

# Operating Instructions

Controller in field housing for a  
continuously measuring digital or  
analogue level sensor

## VEGAMET 861

4 ... 20 mA/HART



Document ID: 58866



# VEGA

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# 1 About this document

## 1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, 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 [www.vega.com](http://www.vega.com) you will reach the document download.



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



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



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



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



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



### Ex applications

This symbol indicates special instructions for Ex applications.



### List

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



### 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, qualified 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

VEGAMET 861 is a universal controller for connection of a 4 ... 20 mA/HART sensor.

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.

## 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.

The EU conformity declaration can be found on our homepage.

### **Electromagnetic compatibility**

The instrument is 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 a class A instrument according to EN 61326-1. If the instrument is used in a different environment, its electromagnetic compatibility with other devices must be ensured by suitable measures.

## 2.6 Safety instructions for Ex areas

For Ex applications, only devices with corresponding Ex approval may be used. Observe the Ex-specific safety instructions. These are an integral part of the operating instructions and are enclosed with every device with Ex approval.

## 3 Product description

### 3.1 Configuration

#### Scope of delivery

The scope of delivery encompasses:

- Controller VEGAMET 861
- Mounting plate
- Screws/plugs for mounting
- Cable glands/Blind plugs (optional)
- Ground terminal for cable screening
- Information sheet "*Documents and software*" with:
  - Instrument serial number
  - QR code with link for direct scanning
- Information sheet "*PINs and Codes*" with:
  - Bluetooth access code
- Information sheet "*Access protection*" with:
  - Bluetooth access code
  - Emergency Bluetooth unlock code
  - Emergency device code

The further scope of delivery encompasses:

- Documentation
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - If necessary, further certificates



#### Note:

Optional instrument features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

#### Scope of this operating instructions

This operating instructions manual applies to the following instrument versions:

- Hardware version from 1.0.0
- Software version from 1.0.0

## Constituent parts

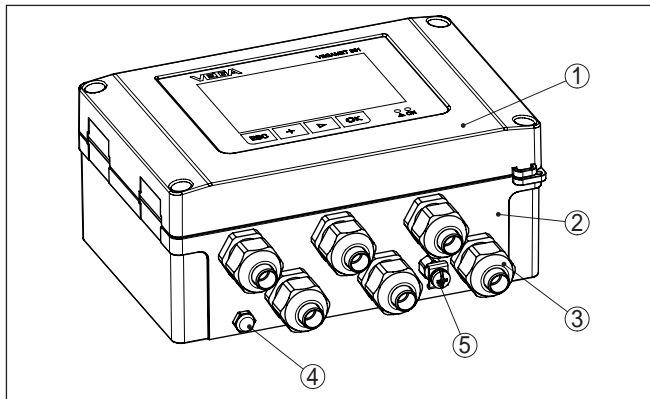


Fig. 1: VEGAMET 861

- 1 Display and adjustment unit
- 2 Housing with cable glands and connection compartment
- 3 Mounting plate
- 4 Ventilation/pressure compensation
- 5 Ground terminal for cable screening

## Type label

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

- Instrument type
- Information about approvals
- Technical data
- Serial number of the instrument
- QR code for device documentation
- Number code for Bluetooth access
- Manufacturer information

## Documents and software

Move to "[www.vega.com](http://www.vega.com)" and enter in the search field the serial number of your instrument.

There you can find the following information about the instrument:

- Order data
- Documentation
- Software

Alternatively, you can find all via your smartphone:

- Scan the QR-code on the type label of the device or
- Enter serial number manually in the VEGA Tools app (available free of charge in the respective stores)

## Application area

### 3.2 Principle of operation

Measured value visualisation, limit value monitoring for storage tanks and pumping stations, flow measurement at open channels and weirs, storm water overflow basin.



The controller VEGAMET 861 is specialized in the processing and clear reproduction of process states. A generous display for data visualization is already integrated in the compact housing designed for harsh field conditions. During operation, the device feeds the connected digital or analogue 4 ... 20 mA/HART sensor.

With the VEGAMET 861 limit values can be safely monitored and relays, such as an overflow protection according to WHG, can be switched. The equipment includes functions for adjustment and pump control, which allow a wide range of individual adaptations. The VEGAMET 861 is suitable for all industrial sectors, including chemicals, building materials, water and waste water.

In the field of water and waste water, the device convinces with functions such as pump changeover, flow measurement in open channels, trend function, totalizer and data logger.

## Functional principle

The VEGAMET 861 controller can power the connected sensor and process its measurement signals. The requested parameter is shown on the display and also output to the integrated current output for further processing. The measurement signal can thus be transferred to a remote display or a superordinate control system. Operating relays for control of pumps or other devices are also integrated.

## 3.3 Adjustment

### Local adjustment

On-site adjustment of the device is carried out via the integrated display and adjustment unit.

### Wireless adjustment

The optionally integrated Bluetooth module enables in addition a wireless adjustment of VEGAMET 861 via standard adjustment tool:

- Smartphone/tablet (iOS or Android operating system)
- PC/notebook with Bluetooth LE or Bluetooth USB adapter (Windows operating system)



### Information:

Certain setting options are not possible or only possible to a limited extent with the integrated display and adjustment unit, for example the settings for flow measurement or pump control. For these applications, the use of PACTware/DTM or the VEGA Tools app is recommended. An overview of the available applications and functions as well as their adjustment options can be found in the appendix.

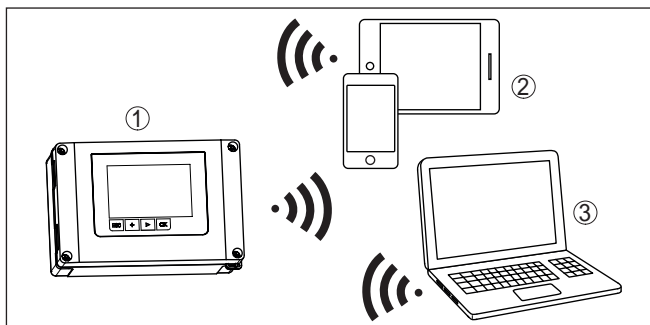


Fig. 2: Wireless connection to standard adjustment tools with integrated Bluetooth LE or alternatively Bluetooth USB adapter.

- 1 VEGAMET 861
- 2 Smartphone/Tablet
- 3 PC/Notebook

### 3.4 Packaging, transport and storage

#### Packaging

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

The packaging consists of environment-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 concealed 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

The permissible storage and transport temperatures can be found in chapter "Supplement - Technical data - Ambient conditions"

### 3.5 Accessories

**Sun shade**

The sun protection protects the device from direct sunlight and thus prevents overheating of the electronics. It also improves the readability of the display when exposed to sunlight. The sun protection can be used for wall and pipe mounting.

**Pipe mounting set**

The pipe mounting set is used for optimal and safe mounting of the devices in horizontal and vertical mounting on pipes.

## 4 Mounting

### 4.1 General instructions

#### Mounting options

The field housing of the VEGAMET 861 is equally suitable for outdoor or indoor installation due to its degree of protection IP66/IP67 and Type 4X. The standard version is designed for wall mounting. A mounting adapter for pipe mounting is available as an option.

#### Ambient conditions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

Avoid direct sunlight or use the optionally available sun shade.

Make sure that the environmental and ambient conditions specified in chapter "*Technical data*" are maintained.

#### Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Use the recommended connection cable (see chapter "*Connecting to power supply*")
- Tighten the cable gland
- Mount the instrument in such a way that the cable glands point downward
- Loop the connection cable downward in front of the cable gland

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

The visible area of the front panel must be protected from knocks, otherwise water can penetrate through breaking of the front foil. In this case, protection against accidental contact can no longer be ensured.



#### Caution:

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.

#### Pressure compensation

The pressure compensation for the housing is realized via a breather element.



#### Note:

Make sure that the pressure equalization element is always free of buildup during operation. A high-pressure cleaner may not be used for cleaning.

### 4.2 Mounting instructions

#### Wall mounting

Fix the mounting plate to the wall using the screws and dowels supplied as shown in the figure below. Make sure that the arrows on the mounting plate point upwards.

Loosen the four screws in the housing cover and open it to the left. Fasten the device to the mounting plate using the screws (M5) supplied.

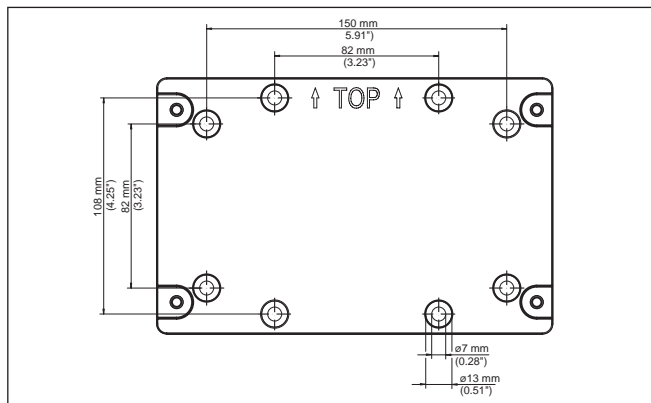


Fig. 3: Mounting plate for wall mounting VEGAMET 861

## Tube mounting

The optionally available mounting accessories are required for tube mounting. The kit consists of two pairs of mounting brackets and four mounting screws M6 x 100.

The mounting brackets are screwed to the mounting plate and the tube as shown in the following illustration.

Loosen the four screws in the housing cover and open it to the left. Fasten the device to the mounting plate using the screws (M5) supplied.

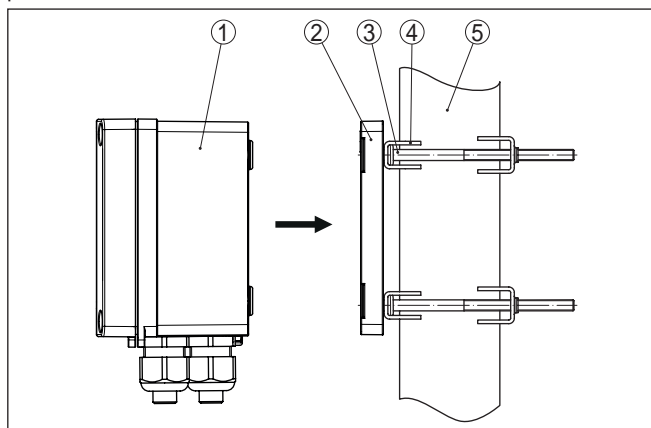


Fig. 4: Tube mounting

- 1 VEGAMET 861
- 2 Mounting plate
- 3 4 screws M6 x 100
- 4 Mounting brackets
- 5 Pipe for diameter 29 ... 60 mm (1.14" to 2.36")

**Mounting sun shade**

The optional sun protection can be used to protect against direct sunlight. The sunshade is simply mounted between the mounting plate and the controller, this is possible for both wall and pipe mounting.

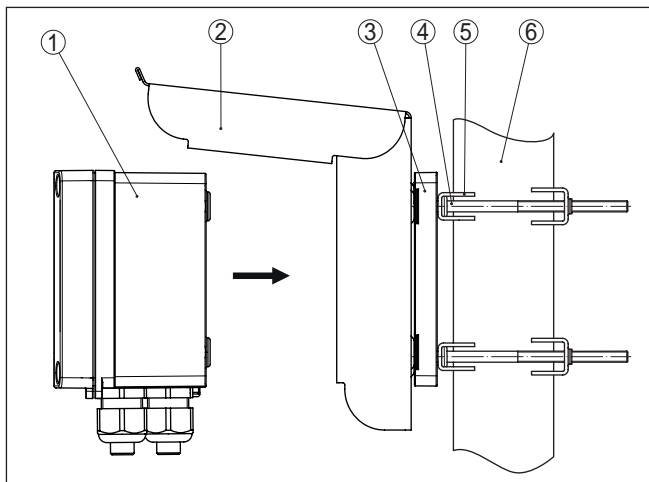


Fig. 5: Mounting sun protection with pipe mounting

- 1 VEGAMET 861
- 2 Sun shade
- 3 Mounting plate
- 4 4 screws M6 x 100
- 5 Mounting brackets
- 6 Pipe for diameter 29 ... 60 mm (1.14" to 2.36")

## 5 Connecting to power supply

### 5.1 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.

#### Voltage supply

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

The instrument belongs to protection class I, hence connection of an earth conductor is required.

#### Connection cable

Use cable with round cross section. The cable diameter must be suitable for the cable gland used to ensure the seal effect of the cable gland (IP protection).

The voltage supply is connected with standard cable according to the national installation standards.

Standard two-wire cable can be used for connecting the sensors. The screening is absolutely necessary to ensure interference-free operation with HART sensors.



#### Note:

If the temperatures are too high, the cable insulation can be damaged. Hence keep apart from the ambient temperature also the self-heating of the instrument for the temperature resistance of the cable in the connection compartment in mind<sup>1)</sup>.

#### Cable screening and grounding

When connecting HART sensors, the supplied ground terminal must be attached to the outside of the housing. To do this, carefully remove the pre-embossed opening (ø 6 mm) on the lower side of the device with a suitable tool and screw in the ground terminal.

Connect the cable screening on both ends to ground potential. In the sensor/VEGAMET 861, the shielding must be connected directly to the internal ground terminal. The ground terminal on the outside of the sensor housing/VEGAMET 861 must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the screen connection on the side of VEGAMET 861 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.

<sup>1)</sup> With an ambient temperature  $\geq 50\text{ °C}$  ( $122\text{ °F}$ ) the connection cable should be suitable for an ambient temperature which is at least  $20\text{ °C}$  ( $36\text{ °F}$ ) higher.

**Cable glands****Warning:**

In delivery status, all openings are fitted with dust protection caps. These caps are only for protection during transport and are not suitable for protection during operation! Instead, all openings must be closed with cable glands/blind plugs.

Cable glands, NPT adapters or blind plugs that are not included in the scope of delivery must meet the applicable requirements in order to ensure the environmental compatibility of the housing. For outdoor applications, the weather resistance of the accessories to be used must be taken into account. The cable glands, NPT adapters and blind plugs must have a metric thread M20 to be compatible with the threaded openings of the metal plate in the housing.

**5.2 Sensor input mode active/passive**

Through the selection of the terminals, you can choose between active and passive operation of the sensor input.

- In active mode, the controller provides the power for the connected sensors. Power and measurement data are transmitted over the same two-wire cable. This mode is provided for connection of measuring transducers without separate power supply (sensors in two-wire version).
- In passive mode the sensors are not powered, only the measured value is transmitted. This input is for connection of transmitters with their own separate voltage supply (sensors in four-wire version). The VEGAMET 861 can also be looped into the existing circuit like a normal ammeter.

**Note:**

With a VEGAMET 861 in Ex version, the passive input is not available for reasons of approval.

**5.3 Connecting****Connection technology**

The voltage supply and inputs and outputs are connected via the spring-loaded terminals.

**Information:**

Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, a small screwdriver must be pressed into the rectangular opening so that the terminal opening is then free. When the screwdriver is pulled out, the terminals are closed again.

You can find further information on the max. wire cross-section in the technical data.

**Connecting**

Connect the device as described in the following wiring plan.



## 5.4 Wiring plan

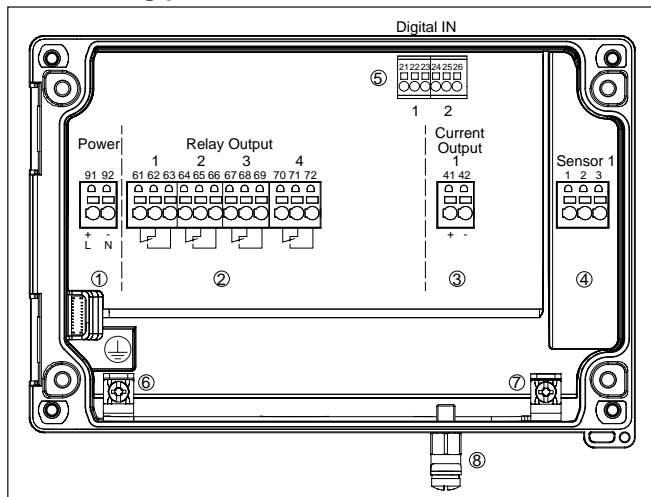


Fig. 6: Wiring plan VEGAMET 861

- 1 Voltage supply of the controller
- 2 Relay outputs 1 ... 4
- 3 Current output
- 4 Sensor input (active/passive)
- 5 Digital inputs 1/2
- 6 Ground terminal for protective conductor
- 7 Ground terminal for cable screening sensor cable
- 8 Ground terminal for potential equalization

### Detail sensor connection - two-wire sensor

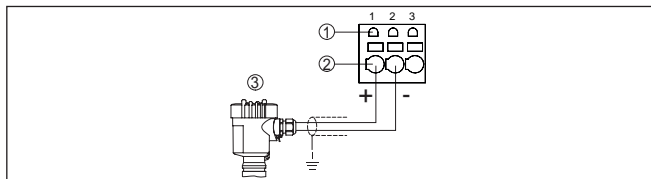


Fig. 7: Connection of a two-wire sensor

- 1 2 mm socket for connection of a VEGACONNECT/HART handheld
- 2 Measurement data input with sensor supply (active input) for two-wire sensor
- 3 Two-wire sensor

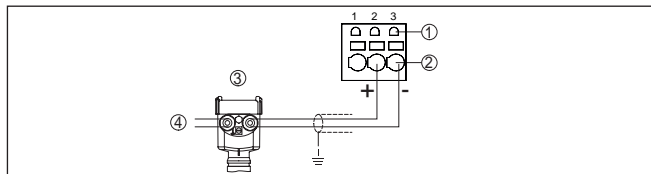
**Detail sensor connection - four-wire sensor**

Fig. 8: Connection of a four-wire sensor

- 1 2 mm socket for connection of a VEGACONNECT/HART handheld
- 2 Measurement data input (passive input) for four-wire sensor, not with Ex-ia version
- 3 Four-wire sensor
- 4 Voltage supply for four-wire sensor

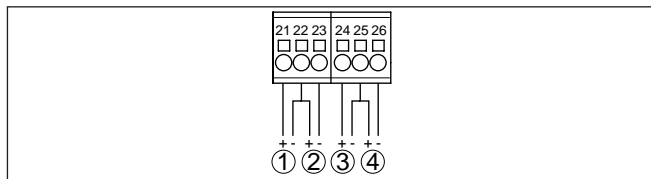
**Detail, digital inputs VEGAMET 861**

Fig. 9: Connection of the digital inputs

- 1 Digital input 1 (active)
- 2 Digital input 1 (passive)
- 3 Digital input 2 (active)
- 4 Digital input 2 (passive)

**5.5 Switch-on phase**

After switching on, the device first carries out a short self-check.

- Internal check of the electronics
- Output signals are set to failure, background lighting of the display lights red

The current measured values are then displayed and transmitted to the outputs. The background lighting of the display changes to white.

## 6 Access protection

### 6.1 Bluetooth radio interface

Devices with a Bluetooth radio interface are protected against unwanted access from outside. This means that only authorized persons can receive measured and status values and change device settings via this interface.

#### Bluetooth access code

A Bluetooth access code is required to establish Bluetooth communication via the adjustment tool (smartphone/tablet/notebook). This code must be entered once when Bluetooth communication is established for the first time in the adjustment tool. It is then stored in the adjustment tool and does not have to be entered again.

The Bluetooth access code is individual for each device. It is printed on the device housing and is also supplied with the device in the information sheet "*PINs and Codes*". It can be changed by the user after the first connection has been established. If the Bluetooth access code has not been entered correctly, a new entry can only be made after a waiting period has elapsed. The waiting time increases with each additional incorrect entry.

#### Emergency Bluetooth unlock code

The emergency Bluetooth access code enables Bluetooth communication to be established in the event that the Bluetooth access code is no longer known. It can't be changed. The emergency Bluetooth access code can be found in information sheet "*Access protection*". If this document is lost, the emergency Bluetooth access code can be retrieved from your personal contact person after legitimation. The storage and transmission of Bluetooth access codes is always encrypted (SHA 256 algorithm).

### 6.2 Protection of the parameterization

The settings (parameters) of the device can be protected against unwanted changes. The parameter protection is deactivated on delivery, all settings can be made.

#### Device code

To protect the parameterization, the device can be locked by the user with the aid of a freely selectable device code. The settings (parameters) can then only be read out, but not changed. The device code is also stored in the adjustment tool. However, unlike the Bluetooth access code, it must be re-entered for each unlock. When using the adjustment app or DTM, the stored device code is then suggested to the user for unlocking.

#### Emergency device code

The emergency device code allows unlocking the device in case the device code is no longer known. It can't be changed. The emergency device code can also be found on the supplied information sheet "*Access protection*". If this document is lost, the emergency device code can be retrieved from your personal contact person after legitimation. The storage and transmission of the device codes is always encrypted (SHA 256 algorithm).

### 6.3 Storing the codes in myVEGA

If the user has a "myVEGA" account, then the Bluetooth access code as well as the device code are additionally stored in his account under "*PINs and Codes*". This greatly simplifies the use of additional adjustment tools, as all Bluetooth access and device codes are automatically synchronized when connected to the "myVEGA" account

## 7 Set up with the integrated display and adjustment unit

### 7.1 Adjustment system

#### Function

The integrated display and adjustment unit is used for measured value display, adjustment and diagnosis of the VEGAMET 861. Display and adjustment are carried out via four keys and a graphic-capable display with background lighting.

Certain adjustment options are not available or only partially available with the integrated display and adjustment unit, e.g. the settings for flow measurement or pump control. For such applications, the use of PACTware/DTM or the VEGA Tools app is recommended.

#### Display and adjustment elements

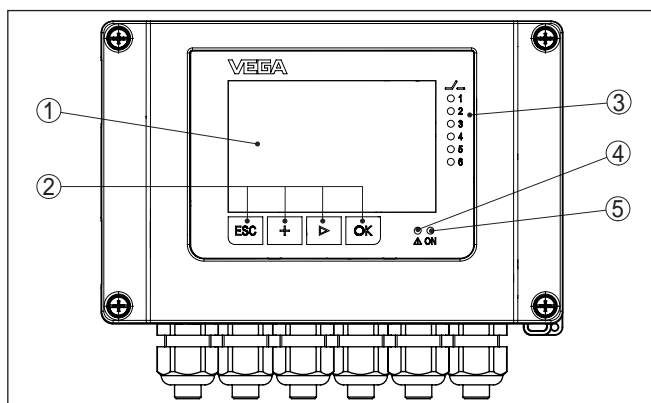


Fig. 10: Display and adjustment elements

- 1 LC display
- 2 Adjustment keys
- 3 Status indication relay
- 4 Status indication fault signal
- 5 Status indication operation

#### Key functions

Key	Function
[OK]	Entry to the menu level Jump to selected menu item Edit parameter Save value
[>]	Switching between the individual measured value windows Navigation in the menu items Select editing position
[+]	Change parameter values
[ESC]	Jump to next higher menu Interrupt input

## 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.

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.

## Measured value indication

### 7.2 Display

The measured value display shows the digital display value, the measuring loop name ( measurement loop TAG) and the unit. In addition, an analogue bargraph can be displayed. Up to three measured value windows with different measured values can be configured. If pump control is activated, an additional status bar with display of the assigned pumps is available.

Measured values are displayed according to the following presentation:

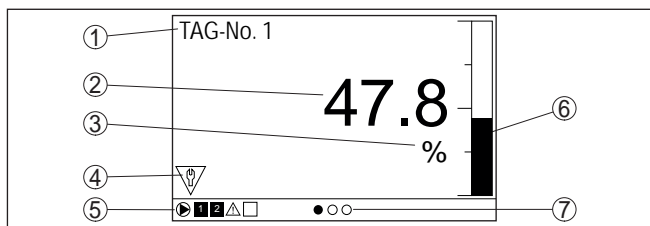


Fig. 11: Measured value display (example)

- 1 Measurement loop name
- 2 Measured value
- 3 Unit
- 4 Status message acc. to NAMUR NE 107
- 5 Status bar for pump control
- 6 Bar graph measured value
- 7 Display active measured value window

## Menu item display

The menu items are displayed according to the following presentation:

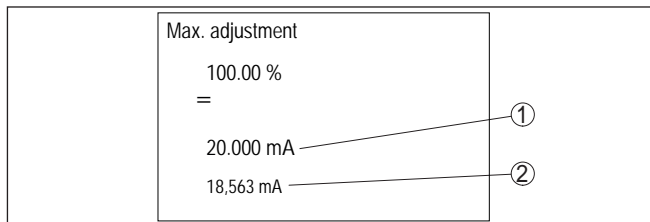


Fig. 12: Menu item display (example)

- 1 Sensor measured value at 100 %
- 2 Current sensor measured value

## 7.3 Menu overview

### Measurement loop

Description	Basic settings
Input	Input selection analogue or digital
Adjustment	Adjustment settings
Linearisation	Linearization settings
Scaling	Scaling settings
Relay	Relay settings

### Indication

Description	Basic settings
Number of measured value windows	Number of displayed measured value windows
Measured value window	Measured value window settings
Options	Display options e.g. brightness, contrast, illumination
Menu language	Language settings

### Extended functions

Description	Basic settings
Measurement loop	Extended settings of the measuring point, such as for example damping, current output
Fail safe relay	Activate/deactivate fail safe relay
Access protection	Access protection for Bluetooth and protection of the parameter adjustment
Date/Time	Date and time settings
Reset	Reset of the device

### Diagnostics

Description	Basic settings
Status	Status indication, e.g. device, sensor, relay
Simulation	Simulation function, e.g. measuring point, current output
Device-TAG	Display device name
Device information	Device information, e.g. serial number

## 7.4 Setup steps

### Parameter adjustment

Through parameter adjustment, the instrument is adapted to the individual application conditions. A measurement loop calibration is the most important step and should always be carried out. A scaling of the measured value to the desired physical variable and unit, possibly including a linearisation curve, is often useful. The adaptation of the relay switching points or the setting of an integration time to smooth the measured value are further standard adjustment options.

**Information:**

When using PACTware and the respective DTM or the VEGA Tools app, additional settings can be carried out which are not possible or only partly possible with the integrated display and adjustment unit. Communication takes place via the built-in Bluetooth interface.

**Applications**

The device is configured ex works for universal applications. The following applications can be changed over and configured via the VEGA Tools app or the DTM:

- Universal
- Level storage tank
- Pumping station
- Sewage screw pump lifting station
- Flow measurement flume/Weir

**Information:**

An overview of the available applications and functions can be found in the appendix

**Main menu**

The main menu is divided into four areas with the following functions:

- **Measuring point:** Includes settings for adjustment, linearization, scaling, relay outputs, ...
- **Display:** Contains settings for display of measured values
- **Extended functions:** Includes settings for measuring point, fail safe relay, access protection, reset, ...
- **Diagnosis** Includes information on device type/status, ...

**7.4.1 Measurement loop****Input**

The VEGAMET 861 can process measured values from 4 ... 20 mA/HART sensors via analogue communication as well as via digital HART protocol.

**Analogue 4 ... 20 mA transmission**

In the standard setting of VEGAMET 861 the measured value transmission is carried out via analogue 4 ... 20 signal. An adjustment in the sensor influences directly the input variable of VEGAMET 861. Only carry out the adjustment on one instrument, either on VEGAMET 861 or on the sensor. The adjustment in VEGAMET 861 is always carried out in mA (analogue transmission).

**Digital HART transmission**

For transmission via HART, VEGAMET 861 must be informed which sensor value should be used for further processing. Depending on the sensor type, this can be distance, pressure or temperature. With all HART sensors, the unchanged initial value of the sensor is always transmitted to VEGAMET 861. Thus, adjustment must always be carried out on VEGAMET 861, never on the sensor. Different parameters and measuring units are available.

When connecting HART sensors from other manufacturers, the following selection options are available, among others:



- PV (Primary Value)
- SV (Secondary Value)
- TV (Tertiary Value)
- QV (Quarterly Value)

The prerequisite for this is the support of the HART commands 0, 1, 3 and 15. This information and which measured values are transferred must be taken from the operating instructions manual of the respective sensor manufacturer.

After selecting the input type "HART", perform a sensor search first. All connected HART sensors are then listed and you can select the desired sensor. Then you can define the appropriate *Sensor value*. In the menu item "Sensor info" information such as sensor type, measuring range, serial number, HART address, measuring range, sensor TAG, ... are available.

## Adjustment

Through the adjustment the input value of the connected sensor is converted into a percentage value. This conversion step allows any input value range to be depicted in a relative range (0 % up to 100 %).

The percentage values can be used for presentation on the display, for direct use in an output or for further conversion via linearization or scaling.

When using the display and adjustment unit, the adjustment unit is always "mA". When using PACTware/DTM or the VEGA Tools app, further units can be selected. If these have been activated, they are also shown in the display.

### Min. adjustment (empty vessel)

If you want to use the currently measured level as a 0 %value, select the menu item "Accept" (live adjustment or adjustment with medium). If the adjustment is to be carried out independently of the measured level, select the option "Edit". Now enter the appropriate current in mA for the empty vessel (0 %) (dry adjustment or adjustment without medium).

### Max. adjustment (full vessel)

If you want to use the currently measured level as a 100 %value, select the menu item "Accept" (live adjustment or adjustment with medium). If the adjustment is to be carried out independently of the measured level, select the option "Edit". Now enter the appropriate current in mA for the full vessel (100 %) (dry adjustment or adjustment without medium).

## Linearisation

A linearisation is necessary for all vessels in which the vessel volume does not increase linearly with the level, for example a horizontal cylindrical or spherical tank. Corresponding linearisation curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be also set.

When setting up a flow measurement, a linearization curve suitable for the structural conditions must be selected. Corresponding curves

such as venturi, triangular overflow, ... are available here. In addition, individual, user-programmable linearisation curves can be stored via DTM.

## Scaling

Scaling means converting the measured value into a certain parameter and unit. The linearized percentage value is the source signal which is used as basis for the scaling. The indication can then show the volume in litres e.g., instead of the percentage value. Indication values from max. -9999999 to +9999999 are possible.

## Relay outputs

A total of four relays is available. Relays 1 ... 3 are freely available and not yet assigned to a function. To be able to use these relays, they must first be activated. Relay 4 is configured in the factory as a fail safe relay, but can also be configured as additional operating relay.

After activating a relay output, the desired mode of operation must first be selected ("*Overfill protection/Dry run protection*").

- **Overfill protection:** Relay is switched off when the max. level is exceeded (safe currentless state), relay is switched on again when the level falls below the min. level (switch-on point < switch-off point)
- **Dry run protection:** Relay is switched off when the level falls below the min. level (safe currentless state), relay is switched on again when the max. level is exceeded (switch-on point > switch-off point)

Additional modes such as "*Pump control*", "*Switching window*", "*Flow*" and "*Tendency*" can be only set via PACtware/DTM or the VEGA Tools app.

In the menu item "*Reference value*" it is defined which measured value serves as input signal for the relay (percentage/lin.-percent/scaled).

Enter the values for switching the relay on and off under Enter the values for switching the relay on and off under "*Switching point*".

The menu item "*Behaviour in case of failure*" defines how the relay behaves if the assigned measuring point is disturbed. Here it can be selected whether the switching state of the relay remains unchanged or whether the relay is switched off in the event of a failure.

### 7.4.2 Indication

#### Number of measured value windows

A measured value window can display up to three different, user-configurable measured values simultaneously. In addition, up to three different measured value windows can be displayed, which can be selected using the arrow keys. Alternatively, the display of the measured value windows can also be changed automatically at intervals of approx. 3 seconds.

In the menu item "*Display - Number of measured value windows*" you can configure how many measured value windows are to be displayed.

#### Measured value window 1 ... 3

The content of the measured value window is configured in the menu item "*Display - Measured value window*". Up to 3 different measured

values can be displayed in one window. For each measured value it is also possible to configure which display value (percent, scaled, sensor value, ...) is displayed. In addition, the display format (number of decimal positions) can also be configured. In addition, a bar graph can be displayed parallel to the measured value (only available when displaying a single measured value).

<b>Options - Brightness</b>	In the menu item " <i>Display - Options - Brightness</i> " the brightness of the background lighting can be adjusted.
<b>Options - Contrast</b>	In the menu item " <i>Display - Options - Contrast</i> " the contrast of the display can be adjusted.
<b>Options - Lighting</b>	In the menu item " <i>Display - Options - Lighting</i> " the lighting can be set permanently to " <i>Permanently ON</i> " or " <i>Automatically OFF</i> " (after two minutes). With the setting " <i>Automatically OFF</i> " the lighting is switched on for two minutes as soon as any button is pressed.
<b>Menu language</b>	In the menu item " <i>Display - Menu language</i> ", the requested language can be adjusted. The following languages are available: <ul style="list-style-type: none"> <li>• German</li> <li>• English</li> <li>• French</li> <li>• Spanish</li> <li>• Italian</li> <li>• Dutch</li> </ul>

### 7.4.3 Extended functions

<b>Meas. loop - Damping</b>	To suppress fluctuations in the measured value display, e.g. caused by an agitated product surface, an integration time can be set. This time can be between 0 and 999 seconds. Remember that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.
<b>Measuring point - Current output</b>	<p>The current output is used to transfer the measured value to a super-ordinate system, e.g. a PLC, a process control system or a measured value indication. This is an active output, i.e. the current is provided actively. The processing must hence have a passive current input. If the current output is not used, it can be deactivated in the first menu item.</p> <p>The characteristics of the current output can be set to 0 ... 20 mA, 4 ... 20 mA or inverted. The reaction in case of failure can also be adapted to the requirements. The reference value you refer to can also be selected.</p>
<b>Fail safe relay</b>	Relay 4 can optionally be configured as additional operating relay or as a fail safe relay. In this menu item, the fail safe relay can be activated or deactivated. If relay 4 is to be configured as an operating relay, it must still be activated as an operating relay after deactivation as a fail safe relay. This is done in menu item " <i>Measuring point - Relay 4</i> "

**Access protection -  
Bluetooth communication**

Bluetooth communication can be activated/deactivated in this menu item. If Bluetooth communication is deactivated, a connection via app or DTM is no longer possible.

You can find further details in chapter "*Access protection*".

**Access protection -  
Bluetooth access code**

Bluetooth communication is encrypted to prevent unauthorized access. The Bluetooth access code required for communication is displayed here and can be changed as required.

**Note:**

The individual preset Bluetooth access code of the device can be found on the supplied information sheet "*PINs and Codes*". If this is changed by the user and is no longer available, access is only possible via the emergency Bluetooth access code on the information sheet "*Access protection*" also supplied.

You can find further details in chapter "*Access protection*".

**Access protection - Protection of the parameter adjustment**

The device parameters can be protected against unwanted or unintended changes by entering a device code.

With activated protection of the parameter adjustment, the individual menu items can be selected and displayed, however the parameters can no longer be modified.

Releasing the device adjustment is also possible in any menu item by entering the device code.

**Note:**

The factory set device code is "000000". If this is changed by the user and is no longer available, access is only possible via the emergency device code on the information sheet "*Access protection*" also supplied.

**Caution:**

With protected parameter adjustment, adjustment via the VEGA Tools app as well as PACTware/DTM and other systems is also blocked.

**Date/Time**

In this menu item the current date and time as well as the time format (24/12 hours) can be entered. These time settings are buffered by a capacitor and a battery for up to 10 years in the event of a power failure.

**Reset**

With a reset to basic setting, all settings except the display language and the Bluetooth access code are reset to factory settings. If desired, the device can also be restarted.

**7.4.4 Diagnostics****Status**

When the instrument displays a fault, further information about the fault can be called up via the menu item "*Diagnosis - Status*". Furthermore, the sensor status with input current as well as the digital inputs can be displayed. The status of the relay, its switched-on period and the number of switch-on events can also be displayed. The counters can also be reset.

### Simulation

The simulation of a measured value is used to check the outputs and connected components. The simulation can be applied to the percentage value, the lin. percentage value and the scaled value as well as the sensor value.



#### Note:

Please note that downstream plant components (valves, pumps, motors, controls) are influenced by the simulation, which can lead to unintentional plant operating states. The simulated value is output until you deactivate the simulation mode again. The simulation is automatically terminated after approx. 60 minutes.

### Device-TAG

You can assign an unambiguous name to VEGAMET 861 to the Device-TAG via DTM/VEGA Tools app. This function is recommended when several instruments are implemented and a good documentation of larger systems is required.

### Device information

The menu item "*Device information*" provides the device name and serial number as well as the hardware and software version.

### Device memory

Before removing an inserted SD card, use this function to safely remove the card without data loss.

## 8 Setup with smartphone/tablet (Bluetooth)

### 8.1 Preparations

#### System requirements

Make sure that your smartphone/tablet meets the following system requirements:

- Operating system: iOS 8 or newer
- Operating system: Android 4.3 or newer
- Bluetooth 4.0 LE or newer

Download the VEGA Tools app from the "Apple App Store", "Google Play Store" or "Baidu Store" to your smartphone or tablet.

### 8.2 Connecting

#### Connecting ...

Start the VEGA Tools app and select the function "Setup". The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

The devices found are listed and the search is automatically continued continuously.

Select the requested instrument in the device list.

The message "Searching ..." is displayed.

#### Authenticate

For the first connection, the adjustment tool and the controller must authenticate each other. After successful authentication, the next connection functions without authentication.

#### iOS

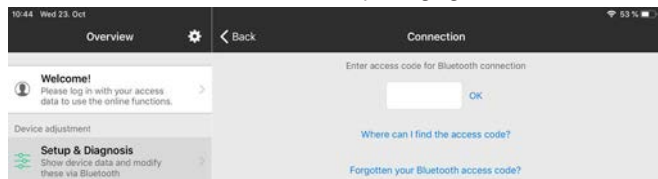
During the pairing process, the following message is displayed: "Pairing request (Bluetooth), e.g. 12345678 wants to pair with your iPhone/iPad". Press "Pair".

#### Android

The coupling passes through automatically.

#### Enter Bluetooth access code

For authentication, enter the 6-digit Bluetooth access code in the next menu window or scan it via the bar code (DataMatrix). You can find the code on the outside of the device housing and on the information sheet "PINs and Codes" in the device packaging.



#### Note:

If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

The message "Waiting for authentication" is displayed on the smartphone/tablet.

## Connected

After connection, the adjustment menu is displayed on the respective adjustment tool.

If the Bluetooth connection is interrupted, e.g. due to a too large distance between the two devices, this is displayed on the adjustment tool. The message disappears when the connection is restored.

## Change device code

Parameter adjustment of the device is only possible if the parameter protection is deactivated. When delivered, parameter protection is deactivated by default and can be activated at any time.

It is recommended to enter a personal 6-digit device code. To do this, go to menu "Extended functions", "Access protection", menu item "Protection of the parameter adjustment".

## Enter parameters

### 8.3 Parameter adjustment

The adjustment menu is divided into two halves:

On the left you will find the navigation area with the menus "Setup", "Extended functions" as well as "Diagnosis".

The selected menu item, recognisable by the colour change, is displayed in the right half.

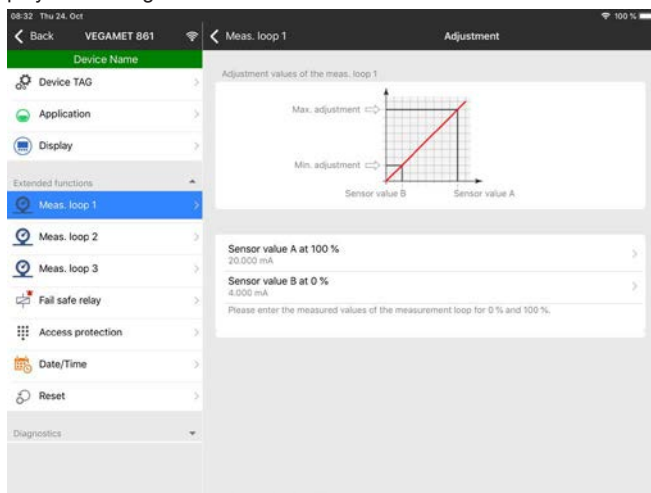


Fig. 13: Example of an app view - Setup adjustment

Enter the requested parameters and confirm via the keyboard or the editing field. The settings are then active in the device.

Close the app to terminate connection.

## 9 Setup with PC/notebook (Bluetooth)

### 9.1 Preparations

#### System requirements

Make sure that your PC/notebook meets the following system requirements:

- Operating system Windows 10
- DTM Collection 12/2019 or newer
- Bluetooth 4.0 LE or newer

#### Activate Bluetooth connection

Activate the Bluetooth connection via the project assistant.



#### Note:

Older systems do not always have an integrated Bluetooth LE. In these cases, a Bluetooth USB adapter is required. Activate the Bluetooth USB adapter using the Project Wizard.

After activating the integrated Bluetooth or the Bluetooth USB adapter, devices with Bluetooth are found and created in the project tree.

### 9.2 Connecting

#### Connecting ...

Select the requested device for the online parameter adjustment in the project tree.

#### Authenticate

The window "Authentication" is displayed. For the first connection, the PC and the controller must authenticate each other. After successful authentication, the next connection functions without authentication.

#### Enter Bluetooth access code

For authentication, enter in the next menu window the 6-digit Bluetooth access code:

You can find the code on the information sheet "PINs and Codes" in the device packaging:



#### Note:

If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

The message "Waiting for authentication" is displayed on the PC.



## Connected

After connection, the DTM appears.

If the connection is interrupted, e.g. due to a too large distance between controller and PC, this is displayed on the PC. The message disappears when the connection is restored.

## Change device code

Parameter adjustment of the device is only possible if the parameter protection is deactivated. When delivered, parameter protection is deactivated by default and can be activated at any time.

It is recommended to change the factory default 6-digit device code "000000" to your personal 4 - 10-digit device code. Go to the menu "Extended functions", "Access protection", menu item "Protection of the parameterization".

## 9.3 Parameter adjustment

### Prerequisites

For parameter adjustment of the instrument via a Windows PC, the configuration software PACTware and a suitable instrument driver (DTM) according to FDT standard are required. The latest 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.

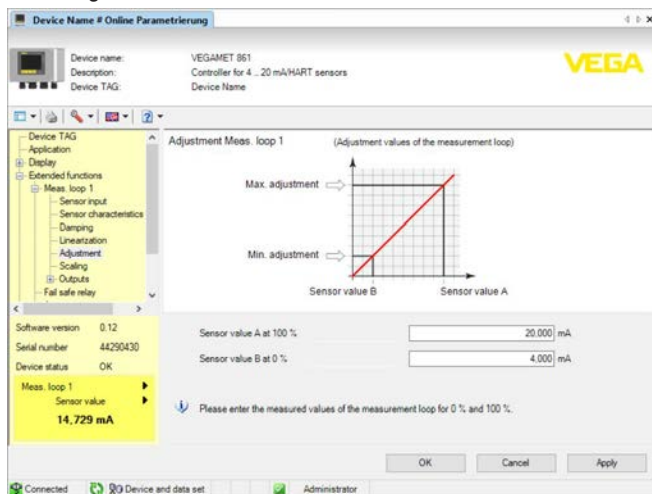


Fig. 14: Example of a DTM view - Adjustment

## 10 Measured value memory/data logger

With the measured value memory, the measured values of a VEGA instrument can be recorded and monitored. There are two different possibilities of measured value recording:

### Measured value memory

The data are saved over a certain period in the instrument and can be read out again later on. Via PACTware and DTM different recording conditions can be set and the process can be started or stopped. The max. recording period is limited by the memory of the controller. The max. recording period differs depending on the recording type (interval or measured value difference).

When recording with interval, a maximum of 200 000 measured values can be recorded, when recording with measured value difference, the maximum is reduced to 140 000. If a measured value is saved every minute, a period of e.g. 138 days results (with measured value difference). If more than one curve is recorded, this period is reduced accordingly.



#### Note:

The recorded data are written in a period of two to five minutes from the internal RAM to a flash disk. In case of voltage failure, recordings of the last minutes can get lost.

### Measured value memory (DTM)

The data are only saved on the PC during an online connection with PACTware and DTM. The max. recording period is limited only by the storage space on the hard disc.

### 10.1 Setting the measured value memory

The settings are carried out in the DTM under the menu item "*Diagnosics - Measured value memory - Settings*". Up to 3 curves are available. If required, these curves are activated or deactivated/deleted on this side. By pushing the button "*Add*", an installation assistant for creating the selected curve is started. The following settings are carried out step-by-step:

### Measurement loop/Measured value

In the first step you have to select the requested measurement loop and the measured value.

### Recording mode

Here you set the requested recording interval. The following options are possible:

- "*In time interval*": Recording is carried out in certain adjustable time intervals
- "*With measured value difference*": Recording is carried out measured value dependent with adjustable measured value difference

A combination of the two recording modes is also possible.

### Start/Stop conditions

To enable a specific monitoring, the start and stop conditions can be set for the recording in dependence on the current measured value. If a start condition is met, the recording starts in the instrument. The current recording stops as soon as the stop condition is reached. If

the start condition is fulfilled again, the recording does not switch on again.



**Note:**

If the recording is started, previously recorded values of this curve are deleted.

The recording can be stopped automatically if the memory in the VEGA instrument is full. Select the option "*Stop recording when memory is full*". If this option is selected, the older measured values will be overwritten automatically (ring buffer).

## 10.2 Start of the recording

After having adjusted the recording mode and the start/stop conditions, these settings have to be transferred to the instrument ("*Device data - Save in device*"). Activate the trend recording by pushing the button "*Start recording*". The current utilisation of the memory and the number of recorded measured values is now displayed under "*Status*". Modification of the recording conditions is not possible during a recording.

## 10.3 Load recording from device

To load a saved curve from the device, select the page "*Diagnose - Measured value memory*" and click with the right mouse key to the diagram. Select in the opening popup menu the entry "*Load recording from device*". A dialogue window opens in which the curve and the range can be selected. In the list box for selecting the curve, all curves are shown which are currently activated in the controller. Under "*Range*" you see the available range on the right which can be limited by the fields "*Begin*" and "*End*". Through this, the time required for reading out the curve can be considerably reduced.

Further information on trend recording is available in the online help of the corresponding DTM.

## 10.4 Save to SD card

The measured values are always stored in the internal memory of the instrument and can be read out again via the DTM. In addition, the measured values are stored on the supplied memory card (MicroSDXC). This has the advantage that the memory card can be removed and the recorded values can be accessed elsewhere.

The card reader is only accessible when the housing is open. It is located under the display cover and is labelled "*SD Card*".



**Note:**

The memory card may only be removed if it has previously been safely removed from the system via the menu item "*Diagnosis - Device memory*".

## 11 Applications and functions

The controller contains already preset applications and functions, which can be easily adjusted by means of an application assistant via PACTware/DTM or the VEGA Tools app. The following applications/functions are described here as examples.

- Level measurement storage tank
- Pumping station

### 11.1 Level measurement in storage tanks with overfill protection/dry run protection

#### Application

The level is detected by a sensor and transmitted to the controller by means of a 4 ... 20 mA signal. Here, an adjustment is carried out, converting the input value delivered by the sensor into a percentage value.

Depending on the geometrical form of the tank, the vessel volume does not increase linearly with the level, e.g. with an horizontal cylindrical tank. This can be compensated by selecting the linearisation curve integrated in the instrument. This curve states the relationship between percentage level and vessel volume. If the level is to be displayed in litres, a scaling must also be carried out. For this purpose, the linearised percentage value is converted into a volume, for example with the unit litre.

Filling and emptying are controlled via relay 1 and 2 which are integrated in the controller. During filling, relay mode "Overfill protection" is set. The relay is thus switched off (safe currentless state) when the max. level is exceeded, and switched on again when the min. level is underrun (switch-on point < switch-off point). During emptying, mode "Dry run protection" is used. This relay is thus switched off when the min. level is underrun (safe currentless condition), and switched on again when the max. level is exceeded (switch-on point > switch-off point).

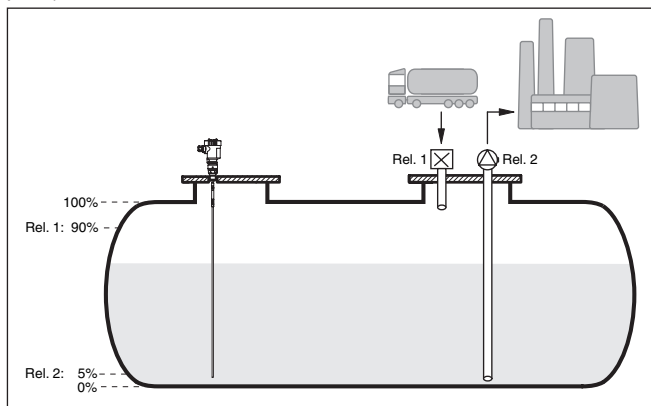


Fig. 15: Example of level measurement, horizontal cylindrical tank

## Example

A horizontal cylindrical tank has a capacity of 10000 litres. The measurement is carried out with a level sensor operating according to the guided microwave principle. The filling by a tank car is controlled via relay 1 and a valve (overflow protection). The discharge is carried out via a pump and is controlled by relay 2 (dry run protection). The max. volume should be at 90 % level, this means 9538 litres with a standard vessel (according to sounding table). The min. level should be set to 5 %, this corresponds to 181 litres. The volume is to be displayed in litres.

## Setup

The application wizard guides you through the various configuration possibilities and options. The following steps are performed:

- Selection of the application "*Level storage tank*"
- Assign measuring loop name
- Define sensor characteristic values (sensor type, measuring range, ...)
- Define linearization
- Adjustment
- Scaling
- Configure relay (mode of operation, switching points, ...)

## Adjustment

Carry out the adjustment in the controller as described in chapter "*Setup steps*". No further adjustment may be carried out in the sensor itself. For the max. adjustment, fill the vessel up to the requested max. level and accept the actually measured value. If this is not possible, the corresponding current value can also be entered. For the min. adjustment, empty the vessel down to the min. level or enter the corresponding current value.

## Linearisation

To display the percentage level correctly, select under "*Measurement loop - Linearization curve*" the entry "*Horiz. cylindrical tank*".

## Scaling

To display the volume in litres, you have to enter "*Volume*" as the unit in litres under "*Measurement loop - Scaling*". The allocation is then carried out, in this example 100 %  $\triangleq$  10000 litres and 0 %  $\triangleq$  0 litres.

## Relay

Percent is selected as reference value for the relays. The mode of relay 1 is set to overflow protection, relay 2 must be activated and gets mode dry run protection. To ensure that the pump switches off in case of failure, the reaction in case of failure should be set to switching status OFF. The switching points are set as follows:

- **Relay 1:** Switch-off point 90 %, switch-on point 85 %
- **Relay 2:** Switch-off point 5 %, switch-on point 10 %



## Information:

The switch-on and switch-off point of the relays must not be set to the same switching point because this would cause a continuous switching on and off when this threshold is reached. To avoid this effect also with fluctuating product surfaces, it is a good idea to set a difference (hysteresis) of 5 % between the switching points.

## 11.2 Pump station with pump control function

### Application description

The waste water from households and industry, together with surface water, is fed to the sewage treatment plant via an extensive network of sewers. If the natural gradient is not sufficient, various pumping stations are required to compensate for the differences in height. The level measurement in the inlet shaft serves for the economic control of the pumps. The intelligent control of up to four pumps can be easily adjusted by the controller.

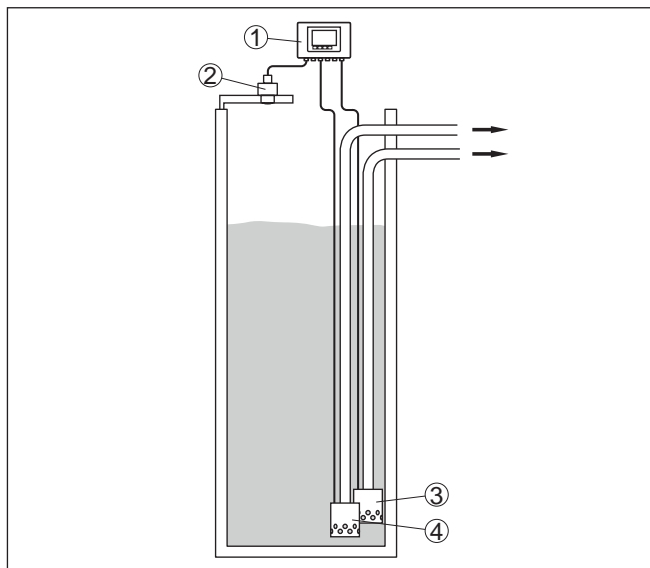


Fig. 16: Example pumping station: Pump control in the inlet shaft

- 1 VEGAMET 861
- 2 Radar sensor
- 3 Pump 1
- 4 Pump 2

### Display indication

When pump control is activated, the assigned relays and possible pump malfunctions are also displayed in the status bar of the measured value indication.

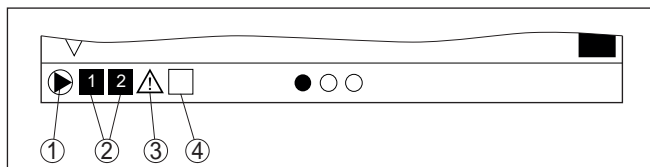


Fig. 17: Status bar in display when pump control is activated

- 1 Symbol, activated pump control
- 2 Relay 1 and 2 are assigned to the pump control
- 3 Relay 3 is assigned to the pump control and signals failure
- 4 Relay 4 is free i.e. not assigned to the pump control

## Setup

The application wizard guides you through the various configuration possibilities and options. The following steps are performed:

1. **Select application**  
Select the application "*Pumping station*" from the options offered.
2. **Assign measuring loop name**  
Assign a unique designation to the measuring point so that there can be no confusion with other measuring points.
3. **Select sensor input (only for devices with HART)**  
Define how the measured value is to be transmitted (4 ... 20 mA or HART). When selecting HART, the desired sensor must be selected.
4. **Define sensor characteristic values**  
At 4 ... 20 mA, select the connected sensor type, the measuring unit and the measuring range of the connected sensor. For HART selection, the desired sensor value and the unit must be defined.
5. **Define adjustment values**  
Enter the adjustment values of the measuring point for 0 % and for 100 %.
6. **Define mode of operation of the pump control**  
Define the desired operating mode of the pump control: pump control 1/2 (same running time) or pump control 3/4 (fixed sequence). In addition, you can select the mode sequenced or alternating pump operation. The setup wizard and the following application examples provide you with details on how it works.
7. **Configure pump monitoring**  
In this step a monitoring of the pumps can be configured. Furthermore, a forced pump changeover can be activated. The setup wizard and the following application examples provide details on how the pump works.
8. **Configure relay switching points**  
In the last step, enter the relay switching points at which the pumps are to be switched.

## Application example pump control 1/2

### Functional principle

Pump control 1/2 is used to control several pumps with the same function, in dependence on their respective elapsed running times. The pump with the shortest elapsed running time is switched on and the pump with the longest running time switched off. In case of increased pumping requirement, all pumps can also run at the same time, in dependence on the entered switching points. This measure achieves an even utilization of the pumps and increases operational reliability.

All relays with activated pump control are switched on or off depending on the accumulated operating time. The controller selects the relay with the shortest elapsed operating time when the switch-on

point is reached and the relay with the longest elapsed operating time when the switch-off point is reached.

Pump fault messages can also be processed via the digital inputs.

This pump control system offers two different options:

- **Pump control 1:** The upper switching point determines the switch-off point for the relay, whereas the lower switching point determines the switch-on point
- **Pump control 2:** The upper switching point determines the switch-on point for the relay, whereas the lower switching point determines the switch-off point

## Example

Two pumps should empty the vessel when a certain level is reached. At 80 % filling, the pump with the shortest elapsed running time should switch on. If the level nevertheless increases, a second pump should switch on at 90 %. Both pumps should switch off again at 10 % filling.

For relay 1 and 2, the mode of operation "Pump control 2" is adjusted with the option "Sequenced operation". The relay switching points are configured as follows:

- Relay 1 upper switching point = 80.0 %
- Relay 1 lower switching point = 10.0 %
- Relay 2 upper switching point = 90.0 %
- Relay 2 lower switching point = 10.0 %

The function of pump control 2 is shown in detail in the following diagram. The previously described example is used as a basis.

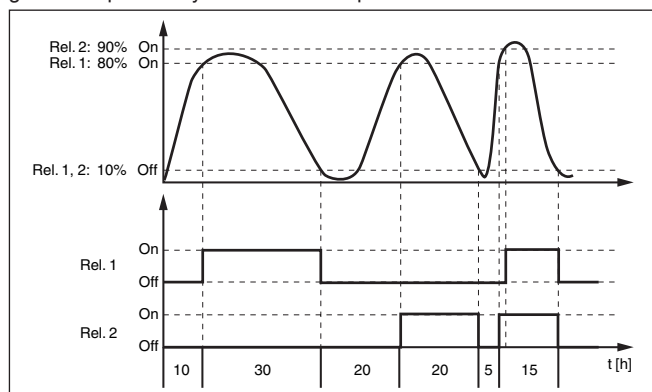


Fig. 18: Example of pump control 2

## Option Dry weather pump

Pump control 2/4 with dry weather pump is used to protect e.g. rain retention basins with different sized pumps against overfilling. Normally (in fair weather), a pump with low capacity (dry weather pump) is sufficient to maintain the level in the retention basin at a safe level (Hi-Level). If heavy rainfall causes an increased inflow, the fair weather pump can no longer maintain the level. In such cases, a larger pump is switched on when the HiHi level is exceeded and the



dry weather pump is switched off. The large pump then remains in operation until the switch-off point is reached. If the level rises again, the dry weather pump switches back on first.

There is also the possibility of using multiple large pumps in alternating mode. The algorithm for the switching function is then determined by the pump control mode.

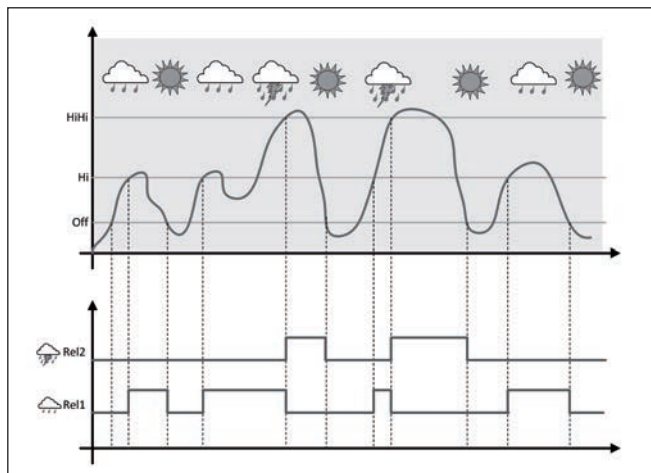


Fig. 19: Example of a pump control with option "Dry weather pump"



**Note:**

If the option "Dry weather pump" is activated, only the mode "Alternating pump operation" will be available, i.e. only one pump at a time is in operation.

**Pump control mode**

The pump control system offers the possibility to choose between sequenced and alternating pump operation:

- **Sequenced operation:** Depending on the switching points, all pumps are switched on one after the other, i.e. the max. number of pumps that can be switched on corresponds to the number of assigned relays
- **Alternating pump operation:** Independent of the switching point, only one pump at a time is switched on

**Option, forced switchover**

If the level has not changed over a longer period, the same pump would always remain switched on. Via the parameter "Switchover time", a time can be preset which, after it is elapsed, forces a switchover of the pump. Which pump is switched on depends on the selected pump mode. If all pumps are already switched on, the pump remains switched on.



**Note:**

If the pump is already switched on when the forced switchover is activated, the timer is not started. Only after the pump is switched off and on again will the timer start. If a switch-off delay is set, it will not

be taken into account, i.e. the switchover is carried out exactly after the preset time for the forced switchover expires. A preset switch-on delay, however, is taken into account, i.e. the forced switchover to another pump is carried out after the preset time expires. Before the newly selected pump switches on, the preset switch-on delay for this pump must have expired.

## Pump monitoring

With a pump control, there is also the possibility of switching on pump monitoring. For this purpose, a feedback signal is required on the respective digital input. The digital inputs are assigned 1:1 to the relays. Digital input 1 acts on relay 1, etc.

If the pump monitoring for a relay was switched on, a timer is started when the relay is switched on (time allowance with parameter "*Report time*"). If the checkback signal comes from the pump on the respective digital input within the defined report time, the pump relay remains energized, otherwise the relay is immediately switched off and a fault signal outputted. A fault signal and a switching off of the relay is carried out even if the relay is already switched on and the pump checkback signal changes during the running time of the pump. In addition, a switched-off relay of the pump control is looked for and switched on instead of the faulted relay. A Low signal on the digital input is evaluated as a pump error signal.

The fault message is cancelled when the signal on the digital input changes to "Good" or when it is reset via the "OK" key and selection of the menu item "*Acknowledge failure*". If the fault message is reset via the menu and the pump still signals failure, a fault message is triggered after the enquiry period. The enquiry period is started as described above when the relay is switched on.

### Switch-on behaviour of pump control 2

When the controller is switched on, the relays are at first in a switched-off status. Depending on the actual input signal and the switched-on period of the individual relays, the following relay switching conditions can occur after the start procedure:

- Input signal is higher than the upper switching point -> Relay with the shortest switched-on period is switched on
- Input signal is between lower and upper switching point -> Relay remains switched off
- Input signal is smaller than the lower switching point -> Relay remains switched off

## Application example pump control 3/4

### Functional principle

Pump control 3/4 is used to control several pumps with the same function alternately and in a fixed sequence. In case of increased pumping requirement, all pumps can also run at the same time, in dependence on the entered switching points. This measure achieves an even utilization of the pumps and increases operational reliability.

All relays with activated pump control are not assigned to a certain switching point but are switched on and off alternately. When a switching point is reached, the controller selects the relay that is next in the

sequence. When a switch-off point is reached, the relays are switched off in the sequence they were switched on.

Via the digital inputs, possible fault signals of the pumps can also be evaluated. You can find the description of this in the application example "*Pump control 1/2*" under "*Pump monitoring*".

This pump control system offers two different options:

- Pump control 3: The upper switching point determines the switch-off point for the relay, whereas the lower switching point determines the switch-on point
- Pump control 4: The upper switching point determines the switch-on point for the relay, whereas the lower switching point determines the switch-off point

The sequence cannot be changed, the relay with the lowest index is switched on first, then the relay with the next higher index. After the relay with the highest index, the relay with the lowest index follows, for example Rel. 1 -> Rel. 2 -> Rel. 3 -> Rel. 4 -> Rel. 1 -> Rel. 2 ...

The sequence applies only to those relays assigned to the pump control.

## Example

In a waste water disposal system, a sump should be pumped empty when a certain level is reached. Three pumps are available for this. At 60 % level, pump 1 should run until the level has fallen below 10 %. If the 60 % point is exceeded again, the same task is transferred to pump 2. In the third cycle, pump 3 is activated; after that, pump 1 again. If the level continues to rise despite operation of a pump, an additional pump switched on when the level exceeds the 75 % switching point. And if the level still rises further due to extreme inflow and exceeds the 90 % limit, pump 3 is also switched on.

For relay 1 ... 3, the mode of operation "*Pump control 4*" is adjusted with the option "*Sequenced operation*". The relay switching points are configured as follows:

Select in the DTM navigation section the menu items "*Meas. loop - Outputs - Relay*".

- Relay 1 upper switching point = 60.0 %
- Relay 1 lower switching point = 10.0 %
- Relay 2 upper switching point = 75.0 %
- Relay 2 lower switching point = 10.0 %
- Relay 3 upper switching point = 90.0 %
- Relay 3 lower switching point = 10.0 %

The function of pump control 4 is shown in detail in the following diagram. The previously described example is used as a basis.

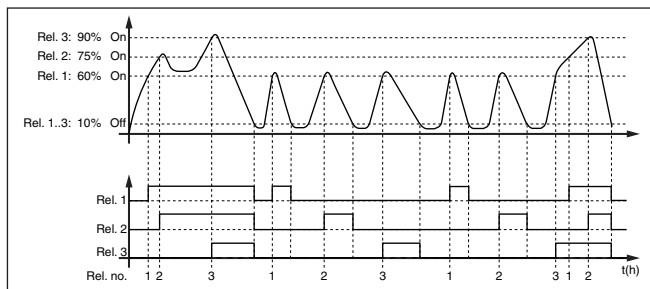


Fig. 20: Example of pump control 4

### Option Dry weather pump

Pump control 2/4 with dry weather pump is used to protect e.g. rain retention basins with different sized pumps against overflowing. Normally (in fair weather), a pump with low capacity (dry weather pump) is sufficient to maintain the level in the retention basin at a safe level (Hi-Level). If heavy rainfall causes an increased inflow, the fair weather pump can no longer maintain the level. In such cases, a larger pump is switched on when the HiHi level is exceeded and the dry weather pump is switched off. The large pump then remains in operation until the switch-off point is reached. If the level rises again, the dry weather pump switches back on first.

There is also the possibility of using multiple large pumps in alternating mode. The algorithm for the switching function is then determined by the pump control mode.

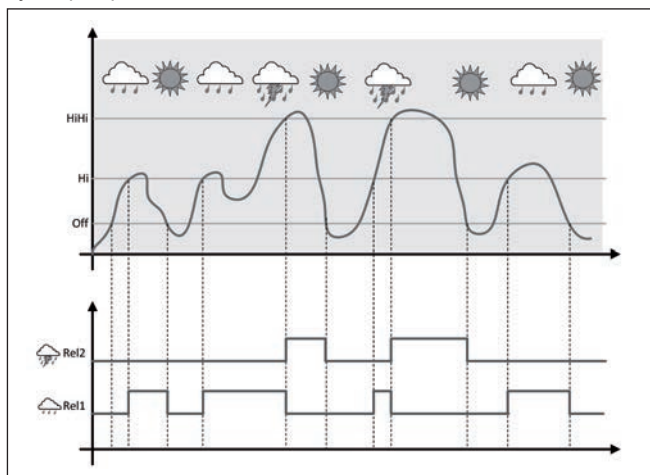


Fig. 21: Example of a pump control with option "Dry weather pump"



#### Note:

If the option "Dry weather pump" is activated, only the mode "Alternating pump operation" will be available, i.e. only one pump at a time is in operation.

## Pump control mode

The pump control system offers the possibility to choose between sequenced and alternating pump operation:

- **Sequenced operation:** Depending on the switching points, all pumps are switched on one after the other, i.e. the max. number of pumps that can be switched on corresponds to the number of assigned relays
- **Alternating pump operation:** Independent of the switching point, only one pump at a time is switched on

## Option, forced switchover

If the level does not change over a longer period of time, the same pump would remain switched on. Via the parameter "*Changeover time*", a time period can be preset, after which a forced changeover of the pump is carried out. This function is described under pump control 1/2.

## Pump monitoring

When pump control is activated, pump monitoring can also be switched on. A return signal to the respective digital input is required for this. The function is described under pump control 1/2.

## Diagnosis via running time

If all pumps have the same capacity and are used for the same task alternately, the running time should always be roughly the same. The respective operating hours are summed up individually in the controller and can be read out in the menu "*Diagnosis – Switched-on time*". If a large difference between the pumps is determined, the capacity of one of the pumps must have fallen considerably. This information can be consulted for diagnosis and service, e.g. to recognize plugged-up filters or worn out bearings.

Since in this case all pumps operate alternately in the same area, their switch-on and switch-off points must be the same. In addition, the mode "*Alternating pump operation*" must be active.



### Note:

The index of the last switched-on relay is not saved in case of voltage loss, this means that after the controller is switched back on again, the relay with the lowest index always starts first.

## 12 Diagnostics and servicing

### 12.1 Maintenance

#### Maintenance

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

#### Cleaning

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, type label and seals
- Use only cleaning methods corresponding to the housing protection rating

### 12.2 Rectify faults

#### Reaction when malfunction occurs

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

#### Causes of malfunction

The device offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Measured value from sensor not correct
- Voltage supply
- Interference in the cables

#### Fault rectification

The first measures are:

- Evaluation of fault messages
- Checking the input/output signal

A smartphone/tablet with the VEGA Tools app or a PC/notebook with the software PACTware and the suitable DTM offer you further comprehensive diagnostic possibilities. In many cases, the causes can be determined in this way and the faults eliminated.

#### 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 hotline

Should 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.

### 12.3 Diagnosis, fault messages

#### Fault message

The controller and the connected sensors are permanently monitored during operation and the values entered during parameter adjustment are checked for plausibility. If irregularities occur or in case of

incorrect parameter adjustment, a fault signal is triggered. In case of an instrument defect or line break/shortcircuit, a fault signal is also triggered.

The fault indication lights up in case of failure and the current output as well as the relays react according to the configured fault mode. If the fail safe relay was configured, it will deenergize. In addition, one of the following error messages is outputted on the display and the background lighting changes to colour acc. to NAMUR NE 107.

## Failure

Error code	Cause	Rectification
F003 Hardware: CRC error	CRC error (error with self-check)	Switch the instrument off/on Carry out a reset Send instrument for repair
F008 Sensor input: Failure, sensor	Sensor not found	Check connection of the sensor Check HART address of the sensor
F012 Hardware: AD converter	Hardware error, sensor input	Switch the instrument off and on Send instrument for repair
F014 Sensor input: Short-circuit	Sensor current > 21 mA or short-circuit	Check sensor on failure signal Remove short-circuit
F015 Sensor input: Line break	Sensor in boot phase Sensor current < 3.6 mA or line break	Check sensor on failure signal Remove line break Check connection of the sensor
F034 EEPROM: CRC error	EEPROM: CRC error	Switch the instrument off and on Carry out a reset Send instrument for repair
F035 ROM defective	ROM: CRC error	Switch the instrument off and on Carry out a reset Send instrument for repair
F036 RAM	RAM error	Switch the instrument off and on Carry out a reset Send instrument for repair
F037 RAM	RAM defective	Switch the instrument off and on Carry out a reset Send instrument for repair
F040 General hardware error	Hardware error	Switch the instrument off and on Carry out a reset Send instrument for repair

## Out of specification

Error code	Cause	Rectification
S007 Sensor input: Type not compatible	Sensor type not compatible	Search for sensor again and allocate under " <i>Meas. loop - Input</i> "
S013 Sensor input: Sensor error	The input of the measuring point returns an error.  The connected sensor returns an error.	Switch device/sensor off and on Send device/sensor for repair
S016 Adjustment: Min./Max. exchanged	The min./max. adjustment points were exchanged.	Carry out the adjustment again, correct the min. and max. values.
S017 Adjustment: Span too small	Adjustment span too small	Carry out a fresh adjustment and increase the distance between min./max. adjustment
S021 Scaling: Span too small	Scaling span too small	Carry out a fresh scaling, increase the distance between min./max. scaling.
S022 Scaling: Span too large	Value for one of the two scaling points is too large	Carry out the scaling again, correct the min. and max. values.
S030 Measured value not valid	The connected sensor is still in the start-up phase or is interrupted	Check sensor
S053 Sensor measuring range faulty	Sensor measuring range was not read correctly	Restart instrument
S062 Pulse priority too small	Pulse priority too small	Increase under " <i>Output</i> " the entry " <i>Pulse output all</i> " so that max. one pulse per second is output.
S110 Relay: Span too small	Relay switching points too close together	Increase the difference between the two relay switching points
S111 Relay: Switching point interchanged	Relay switching points interchanged	Change relay switching points for " <i>On/Off</i> "



Error code	Cause	Rectification
S115 Pump control: Faulty interference behaviour	Several relays are assigned to the pump control which are not set to the same failure mode	All relays which are assigned to the pump control must be set to the same failure mode
S116 Pump control: Operating mode faulty	Several relays that are not configured with the same mode are assigned to the pump control	All relays which are assigned to the pump control must be set to the same mode

## Function check

Error code	Cause	Rectification
C029 Simulation	Simulation active	Finish simulation

## Maintenance

Error code	Cause	Rectification
M117 Pump signals failure	Pump signals failure	Check faulty pump

## 12.4 Software update

An update of the device software is possible via the Bluetooth interface.

The following components are required:

- Instrument
- Voltage supply
- PC/Notebook with PACTware/DTM
- 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.



### 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 on our homepage.

## 12.5 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage. By doing this you help us carry out the repair quickly and without having to call back for needed information.

In case of repair, 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
- Ask the agency serving you to get the address for the return shipment. You can find the agency on our homepage.

## 13 Dismount

### 13.1 Dismounting steps

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

### 13.2 Disposal

The device is made of recyclable materials. For this reason, it should be disposed of by a specialist recycling company. Observe the applicable national regulations.

## 14 Certificates and approvals

### 14.1 Environmental instructions

#### Objective and measures

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*"

## 15 Supplement

### 15.1 Technical data

#### Note for approved instruments

The technical data in the respective safety instructions are valid for approved instruments (e.g. with Ex approval). In some cases, these data can differ from the data listed herein.

All approval documents can be downloaded from our homepage.

#### Materials and weights

##### Materials

– Housing	PC-FR
– Housing screws	StSt
– Inspection window	PE
– Seal	Silicone
– Cable glands	PA
– Sun shade	316L
– Brackets for tube mounting	V2A
Weight with mounting plate	1310 g (2.888 lbs)

#### Voltage supply

##### Operating voltage

– Nominal voltage AC	100 ... 230 V (-15 %, +10 %) 50/60 Hz
– Nominal voltage DC	24 ... 65 V DC (-15 %, +10 %)

Power consumption	max. 13 VA; 4 W
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#### Sensor input

Number of sensors	1 x 4 ... 20 mA/HART
Type of input (selectable)	
– Active input	Sensor supply through VEGAMET 861
– Passive input	Sensor has an own voltage supply
Measured value transmission	
– 4 ... 20 mA	analogue for 4 ... 20 mA sensors
– HART protocol	digital for HART sensors
Deviation (4 ... 20 mA)	
– Accuracy	±20 µA (0.1 % of 20 mA)
Terminal voltage	27 ... 22 V at 4 ... 20 mA
Current limitation	approx. 26 mA
Detection line break	≤ 3.6 mA
Detection shortcircuit	≥ 21 mA
Adjustment range 4 ... 20 mA sensor	
– Empty adjustment	2.4 ... 21.6 mA
– Full adjustment	2.4 ... 21.6 mA

– min. adjustment delta	16 $\mu$ A
Temperature error relating to 20 mA	0.008 %/K
Adjustment range HART sensor	
– Adjustment range	$\pm 10$ % of sensor measuring range
– min. adjustment delta	0.1 % of sensor measuring range
Connection cable to the HART sensor	two-wire screened standard cable

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### Digital input

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Quantity	2 x digital input
Input type active	
– Voltage	> 14 V DC
– Current	> 3 mA
– Max. load	200 $\Omega$
Input type passive	
– Switching threshold Low	-3 ... 5 V DC
– Switching threshold High	11 ... 30 V DC
– Max. input voltage	30 V DC
– Max. input current	30 mA
– Max. sampling rate	10 Hz
– Input impedance	8 k $\Omega$

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### Relay output

---

Quantity	4 x operating relay, one can be configured as fail safe relay
Function	Switching relay for level, fault signal or pulse relay for flow/sampling pulse, pump control
Contact	Floating spdt
Contact material	AgSnO <sub>2</sub> , hard gold-plated
Switching voltage	max. 250 V AC/60 V DC
Switching current	max. 1 A AC (cos phi > 0.9), 1 A DC
Breaking capacity <sup>2)</sup>	min. 50 mW, max. 250 VA, max. 40 W DC (with U < 40 V DC)
AC/DC operation	Mixed operation with AC/DC voltage is not permitted for the relay outputs
Min. programmable switching hysteresis	0.1 %
Mode pulse output	
– Pulse length	350 ms

---

### Current output

---

Quantity	1 x output
Function	Level/flow/sampling pulse

<sup>2)</sup> 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.

Range	0/4 ... 20 mA, 20 ... 0/4 mA
Resolution	1 $\mu$ A
Max. load	500 $\Omega$
Fault signal (switch over)	0; < 3.6; 4; 20; 20.5; 22 mA
Accuracy	
– Standard	$\pm 20 \mu\text{A}$ (0.1 % of 20 mA)
– with EMC interferences	$\pm 80 \mu\text{A}$ (0.4 % of 20 mA)
Temperature error relating to 20 mA	0.005 %/K
Mode pulse output	
– Current pulse	20 mA
– Pulse length	200 ms

## Bluetooth interface

Bluetooth standard	Bluetooth 5.0 (downward compatible to Bluetooth 4.0 LE)
Max. participants	1
Effective range <sup>3)</sup>	max. 25 m (82 ft)

## Electromechanical data

Cable entry	
– Cable gland (optional)	M20 x 1.5 (cable diameter 6 ... 12 mm)
– NPT adapter (optional)	M20 on ½ NPT
– Blind plug (optional)	M20 x 1.5
Connection terminals	
– Type of terminal	Spring-loaded terminal
– Wire cross-section massive wire, strand	0.2 mm <sup>2</sup> (AWG 26) ... 2.5 mm <sup>2</sup> (AWG 12)
– Wire cross-section strand with end sleeve	0.25 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Terminals digital input	
– Type of terminal	Spring-loaded terminal
– Wire cross-section massive wire, strand	0.2 mm <sup>2</sup> (AWG 26) ... 1.5 mm <sup>2</sup> (AWG 16)
– Wire cross-section strand with end sleeve	0.25 mm <sup>2</sup> ... 0.75 mm <sup>2</sup>

## Indicators

Measured value indication	
– Graphic-capable LC display, with lighting	89 x 56 mm, digital and quasianalogue display
– Indication range	-9999999 ... 9999999

<sup>3)</sup> Depending on the local conditions

**LED displays**

– Status, operating voltage	LED green
– Status, fault signal	LED red
– Status, operating relay	LED yellow

Background lighting      Colour signalling according to NAMUR NE 107

**Adjustment**

Adjustment elements	4 x keys for menu adjustment
PC/Notebook	PACTware/DTM
Smartphone/Tablet	VEGA Tools-App

**Memory card**

Memory card type	microSDXC industrial
Capacity (supplied card)	8 GB
Capacitance (max.)	64 GB

**Ambient conditions**

Ambient temperature	
– Instrument in general	-40 ... +60 °C (-40 ... +140 °F)
– Display (readability)	-20 ... +60 °C (-4 ... +140 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

**Electrical protective measures**

Protection rating	IP66/IP67 acc. to IEC 60529, Type 4X acc. to UL 50
Altitude above sea level	up to 5000 m (16404 ft)
Overvoltage category (IEC 61010-1)	II
Protection class	I
Pollution degree	4

**Protection against dangerous body currents**

Reliable separation according to IEC/EN 61140 by reinforced insulation according to IEC/EN 61010 part 1 up to 253 V AC/DC with overvoltage category II and fulfilled enclosure protection class between the supply, signal and relay circuits.

Sensor inputs (active) are energy limited circuits according to IEC/UL 61010 part 1.

**15.2 Overview applications/functionality**

The following charts provide an overview of the standard applications and functions of VEGAMET 800 series controllers. They give also information about whether the respective function can be activated and adjusted via the integrated indicating and adjustment unit (OP) or via DTM/app.<sup>4)</sup>

<sup>4)</sup> OP: Operating Panel (integrated display and adjustment unit)



Applications (adjustable with DTM/app)	VEGAMET				Adjustment	
	841	842	861	862	OP	DTM/ App
Universal	•	•	•	•	•	•
Level storage tank	•	•	•	•		•
Calculation difference		•		•		•
Flow measurement flume/Weir	•	•	•	•		•
Pumping station	•	•	•	•		•
Weir control		•		•		•
Sewage screw pump lifting station	•	•	•	•		•

Additional application examples	VEGAMET				Adjustment	
	841	842	861	862	OP	DTM/ App
Level measurement	•	•	•	•		•
Gauge measurement	•	•	•	•		•
Process pressure measurement	•	•	•	•		•

Functions	VEGAMET				Adjustment	
	841	842	861	862	OP	DTM/ App
Application wizard	•	•	•	•		•
Indication measured values	•	•	•	•	•	•
Automatic display change	•	•	•	•	•	•
Display multilingual	•	•	•	•	•	•
Sensor input 4 ... 20 mA	•	•	•	•	•	•
Sensor input HART			•	•	•	•
Damping	•	•	•	•	•	•
Linearization preset curves	•	•	•	•	•	•
Linearization dimensions ISO standard	•	•	•	•		•
Linearization flow formula	•	•	•	•		•
Linearization manufacturer definition	•	•	•	•		•
Linearization calculation wizard	•	•	•	•		•
Linearization bearing table	•	•	•	•		•
Linearization gauging by litres	•	•	•	•		•
Import linearization curves	•	•	•	•		•
Adjustment of the measuring point	•	•	•	•	•	•
Scaling	•	•	•	•	•	•
Totalizer 1/2	•	•	•	•		•
Totalizer 3/4		•		•		•

Functions	VEGAMET				Adjustment	
	841	842	861	862	OP	DTM/ App
Relay mode overflow protection	•	•	•	•	•	•
Relay mode dry run protection	•	•	•	•	•	•
Relay mode switching window ON	•	•	•	•		•
Relay mode switching window OFF	•	•	•	•		•
Relay mode flow rate pulse	•	•	•	•		•
Relay mode sampling pulse	•	•	•	•		•
Relay mode rising tendency	•	•	•	•		•
Relay mode falling tendency	•	•	•	•		•
Relay mode pump control 1 (same running time)	•	•	•	•		•
Relay mode pump control 2 (same running time)	•	•	•	•		•
Relay mode pump control 3 (fixed sequence)	•	•	•	•		•
Relay mode pump control 4 (fixed sequence)	•	•	•	•		•
Mode pump control sequenced operation	•	•	•	•		•
Mode pump control alternating pump operation	•	•	•	•		•
Dry weather pump	•	•	•	•		•
Pump monitoring			•	•		•
Forced pump changeover	•	•	•	•		•
Relay switch on and off delay	•	•	•	•		•
Bandwidth for switching points	•	•	•	•		•
Fail safe relay	•	•	•	•	•	•
Current output 0/4 ... 20 mA, 20 ... 4 mA	•	•	•	•	•	•
Current output flow rate pulse	•	•	•	•		•
Current output sampling pulse	•	•	•	•		•
Diagnosis Status	•	•	•	•	•	•
Diagnosis measured values	•	•	•	•	•	•
Simulation sensor value, %, lin% value, scaled values	•	•	•	•	•	•
Simulation current output	•	•	•	•		•
Simulation relay output	•	•	•	•		•
Simulation digital input			•	•		•
Date/Time			•	•	•	•
Internal device memory/SD card			•	•		•
Protection of the parameterization	•	•	•	•	•	•
Bluetooth access code	•	•	•	•	•	•

## 15.3 Dimensions

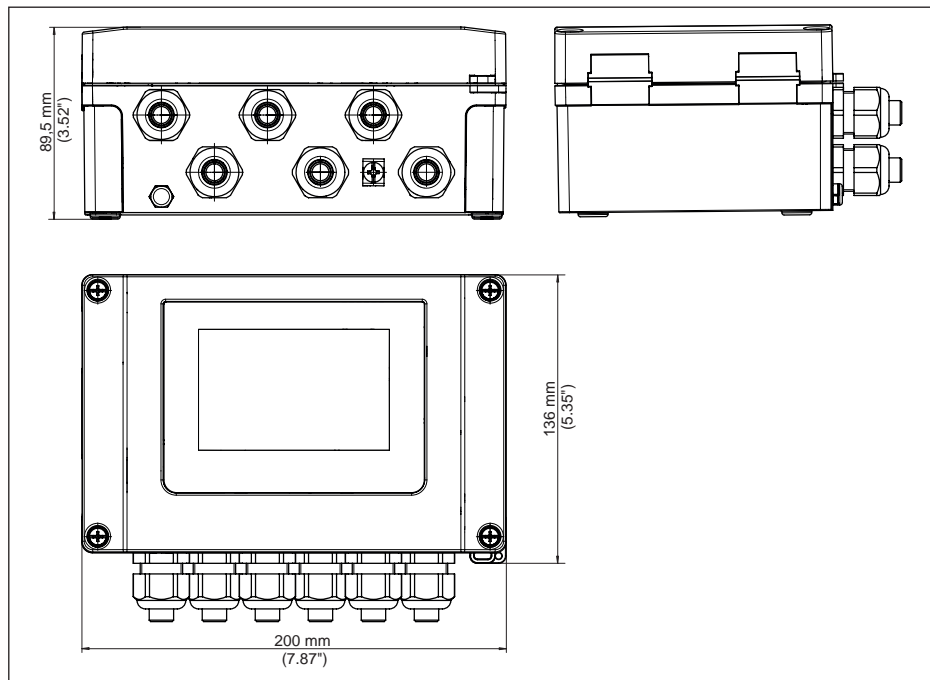


Fig. 22: Dimensions VEGAMET 861

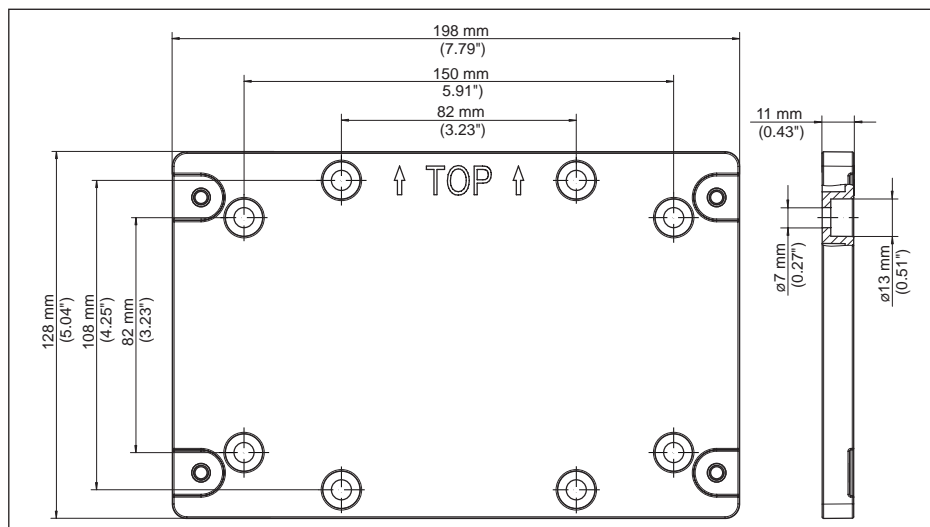


Fig. 23: Dimensions mounting plate

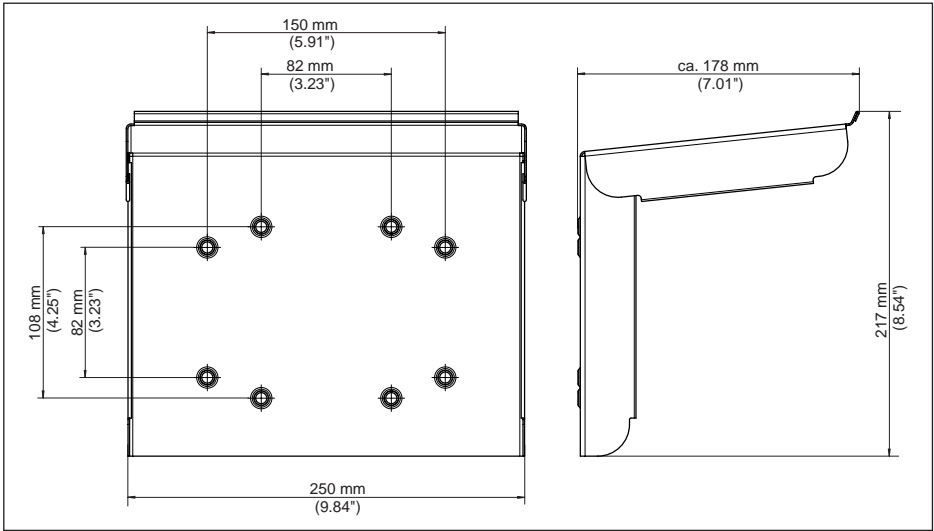


Fig. 24: Dimensions sun shade

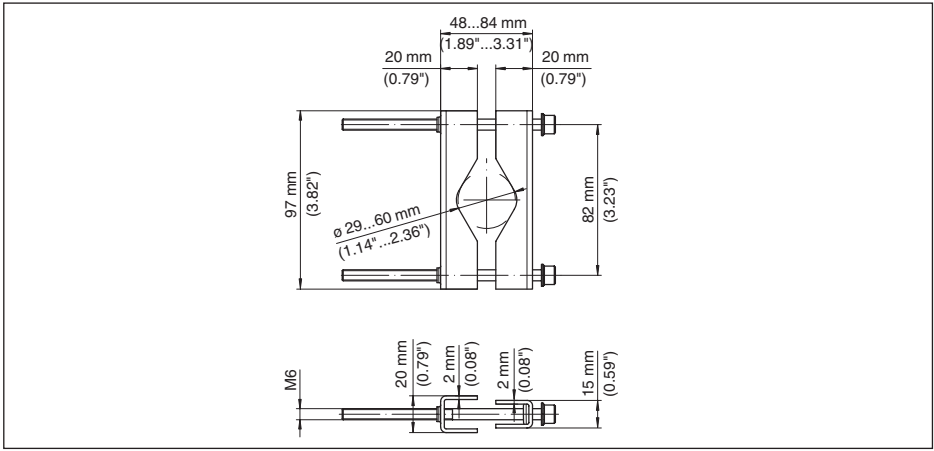


Fig. 25: Dimensions Brackets for tube mounting

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# 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.

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VEGA Grieshaber KG  
Am Hohenstein 113  
77761 Schiltach  
Germany

Phone +49 7836 50-0  
Fax +49 7836 50-201  
E-mail: [info.de@vega.com](mailto:info.de@vega.com)  
[www.vega.com](http://www.vega.com)