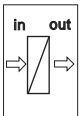


Operating Instructions VEGAMET 381



Contents

1	About this document	4
1.1	Function	4
1.2	Target group	4
1.3	Symbolism used	4
2	For your safety	6
2.1	Authorised personnel	6
2.2	Appropriate use	6
2.3	Warning about misuse	6
2.4	General safety instructions	6
2.5	CE conformity	7
2.6	Environmentally responsible behaviour	7
3	Product description	8
3.1	Configuration	8
3.2	Principle of operation	8
3.3	Adjustment	8
3.4	Storage and transport	9
4	Mounting	10
4.1	Mounting procedure	10

5	Connecting to power supply	12
5.1	Sensor connection	12
5.2	Terminal assignment.....	13
6	Set-up	14
6.1	Adjustment system	14
6.2	Adjustment	16
6.3	Adjustment	22
6.4	Reset	25
7	Diagnostics	26
7.1	Simulation	26
7.2	Fault messages	26
6	Dismounting	28
6.1	Dismounting procedure	28
6.2	Disposal	28
	Supplement	29
	Technical data	29
	Dimensions.....	31

1 About this document

1.1 Function

This operating instructions manual gives you all the information you need for quick set-up and safe operation of VEGAMET 381. Please read this manual before you start set-up.

1.2 Target group

This operating instructions manual is directed to trained specialist staff. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note



This symbol indicates helpful additional information.

Caution



This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.

Ex applications



This symbol indicates special instructions for Ex applications.

- **List**

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

- **Action**

This arrow indicates a single action.

- 1 **Sequence**

Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must only be carried out by trained and authorised personnel. For safety and warranty reasons, any internal work on the instruments must only be carried out by VEGA personnel.

2.2 Appropriate use

VEGAMET 381 is a digital signal conditioning instrument with integrated level switches and current output for panel, surface or rail mounting with LC display for digital and quasianalogue demonstration.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overflow or damage to system parts through incorrect mounting or setting.



2.4 General safety instructions

VEGAMET 381 is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

2.5 CE conformity

VEGAMET 381 is in CE conformity with EMC (89/336/EWG) and NSR (73/23/EWG). Conformity has been judged acc. to the following standards:

- EMC
 - Emission EN 50081-1: 1992
 - Susceptibility EN 50082-2: 1995
- NSR EN 61010-1: 1993.

2.6 Environmentally responsible behaviour

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

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

- Chapter 3.4 Storage and transport
- Chapter 6.2 Disposal.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAMET 381 indicating and signal conditioning instrument
- mounting set
- documentation
 - this operating instructions manual.

3.2 Principle of operation

VEGAMET 381 is a single signal conditioning instrument with integrated level switches and display for continuously measuring instruments. It is also used as signal conditioning instrument and power supply unit for 4 ... 20 mA sensors. The instrument is suitable for panel as well as surface mounting.

Any sensor delivering a 4 ... 20 mA signal can be connected to the measuring circuit of VEGAMET 381.

3.3 Adjustment

Adjustment is carried out via the integrated keys and a 16-step rotary switch.

3.4 Storage and transport

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test acc. to DIN 55439.

The packaging consists of environmental-friendly, recyclable cardboard. Dispose of the packing material via specialised recycling companies.

Storage and transport temperature

- Storage and transport temperature -40 ... +80°C
- Relative humidity 20 ... 85 %.

4 Mounting

4.1 Mounting procedure

VEGAMET 381 indicating instrument can be either mounted directly to the wall (by means of three screws), plugged on carrier rail 35 x 7.5 acc. to DIN EN 50 022 or lowered into a front panel.

Carrier rail mounting

- Place the adapter plate (A) to the rear of VEGAMET 381 (spring of the adapter plate to the bottom) and tighten the plate with screw B (M4 x 6).
- Place VEGAMET 381 from the bottom to the carrier rail (C) and push the instrument to the top until it snaps in.

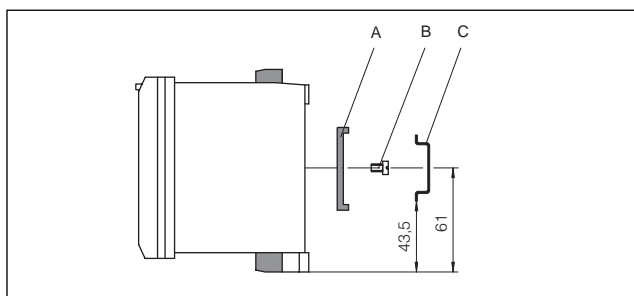


Fig. 1:
Carrier rail mounting

Wall mounting

- Insert the metal sleeve (D) from top into the housing cut-out.
- Fasten the instrument with three screws (\varnothing max. 4 mm) directly to the wall.

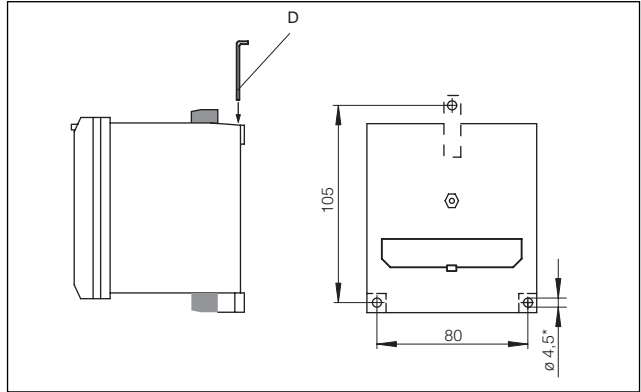


Fig. 2:
Wall mounting

Front panel mounting

- Remove the two pluggable terminal boards (F) and terminal board (K) to the top.
- Screw the pin (H) to the rear of VEGAMET 381 and tighten with a screwdriver.
- Insert VEGAMET 381 from the front into the front panel (E).
- Push the terminal strap (G) from the back to the pin (H) and pull it with the knurled nut (I) against the front panel (E).

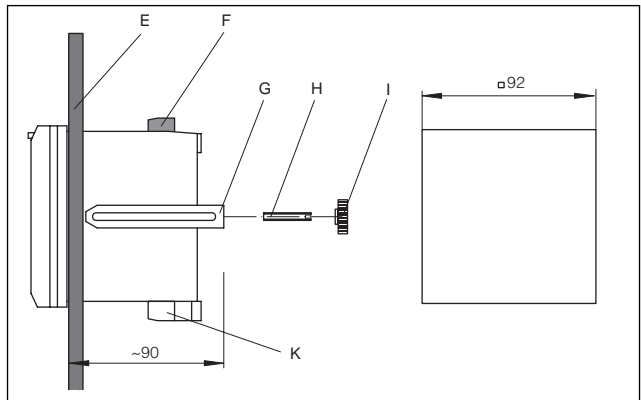


Fig. 3:
Panel mounting

5 Connecting to power supply

5.1 Sensor connection

Note

Switch off power supply before starting connection work.

Active operation

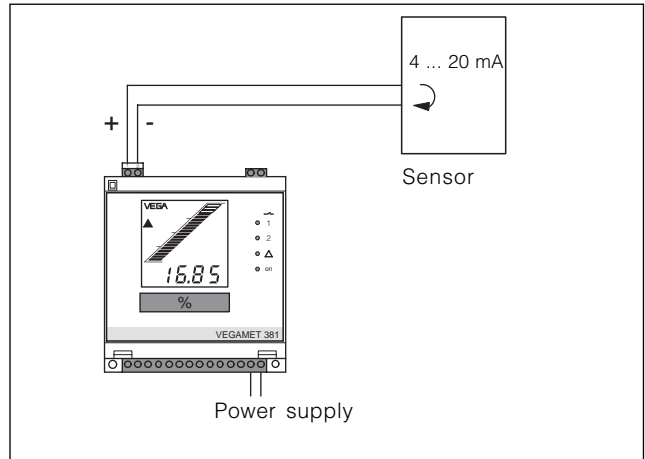


Fig. 4:
Active operation (I_a)¹⁾

Passive operation

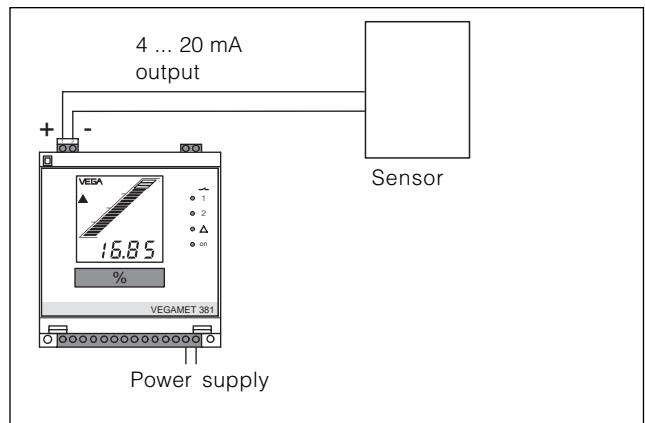


Fig. 5:
Passive operation (I_p)¹⁾

¹⁾ Active or passive operation selectable. See "Adjustment"

5.2 Terminal assignment

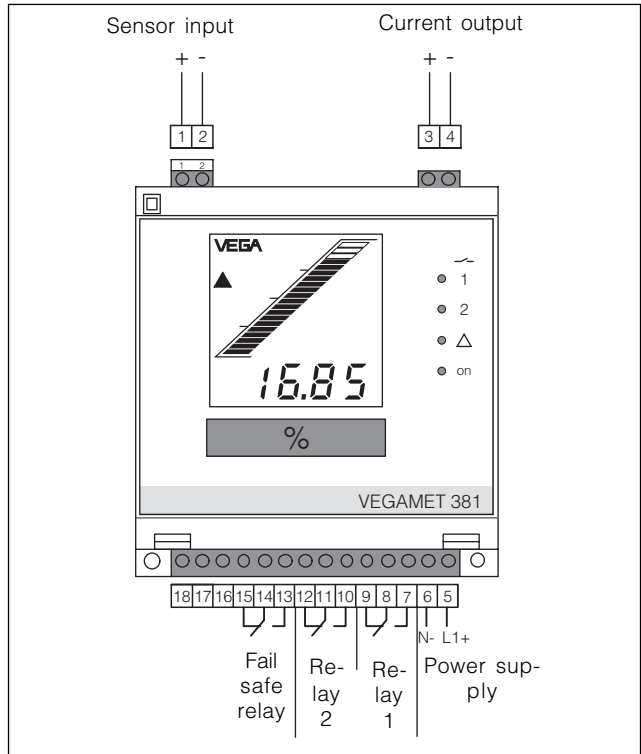


Fig. 6:
Terminal assignment

When switching on power supply, the software version of VEGAMET 381 is displayed for approx. 7 seconds.

6 Set-up

6.1 Adjustment system

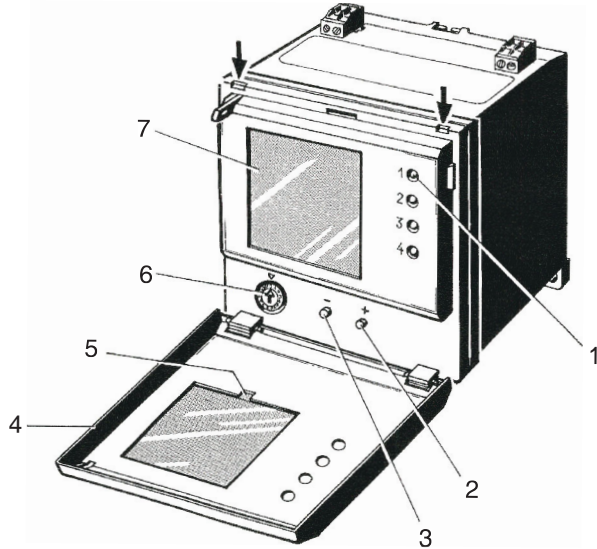


Fig. 7

- 1 Control lamps:
 1 - LED (yellow) Level relay 1
 2 - LED (yellow) Level relay 2
 ⚠ - LED (red) Fail safe relay
 on - LED (green) Power supply
- 2 Plus key
 3 Minus key
 4 Protective cover
 5 Shackle
 6 Rotary switch
 7 Digital indication

The figures in brackets relate to the information in illustration 7.

To open the protective cover (4), insert a screwdriver into the two slots marked with arrows.

Turn the screwdriver by a quarter turn and the protective cover (4) opens.

To protect the instrument against unauthorized adjustment, the protective cover (4) of VEGAMET 381 can be sealed. Insert the seal wire with closed cover in the top left corner through the hole of the lug.

Designation:

In practice it has proven to mark VEGAMET. Information on the appropriate measurement loop and the respective unit of the indicated value help to avoid failures and misunderstandings. On the housing, a shackle (5) is provided for designation. Here you can insert one of the supplied labels.

Rotary switch (6)

- 0 - OPERATE/Simulation = Indication of the measured value/Simulation
- 1 - Relay 1 on = Relay 1 on
- 2 - Relay 1 off = Relay 1 off
- 3 - Relay 2 on = Relay 2 on
- 4 - Relay 2 off = Relay 2 off
- 5 - Decimal point = Decimal point
- 6 - Display max = Scaled indication at 100 %
- 7 - Display min = Scaled indication at 0 %
- 8 - Out 0 ... 20 mA,
Out 4 ... 20 mA = Current output
- 9 - t_i = Integration time
- A - Offset correction = Offset correction
- B - Live adjustment min. (% adjustable)
- C - Live adjustment max. (% adjustable)
- D - Dry adjustment min. (mA)
- E - Dry adjustment max. (mA)
- F - IN active/passive current input

With the rotary switch (16 steps) you select the appropriate function. To move to **Simulation**, you have to push the plus and minus key simultaneously for approx. 3 seconds in rotary switch position 0 (Operate).

If you are in the simulation mode, the „VEGA“ logo on the display **flashes**. To switch off the simulation mode, you have to push again the two keys for approx. 3 seconds. If no key is pushed, the indication resets automatically to „OPERATE“ after approx. 60 minutes.

Plus/Minus keys (2 and 3)

With these two key you modify the value of the digital indication. If you hold the key pushed, the digital indication changes its value with raising speed. Save the value by pushing both keys simultaneously. This display indicates briefly „Save“.

6.2 Adjustment

When switching on power supply, the LEDs of the relays light briefly and the display indicates for approx. 7 seconds the software version of VEGAMET 381.

The numbers in brackets relate to figure 7 under 6.1 (Adjustment system).

Course

- Choose the requested mode with the rotary switch (6).
- Push one of the two keys (2 or 3). The digital indication (7) begins to flash.
- Push one of the two keys to change the value of the digital indication appropriately. If the rotary switch (6) is set to „OPERATE“, the keys (2 and 3) are without function.

Save the value by pushing both keys simultaneously.

Example

- an upright cylindrical (linear) vessel with a content of 2700 l.
- the max. volume is 2650 l, the min. volume 50 l.
- the level sensor in the vessel is a pressure transmitter (passive) providing a standardized 4 ... 20 mA signal.
- for further processing you need an additional 4 ... 20 mA output signal.
- the full and empty adjustment was carried out correctly. The sensor delivers the following values:
Max. volume (display max.)
20 mA = 2650 l
Min. level (display min.)
4 mA = 50 l
- relay 1 should switch on an emptying pump at a volume of 90 % and switch off the pump at a volume of 10 %.

Choose the parameters of your application:

IN active/Passive current input (F)

Set the input type:

In-A = active current input (I_a)

In-P = passive current input (I_p)

For the given example choose In-A (active current input).

Save the value by pushing both keys simultaneously.

Current output

- Set the rotary switch (6) to position 8. With the keys (2 and 3) you can choose between measured value output 4 ... 20 mA or 0 ... 20 mA.
For the given example choose 4 - 20.

The display indications have the following meaning:

0 - 20 = 0 ... 20 mA; 4 - 20 = 4 ... 20 mA

Save the value by pushing the two keys simultaneously.

The contents for 0 % and 100 % must be entered for scaling the indication in VEGAMET 381. The vessel must not be empty or full. Proceed as follows to enter the two values:

Decimal point

As the range of the example tank is from 50 l to 2650 l, you require all four positions of the digital indication.

- Set the rotary switch (6) to position 5 (Decimal Point).
- By pushing the keys (2 and 3) you move the decimal point.

Save the value by pushing the two keys simultaneously.

Scaled indication at 0 %

- Set the rotary switch (6) to position 7 (Display min.).
- Push the plus key (2) to increase the indicating value or the minus key (3) to reduce the indicating value.
- If you keep the key pushed, the digital indication (7) changes the indicating value quicker. For the given example, set the digital indication (7) to the value 50.

Save the value by pushing the two keys simultaneously.

Scaled indication at 100 %

- Set the rotary switch (6) to position 6 (Display max.).
- Push the plus key (2) to increase the indicating value or the mouse key (3) to reduce the indicating value.
- For the given example, set the digital indication (7) to the value 2650.

Save the value by pushing the two keys simultaneously.

Relay

- Set the rotary switch (6) to position 1 (relay 1 on). You can change the value of the indication with the keys (2 and 3). For the given example, set the digital indication (7) to the value 90.0 (90.0 %). Hence the internal relay 1 switches on when this value is reached. Save the value by pushing the two keys simultaneously.
- Set the rotary switch (6) to position 2 (relay 1 off). You can change the value of the indication with the keys (2 and 3). For the given example, set the digital indication (7) to the value 10.0 (10.0 %). Hence the internal relay 1 switches off when this value is decreased. The appropriate relay control lamp (1) lights when the relay is energised. If the switching points are too close together ($< 0.1\%$), the appropriate LED flashes. The relay takes the safe condition. In mode „Operate“ a fault signal is displayed.
- If you want to control further relays, proceed in the same way as for relay 1. The positions for adjustment of the appropriate relays are stated in the list of the rotary switch (6) under Adjustment.

Note

If you want to change the mode (i.e. the switching function of the relays) you have to exchange the on and off values (see fig. 4.2)

- Mode A (overflow protection)

Switching on point < Switching off point

If you adjust e.g. mode A (overflow protection) for relay 1, you have to enter with position 1 (relay 1 on) of the rotary switch (6) the lowest value and with position 2 (relay 1 off) the higher value.

Hence relay 1 is switched off when the max. level is reached (deenergised condition) and switched on when min. level is reached.

- Mode B (dry run protection)

Switching on point > Switching off point

If you adjust mode B (dry run protection) for relay 1, you have to enter with position 1 (relay 1 on) of the rotary switch (6) the higher value and with position 2 (relay 1 off) the lower value. Hence relay 1 is switched on when the max. level is reached and switched off when min. level is reached (deenergised condition).

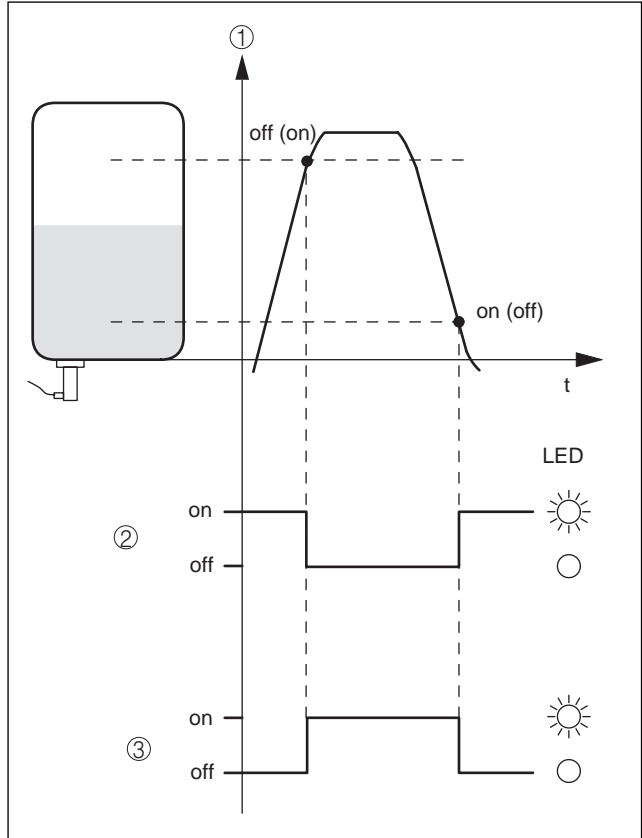


Fig. 7:

- 1 Level
- 2 Mode A
- 3 Mode B

Integration time

- If you want to adjust an integration time (reaction delay), set the rotary switch (6) to position 9.
- With the keys (2 and 3) you can save the value of the indication (0 to 250 seconds).

Save the value by pushing the keys simultaneously.

6.3 Adjustment

You can carry out the adjustment with medium or without. To carry out an adjustment with medium, it is necessary that you know the percentage values of the actual filling.

Adjustment with medium

In this case you have to enter the percentage values for min. and max. corresponding to the actual filling. It is not important if you first enter the min. or the max. value. If you know e.g. that the filling is actually 80 %, enter the value „80.0“ in rotary switch position C. If the filling is then e.g. 10 %, you have to enter the value „10.0“ in rotary switch position B.

The higher the difference between the two adjustment points, the more precise the measurement over the complete curve. Ideal would be the adjustment at 0 % and 100 %. For practical reasons it is not always possible to completely empty or fill a vessel. However, the difference between the two adjustment points should be at least 10 % of the sensor range.

Adjustment without medium

For this adjustment you have to enter two sensor current values (4 ... 20 mA) corresponding to the 0 % and 100 % levels.

Adjustment example

You know the sensor data, i.e. that the sensor delivery a current of 4.2 mA at 0 % filling and a current of 15.5 mA at 100 % filling. Enter these values in the rotary switch positions E and D.

Enter „15.5“ (100 % value) in position E. Enter „4.2“ (0 % value) in position D.

Offset correction

By default, pressure transmitters are adjusted in a certain position. If the transmitter is installed in another position, the measuring range will be shifted.

- Make sure that the sensor is unpressurised.
- To make an offset correction, set rotary switch (6) to position A (Offset correction). Now the display indicates the actual sensor current in mA.
- Push the plus and minus keys (2 and 3) simultaneously. The measuring range does not change, but is shifted completely.
- Save the value by pushing the two keys simultaneously. All entered values are transferred and saved in an EEPROM memory. They remain there even in case of a voltage loss.

Sensor input

You can switch over between active and passive sensor input.

- In-A - Active operation: The sensor is powered by VEGAMET 381. Sensors connected in this configuration are called passive sensors. VEGAMET 381 acts like a current source.
- In-P - Passive operation: VEGAMET 381 is connected to the sensor cable (current input 4 ... 20 mA). Sensors connected in this configuration are called active sensors. VEGAMET 381 acts like a consumer.

6.4 Reset

A reset can be made on VEGAMET 381. All adjusted values are then reset to default.

- Interrupt the power supply of VEGAMET 381.
- Push the plug and minus keys (2 and 3) simultaneously and hold them pushed. Switch on the power supply. The display shows „-RES-“. The instrument carries out a reset.

VEGAMET 381 has the following reset default values.

Reset default values

- Relay switching on points 10.0 %
- Relay switching off points 100.0 %
- Display min. 0
- Display max. 1000
- Decimal point 888.8
- Integration time 0 s
- Offset correction 0 μ A
- Current output 4 ... 20 mA
- Min. adjustment 0 % = 4 mA
- Max. adjustment 100 % = 20 mA
- Sensor input I_{active}

7 Diagnostics

7.1 Simulation

The numbers in brackets relate to illustration 7 under „6.1 Adjustment system“.

- Set the rotary switch (6) to position 0 „OPERATE“.
- Now keep the two keys (2 and 3) pushed for approx. 3 seconds. The actual measured value is taken over and flashes. The simulation is immediately active.
- With the keys (2 and 3) you can change the value of the indication. You can set any value in the scaled range and test the function of the current output and the integrated output relay.
- To interrupt the simulation, you have to push the two keys simultaneously for approx. 3 secs. The simulation is automatically interrupted after 60 minutes.

7.2 Fault messages

The following fault messages can be displayed:

? E003

- Error during the self-test
→ Relays deenergise (safe condition), current output 22 mA. Carry out a reset (see 6.4 Reset). All adjusted values will be reset to default. If the error appears again, you have to return the instrument to our repair department.

? E014

- Short-circuit
→ Relays deenergise (safe condition), current output 22 mA. Sensor current > 21 mA. Check the terminals and the connection cable to the sensor.

- ? E015
 - Line break
 - Relays deenergise (safe condition), current output: 22 mA. Sensor current < 3.6 mA. Check the terminals and the connection cable to the sensor. Probably there is no sensor connected or the sensor input is set to I_{passive} and the connected sensor is a passive sensor.
- ? E016
 - Adjustment
 - Empty/full exchanged
- ? E017
 - Adjustment
 - Span too small ($\Delta < 300\mu\text{A}$)
- ? E021
 - Scaling, difference too small
 - Repeat the setting „6.2 Adjustment“. Increase the difference between the two indication values
- ? E110
 - Relay switching points, difference too small
 - The LEDs of the concerned relay are flashing. The concerned relay deenergised (safe condition). Repeat the setting „6.2 Adjustment“. Increase the difference between the two relay switching points.

6 Dismounting

6.1 Dismounting procedure

Take note of chapters 4 „Mounting“ and carry out the listed steps in reverse order.

6.2 Disposal

VEGAMET 381 consists of materials which can be recycled by specialised recycling companies. We have purposely designed the electronic modules to be easily separable. Mark the instrument as scrap and dispose of it according to government regulations (electronic scrap ordinance, etc. ...).

Materials: see technical data

If you cannot dispose of the instrument properly, please contact us concerning disposal methods or return.

Supplement

Technical data

General

Series	instrument for panel or wall mounting or rail mounting 35 x 7.5
Dimensions	W = 96 mm, H = 104 mm, D = 90 mm
Weight	approx. 400 g
Housing material	plastic ABS/POM
Terminal cross section	max. 2.5 mm ²

Ambient conditions

Permissible ambient temperature	-20°C ... +60°C
Storage and transport temperature	-40°C ... +85°C
Temperature error	0.01 %/K

Electrical protective measures

Protection class	II
Overvoltage category	II
Protection	
- wall or rail mounting	IP 20
- panel mounting	IP 40

Power supply

Power supply	20 ... 253 V AC/DC
Power consumption	7 VA

Sensor input 4 ... 20 mA active/passive (floating)

Resolution	0.01 % (16 μ A)
Linearity error	0.1 %
Transmission	analogue
Connection cable to the sensor	2-wire
I_{active}	
- sensor power supply	19.5 ... 15 V (range 4 ... 20 mA)
- short-circuit current limitation	approx. 30 mA
I_{passive}	
- internal resistance	< 250 Ohm (range 4 ... 20 mA)
Terminal voltage	
- at 4 mA	19.5 V
- at 20 mA	14.5 V
Adjustment range	
- empty adjustment	3.8 ... 20.2 A
- full adjustment	4.1 ... 20.5 mA
- min. adjustment difference	300 μ A

Current output 0/4 ... 20 mA (signal circuit, floating)

Resolution	0.1 % or 20 μ A (range 0/4 ... 20 mA)
max. load	500 Ω
Fault signal	22 mA
Linearity error	0.1 %
Temperature error	0.01 %/K

Relay output

Number of relays	2 level relay, 1 fail safe relay
Turn-on voltage	min. 10 mV max. 250 V AC, 250 V DC
Switching current	min. 10 μ A max. 3 A AC, 1 A DC
Breaking capacity	max. 54 W DC, 500 VA AC
Indicating of switching status	LED lights - relay energised LED of - relay deenergised

Digital indication

Zero point (0 %)	-9999 ... 9999
Final point (100 %)	-9999 ... 9999
Decimal point	individually selectable

Dimensions

