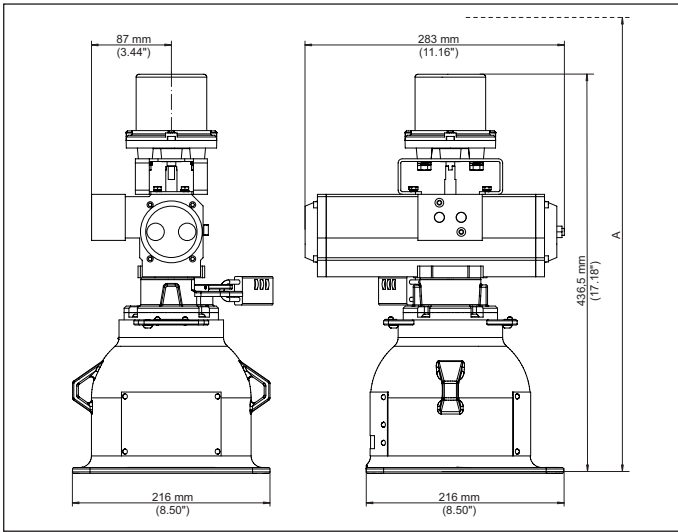


Fig. 54: Source holder VEGASOURCE 82, version B - Pneumatic changeover
 A Free height for removal of the loading tube = 558 mm (21.97 in)

Source holder VEGASOURCE 82, version B - Pneumatic changeover with ON/OFF position switches

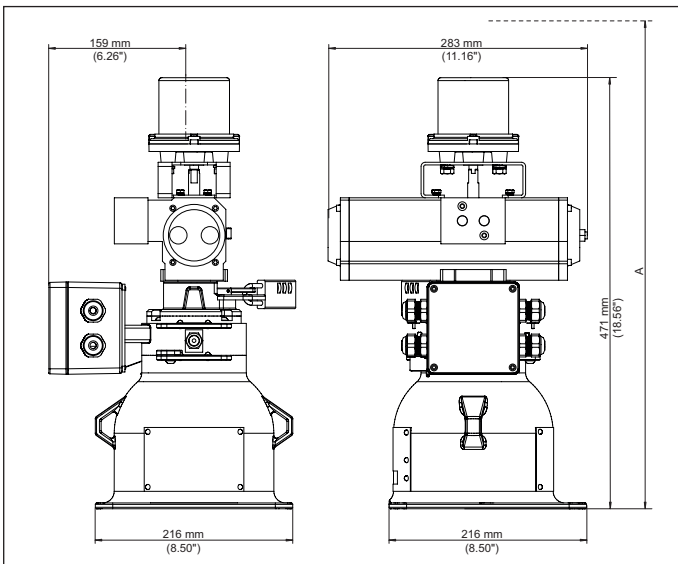


Fig. 55: Source holder VEGASOURCE 82, version B - Pneumatic changeover with ON/OFF position switches
 A Free height for removal of the loading tube = 558 mm (21.97 in)

Gamma modulator (optional)

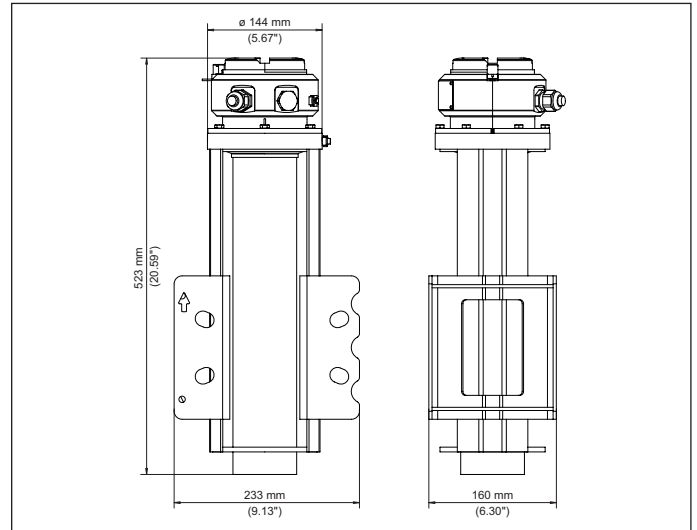


Fig. 56: Gamma modulator for uninterrupted measurement even with X-ray radiation

Mounting brackets KV 31, for pipes from 50 ... 100 mm (1.97 ... 3.94 in) for 30° diagonal irradiation



Fig. 57: Mounting brackets for diagonal mounting on pipes from 50 ... 100 mm (1.97 ... 3.94 in)

**Mounting brackets KV 31, for pipes from 50 ... 220 mm
(1.97 ... 8.66 in)**

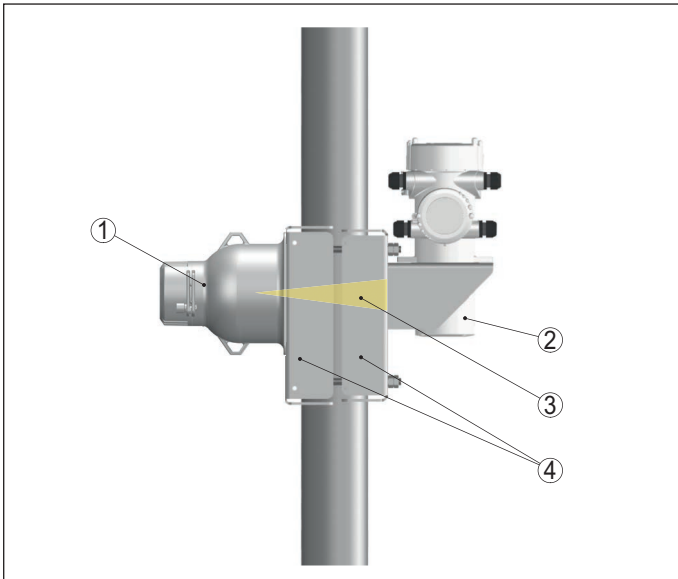


Fig. 58: Mounting brackets for mounting on pipes from 50 ... 220 mm
(1.97 ... 8.66 in) for 30° diagonal irradiation

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

**Mounting brackets KV 31, for pipes from 50 ... 220 mm
(1.97 ... 8.66 in)**

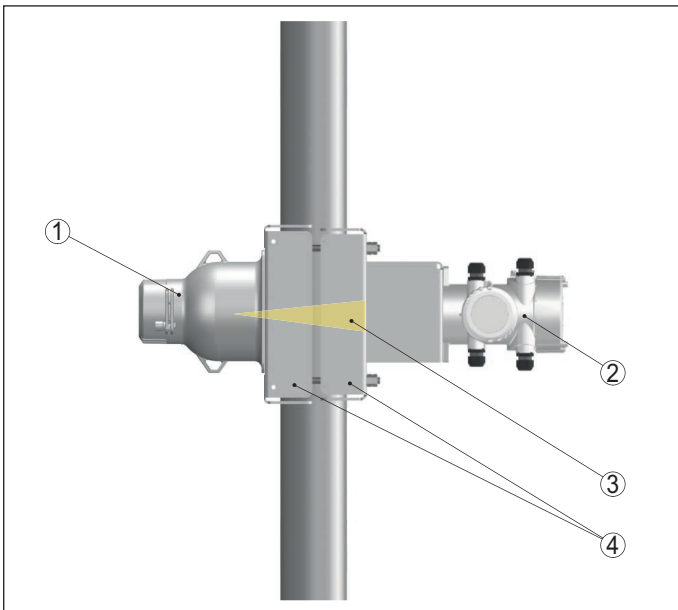


Fig. 59: Mounting brackets for mounting on pipes from 50 ... 220 mm
(1.97 ... 8.66 in)

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



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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VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
E-mail: info.de@vega.com
www.vega.com

VEGA

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