Operating Instructions

VEGADIS 176

External indicating and adjustment display
without external energy for front panel
mounting

📖

Document ID: 47916

VEGA

Contents

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Safety instructions for Ex areas

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

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup of the instrument. Furthermore there are 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 specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used

Information, tip, note
This symbol indicates helpful additional information.

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

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

Ex applications
This symbol indicates special instructions for Ex applications.

SIL applications
This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.

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

→ **Action**
This arrow indicates a single action.

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

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

2 For your safety

2.1 Authorised personnel

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

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

2.2 Appropriate use

The VEGADIS 176 is used for separate measured value indication of all standardized 4 … 20 mA circuits

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment. Thus damage to property, to persons or environmental contamination can be caused. Also the protective characteristics of the instrument can be influenced.

2.4 General safety instructions

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

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

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

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

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

2.5   Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6   EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm successful testing of the product.

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

2.7   NAMUR recommendations

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

The device fulfils the requirements of the following NAMUR recommendations:

● NE 21 – Electromagnetic compatibility of equipment
● NE 43 – Signal level for fault information from measuring transducers

For further information see www.namur.de.

2.8   Environmental instructions

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

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

● Chapter "*Packaging, transport and storage*"
● Chapter "*Disposal*"

3   Product description

3.1   Configuration

Scope of delivery

The scope of delivery encompasses:

● Indication and adjustment display VEGADIS 176
● Mounting material
● Documentation
    – This operating instructions manual
    – Ex specific safety instructions (with Ex versions), if necessary
       further certificates

3.2   Principle of operation

Application area

The VEGADIS 176 is an external indicating and adjustment display
without additional external energy for front panel mounting. It is used
for separate measured value indication of all standardized 4 … 20 mA
circuits. An existing HART signal will not be influenced (HART-trans-
parent).

The instrument is looped directly into the 4 … 20 mA circuit and
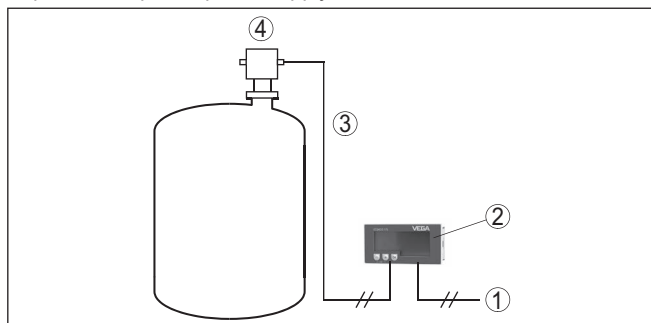requires no separate power supply.

Fig. 1: Connection of VEGADIS 176 to a sensor

1   Voltage supply/Signal output sensor
2   VEGADIS 176
3   4 … 20 mA signal cable
4   Sensor

3.3   Indication and adjustment

The VEGADIS 176 is equipped with a 5-digit, scalable LC display.
Apart from the digital measured value, parameter adjustment of
an analogue bar graph and the unit is also possible. If required,
background lighting can be activated by selecting the corresponding
terminals.

Adjustment is carried out via three keys in the front plate of the instru-
ment.

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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 of standard instruments 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 con-cealed defects must be appropriately dealt with.

Storage

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

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

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

Storage and transport temperature

● Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
● Relative humidity 20 … 85 %

Lifting and carrying

With an instrument weight of more than 18 kg (39.68 lbs) suitable and approved equipment must be used for lifting and carrying.
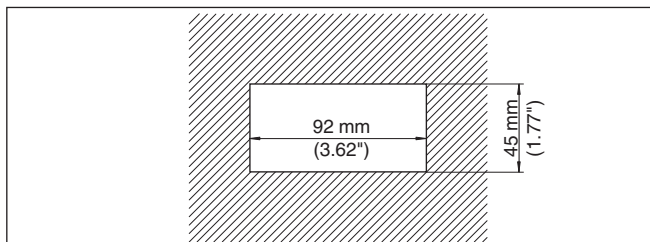
4   Mounting

4.1   Mounting location, installation position

The instrument is designed for use in a front panel. The installation position is horizontal.

4.2   Mounting preparations

Prepare panel cut-out 92 x 45 mm (3.62 x 1.77 in) according to illustration and DIN 43700. Max. panel thickness 13 mm (0.51 inch)
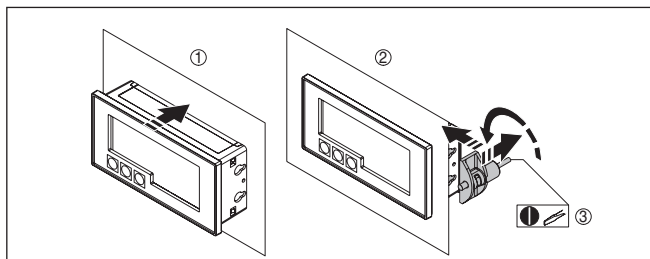

Required tools:

● Slot screwdriver

4.3   Installation procedure

Proceed as follows:

1.   Insert the instrument into the opening from the front

2.   Attach mounting clips to the side of the housing

3.   Tighten threaded rods evenly with the screwdriver

5   Connect to the signal circuit

5.1   Preparing the connection

Safety instructions   Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- Only connect to a 4 … 20 mA signal circuit with sensor or the
  4 … 20 mA signal output of a signal conditioning instrument

Voltage supply   The instrument must only be powered by an energy-limited circuit
according to IEC 61010-1.

Caution:
Never connect the VEGADIS 176 directly to a voltage source without
current limitation. Otherwise the instrument can be destroyed by a too
high current.

5.2   Connection technology and steps

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

Connection procedure   Proceed as follows:

1. Remove approx. 10 cm (4 in) of the cable mantle, strip approx.
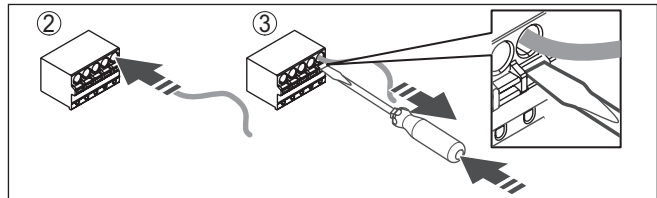   1 cm (0.4 in) of insulation from the ends of the individual wires

Fig. 4: Connection steps 2 and 3

2. Solid cores as well as flexible cores with cable end sleeves are
    inserted directly into the terminal openings.
3. In case of flexible cores without end sleeves, press the terminal
    from above with a small screwdriver, the terminal opening is then
    free. When the screwdriver is released, the terminal closes again.

Information:
You can find further information on the max. wire cross-section under
"*Technical data - Electromechanical data*".

4. Check the hold of the wires in the terminals by lightly pulling on
    them
5. Connect screen to the potential equalisation terminal.

5.3   Wiring plan

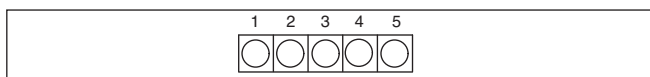**Terminal assignment**   The terminals are on the rear of the housing.

Fig. 5: Terminal assignment VEGADIS 176

Terminal	Function	Polarity	Notes
1	Output, sensor	+	Display with backlight
	Connection active 4 … 20 mA circuit	-	
2	Output, sensor	+	Display without backlight
	Connection active 4 … 20 mA circuit	-	
3	Output, sensor	-	Bridged internally with terminal 4
4	Input voltage supply	-	Bridged internally with terminal 3
5	Input voltage supply	+	
	Connection active 4 … 20 mA circuit	+	

Function ground

The terminal for function ground is also on the rear of the instrument. We recommend connecting it to the potential equalization for EMC reasons.
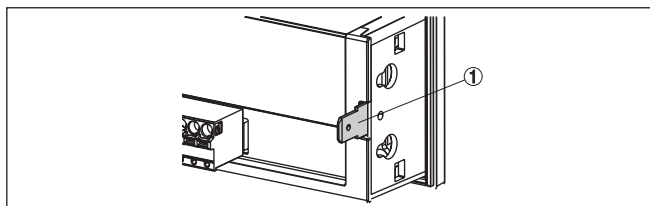

Fig. 6: Connection to function ground with VEGADIS 176
1   Connecting lug for function ground
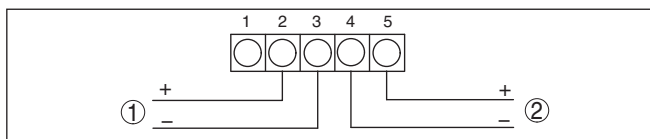
Passive sensors

Fig. 7: Wiring plan VEGADIS 176 to passive sensors
1   To the sensor
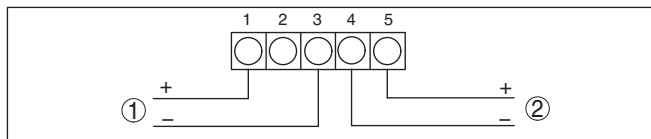2   To power supply or processing system

**Passive sensors with
backlight**

Fig. 8: Wiring plan VEGADIS 176 to passive sensors, with backlight

1   To the sensor
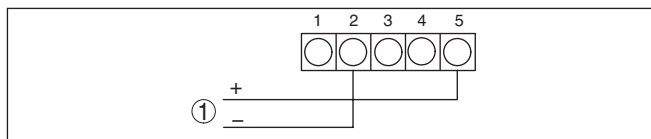*2   To power supply or processing system*

**Active sensors, signal
conditioning instruments**

*Fig. 9: Wiring plan VEGADIS 176 to active sensors or signal conditioning instru-
ments*

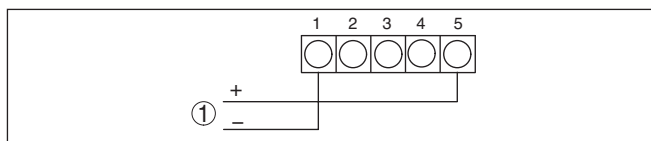*1   To the sensor*

**Active sensors or signal
conditioning instruments
with backlight**

*Fig. 10: Wiring plan VEGADIS 176 to active sensors or signal conditioning
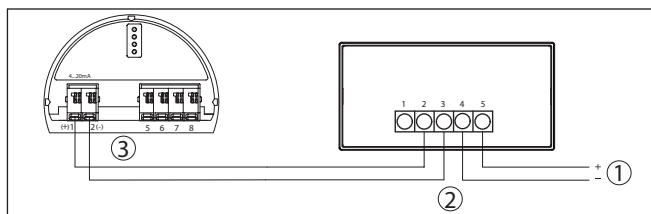instruments, with backlight*

1   To the sensor

5.4   Connection examples

**Connection to signal
circuit**

Fig. 11: Connection example VEGADIS 176, 4 … 20 mA sensor

1   Voltage supply
2   VEGADIS 176
3   Sensor

**Connection to signal con-
ditioning instruments**
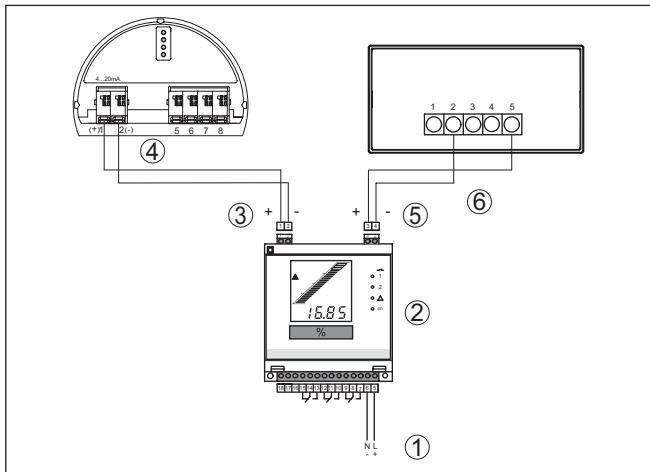
*Fig. 12: Connection of the VEGADIS 176 as external indication to signal condi-
tioning instrument or four-wire sensor*

1   Voltage supply
2   Signal conditioning instrument
3   Input, signal conditioning instrument (sensor circuit)
4   Sensor
5   Output, signal conditioning instrument (indicating circuit)
6   VEGADIS 176

5.5   Switch-on phase

After connecting the sensors to VEGADIS 176 and the voltage supply
or after voltage recovery, the instrument carries out a self-check for
approx. 10 s and then displays the following:

● All display segments
● Firmware version, e.g. 1.02.00
● Status message, e.g. S901

Then the actual measured value is displayed. You can find further
information on the display in chapter "*Parameter adjustment - Menu
Setup*".

6 Setup

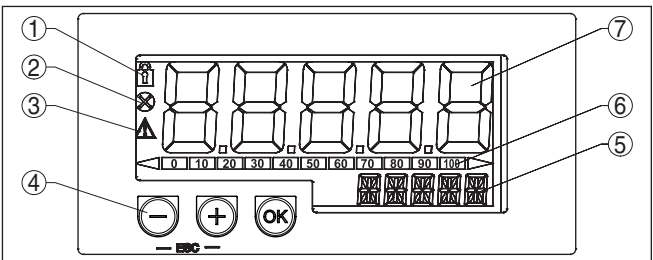## 6.1 Indication and adjustment

Display and adjustment elements

Fig. 13: Display and adjustment elements of VEGADIS 176

1 Symbol: adjustment menu locked
2 Symbol: error
3 Symbol: upper/lower range
4 Adjustment keys
5 14-segment display for unit/TAG
6 Bargraph with marks for lower and upper range
7 5-digit, 7-segment display for measured value

The adjustment is carried out via three buttons on the housing front.

Key	Function
(OK)	Adjustment key ● Invoke the adjustment menu ● Confirm selection ● Adjustment of parameters in the adjustment menu
(−) (+)	Plus/minus buttons ● Selection and adjustment/change of values in the adjustment menu ● Pushing "-" and "+" simultaneously will cause a reset to the nixt higher menu level without saving the adjusted value (ESC)

The device setup can be locked with a 4-digit user code. When the setup is locked, a lock symbol is displayed when invoking an adjustment parameter.

Adjustment system

The adjustment functions of the process indicator are ordered in the following menus. The individual parameters and settings are described in the following chapters "*Parameter adjustment*".

The 7-segment display can only display numbers, not alphanumeric characters. Hence, the procedure for entering numbers is different from that for text parameters.

Number parameters
If an adjustment position contains only numbers as a parameter, the adjustment position itself is shown in the 14-segment display and the

set parameter in the 7-segment display. Press the "*OK*" key to edit and then enter the user code.

Text parameters

If the adjustment position contains text parameters, at first only the adjustment position is displayed in the 14-segment display. After the "*OK*" key is pressed again, the set parameter is shown in the 14-segment display. To edit, press the "+" key and then enter the user code.

Return

A return is carried out:

- At the end of the individual menus and menu points, return to the next higher menu level by pressing "*Back*" and the "*OK*" key
- Pressing "-" and "+" simultaneously (see table above) brings the user to the next higher menu level, and so on up to the measured value indication
- 10 minutes after the last pressing of a key, the display automatically jumps back to measured value indication

In all cases, the EXPRT menu is again locked.

ℹ Note:
If the adjustment menu is locked by a user code, the individual menus and parameters can be displayed but not modified. To modify a parameter, the user code has to be entered.

Adjustment menu

The following table shows the menu structure:

Menu	Function	Description
SETUP	Setup	Fundamental device settings
DIAG	Diagnostics	Device information, indication of error messages
EXPRT	Expert	Expert settings for device setup. Editing in the menu Expert is protected by an access code (default 0000).

6.2 Parameter adjustment - Menu Setup

Setup - DECIM

In this menu item you specify the number of decimal places for the indication.

Value range: 0 DEC, 1 DEC, 2 DEC, 3 DEC, 4 DEC

Setup - SC__4

In this menu item you specify the 5-digit number value (number of decimal places as set under DECIM) for the scaling of the measured value at 4 mA.

Example: SC__4 = 0.0 means display 0.0 with measurement current 4 mA. The unit selected under UNIT is used in the display.

Value range: -19 999 … 99 999

Setup - SC__20

In this menu item you specify the 5-digit number value (number of decimal places as set under DECIM) for the scaling of the measured value at 20 mA.

Example: SC__20 = 100.0 means display 100.0 with measurement current 20 mA. The unit selected under UNIT is used in the display.

Value range: -19 999 … 99 999

Setup - UNIT

In this menu item you select the unit for the display. By setting "*USER*", a user-defined unit can be entered in parameter "*TEXT*".

Value range: %, °C, °F, K, USER

Setup - TEXT

By setting "*USER*" in "*UNIT*", a user-defined unit can be entered.

Value range: Free text, 5 characters

6.3 Parameter adjustment - Menu Diagnosis

Diagnosis - AERR

In this menu item, actually occurring diagnostic messages (Actual Error) are displayed. If several messages occur at the same time, the message with the highest priority is displayed.

Diagnosis - LERR

In this menu item, the last diagnostic message (Last Error) with the highest priority is displayed.

Diagnosis - FWVER

In this menu item, the firmware version is displayed.

6.4 Parameter adjustment - Menu Expert

The menu Expert also contains, in addition to all menu items from the menu Setup, the submenus and menu items described here. When the Expert menu is invoked, the user code is requested (UCODE, Default: 0000).

SYSTM - UCODE

Instrument setup can be protected against unauthorized modification by means of the user code. If setup is locked, the lock symbol is displayed when an adjustment parameter is invoked. With default setting "*0000*", the user code is not active, i.e. parameters in the setup can be modified without entering the code. To gain access to the Expert menu, the code always has to be entered, even when the default settings are active.

Value range: 0000 … 9999

SYSTM - FRSET

Resetting the instrument setup to default values.

By selecting "YES" and confirming with the "*OK*" key, the instrument is reset.

Value range: YES, NO

The following table shows the default values after a reset:

Menu	Submenu	Menu item	Default values
SETUP	-	DECIM	1 DEC
	-	SC__4	0.0
	-	SC__20	100.0
	-	UNIT	%
	-	TEXT	-
EXPRT	SYSTM	UCODE	0000
		FRSET	NO
	INPUT	DECIM	1 DEC
		SC__4	0.0
		SC__20	100.0
		UNIT	%
		TEXT	-
		CURVE	LINAR
		NAMUR	YES
		RNGLO	03.80
		RNGHI	20.00
		OFFST	0.0

INPUT-CURVE

Selection of the linearization curve for the measurement current. With this parameter the instrument can be adapted to a linear or square measurement signal.

Value range: LINAR, SQRT

INPUT-NAMUR

Specification of the error limits according to standard NAMUR NE 43

Value range: YES, NO

INPUT-RNGLO

Lower range limit. If the measured current falls below this limit, an error message is outputted.

Only visible with NAMUR = NO

Value range: 00.00 … 99.99

INPUT-RNGHI

Upper range limit. If the measured current exceeds this limit, an error message is outputted.

Only visible with NAMUR = NO

Value range: 00.00 … 99.99

INPUT-OFFST

Entering an offset value for indication of the measured value.

Value range: --19999 … 99999

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7   Maintenance and fault rectification

7.1   Maintenance

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

7.2   Rectify faults

Causes of malfunction

VEGADIS 176 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

● Sensor
● Process
● Voltage supply
● Signal processing

Fault rectification

The first measure to be taken is to check the sensor output signal according to the operating instructions of the respective sensor. In many cases, the causes can be determined and faults can be quickly rectified.

Check the 4 … 20 mA signal

Error code	Reason	Rectification
4 … 20 mA signal missing	Wrong connection to voltage supply	Check and correct, if necessary, according to chapter "*Wiring plan*"
	No power supply	Check cables for breaks; repair if necessary
	Operating voltage too low or load resistance too high	Check, adapt if necessary

Error limits - NAMUR NE 43

The instrument can be adjusted to error limits according to NAMUR NE 43. If one of these values is violated, then the instrument displays a diagnosis code.

Error limit with current value I	Error	Diagnosic code
I ≤ 3.6 mA	Lower range	F100
3.6 mA < I ≤ 3.8 mA	Unpermitted measured value	S901
20.5 mA ≤ I < 21.0 mA	Unpermitted measured value	S902
I > 21 mA	Upper range	F100

Sensor diagnosis

The instrument is equipped with diagnostic functions for the sensor. If an error is detected, the instrument displays a diagnostic code.

Diagnosic code	Short text	Rectification measure
F100	Sensor error	● Check electrical wiring ● Check sensor ● Check sensor parameter adjustment
S901	Input signal too low	● Check sensor output for defects and deviation from normal character-istics
S902	Input signal too large	● Check sensor parameter adjustment

Electronics diagnosis

The instrument has diagnostic functions for its own electronics. If an error is detected, a diagnostic message is displayed.

Diagnosic code	Short text	Rectification measure
F261	Electronics mod-ule	Replace electronics
F283	Memory content	● Restart instrument ● Carry out device reset ● Replace electronics
F431	Factory calibration	Replace electronics

Configuration diagnosis

Diagnosic code	Short text	Rectification measure
M561	Display exceeded	Check scaling

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 manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

7.3   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: www.vega.com.

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

If a repair is necessary, please proceed as follows:

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

8 Dismount

8.1 Dismounting steps

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

8.2 Disposal

The display and adjustment module consists of materials which can recycled by specialised recycling companies. We have purposely designed the components to be easily separable.

WEEE directive 2002/96/EG
This display and adjustment module is not subject to the WEEE directive 2002/96/EG and the respective national laws (in Germany, e.g. ElektroG). Pass the display and adjustment module directly on to a specialised recycling company and do not use the municipal collecting points. These may only be used for privately used products according to the WEEE directive.

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

Materials: see chapter "*Technical data*"

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

9   Supplement

9.1   Technical data

Note for approved instruments

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

General data

Materials	
– Housing front	Aluminium
– Housing	Sheet steel, galvanized
– Rear of the housing	Polycarbonate PC
Installation position	Horizontally
Weight approx.	0.115 kg (0.254 lbs)

Ambient conditions

Ambient temperature	
– Function range	-40 … +60 °C (-40 … +140 °F)
– Read area	-25 … +60 °C (-13 … +140 °F)
Storage and transport temperature	-40 … +85 °C (-13 … +185 °F)
Climatic class	Class B 2 according to EN 60654-1
Altitude	up to 5,000 m (16,400 ft) above sea level acc. to IEC 61010

Electromechanical data

Terminals for wire cross-section up to	
– solid, flexible	1.5 mm² (AWG 16)
– Braid with end sleeve and plastic sleeve	0.5 mm² (AWG 21)

Display and adjustment elements

Indication	LC display, 5-digit
Height of figures	17 mm (0.67 in)
Indication range	-19999 up to +99999
Adjustment elements	3 keys (-/+/OK)

Signal and supply circuit

Type	4 … 20 mA circuit
Power limitation	SELV/Class 2
Operating voltage max.	30 V DC
Voltage drop with current value 4 … 20 mA	
– Without lighting max.	1.0 V
– With lighting max.	additional 2.9 V

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Current range	3.6 … 22 mA
Overcurrent resistance	200 mA (fuse protection, supply side)
HART signal	Not influenced (HART-transparent)
Reverse voltage protection	Available
Functional safety	SIL non-reactive

Deviation

Deviation[1]	< 0.1 %
Signal resolution	> 13 bit
Influence of the ambient temperature[2]	< 0.02 %/1 K (0.01 %/1 °F)
Reference temperature	25 °C ±5 °C (77 °C ±9 °C)
Start-up time	10 min.

Electrical protective measures

Protection rating	
− Front side	IP 65
− Rear side	IP 20
Protection class	III
Overvoltage category	II, pollution degree 2

Approvals

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

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

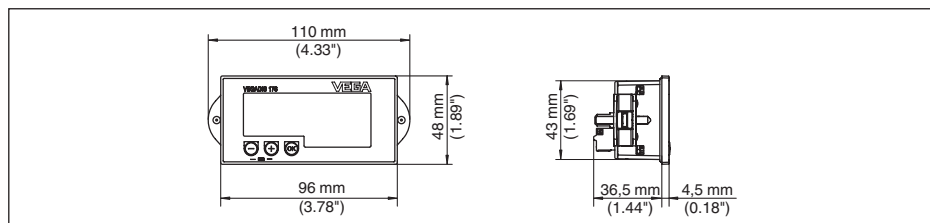## 9.2 Dimensions

VEGADIS 176

Fig. 17: VEGADIS 176

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[1] Relating to the measuring range.
[2] Relating to the measuring range.

9.3   Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

Only in U.S.A.: Further information see patent label at the sensor housing.

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