Operating Instructions

Radiation-based sensor for level detection

POINTRAC 31

8/16 mA/HART - four-wire





Document ID: 39411







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Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each instrument with Ex approval and are part of the operating instructions manual.

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1 About this document

1.1 Function

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

1.2 Target group

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

1.3 Symbols used



Document ID

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



This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.



Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



Ex applications

 \mathcal{G} This symbol indicates special instructions for Ex applications.

List

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

→ Action

This arrow indicates a single action.

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



Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.



2 For your safety

2.1 Authorised personnel

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

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

2.2 Appropriate use

The POINTRAC 31 is a sensor for point 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.

2.3 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.

2.4 General safety instructions

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

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

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

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

To avoid any danger, the safety approval markings and safety tips on the device must also be observed and their meaning looked up in this operating instructions manual.



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.

2.5 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm the conformity of the instrument with these directives.

You can find the EU conformity declaration on our website under <u>www.vega.com/downloads</u>.

Electromagnetic compatibility

Instruments in four-wire or Ex-d-ia version 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.

2.6 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.

2.7 Security concept, Bluetooth operation

Sensor adjustment via Bluetooth is based on a multi-stage security concept.

Authentication

When starting Bluetooth communication, an authentication is carried out between sensor and adjustment device by means of the sensor PIN. The sensor PIN is part of the respective sensor and must be entered in the adjustment device (smartphone/tablet). To increase adjustment convenience, this PIN is stored in the adjustment device. This process is secured via an algorithm acc. to standard SHA 256.



Protection against incorrect entries

In case of multiple incorrect PIN entries in the adjustment device, further entries are possible only after a certain amount of time has passed.

Encrypted Bluetooth communication

The sensor PIN as well as the sensor data are transmitted encrypted between sensor and adjustment device according to Bluetooth standard 4.0.

Modification of the default sensor PIN

Authentication by means of the sensor PIN is only possible after the default sensor PIN "0000" has been changed in the sensor by the user.

2.8 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

2.9 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"



3 Product description

3.1 Configuration

Type label

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

1 POINTRAC 2 PT31XX VEMXX004	
3 -Electronics: 4.20mA HART four-wire 4 -Gr 4.20mA HART -Gr 4.20mA HART 5 -Gr 4.20mA HART -Gr 5 -Arrbent lemperature: -40.+60°C -Length: 6 inch	10
7 -tw/ ver 10.2 Sw. ver 10.0 s/n: 19997099 5 8 VEEA 77761 Schiltach/Germany www.vega.com	

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

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

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)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate (PDF) optional

Go to "<u>www.vega.com</u>", "*Instrument search (serial number)*". Enter the serial number.

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 Data Matrix code on the type label of the instrument or
- Enter the serial number manually in the app

Scope of this operating instructions manual

This operating instructions manual applies to the following instrument versions:

- Hardware from 1.0.6
- Software from 2.0.0



Electronics versions	The instrument is available in different electronics versions. Each version can be identified via the product code on the type label: Standard electronics type PROTRACHXX
Scope of delivery	The scope of delivery encompasses:
	Radiation-based sensor
	Mounting accessories
	Documentation Restant module (antional)
	Diversion module (optional) This operating instructions manual
	 Ex-specific "Safety instructions" (with Ex versions)
	 If necessary, further certificates
	3.2 Principle of operation
Application area	The instrument is suitable for applications in liquids and bulk solids in
	vessels under difficult process conditions. There are application pos- sibilities in nearly all areas of industry.
	The limit level is detected contactlessly through the vessel wall. Nei-
	ther a process fitting nor a vessel opening is required. The instrument
	is this ideal for retroliting.
Functional principle	In radiation-based measurement, a Caesium-137 or Cobalt-60 iso-
	tope emits focussed gamma rays that are attenuated when penetrat-
	ing the vessel wall and the medium. The PVT detector on the opposite side of the tank receives the radiation. When the intensity of the
	radiation drops below a defined value, e.g. due to damping, then the
	POINTRAC 31 switches. The measuring principle has proven itself
	well under extreme conditions because it measures contactlessly
	from outside through the vessel wall. The measuring system ensures
	medium and its properties.
	3.3 Packaging, transport and storage
Packaging	Your instrument was protected by packaging during transport. Its
	capacity to handle normal loads during transport is assured by a test
	based on ISO 4180.
	friendly, recyclable cardboard. For special versions, PE foam or PE
	foil is also used. Dispose of the packaging material via specialised
	recycling companies.
Transport	Transport must be carried out in due consideration of the notes on the
	transport packaging. Nonobservance of these instructions can cause
	damage to the device.
Transport inspection	The delivery must be checked for completeness and possible transit
	damage immediately at receipt. Ascertained transit damage or con-
	cealed defects must be appropriately dealt with.



Storage	Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.
	Unless otherwise indicated, the packages must be stored only under the following conditions:
	 Not in the open Dry and dust free Not exposed to corrosive media Protected against solar radiation Avoiding mechanical shock and vibration
Storage and transport temperature	 Storage and transport temperature see chapter "Supplement - Technical data - Ambient conditions" Relative humidity 20 85 %
Lifting and carrying	With instrument weights of more than 18 kg (39.68 lbs) suitable and approved equipment must be used for lifting and carrying.
	3.4 Accessories and replacement parts
PLICSCOM	The display and adjustment module PLICSCOM is used for measured value indication, adjustment and diagnosis. It can be inserted into the sensor or the external display and adjustment unit and removed at any time.
	The integrated Bluetooth module (optional) enables wireless adjust- ment via standard adjustment devices: ¹⁾
	 Smartphone/tablet (iOS or Android operating system) PC/notebook with Bluetooth USB adapter (Windows operating system)
	You can find further information in the operating instructions " <i>Display and adjustment module PLICSCOM</i> " (Document-ID 36433).
VEGACONNECT	The interface adapter VEGACONNECT enables the connection of communication-capable instruments to the USB interface of a PC. For parameter adjustment of these instruments, the adjustment software PACTware with VEGA-DTM is required.
	You can find further information in the operating instructions "Interface adapter VEGACONNECT" (Document-ID 32628).
VEGADIS 81	The VEGADIS 81 is an external display and adjustment unit for VEGA plics [®] sensors.
	For sensors with double chamber housing the interface adapter "VEGADIS adapter" is also required for VEGADIS 81.
	You can find further information in the operating instructions "VEGADIS 81" (Document-ID 43814).
VEGADIS 82	VEGADIS 82 is suitable for measured value indication and adjustment of sensors with HART protocol. It is looped into the 4 20 mA/HART signal cable.
	¹⁾ Bluetooth function with VEGADIS 82 can only be used at a later date.



	You can find further information in the operating instructions "VEGADIS 82 4 20 mA/HART" (Document-ID 45300).
External indicating unit	The VEGADIS 62 is suitable for measured value indication of sensors. It is looped into the 4 20 mA/HART signal cable.
	You can find further information in the operating instructions "VEGADIS 62" (Document-ID 36469).
Electronics module	The electronics module PT30 is a replacement part for radiation- based sensors POINTRAC 31.
	The electronics module can only be exchanged by VEGA service technician.
Device cooling	The radiation-based sensor has temperature limits which must not be exceeded. In case the max. permissible temperature is exceeded, faulty measurements and a permanent damage of the sensor can be caused.
	You have several possibilities to avoid too high ambient temperatures:
	Passive sun shade Direct sun increases the temperature on the sensor by 20 °K. The best possibility to protect the sensor against the effects of direct sun is a suitable roof structure.
	If this is not possible or only with great effort, then you can use the passive sun shade. The passive sun shade consists of a housing sun shade and a sun protection hose and can reduce the sensor temperature by $10 ^{\circ}$ K.
	Air cooling For ambient temperatures up to +80 °C you can use an air cooling. The cooling air is generated with vortex coolers. Please check if suf- ficient compressed air is available. You can find further information in the supplementary instructions of the water cooling. The air cooling cannot be retrofitted.
	Water cooling For ambient temperatures up to +100 °C you can use a water cool- ing. Please check if sufficient cooled water is available. You can find further information in the supplementary instructions of the water cooling. The water cooling cannot be retrofitted.
	3.5 Corresponding source container
	A radioactive isotope in a suitable source holder is the prerequisite for a radiation-based measurement setup.
	The handling of radioactive substances is regulated by law. The radia- tion protection rules of the country in which the system is operated apply first and foremost.
	In Germany, for example, the current radiation protection ordinance (StrISchV) based on the Atomic Energy Law (AtG) applies.
	The following points are important for measurement with radiation- based 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. 2: 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.



Switch off source

4 Mounting

4.1 General instructions

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
- When mounting horizontally, turn the housing so that the cable gland or plug connector point downward
- 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.

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

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

Suitability for the process
conditionsMake 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

You can find detailed information on the process conditions in chapter "*Technical data*" as well as on the type label.

Suitability for the ambient The instrument is suitable for standard and extended ambient conditions acc. to IEC/EN 61010-1.



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.

4.2 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.







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





Fig. 4: Mounting position - level detection - version without detector tube

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

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.

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 POINTRAC 31.

Fasten the sensor in such a way that it cannot fall out of the holder. If necessary, provide the sensor with a support from below.

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.

Mounting clamp

You can mount the sensor (version with detector tube) with the attached mounting clamp to your vessel.





Fig. 5: Mounting clamp

- 1 Screw M8 x 80
- 2 Hinge bolt clamp
- 3 Detector tube
- 4 Console
- 1. Determine the exact mounting position of the mounting clamp and mark the holes.

Drill appropriate holes (max. M12) for fastening the mounting clamps.

2. For mounting, insert the detector tube (3) into the V-shape holding fixture of the console (4).

Draw the hinge bolt clamp (2) according to the illustration through the console (4).

Screw the hinge bolt clamp (2) together and tighten the screw (1) with a max. torque of 20 Nm (14.75 lbf/ft).



Note:

The mounting clamps do not come with fastening screws. Use fastening elements that are appropriate for the situation in your plant.

Sensor orientation

Level detection - max. detection

The POINTRAC 31 is suitable for level detection in liquids or bulk solids. It is mounted at the height of the requested switching point.





Fig. 6: POINTRAC 31 as max. level detection (uncovered)





Fig. 7: POINTRAC 31 as min. level detection (covered)



Bulk solids with low density



Fig. 8: POINTRAC 31 as level detection (top view)

POINTRAC 31 lends itself well for level detection of bulk solids with low density. Mount the instrument horizontally at the height of the requested switching point.

Mount the source container VEGASOURCE displaced by 90° in order to get the widest possible radiation angle.

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

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 POINTRAC 31.

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



5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

Warning:

 \sum Connect only in the complete absence of line voltage.

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



Note:

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

Voltage supply via mains voltage In this case, the instrument is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the national installation regulations.

Supply voltage and current signal are carried on separate connection cables if reliable separation is required. The supply voltage range can differ depending on the instrument version.

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

Select connection cable

General requirements

- Make sure that the cable used has the required temperature resistance and fire safety for max. occurring ambient temperature
- Use cable with round cross section for instruments with housing and cable gland. To ensure the seal effect of the cable gland (IP protection rating), find out which cable outer diameter the cable gland is suitable for.
- Use a cable gland fitting the cable diameter.
- Unused cable glands do not offer sufficient protection against moisture and must be replaced by blind plugs.

Voltage supply

For power supply, an approved, three-wire installation cable with PE conductor is required.

Signal cable

The 8/16 mA current output is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

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.

Before setup you have to replace these protective caps with approved cable glands or close the openings with suitable blind plugs. Unused cable glands do not provide sufficient protection against moisture and must be replaced with blind plugs.

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

Cable screening and grounding If screened cable is required, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low-frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.



Warning:

Significant potential differences exist inside galvanization plants as well as on vessels with cathodic corrosion protection. Considerable equalisation currents can flow over the cable screen if the screen is grounded on both ends.

To avoid this, the cable screen in such applications must be connected only on one end to ground potential in the switching cabinet. The cable screen must **not** be connected to the inner ground terminal in the sensor and the outer ground terminal on the housing must **not** be connected to potential equalization!

Information:

The metal parts of the instrument are conductively connected with the inner and outer ground terminal on the housing. This connection is either a direct metallic connection or, in case of instruments with external electronics, a connection via the screen of the special connection cable.

You can find specifications on the potential connections inside the instrument in chapter "*Technical data*".

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. 9: 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

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 screen 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.



• Information: The terminal b

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.

5.2 Connection

Non-Ex instruments and instruments with non-intrinsically safe current output

Electronics and terminal compartment - Non-Ex instruments and instruments with non-intrinsically safe current output



Fig. 10: Electronics and terminal compartment with non-Ex instruments and instruments with non-intrinsically safe current output

- 1 Voltage supply
- 2 Relay output
- 3 Signal output 8/16 mA/HART active
- 4 Signal output 8/16 mA/HART Multidrop 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 (MGC)
- 10 Setting the bus address for sensor-sensor communication (MGC)²⁾

2) MGC = Multi Gauge Communication



Adjustment and connection compartment - Non-Ex instruments and instruments with nonintrinsically safe current output



Fig. 11: 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

Instruments with intrinsically safe current 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 Exapproved instruments.

Electronics and terminal compartment - Instruments with intrinsically safe current output





- 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 (MGC)
- 8 Setting the bus address for sensor-sensor communication (MGC)³⁾

³⁾ MGC = Multi Gauge Communication



Adjustment and connection compartment - Instruments with intrinsically safe current output



Fig. 13: Adjustment and connection compartment (Ex-ia) with instruments with intrinsically safe current output

- 1 Terminals for intrinsically safe signal output 8/16 mA/HART (Multidrop) active
- 2 Contact pins for the display and adjustment module or interface adapter
- 3 Terminals for the external display and adjustment unit
- 4 Ground terminal



6 Set up with the display and adjustment module

6.1 Insert display and adjustment module

Mount/dismount 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 power supply.

Proceed as follows:

- 1. Unscrew the small housing cover
- 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. 14: 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.



6.2 Adjustment system







Fig. 16: Display and adjustment elements - with adjustment via magnetic pen

- 1 LC display
- 2 Magnetic pen
- 3 Adjustment keys
- 4 Bluetooth symbol
- 5 Lid with inspection window

Time functions

When the [+] and [->] keys are pressed quickly, the edited value, or the cursor, changes one value or position at a time. If the key is pressed longer than 1 s, the value or position changes continuously.

When the **[OK]** and **[ESC]** keys are pressed simultaneously for more than 5 s, the display returns to the main menu. The menu language is then switched over to "*English*".

Approx. 60 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with *[OK]* will not be saved.

6.3 Parameter adjustment

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

Main menu

The main menu is divided into five sections with the following functions:



Setup: Settings, e.g. for measurement loop name, isotope, application, background radiation, adjustment, signal output

Display: Settings, for example language, measured value display

Diagnosis: Information, for example, of device status, peak value, simulation

Additional adjustments: Instrument unit, reset, date/time, copying function

Info: Instrument name, hardware and software version, date of manufacture, instrument features



Procedure	Check if the correct language is already set for the display. If not, you can change the language in the menu item " <i>Display - Menu lan-guage</i> ". Setup Display Setup Display Display Brache des Menus Razeigewert 2 Anzeigevert 2 Razeigeformat Einheit der Pulsrate
	Start with the setup of POINTRAC 31.
	In the main menu item " <i>Setup</i> ", the individual submenu items should be selected one after the other and provided with the correct parameters to ensure optimum adjustment of the measurement. The procedure is described in the following.
	Stick with the normal sequence of the menu items as closely as possible.
	Setup
Setup - Measurement loop name	In this menu item you can assign an unambiguous name to the sensor or measurement loop. Push the " <i>OK</i> " key to start the editing. With the "+" key you change the sign and with the "->" key you jump to the next position.
	You can enter names with max. 19 characters. The character set comprises:
	 Capital letters from A Z Numbers from 0 9 Special characters + - / _ blanks
	Measurement loop name
	SENSOR
Setup - Isotope	In this menu item you can adjust the POINTRAC 31 to the isotope installed in the source container.
	For this purpose, check which isotope is in the source container. You can find this information on the type label of the source container.
	Isotope Isotope
	Cs-137 ▼ ✓ Co-60
	Through this selection, the constituity of the consor is adapted per
	fectly to the isotope. The normal reduction of source activity through radioactive decay is thus taken into account.
	The POINTRAC 31 requires this information for the automatic decay compensation. This ensures error-free measurement over the entire lifetime of the gamma emitter - an annual recalibration is not necessary.

Enter the requested parameters via the appropriate keys, save your settings with *[OK]* and jump to the next menu item with the *[ESC]* and the *[->]* key.



Setup

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: " <i>Level</i> ", " <i>X-ray alarm</i> " or " <i>Real value correction</i> ". Point level X-Ray alarm Standardization
	X-ray alarm The radiation of external radiation sources can influence the measur- ing result of continuously measuring, radiation-based sensors. You can also use the POINTRAC 31 as a Slave instrument for detec- tion against X-ray alarm. Hence an alarm can be triggered. For this function you require PACTware with the respective DTM.
	Real value correction You can also use the POINTRAC 31 as a Slave instrument for detection of a defined level. Hence you can automatically correct the measured value of a continuously measuring, radiation-based sensor to the real value when this level is reached. For this function you require PACTware with the respective DTM.
Setup - Background radiation	The natural radiation on earth influences the accuracy of the meas- urement. With this menu item the natural background radiation can be faded
	For this purpose, the POINTRAC 31 measures the natural back- ground radiation and sets the pulse rate to zero.
	In the future, the pulse rate from this background radiation will be automatically deducted from the total pulse rate. This means: only the component of the pulse rate originating from the source will be displayed.
	The source container must be closed for this setting.
	Background radiation Oct/s Get count
Setup - Unit	In this menu item you can select the temperature unit.
Setup - Adjustment mode	in this menu item you can select if you want to carry out a single or

double point adjustment on the sensor.



With the double point adjustment, the Delta I value is selected automatically.

We recommend selecting the double point adjustment. To use this, you must be able to change the level of the vessel so as to carry out the adjustment of the sensor with full status (covered) and with empty status (uncovered).

Hence, you will get a very reliable switching point.

With single point adjustment, you have to define the difference between the min. and max. adjustment points (Delta I) yourself during the following setup.



Setup - Adjustment uncovered (single point adjustment)

This menu item appears only if you have selected "Single point adjustment" as adjustment mode (Setup - Adjustment mode).

In this menu item you determine the point at which the POINTRAC 31 should switch in uncovered status.

Empty the vessel until the sensor is uncovered.

For this enter the requested pulse rate manually or let the rate be determined by POINTRAC 31. Automatic determination of the pulse rate should be given preference.

The count rate is stated in ct/s. This is the number of counts per second, i.e. the measured radioactive radiation dose actually reaching the sensor.

Prerequisites:

- Radiation is switched on Source container is set to "ON"
- There is no medium between source container and sensor



You can enter the value for "Adjustment uncovered" (ct/s) manually.



You can have the value for "*Adjustment uncovered*" determined by POINTRAC 31.



Setup - Delta I (single point adjustment)

This menu item appears only if you have selected "Single point adjustment" as adjustment mode (Setup - Adjustment mode).



In this menu item you can adjust at which percentage value of the max. pulse rate the sensor should switch over.

Since in most cases the radiation is almost completely absorbed when the sensor is covered, the pulse rate when the sensor is covered is very low.

The change between the two statuses is sufficiently clear.

Hence a percentage value of 90 % for the Delta I value is recommended.

You select lower values for sensitive detection of material cones or buildup which cause only partial absorption of the radiation.



Setup - Adjustment covered (two point adjustment)

This menu item appears only if you have selected "**Two point adjust**ment" as adjustment mode (Setup - Adjustment mode).

In this menu item you can set the min. pulse rate (ct/s) at which the sensor should switch over.

Fill the vessel until the POINTRAC 31 is covered.

You thus get the min. pulse rate (ct/s) for the "covered" adjustment.

Enter the requested pulse rate manually or let the rate be determined by POINTRAC 31. Automatic determination of the pulse rate should be given preference.



You can enter the adjustment point (ct/s) manually.



You can let the adjustment point be determined by POINTRAC 31.



Setup - Adjustment uncovered (two point adjustment)

This menu item appears only if you have selected "**Two point adjustment**" as adjustment mode (Setup - Adjustment mode).

In this menu item you can set the max. pulse rate (ct/s) at which the sensor should switch over.

Empty the vessel until the POINTRAC 31 is uncovered.

You thus get the max. pulse rate (ct/s) for the "uncovered" adjustment.



Enter the requested pulse rate manually or let the rate be determined by POINTRAC 31. Automatic determination of the pulse rate should be given preference.



You can enter the adjustment point (ct/s) manually.



You can let the adjustment point be determined by POINTRAC 31.

et count	
610 ct/s	
Accept Escape	

Setup - Current output, mode

In this menu item you can select the switching behaviour of the sensor.

Current output node	
Output node	
8-16mA	▼
Failure mode	
< 3.6 mA	•

You can choose between an 8 - 16 mA characteristics or a 16 - 8 mA characteristics.



In this menu item you can also define the switching behaviour in case of fault. You can select if the current output should output 22 mA or < 3.6 mA in case of fault.



Setup - Relay

In this menu item you can select which mode the sensor should operate in.

You can choose between overfill and dry run protection.

The relay outputs of the sensor react accordingly.

Overfill protection = the relay will deenergise (safe state) when the max. level is reached.

Dry run protection = the relay will deenergise (safe state) when the min. level is reached.



Make sure that you have selected the correct characteristics. See menu item "Setup - Current output mode".



Lock/unlock setup - Adjustment

In the menu item "*Lock/unlock adjustment*", you can protect the sensor parameters against unauthorized or inadvertent modification. The sensor is locked/unlocked permanently.

With locked instrument, only the following adjustment functions are possible without entering a PIN:

- Select menu items and show data
- Read data from the sensor into the display and adjustment module

Bedienung	Bedienung
Gesperrt	0000
Freigeben?	0 9999

Before you lock the sensor in unlocked condition, you can modify the four-digit PIN number.

Keep the entered PIN number in mind. Operation of the sensor is only possible with this PIN number.



Caution:

When the PIN is active, adjustment via PACTware/DTM as well as other systems is also blocked.

In delivery status, the PIN is 0000.

Call our service department if you have modified and forgotten the PIN.

Display

In the main menu point "*Display*", the individual submenu points should be selected one after the other and provided with the correct parameters to ensure the optimum adjustment of the display. The procedure is described in the following.

Display - Menu language

This menu item enables the setting of the requested national language.



In delivery status, the sensor is set to the ordered national language. If no language is preset, you will be asked during setup.

Display - Indicated value With this parameter you can change the indication of the display. You can choose if the display should show the actual pulse rate or the electronics temperature.



Anzeigewert 1 Pulsrate	✓ <mark>Count rate</mark> Electronics temp.
------------------------	--

Diagnostics

Diagnostics - Device status In this menu item, you can enquire the status of your sensor. In normal operation, the sensor displays the message "OK". In case of fault, you will find the corresponding fault code here.

)evice status
ОК

Diagnosis - Peak value The peak value function holds the max. and min. values during operation.

- Pulse rates min./max.
- Temperature min./max./actually

Peak values	
Pulse/sec.min.	Oct/s
Pulse/sec.max.	35467 ct/s
Tmin.	21.5 °C
Tmax.	31.5 °C
Tact.	31.0 °C

Diagnosis - Adjustment data Here, you can retrieve the adjustment value of the sensor. This is the percentage value of the max. pulse rate at which the sensor switches over.

If you have carried out a single point adjustment, this is the entered value. With a two-point adjustment, this is the calculated value.

The value is an indication for the reliability and reproducibility of the switching point.

The greater the difference in the pulse rate between covered and uncovered status, the greater the differential value (Delta I) and the more reliable the measurement. The automatically calculated damping is also oriented around the Delta I value. The higher the value, the lower the damping.

A Delta I value below 10 % is an indication for a critical measurement.

Adjustnent data Delta I
90.00 %

Diagnosis - Simulation

In this menu item you can simulate measured values via the current output. This allows the signal path to be tested, e.g. through downstream indicating instruments or the input card of the control system. You can simulate different values:





Information: The simulatio

The simulation is automatically terminated 10 minutes after the last pressing of a key.

Diagnosis - Calculated damping The sensor calculates a suitable integration time automatically.

Calculated Integration time	
2 s	

Additional adjustments

Additional settings - Date/ Time



In this menu item you can set the actual date, time and display format.







Additional settings -Reset When a reset is carried out, all settings (with only a few exceptions) are reset. The exceptions are: PIN, language, SIL and HART mode.



The following reset functions are available:

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Basic settings: Resetting of the parameter adjustments to default values at the time of shipment. Order-specific settings are deleted.

Default settings: Resetting of the parameter adjustment like under "*Basic settings*". In addition, special parameters are reset to default values. Order-specific settings are deleted.

Peak values of measured value: Resetting of the parameter adjustments in the menu item "*Setup*" to the default values of the respective instrument. Order-specific settings remain but are not taken over into the current parameters.

Peak values of temperature: Resetting of the measured min. and max. temperatures to the actual measured value.

The following table shows the default values of the instrument. The values apply for the application "*Limit level*". First of all you have to select the application.

Menu	Menu item	Default value
Setup	Measurement loop name	Sensor
	Isotope	Cs-137
	Application	Limit level
	Adjustment mode	Single point adjustment
	Adjustment - uncovered	90000 ct/s
	Adjustment - covered	9000 ct/s
		only with two-point adjustment
	Delta I	90 %
	Background radiation	0 ct/s
	Temperature unit	°C
	Damping	Is calculated automatically by the instrument
	Current output mode	8/16 mA, < 3.6 mA
	X-ray alarm	Modulated measuring current
	Mode - Relay	Overfill protection
	Lock adjustment	Released
Display	Language	Selected language
	Displayed value	Pulse rate
Additional adjust-	Temperature unit	°C
ments	HART mode	Standard

Depending on the instrument version, not all menu items may be available or they may be differently assigned:

Additional settings -HART mode

With this function you can select the mode.

The sensor offers the HART modes standard and multidrop.

HART-Betriebsart Standard Adresse 0

HART-Betriebsart V**Standard** Multidrop



The default setting is standard with address 0.

If the measured value is outputted via the 4 ... 20 mA output, you must not switch over to HART Multidrop.

The mode 'Standard', with fixed address 0 (factory setting), means output of the measured value as 8/16 mA signal.

In Multidrop mode, several sensors are communicating on one twowire cable via the HART protocol.

In Multidrop mode, up to 15 sensors can be operated on one two-wire cable. An address between 1 and 15 must be assigned to each sensor.



Additional settings - Copy With this function instrument settings

- Load parameter adjustment data from the sensor into the display and adjustment module
- Write parameter adjustment data from the display and adjustment module into the sensor



The copied data are permanently saved in an EEPROM memory in the display and adjustment module and remain there even in case of a power failure. From there, they can be written into one or more sensors or kept as backup for a possible sensor exchange.

Note:

Before the data are copied into the sensor, a check is carried out to determine if the data fit the sensor. If the data do not fit, a fault signal is triggered. When data are being written into the sensor, the display shows which instrument type the data originate from and which TAG number this sensor had.

Info

In this menu you will find the following menu items:

- Instrument name shows instrument name and serial number
- Instrument version shows hardware and software version of the instrument
- Date of manufacture shows calibration date and the date of the last change
- Instrument features shows further instrument features, such as e.g. approval, electronics ...

Examples for info display:

Info

39411-EN-180322



Kalibrierdatum	Gerätenerknale
3. April 2013	Housing / Protection
Letzte Änderung	Aluminium / IP66/IP/
4. Nov 2016	7
	Kalibrierdatun 3. April 2013 Letzte Änderung 4. Nov 2016

IP66/IP6

6.4 Saving the parameterisation data

We recommended writing down the adjustment data, e.g. in this op-On paper erating instructions manual, and archiving them afterwards. They are thus available for multiple use or service purposes.

In the display and adjust-If the instrument is equipped with a display and adjustment module, ment module the parameter adjustment data can be saved therein. The procedure is described in menu item "Copy device settings".



7 Setup with PACTware

7.1 Connect the PC

Via the interface adapter directly on the sensor



Fig. 17: Connection of the PC directly to the sensor via the interface adapter

- 1 USB cable to the PC
- 2 Interface adapter VEGACONNECT 4
- 3 Sensor

Information:

Т

The interface adapter VEGACONNECT 3 is not suitable for connection to the sensor.

Connection via HART



Fig. 18: Connecting the PC via HART to the signal cable

- 1 POINTRAC 31
- 2 HART resistance 250 Ω (optional depending on evaluation)
- 3 Connection cable with 2 mm pins and terminals
- 4 Processing system/PLC/Voltage supply
- 5 Voltage supply

Necessary components:

- POINTRAC 31
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT 4
- HART resistance approx. 250 Ω



Voltage supply

• Note: With p

With power supply units with integrated HART resistance (internal resistance approx. 250Ω), an additional external resistance is not necessary. This applies, e.g. to the VEGA instruments VEGATRENN 149A, VEGAMET 381 and VEGAMET 391). Commercially available Ex separators are also usually equipped with sufficient current limitation resistance. In such cases, VEGACONNECT 4 can be connected parallel to the 4 ... 20 mA cable.

7.2 Parameter adjustment with PACTware

Prerequisites For parameter adjustment of the sensor via a Windows PC, the configuration software PACTware and a suitable instrument driver (DTM) according to FDT standard are required. The up-to-date PACTware version as well as all available DTMs are compiled in a DTM Collection. The DTMs can also be integrated into other frame applications according to FDT standard.

• Note: To ens

To ensure that all instrument functions are supported, you should always use the latest DTM Collection. Furthermore, not all described functions are included in older firmware versions. You can download the latest instrument software from our homepage. A description of the update procedure is also available in the Internet.

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware*" attached to each DTM Collection and which can also be downloaded from the Internet. Detailed descriptions are available in the online help of PACTware and the DTMs.



0 💕 🖬 d		Ø □ Ø Ø 0 Ø Ø % %		
SENSOR #	Online parame	terization		4 5 ×
	vice name: scription: asurement loop r	POINTRAC 31 Radiation-based sensor for level de ame: SENSOR	tection Application: Point leve	VEGA
• 🕹 🔦	• 🔜 • 👔	•		
Setup*		Point adjustment (/	djustment of the switching thresholds)	
Port of Control o	t output tment ngs 10.1/PRE05	4		justment point
ietal number	19245346	Adjustment mode	/ Single point	*
levice status	ок	Adjustment point	- (200 ct/s
Pularate			Determine pulse	rate
12 c	/s	Delta I	-	90 %
			or 1	

Fig. 19: Example of a DTM view

Standard/Full version

All device DTMs are available as a free-of-charge standard version and as a full version that must be purchased. In the standard version, all functions for complete setup are already included. An assistant for simple project configuration simplifies the adjustment considerably. Saving/printing the project as well as import/export functions are also part of the standard version.

In the full version there is also an extended print function for complete project documentation as well as a save function for measured value and echo curves. In addition, there is a tank calculation program as well as a multiviewer for display and analysis of the saved measured value and echo curves.

The standard version is available as a download under <u>www.vega.com/downloads</u> and "*Software*". The full version is available on CD from the agency serving you.

7.3 Saving the parameterisation data

We recommend documenting or saving the parameterisation data via PACTware. That way the data are available for multiple use or service purposes.



8 Set up with other systems

8.1 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 <u>www.vega.com/downloads</u> under "Software".

8.2 Field Communicator 375, 475

Device descriptions for the instrument 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.



9 Diagnostics and servicing

9.1 Maintenance

If the instrument is used correctly, no maintenance is required in normal operation.

The corresponding source container must be checked in regular intervals. You can find further information in the operating instructions manual of the source container.

9.2 Status messages

The instrument features self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650. In addition to the status messages in the following tables, detailed error messages are available under menu item "*Diagnostics*" via the display and adjustment module, PACTware/DTM and EDD.

Status messages

The status messages are divided into the following categories:

- Failure
- Function check
- Out of specification
- Maintenance requirement

and explained by pictographs:



Fig. 20: Pictographs of the status messages

- 1 Failure red
- 2 Out of specification yellow
- 3 Function check orange
- 4 Maintenance blue

Failure: Due to a malfunction in the instrument, a fault message is outputted.

This status message is always active. It cannot be deactivated by the user.

Function check: The instrument is being worked on, the measured value is temporarily invalid (for example during simulation).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Out of specification: The measured value is unreliable because an instrument specification was exceeded (e.g. electronics temperature).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Maintenance: Due to external influences, the instrument function is limited. The measurement is affected, but the measured value is



still valid. Plan in maintenance for the instrument because a failure is expected in the near future (e.g. due to buildup).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Failure

Code	Cause	Rectification
Text message		
F008	Additional sensors not switched on	Check wiring between the sensors
Error multi sensor commu- nication	 EMC influences No other sensor available 	• Connect the sensors correctly and make them ready for operation
F013	• Error on the current input	Check current input
Sensor signals a fault	 No valid measured value Connected instruments without function 	Check connected instruments (Slaves)
F016	• Values of the min. and max. adjust-	Correct adjustment data
Adjustment data exchanged	ment exchanged	
F017	• The values of the min. and max.	Correct adjustment data
Adjustment span too small	adjustment are too close together	
F025	Wrong value in the linearization table	Correct linearization table
Invalid linearization table		
F030	• Process values are not within the	Repeat adjustment
Process value out of limits	adjusted measuring range	
F034	Electronics defective	 Exchanging the electronics
EPROM hardware error		
F035	• Error in the internal instrument com-	• Carry out a reset
EPROM data error	munication	• Exchanging the electronics
F036	 Error during software update 	Repeat software update
Faulty program memory		Exchanging the electronics
F037	• Error in RAM	 Exchanging the electronics
RAM hardware error		
F038	Connection cable to the Slave instru-	Define instrument as Slave
Slave signals failure	 Instrument not defined as Slave instrument 	Check the connection cable to the Slave instrument
F040	Sensor defective	 Exchanging the electronics
Hardware error		
F041	• Error in the measured value recording	 Exchanging the electronics
Photomultiplier error		
F045	 Error on the current output 	Check wiring of the current output
Error on the current output		• Exchanging the electronics
F052	 Invalid parameter adjustment 	Carry out a reset
Faulty configuration		
F114	Discharge accumulator	Readjust real time clock
Error real time clock		



Code	Cause	Rectification
Text message		
F122	 Instrument addresse was assigned several times 	 Change instrument addresses
Double address on the mul- tisensor communication bus		
F123	• External instruments cause radioactive	 Determine reason for X-ray alarm
X-ray alarm	radiation	 In case of a brief X-ray alarm, shut down the instrument (switching) out- puts for this time
F124	 Radiation dose too high 	Determine reason for increased
Alarm due to increased ra- diation		radiation
F125	Ambient temperature on the housing outside the specification	• Cool (heat) the instrument or protect it
Ambient temperature too high		with isolation material against cold or radiation heat

Tab. 2: Error codes and text messages, information on causes as well as corrective measures

Function check

Code Text message	Cause	Rectification
C029 Simulation	Simulation active	 Finish simulation Wait for the automatic end after 60 mins.

Tab. 3: Error codes and text messages, information on causes as well as corrective measures

Out of specification

Code	Cause	Rectification
Text message		
S017	 Accuracy outside the specification 	 Correct adjustment data
Accuracy outside the speci- fication		
S025	Bad linearization table	Carry out linearisation
Bad linearization table		
S038	 Slave outside the specification 	Check Slave
Slave outside the specification		
S125	 Ambient temperature too high/too low 	Protect instrument with isolating mate-
Ambient temperature too high/too low		rial against extreme temperatures

Tab. 4: Error codes and text messages, information on causes as well as corrective measures

Maintenance

The instrument has no status messages to the section "Maintenance".

9.3 Rectify faults

Reaction when malfunc-	The operator of the system is responsible for taking suitable meas-
tion occurs	ures to rectify faults.

device



Procedure for fault recti-	The first measures are:
fication	 Evaluation of fault messages via the adjustment

- Checking the output signal
- Treatment of measurement errors

Further comprehensive diagnostics options are available with a PC with PACTware and the suitable DTM. In many cases, the reasons can be determined in this way and faults rectified.

Check output signal

The following table describes possible faults that may not generate an error message:

Error	Cause	Rectification
The instrument signals cov- ered without being covered by the measured medium The instrument signals uncov- ered while covered with the measured medium	Voltage supply missing	Check cables for breaks; repair if necessary
	Operating voltage too low or load resistance too high	Check, adapt if necessary
	Electrical connection faulty	Check connection according to chapter "Connection steps" and if necessary, correct ac- cording to chapter "Wiring plan"
	Electronics defective	Change the switching behaviour of the sensors under "Diagnosis/Simulation". If the instrument does not switch over, send it in for repair.
	Buildup on the inner wall of the vessel	Remove buildup
		Check the Delta I value.
		Improve the switching threshold - carry out a double point adjustment
Current signal greater than 22 mA or less than 3.6 mA	Electronics module in the sen- sor defective	Note error messages on the display and adjust- ment module

Reaction after fault rectification Depending on the reason for the fault and the measures taken, the steps described in chapter "*Setup*" must be carried out again or must be checked for plausibility and completeness.

24 hour service hotlineShould these measures not be successful, please call in urgent cases
the VEGA service hotline under the phone no. +49 1805 858550.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

9.4 Exchanging the electronics module

If the electronics module is defective, it can be replaced by the user.



In Ex applications, only instruments and electronics modules with appropriate Ex approval may be used.

If there is no electronics module available on site, the electronics module can be ordered through the agency serving you. The electronics modules are adapted to the respective sensor and differ in signal output or voltage supply.



The new electronics module must be loaded with the default settings of the sensor. These are the options:

- In the factory
- Or on site by the user

In both cases, the serial number of the sensor is needed. The serial numbers are stated on the type label of the instrument, on the inside of the housing as well as on the delivery note.

When loading on site, the order data must first be downloaded from the Internet (see operating instructions manual "*Electronics module*").



Caution:

All application-specific settings must be entered again. That's why you have to carry out a fresh setup after exchanging the electronics.

If you saved the parameter settings during the first setup of the sensor, you can transfer them to the replacement electronics module. A fresh setup is then not necessary.

9.5 Software update

The following components are required to update the instrument software:

- Instrument
- Voltage supply
- Interface adapter VEGACONNECT
- PC with PACTware
- Current instrument software as file

You can find the current instrument software as well as detailed information on the procedure in the download area of our homepage: <u>www.vega.com</u>.



Caution:

Instruments with approvals can be bound to certain software versions. Therefore make sure that the approval is still effective after a software update is carried out.

You can find detailed information in the download area at <u>www.vega.com</u>.

9.6 How to proceed if a repair is necessary

The following procedure refers only to the sensor. Should a repair of the source container be necessary, you can find the respective instructions in the operating instructions manual of the source container.

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage: <u>www.vega.com</u>

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

Print and fill out one form per instrument



- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page www.vega.com.



10 Dismount

10.1 Dismounting steps



Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel or pipeline, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

10.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "Technical data"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

WEEE directive 2012/19/EU

This instrument is not subject to the WEEE directive 2012/19/EU and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.



11 Supplement

11.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions 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.

General data	
316L corresponds to 1.4404 or 1.4435	
Materials, non-wetted parts	
- Detector tube	316L (only with version with 152 mm or 304 mm)
 Scintillation material 	PVT (Polyvinyltoluene)
- Aluminium die-cast housing	Aluminium die-casting AlSi10Mg, powder-coated (basis: Polyester)
 Stainless steel housing 	316L
- Seal between housing and housing lid	NBR (stainless steel housing, investment casting), silicone (Aluminium housing)
 Inspection window in housing cover (optional) 	Polycarbonate
 Ground terminal 	316L
 Cable gland 	PA, stainless steel, brass
 Sealing, cable gland 	NBR
 Blind plug, cable gland 	PA
 Mounting accessories 	316L
Process fittings	
 Fastening lugs 	ø 9 mm (0.35 in), hole centre distance 119 mm (4.69 in)
Weight	
- Aluminium housing, with electronics	3.4 kg (7.5 lbs) + measuring length
 Stainless steel housing, with electron- ics 	8.36 kg (18.43 lbs) + measuring length
- Measuring length 46 mm (1.8 in)	0.7 kg (1.54 lbs)
 Measuring length 152 mm (6 in) 	0.98 kg (2.16 lbs)
 Measuring length 304 mm (12 in) 	1.95 kg (4.3 lbs)
Max. torque, mounting screws	
- Fastening lugs in the sensor housing	15 Nm (11.1 lbf ft), stainless steel A4-70
Max. torque for NPT cable glands and Co	nduit tubes
- Aluminium/Stainless steel housing	50 Nm (36.88 lbf ft)
Input variable	
Measured variable	The measured variable is the intensity of the gamma radiation. When the intensity of the radiation is below the stipulated value due to a damping by the medium, the

POINTRAC 31 switches.





Fig. 21: Data of the input variable

L Measuring range (range in which the switching point must lie)

Output variable		
 Type of input - Relay contact 	100 mA	
 Type of input - Open Collector 	10 mA	
Switching input		
 Internal load 	250 Ω	
 Input type 	4 20 mA, passive	
Analogue input		
Measuring range	46 mm (1.8 in), 152 mm (6 in) or 304 mm (12 in)	

Output signals	8/16 mA/HART - active; 8/16 mA/HART - Multidrop
Terminal voltage passive	9 30 V DC
Shortcircuit protection	Available
Potential separation	Available
Fault signal, current output (adjustable)	22 mA, < 3.6 mA
Max. output current	22 mA
Starting current	≤ 3.6 mA
Load	
- 8/16 mA/HART - active	< 500 Ω
- 8/16 mA/HART - intrinsically safe	< 300 Ω
Damping (63 % of the input variable)	Is calculated automatically by the instrument
HART output values	
– PV (Primary Value)	Switching status
 SV (Secondary Value) 	Electronics temperature
– TV (Third Value)	-
- FV (Fourth Value)	Count rate
Relay output	

Output

Relay output (SPDT), floating spdt



Switching voltage	
– Min.	10 mV
– Max.	253 V AC, 253 V DC
Switching current	
– Min.	10 µA
– Max.	3 A AC, 1 A DC
Breaking capacity	
– Min.	50 mW
– Max.	750 VA AC, 40 W DC
	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-level signal circuits.
Contact material (relay contacts)	AgNi or AgSnO and Au plated
Transistor output	
Output	Floating transistor output, permanently shortcircuit-proof
Load current	< 400 mA
Voltage loss	< 1 V
Switching voltage	< 55 V DC
Blocking current	< 10 µA
Accuracy (according to DIN EN 60	770-1)
Process reference conditions accordi	na to DIN EN 61298-1

- Temperature	+18 +30 °C (+64 +86 °F)
 Relative humidity 	45 75 %
 Air pressure 	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)
Repeatability	≤ 0.5 %
Deviation with bulk solids	The values depend to a great extent on the application. Binding specifications are thus not possible.
Deviation under EMC influence	≤ 1 %

Variables influencing measurement accuracy		
Specifications apply also to the current output		
Temperature drift - Current output	± 0.03 %/10 K relating to the 16 mA span or max. ± 0.3 %	
Deviation in the current output due to analogue/digital conversion	<±15 μA	
Deviation on the current output due to strong, high frequency electromagnetic interference acc. to EN 61326	<±150 μA	
Ambient conditions		
Storage and transport temperature	-40 +60 °C (-40 +140 °F)	



Process conditions

For the process conditions, please also note the specifications on the type label. The lower value always applies.

Process pressure	Unpressurized
Process temperature (measured on the	-40 +60 °C (-40 +140 °F)
detector tube)	With temperatures of more than 60 °C we recommend the use of water cooling
Vibration resistance4)	mechanical vibrations up to 1 g in the frequency range 5 200 Hz

Electromechanical data - version IP 66/IP 67	
Cable entry	
– M20 x 1.5	2 x cable gland M20 x 1.5 (cable: ø 6 12 mm), 4 x blind plug M20 x 1.5
	Included: 1 x cable gland M20 x 1.5
- 1/2 NPT	5 x closing cap (red) ½ NPT
	Included: 3 x cable gland $\frac{1}{2}$ NPT (cable: Ø 6 12 mm), 4 x blind plug $\frac{1}{2}$ NPT
O sector a la sela da sector da sela fac	

Spring-loaded terminals for wire cross-section

 Massive wire, stranded wire 	0.2 2.5 mm ² (AWG 24 14)
 Stranded wire with end sleeve 	0.2 1.5 mm ² (AWG 24 16)

Display and adjustment module											
Display element	Display with backlight										
Measured value indication											
 Number of digits 	5										
Adjustment elements											
– 4 keys	[OK], [->], [+], [ESC]										
- Switch	Bluetooth On/Off										
Bluetooth interface											
- Standard	Bluetooth smart										
 Effective range 	25 m (82.02 ft)										
Protection rating											
- unassembled	IP 20										
- mounted in the housing without lid	IP 40										
Materials											
- Housing	ABS										
 Inspection window 	Polyester foil										
Functional safety	SIL non-reactive										
Integrated clock											
Data farmat	Dev Menth Veer										

Date format

Day.Month.Year

⁴⁾ Tested according to the guidelines of German Lloyd, GL directive 2.



Time format	12 h/24 h
Time zone, factory setting	CET
Max. rate deviation	10.5 min/year

Additional output parameter - Electronics temperature													
Output of the temperature values													
- Analogue	Via the current output												
- Digital	Via the digital output signal (depending on the electror ics version)												
Range	-40 +50 °C (-40 +122 °F)												
Resolution	< 0.1 K												
Accuracy	±5 K												
Bluetooth interface (optional)													
Standard	Bluetooth smart												
Effective range	25 m (82.02 ft)												
Voltage supply													
Operating voltage	20 72 V DC or 20 253 V AC, 50/60 Hz												
Reverse voltage protection	Available												
Max. power consumption	6 VA (AC); 4 W (DC)												
Electrical protective measures													
Protection, depending on housing ver- sion	IP 66/IP 67 (NEMA Type 4X) ⁵⁾												
Overvoltage category	The feeding power supply unit can be connected to networks of overvoltage category III.												
Protection class	1												
Approvals													

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com, "Instrument search (serial number)" as well as in the download area.

11.2 Dimensions

The following dimensional drawings represent only an extract of all possible versions. Detailed dimensional drawings can be downloaded at www.vega.com/downloads under "Drawings".

⁵⁾ A suitable cable is required for maintaining the protection rating.



Aluminium and stainless steel housing



Fig. 22: Aluminium housing or stainless steel housing (precision casting)



POINTRAC 31 with detector tube



Fig. 23: POINTRAC 31 with detector tube - measuring length: 152 mm or 304 mm (6 in/12 in)

L Measuring range = Order length 152 mm or 304 mm (6 in/12 in)



POINTRAC 31 - Mounting example



Fig. 24: POINTRAC 31 with detector tube, 152 mm or 304 mm (6 in/12 in) - with supplied mounting accessories



POINTRAC 31 without detector tube

Fig. 25: POINTRAC 31 without detector tube - measuring range = order length 46 mm (1.8 in)



POINTRAC 31 - Mounting example



Fig. 26: POINTRAC 31 without detector tube, 46 mm (1.8 in) - supplied mounting accessories



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Printing date:



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

Subject to change without prior notice

CE

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