

# Quick setup guide

Radiometric sensor for density measurement

## MINITRAC 31

Foundation Fieldbus



Document ID: 62076



**VEGA**

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**Information:**

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

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

**Operating instructions MINITRAC 31, Foundation Fieldbus:  
Document-ID 41782**

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# 1 For your safety

## 1.1 Authorised personnel

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

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

## 1.2 Appropriate use

The MINITRAC 31 is a sensor for density measurement and level detection.

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

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

## 1.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

## 1.4 General safety instructions

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

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

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

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

This measuring system uses gamma rays. Therefore take note of the instructions for radiation protection in chapter "*Product description*". Any work on the source container may only be carried out under the supervision of a qualified radiation protection officer.

## 1.5 Conformity

The device complies with the legal requirements of the applicable country-specific directives or technical regulations. We confirm conformity with the corresponding labelling.

The corresponding conformity declarations can be found on our homepage.

### Electromagnetic compatibility

Instruments with plastic housing are designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with class A instruments according to EN 61326-1. If the instrument is used in a different environment, the electromagnetic compatibility to other instruments must be ensured by suitable measures.

## 1.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for fault information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see [www.namur.de](http://www.namur.de).

## 1.7 Installation and operation in the USA and Canada

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

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

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

## 1.8 Environmental instructions

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

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

- Chapter " *Packaging, transport and storage* "

- Chapter "*Disposal*"

## 2 Product description

### 2.1 Configuration

#### Type label

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

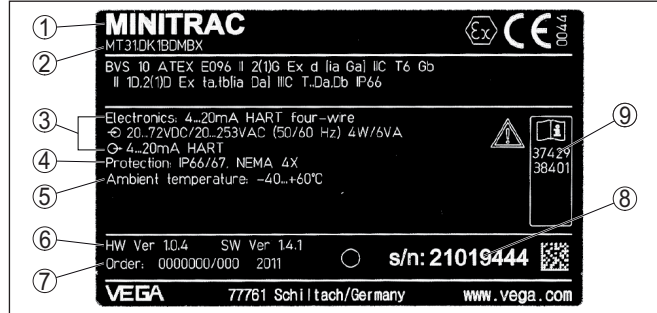


Fig. 1: Layout of the type label (example)

- 1 Instrument type
- 2 Product code
- 3 Electronics
- 4 Protection rating
- 5 Ambient temperature
- 6 Hardware and software version
- 7 Order number
- 8 Serial number of the instrument
- 9 ID numbers, instrument documentation

#### Stainless steel type label

Adhesive labels can peel off or become illegible under harsh ambient conditions or the influence of aggressive materials.

The optional stainless steel type label is screwed tightly to the housing and the labelling is permanently resistant.

The stainless steel type label cannot be retrofitted.

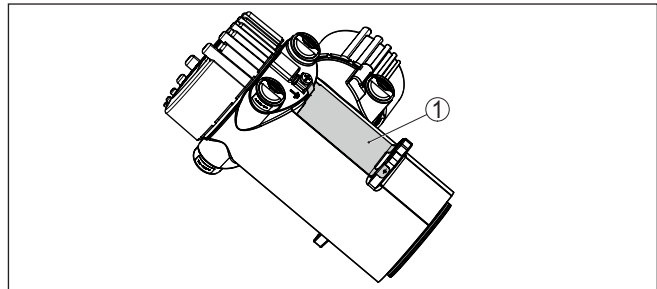


Fig. 2: Position of the stainless steel type label

- 1 Stainless steel type label

#### 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](http://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

## Application area

### 2.2 Principle of operation

The instrument is suitable for applications in liquids and bulk solids in vessels under difficult process conditions. There are application possibilities in nearly all areas of industry.

The measured value is detected contactlessly right through the vessel wall. Neither a process fitting nor a vessel opening are required. The instrument is thus ideal for retro installation.

The instrument can be used for many different measuring tasks. Apart from the main applications such as density measurement and level detection, the MINITRAC 31 can also detect residues and the mass flow rate in conjunction with a flow meter.

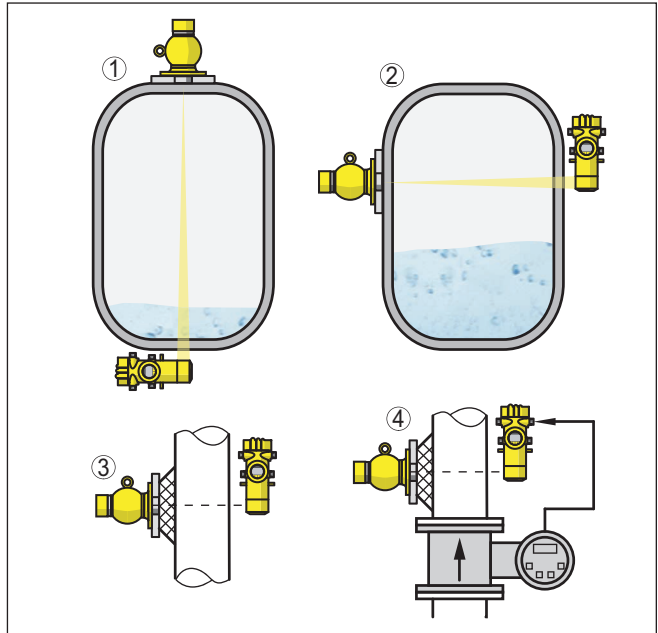


Fig. 3: MINITRAC 31 - Application possibilities

- 1 Level measurement - Residue detection
- 2 Point level detection
- 3 Density measurement
- 4 Mass flow measurement

Further application possibilities are also the use as X-ray alarm or real value correction.

If X-ray alarm is selected, the instrument detects radiation from external sources. Possible external radiation sources can be, for example, a weld joint test in a neighbouring facility or other radiometric instruments.

When the instrument operates as real value correction it transmits the real value to correct another radiometric sensor. The measurement can thus be adapted perfectly to the situation in the vessel.

## Functional principle

In radiometric measurement, a Caesium-137 or Cobalt-60 isotope emits focussed gamma rays that are attenuated when penetrating the tube wall and the medium. The NaI detector on the opposite side, on a pipeline for example, receives the radiation. The intensity of the radiation is dependent on the density of the measured media. The measuring principle has proven to be very reliable in conjunction with extreme process conditions because it measures contactlessly from outside through the tube wall. The measuring system ensures maximum safety, reliability and plant availability independent of the medium and its properties.



### 2.3 Corresponding source container

A radioactive isotope in a suitable source holder is the prerequisite for a radiometric measurement setup.

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, for example, the current radiation protection ordinance (StrlSchV) based on the Atomic Energy Law (AtG) applies.

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 government office or the responsible authority (in Germany, for example, offices for environmental protection, trade supervisory boards, etc.)

You can find further instructions in the operating instructions manual of the source container.

#### 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:

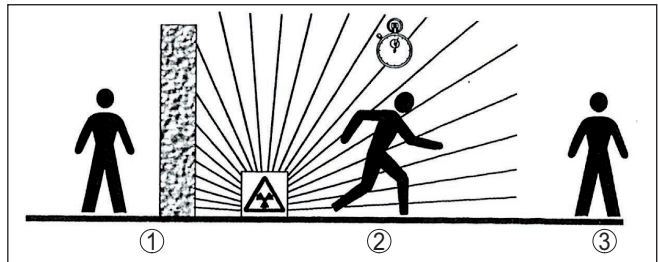


Fig. 4: Measures for protection against radioactive radiation

- 1 Shielding
- 2 Time
- 3 Distance

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

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

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

#### Radiation safety officer

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

**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 guideline of the respective authority (in Germany, for example, the radiation protection ordinance).

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

## 3 Mounting

### 3.1 General instructions

#### Switch off source

The source container is part of the measuring system. In case the source container is already equipped with an active isotope, the source container must be locked before mounting.



#### **Danger:**

Before mounting; make sure that the source is securely closed. Use a padlock to secure the source container in the closed condition and prevent it from being inadvertently opened.

#### Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable (see chapter " *Connecting to power supply* ")
- Tighten the cable gland or plug connector
- Lead the connection cable downward in front of the cable entry or plug connector

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.



#### **Note:**

Make sure that during installation or maintenance no moisture or dirt can get inside the instrument.

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

#### Process conditions



#### **Note:**

For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data* " of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

**Cable glands****Metric threads**

In the case of instrument housings with metric thread, the cable glands are screwed in at the factory. They are sealed with plastic plugs as transport protection.

You have to remove these plugs before electrical connection.

**NPT thread**

In the case of instrument housings with self-sealing NPT threads, it is not possible to have the cable entries screwed in at the factory. The free openings for the cable glands are therefore covered with red dust protection caps as transport protection.

Prior to setup you have to replace these protective caps with approved cable glands or close the openings with suitable blind plugs.

The suitable cable glands and blind plugs come with the instrument.

**3.2 Mounting instructions****Installation position****Note:**

During the planning, our specialists will analyse the conditions of the measurement loop to dimension the isotope accordingly.

You get a "Source Sizing" document specifying the required source activity and containing all relevant mounting information for your measuring point.

You must follow the instructions in this "Source Sizing" document in addition to the following mounting instructions.

The following mounting information is applicable as long as there is nothing else specified in the "Source Sizing" document.

You can find information on protective barriers and the mounting of the corresponding source container in the operating instructions manual of the source container, e.g. VEGASOURCE.

You can mount the MINITRAC 31 in any position. If you have ordered your instrument with a lead cover as a protection against ambient radiation (optionally), the the sensor is shielded laterally against X-ray radiation. In this case, the radiation can only penetrate frontally.

Fasten the sensors in such a way that they cannot fall out of the holder.

Direct the exit angle of the source container to the MINITRAC 31.

Mount the source container 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.

**Caution:**

Make sure that the tube is always completely filled. Mainly in horizontally arranged tube measuring distances, air bubbles or buildup in the tube can influence the measuring result. Measurement should be preferably through the centre of the tube.

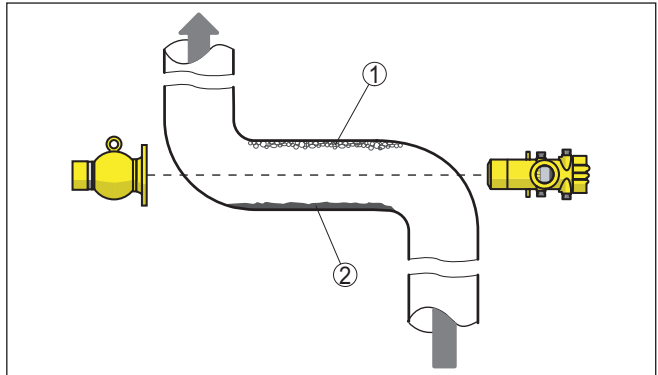


Fig. 5: Installation on a horizontal pipeline

- 1 Air bubbles
- 2 Buildup

### Density measurement

A density and concentration measurement is possible on pipelines and vessels. The accuracy of the measurement increases in proportion to the radiated length (L) of medium. This is particularly important in the case of products with low density or small tube diameters. There are different ways to increase the radiated length (L) of the medium.

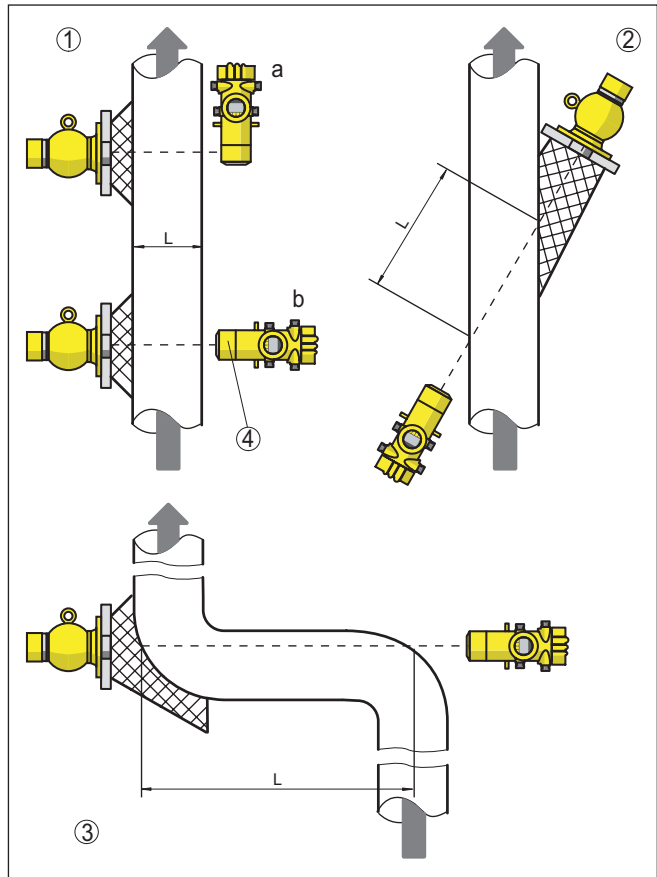


Fig. 6: Installation possibilities - Density measurement or concentration measurement

- 1a Radial radiation - vertical mounting
- 1b Axial radiation - Horizontal mounting or when the lead cover is used as protection against ambient radiation
- 2 Inclined radiation for extension of the radiated length (L)
- 3 Extension of the radiated length (L) by adding a tube angle piece as measuring distance
- 4 Integrated lead cover as protection against ambient radiation - the instrument is hence shielded laterally

With density measurement, the radiation difference with differing density is very low. Especially with small tube diameters, the change is negligible.

Therefore it is important to shield from interfering X-ray radiation. To protect the instrument against X-ray radiation, it can be equipped with an optional lead ring. A later retrofitting of the lead ring is not possible.

**Mass flow rate**

The mass flow rate can be determined with the MINITRAC 31 in conjunction with a flow meter.

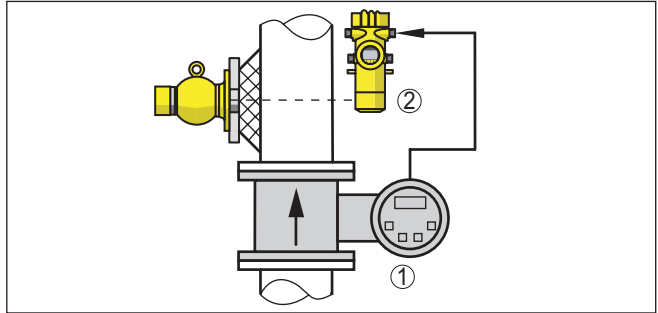


Fig. 7: Mass flow rate measurement

- 1 Flow meter
- 2 MINITRAC 31

**Point level detection**

For level detection, the sensor is generally mounted horizontally at the height of the requested limit level. Make sure that there are no struts or reinforcements at this position in the vessel.

Direct the exit beam of the source container exactly towards the measuring range of MINITRAC 31.

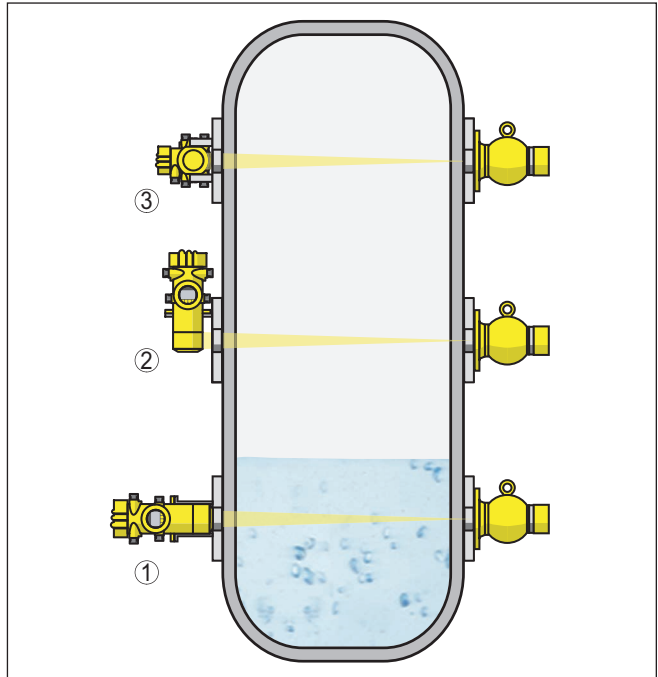


Fig. 8: Mounting position - level detection

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

#### Level measurement - Residue detection

The MINITRAC 31 can be used for residue detection, e.g. in storage tanks for high-cost liquids. For this purpose, the instrument must be mounted at the lowest point of the vessel.



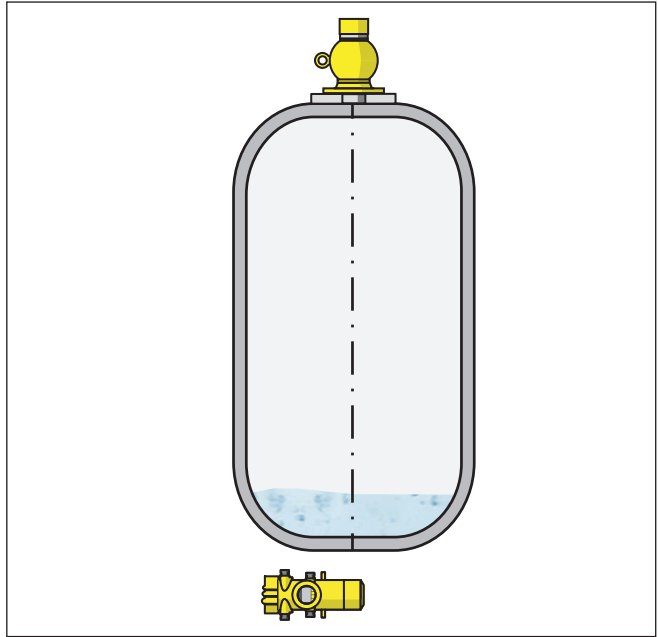


Fig. 9: Level measurement - Residue detection on a storage tank

### Protection against heat

If the max. ambient temperature is exceeded, you must take suitable measures to protect the instrument against overheating.

You can protect the instrument by providing a suitable insulation against the heat or mounting the instrument further away from the heat source.

Make sure these measures are taken into account already in the planning stage. If you want to carry out such measures later on, contact our specialists to ensure that the accuracy of the application is not impaired.

If these measures are not sufficient to maintain the max. ambient temperature, you could consider using the water or air cooling system we offer for MINITRAC 31.

The cooling system must also be included in the calculations for the measuring point. Contact our specialists regarding the dimensioning of the cooling.

## 4 Connecting to power supply

### 4.1 Preparing the connection

#### Safety instructions

Always keep in mind the following safety instructions:

- The electrical connection must only be carried out by trained, qualified personnel authorised by the plant operator.
- If overvoltage surges are expected, overvoltage arresters should be installed.



#### Warning:

Only connect or disconnect in de-energized state.



#### Note:

Install a disconnecting device for the instrument which is easy to access. The disconnecting device must be marked for the instrument (IEC/EN 61010).

#### Connection technology

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

#### Connection procedure

Proceed as follows:

The procedure applies to instruments without explosion protection.

1. Unscrew the big housing cover
2. Loosen compression nut of the cable gland and remove blind plug
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry

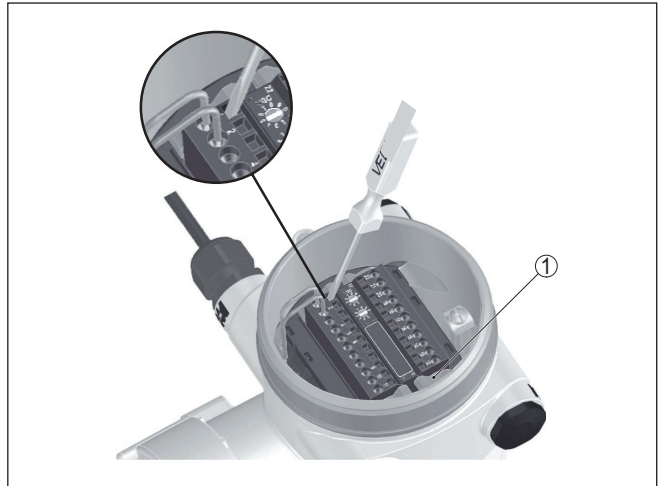


Fig. 10: Connection steps 4 and 5

1 Locking of the terminal blocks

5. Insert a small slotted screwdriver firmly into the rectangular lock openings of the respective connection terminal
6. Insert the wire ends into the round openings of the terminals according to the wiring plan

**i** **Information:**

Solid cores as well as flexible cores with cable end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the rectangular lock opening with a small screwdriver; the terminal opening is freed. When the screwdriver is released, the terminal opening closes again.

7. Check the hold of the wires in the terminals by lightly pulling on them  
To loosen a line, insert a small slotted screwdriver firmly into the rectangular lock opening according to the illustration
8. Connect the shielding to the internal ground terminal, connect the external ground terminal to potential equalisation
9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. Screw the housing lid back on

The electrical connection is finished.

**i** **Information:**

The terminal blocks are pluggable and can be detached from the electronics. To do this, loosen the two lateral locking levers of the terminal block with a small screwdriver. When loosening the locking, the terminal block is automatically squeezed out. It must snap in place when re-inserted.

## 4.2 Connection - Density, mass flow rate measurement

### Non-Ex instruments and instruments with non-intrinsically safe signal output

Electronics and connection compartment - Non-Ex instruments and instruments with non-intrinsically safe signal output

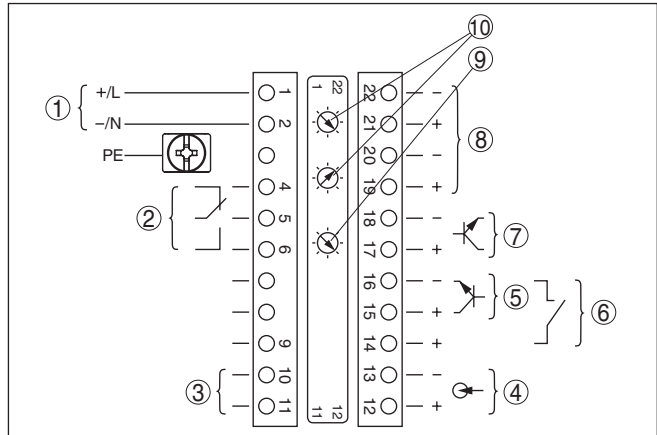


Fig. 11: Electronics and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 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 (MGC)
- 9 Simulation switch (1 = simulation on)
- 10 Setting the bus address for sensor-sensor communication (MGC)<sup>1)</sup>

Adjustment and connection compartment - Non-Ex instruments and instruments with non-intrinsically safe signal output

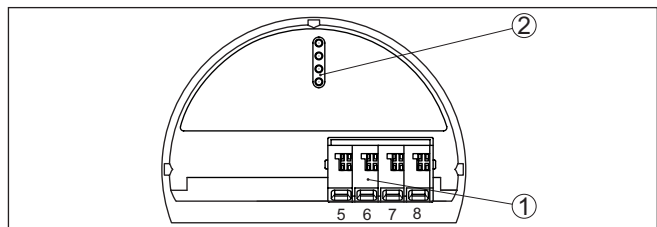


Fig. 12: Adjustment and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

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

<sup>1)</sup> MGC = Multi Gauge Communication

**Instruments with intrinsically safe signal output**



You can find detailed information on the explosion-protected versions (Ex ia, Ex d) in the Ex-specific safety instructions. These safety instructions are part of the scope of delivery and come with the Ex-approved instruments.

**Electronics and connection compartment - Instruments with intrinsically safe signal output**

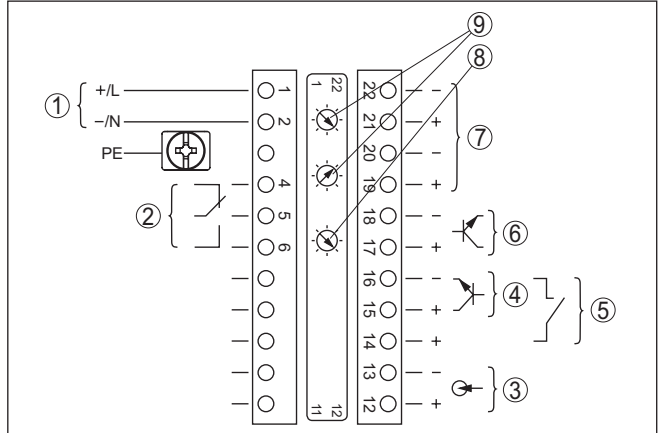


Fig. 13: Electronics and connection compartment (Ex d) with instruments with intrinsically safe signal output

- 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 (MGC)
- 8 Simulation switch (1 = simulation on)
- 9 Setting the bus address for sensor-sensor communication (MGC)<sup>2)</sup>

<sup>2)</sup> MGC = Multi Gauge Communication

### Adjustment and connection compartment - Instruments with intrinsically safe signal output

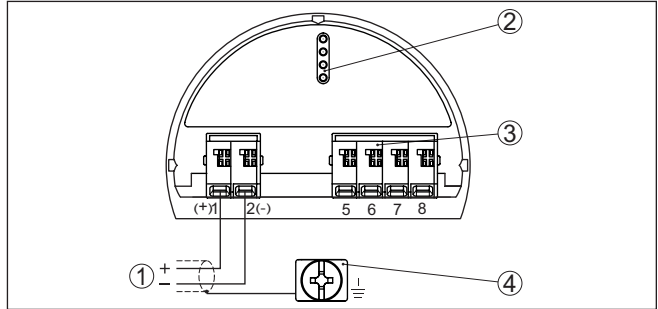


Fig. 14: Adjustment and connection compartment (Ex ia) with instruments with intrinsically safe signal output

- 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

### 4.3 Connection - Level detection

#### Non-Ex instruments and instruments with non-intrinsically safe signal output

Electronics and connection compartment - Non-Ex instruments and instruments with non-intrinsically safe signal output

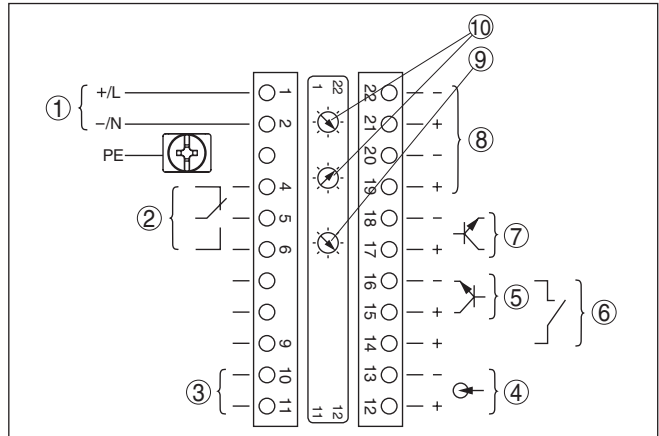


Fig. 15: Electronics and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

- 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 (MGC)
- 9 Simulation switch (1 = simulation on)
- 10 Setting the bus address for sensor-sensor communication (MGC)<sup>3)</sup>

Adjustment and connection compartment - Non-Ex instruments and instruments with non-intrinsically safe signal output

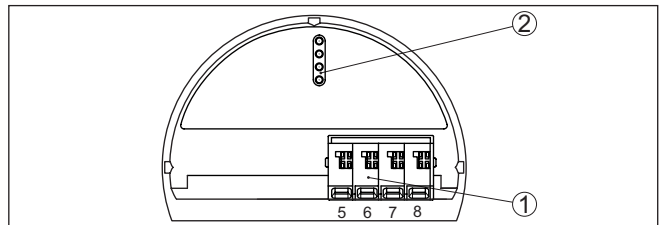


Fig. 16: Adjustment and connection compartment with non-Ex instruments and instruments with non-intrinsically safe signal output

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

#### Connection to a PLC

If inductive loads or stronger currents are switched through, the gold plating on the relay contact surface will be permanently damaged.

<sup>3)</sup> MGC = Multi Gauge Communication

The contact is then no longer suitable for switching low-voltage circuits.

Inductive loads also result from the connection to a PLC input or output and/or in combination with long cables. It is imperative that you take measures to extinguish sparks to protect the relay contact (e.g. Z diode) or the transistor or 8/16 mA output.

### Instruments with intrinsically safe signal output



You can find detailed information on the explosion-protected versions (Ex ia, Ex d) in the Ex-specific safety instructions. These safety instructions are part of the scope of delivery and come with the Ex-approved instruments.

### Electronics and connection compartment - Instruments with intrinsically safe signal output

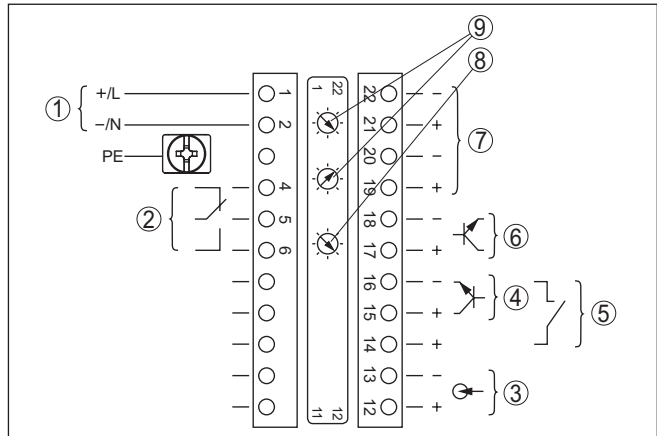


Fig. 17: Electronics and connection compartment (Ex d) with instruments with intrinsically safe signal output

- 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 (MGC)
- 8 Simulation switch (1 = simulation on)
- 9 Setting the bus address for sensor-sensor communication (MGC)<sup>4)</sup>

<sup>4)</sup> MGC = Multi Gauge Communication



**Adjustment and connection compartment - Instruments with intrinsically safe signal output**

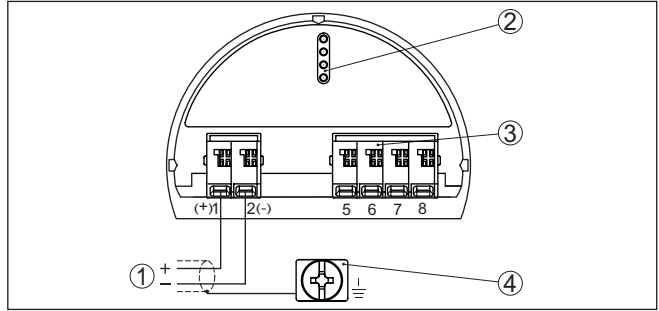


Fig. 18: Adjustment and connection compartment (Ex ia) with instruments with intrinsically safe signal output

- 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

**Connection to a PLC**

If inductive loads or stronger currents are switched through, the gold plating on the relay contact surface will be permanently damaged. The contact is then no longer suitable for switching low-voltage circuits.

Inductive loads also result from the connection to a PLC input or output and/or in combination with long cables. It is imperative that you take measures to extinguish sparks to protect the relay contact (e.g. Z diode) or the transistor or 8/16 mA output.

## 5 Set up with the display and adjustment module

### Mount/dismount display and adjustment module

#### 5.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the voltage supply.

Proceed as follows:

1. Unscrew the small housing cover
2. Place the display and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
3. Press the display and adjustment module onto the electronics and turn it to the right until it snaps in
4. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.

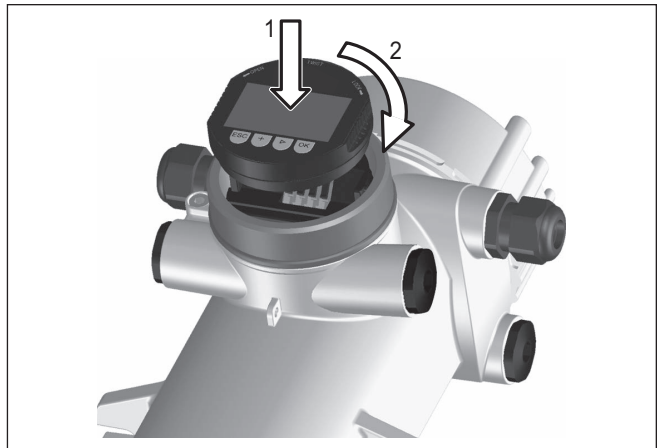


Fig. 19: Insert display and adjustment module



#### Note:

If you intend to retrofit the instrument with a display and adjustment module for continuous measured value indication, a higher lid with an inspection glass is required.

#### 5.2 Parameter adjustment - Density measurement

The instrument is adapted to the application conditions via the parameter adjustment. The parameter adjustment is carried out with an adjustment menu.

**Prerequisites**

The following requirements must be fulfilled for reliable and safe operation:

- The tube must be filled. There must be no air bubbles in the tube
- The source container is switched on
- A sample point is close to the measuring point



**Warning:**

When the source container is switched on, the tube must always be filled. If the tube is empty, there can be an increased local dose rate. Make sure that the tube is filled even in case of plant downtime, or switch the source container off.

**Instrument start**

Carry out a setup in the sequence described in the following.



**Caution:**

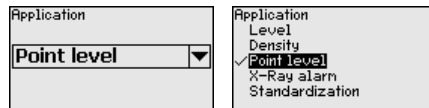
During the first setup or after an instrument reset the instrument starts with preset standard values. These value are not suitable for your application and must be replaced by real values.

**5.2.1 Setup**

**Application**

Enter here, the respective application.

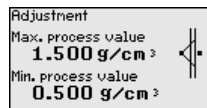
This menu item enables adaptation of the sensor to the requested application. You can choose between the following applications: "Level", "Density", "Limit level", "X-ray alarm" or "Real value correction".



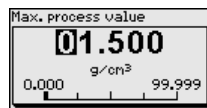
**Adjustment**

In this menu item you can enter the measuring range (min. and max. process value) of the sensor.

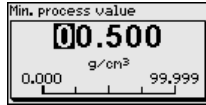
These settings influence the current output of the sensor.



Enter in the menu window "Max. process value" the max. density value, for example in "g/cm<sup>3</sup>". This corresponds to an output current of 20 mA.



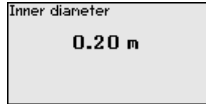
Enter in the menu window "Min. process value" the min. density value, for example in "g/cm<sup>3</sup>". This corresponds to an output current of 4 mA.



**Inner diameter**

In this menu item you can enter the inside diameter of the tube or the radiated length (L).

This setting influences the accuracy of the sensor.



First of all, select the unit of the inside diameter.



Enter in the menu window " *Inside diameter*" the inside diameter of the tube, for example in " *cm*".

If the tube is not radiated with 90°, then you have to enter the radiated length (L) instead of the tube inside diameter.

Enter also here the radiated length without the wall thickness of the tube.

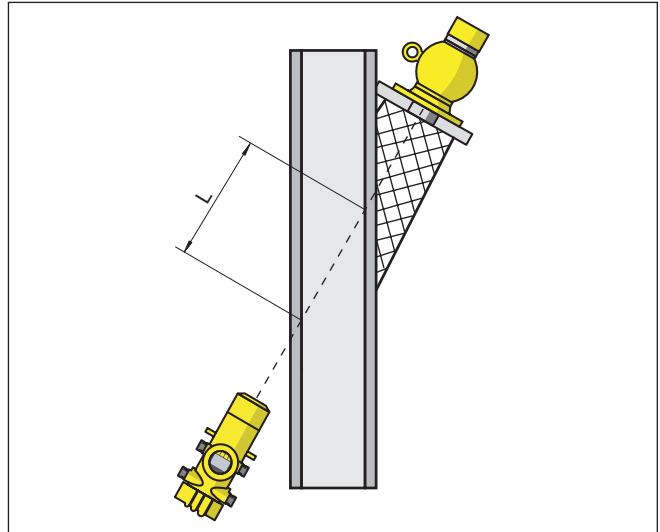
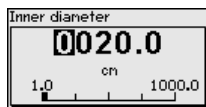


Fig. 20: With inclined mounting, the radiated length of the tube is applicable



## 6 Supplement

### 6.1 Technical data

#### Note for approved instruments

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

#### Electromechanical data - version IP66/IP67

Options of the cable entry

- Cable entry M20 x 1.5; ½ NPT
- Cable gland M20 x 1.5; ½ NPT (cable diameter see below table)
- Blind plug M20 x 1.5; ½ NPT
- Closing cap ½ NPT

Material cable gland	Material seal insert	Cable diameter				
		4.5 ... 8.5 mm	5 ... 9 mm	6 ... 12 mm	7 ... 12 mm	10 ... 14 mm
PA	NBR	-	●	●	-	●
Brass, nickel-plated	NBR	●	●	●	-	-
Stainless steel	NBR	-	●	●	-	●

Flammability class - Supply lines at least VW-1

Wire cross-section (spring-loaded terminals)

- Massive wire, stranded wire 0.2 ... 2.5 mm<sup>2</sup> (AWG 24 ... 14)
- Stranded wire with end sleeve 0.2 ... 1.5 mm<sup>2</sup> (AWG 24 ... 16)

#### Voltage supply

Operating voltage

- Sensor power supply 24 ... 65 V DC (-15 ... +10 %) or 24 ... 230 V AC (-15 ... +10 %), 50/60 Hz
- FF bus 9 ... 32 V DC





Printing date:

**VEGA**

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.

Subject to change without prior notice

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