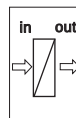
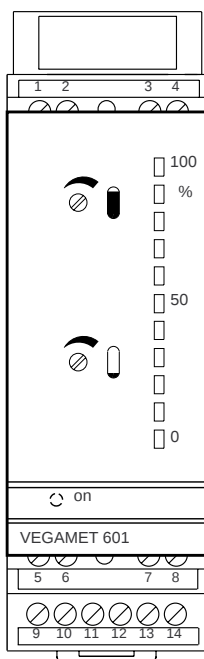


Operating Instructions

VEGAMET 601, 602



Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as prevailing safety regulations and accident prevention rules.

For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out only by qualified VEGA personnel.



Note Ex area

Please note the attached safety instructions containing important information on installation and operation in Ex areas.

These safety instructions are part of the operating instructions and come with the Ex approved instruments.

Contents

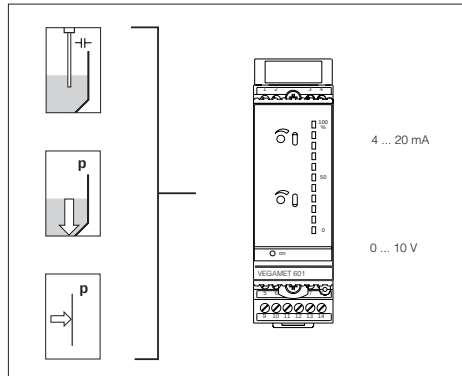
Safety information	2
Note Ex area	2
1 Product description	
1.1 Function and configuration	4
1.2 Approvals	4
1.3 Types and versions	5
1.4 Technical data	6
1.5 Dimensions	9
2 Mounting and installation instructions	10
3 Electrical connection	
3.1 Connection instructions	12
3.2 Connection instructions for approved applications	12
3.3 Wiring plans	13
4 Setup	
4.1 Indicating and adjustment elements	14
4.2 Setup sequence	15
4.3 Adjustment	15
5 Diagnostics	
5.1 Maintenance	18
5.2 Repair	18
5.3 Failure rectification	18

1 Product description

1.1 Function and configuration

VEGAMET 601 and 602 signal conditioning instruments are modular units with plug-in sockets suitable for carrier rail mounting (DIN 46 277). Together with the respective sensors they are used for continuous level measurement.

The evaluation results are made available as a current output 0/4 ... 20 mA and a voltage output 0 ... 10 V. The instruments are equipped with an adjustable integration time, and in addition VEGAMET 602 Ex has a fault monitoring.



VEGAMET...

Function

The measuring data of the sensor are outputted as level-proportional current and voltage signals. The adjustment (empty and full adjustment) can be done very easily via two potentiometers.

Fault monitoring on VEGAMET 602

The integrated fault monitoring on VEGAMET 602 detects shortcircuit and line break of the measuring cable. A failure LED lights in case of failure and a failure relay deenergises.

Configuration

To configure a measuring system, you need a VEGAMET ... signal conditioning instrument and a sensor with analogue transmission of measured values, e.g.

- capacitive electrodes or
- hydrostatic pressure transmitters or
- process pressure transmitters.

1.2 Approvals

If measuring systems are installed according to the following approvals, the respective official documents must be consulted and their regulations followed. The documents are supplied with the respective measuring system.

WHG approval

VEGAMET 602 Ex signal conditioning instrument together with capacitive electrodes or pressure transmitters as part of an overflow protection system acc. to WHG.

Ex approval

For measuring system in hazardous areas, certificate acc. to CENELEC.
VEGAMET 602 Ex signal conditioning instrument

CE approval

see "Technical data".

1.3 Types and versions

VEGAMET 601

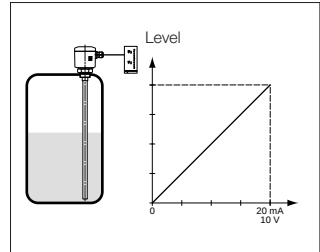
Signal conditioning instrument for continuous level or process pressure measurement

Adjustment via two potentiometers
with adjustable integration time

Input: 1 capacitive electrode or
1 hydrostatic pressure transmitter or
1 process pressure transmitter

Outputs: 1 current output 0/4 ... 20 mA
1 voltage output 0 ... 10 V

Application: level measurement, process pressure measurement



Continuous measurement VEGAMET 601

VEGAMET 602 Ex

Signal conditioning instrument for continuous level or process pressure measurement

Fault monitoring

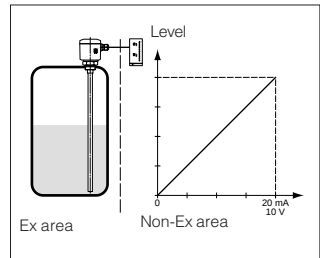
Adjustment via two potentiometers
with adjustable integration time

Input: 1 capacitive electrode or
1 hydrostatic pressure transmitter or
1 process pressure transmitter

Outputs: 1 current output 0/4 ... 20 mA
1 voltage output 0 ... 10 V
1 fail-safe relay

Approvals: [EEx ia] IIC, [EEx ia] IIB,
as part of an overfill protection system acc.
to WHG

Application: level measurement, process pressure measurement



Continuous measurement VEGAMET 602 Ex

1.4 Technical data

General data

Power supply

Operating voltage	20 ... 250 V AC, 50/60 Hz 20 ... 72 V DC emergency power supply with curve shape extremely deviating from sine: $U_{max.} = 125$ V AC (rectangle)
Power consumption	max. 3 W (3 ... 18 VA)
Fuse	T 1 A, 250 V

Meas. data input

Number	1 current input
Type of input	active two-wire input analogue (sensor powered by signal conditioning instrument)
Range	4 ... 20 mA
Sensor	capacitive electrodes hydrostatic pressure transmitters process pressure transmitters
Sensor power supply	
- VEGAMET 601	24 V DC
- VEGAMET 602 Ex	approx. 15 ... 18 V DC
Current limitation	at 24 mA, permanently shortcircuit proof
Connection cable	2-wire (standard cable)
Resistance per conductor	
- VEGAMET 601	max. 250 Ohm
- VEGAMET 602 Ex	max. 35 Ohm

Electrical connection

Screw terminals	max. 1.5 mm ²
-----------------	--------------------------

Electrical protective measures

Protection	
- instrument	IP 30
- plug-in socket	IP 20
Protection class	II
Overvoltage category	II

Mechanical data

Series	module unit with plug-in socket, incl. transparent cover, cover for the special terminals, coded pin, two bonding jumpers
Mounting	carrier rail mounting acc. to DIN 46 277, Bl. 3
Dimensions unassembled	W = 36 mm, H = 118.5 mm, D = 134 mm
Weight	approx. 170 g

Ambient conditions

Permissible ambient temperature	-20°C ... +60°C
Storage and transport temperature	-40°C ... +70°C

Current output

Number	1 output
Function	analogue output of the evaluated data
Range	0/4 ... 20 mA
Load	max. 500 Ohm
Resolution	0.05 % of range
Linearity error	0.05 % of range
Temperature error	0.08 %/10 K of range

Voltage output

Number	1 output
Function	analogue output of the evaluated data
Range	0 ... 10 V
Current	max. 1 mA
Resolution	0.05 % of range
Linearity error	0.05 % of range
Temperature error	0.08 %/10 K of range

Relay output (only with VEGAMET 602)

Number	1 output
Contact	1 floating spdt each AgNi and hard gold plated
Turn-on voltage	min. 10 mV DC max. 250 V AC, 60 V DC
Switching current	min. 10 µA DC max. 3 A AC, 1 A DC
Breaking capacitance	max. 500 VA, 54 W

Indicating elements

LED in front plate	green on: operating voltage on red: fault signal (only on VEGAMET 602)
Analogue indication	11 segments, 0 % ... 100 %

Functions

Integration time	0 ... 20 sec.
Adjustable current output	0 ... 20 mA/4 ... 20 mA

Adjustment elements

On front plate	two potentiometers for adjustment of the empty and full adjustment
On top, laterally	DIL switch - adjustment of the current output 0 ... 20 mA/4 ... 20 mA - integration time

Electrical separation measures

Reliable separation acc. to VDE 0106, part 1 between the potentials	
- reference voltage	250 V
- isolation resistance	3 kV
Potentials VEGAMET 601	
- potential 1	supply voltage
- potential 2	
(common minus potenial)	meas. data input (sensor connection), current output, voltage output
Potential VEGAMET 602	
- potential 1	supply voltage
- potential 2	meas. data input (sensor connection)
- potential 3	
(common minus potenial)	current output, voltage
- potential 4	fail-safe relays, contacts

CE conformity

VEGAMET signal conditioning instruments meet the protective regulations of EMC (89/336/EWG) and NSR (73/23/EWG). Conformity has been judged acc. to the following standards:	
EMC Emission	EN 50 081 - 1: 1992
Susceptibility	EN 50 082 - 2: 1995
NSR	EN 61 010 - 1: 1993

Ex technical data

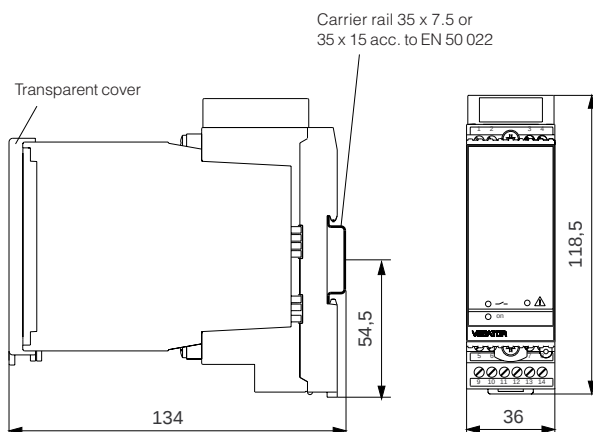
Meas. data input (intrinsically safe signal circuit)

Classification	[EEx ia] IIC or [EEx ia] IIB					
Max. values						
- voltage	U _o - 20 V					
- current	I _o - 125 mA					
- power	P _o - 624 mW					
Characteristics	linear					
Effective inner inductance L _i	negligible					
Effective inner capacitance C _i	negligible					

	EEx ia IIC			EEx ia IIB	EEx ib IIC	EEx ib IIB
Max. permissible outer inductance L _o (mH)	0.5	1	1.5	2	2	9
Max. permissible outer capacitance C _o (nF)	97	78	68	486	200	1000

The intrinsically safe circuits are reliably separated from the non intrinsically safe circuits up to a peak voltage of 375 V.
The max. voltage on the non intrinsically safe circuits should not exceed 250 V_{eff} in case of failure.

1.5 Dimensions



2 Mounting and installation instructions

Mounting

Each series 600 signal conditioning instrument consists of a plug-in socket for carrier rail mounting DIN 46 277 and a module unit.

The supply voltage can be connected to terminals 9 and 10.

For neighbouring series 600 signal conditioning instruments it is possible to continue the connection L1 and N directly via the supplied plug-in jumpers.

The same is valid for the connection of VEGAMET voltage output 0 ... 10 V to VEGASEL voltage input 0 ... 10 V, terminals 7 and 8).

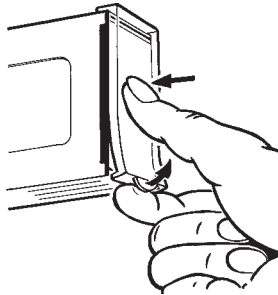
Note!

It is not allowed to use the jumpers for single instruments or at the respective end of an instrument row. If this instruction is not observed, there is the danger of contacting the operating voltage or causing a short-circuit.

As a rule, the signal conditioning instrument must be mounted outside the hazardous area or special Ex protective measures must be taken.

Transparent cover

To protect the instrument against unauthorised or inadvertent use, the front plate of VEGAMET can be provided with a sealable transparent cover after setup. To remove the transparent cover see the following figure.



Coding

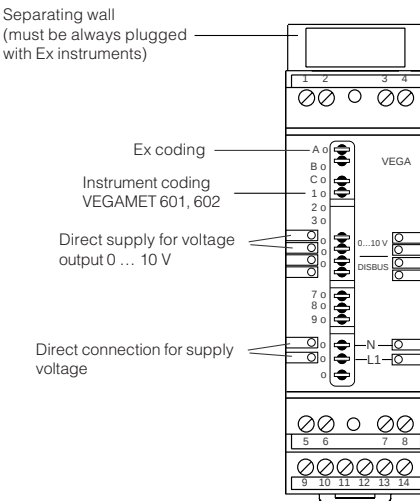
To avoid mixing up the various signal conditioning instruments, the plug-in socket is provided with pins and the signal conditioning instrument with appropriate gaps (mechanical coding).

Instrument coding ensures (with differently positioned coded pins) that the various signal conditioning instruments are not inadvertently swapped.

An Ex coding with fixed coded pin ensures that non-Ex and Ex instruments are not interchanged.

The coding is part of the explosion protection: on VEGAMET 602 Ex the supplied coded pins (instrument coded pin and Ex coded pin) must be inserted by the operator acc. to the table below.

	Instrument coding	Ex coding
VEGAMET 601	1	—
VEGAMET 602 Ex	1	A



3 Electrical connection

3.1 Connection instructions

The following wiring plans are valid for standard as well as Ex versions of the signal conditioning instruments. Please observe the following instructions:

- the relay contact of VEGAMET 602 Ex is shown in a de-energised condition
- if strong electromagnetic interferences are expected, we recommend the use of screened signal cables
- the screening must be earthed only on one side (sensor side)
- in case of overvoltages, we recommend the use of VEGA overvoltage arresters
- the connection must be made acc. to the respective national installation standards (e.g. in Germany acc. to the VDE regulations).

3.2 Connection instructions for approved applications



The following applications require the use of certified instruments:

- in hazardous areas (if necessary, observe special national regulations)
- as part of an overfill protection system acc. to WHG
- in the shipbuilding industry
- in pressurised vessels.

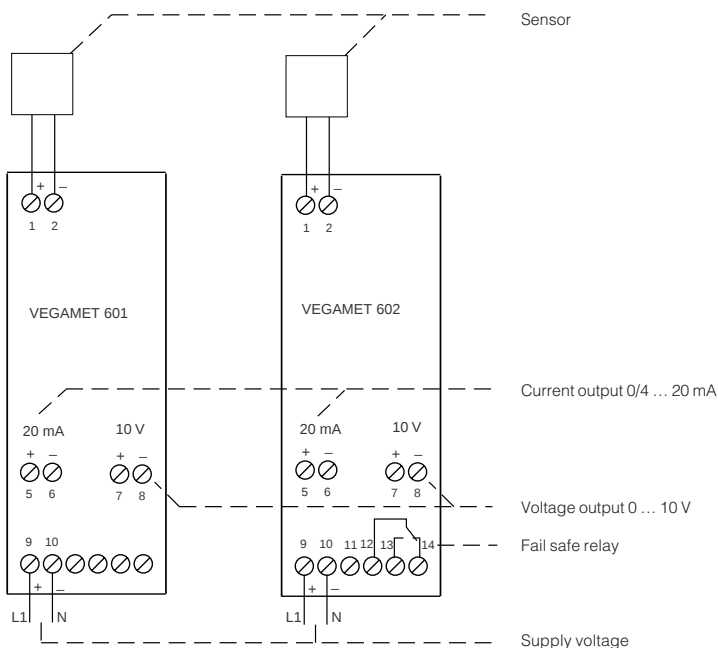
For these applications, the respective official documents (test reports, test certificates, general type approval, type approval certificate and conformity certificates) as well as the valid installation and operating regulations must be noted. The official documents are supplied with the respective instrument.

In Ex applications, the voltage supply of the sensor must only be made via an intrinsically safe circuit. These are the possibilities:

- VEGAMET series 600 signal conditioning instrument in Ex version
- not certified VEGAMET series 600 signal conditioning instrument with VEGA safety barrier type 145

The official documents of these additional instruments must also be noted.

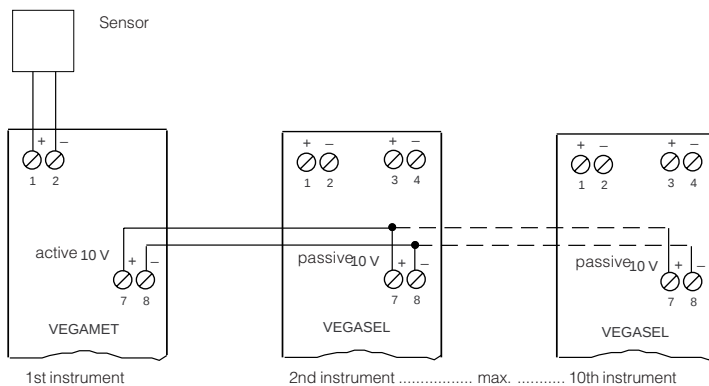
3.3 Wiring plans



Extension example

1st instrument = VEGAMET 601 or 602

2nd up to max. 10th instrument = VEGASEL 643, each wired to the passive voltage input (parallel connection)

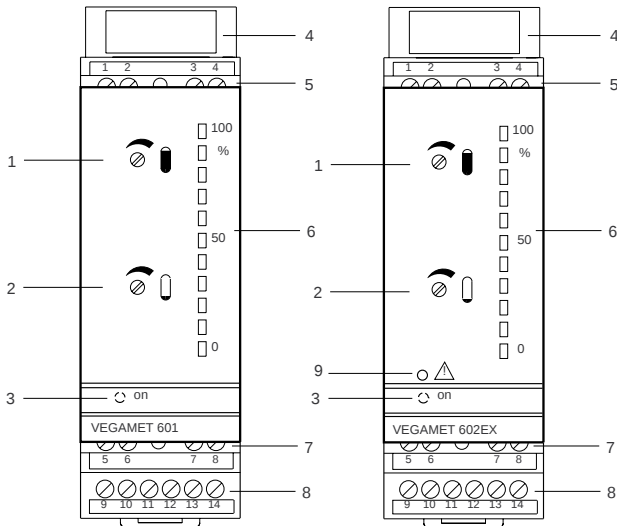


Acc. to the above extension example, it is possible to control several signal conditioning instruments with one sensor and to detect different levels.

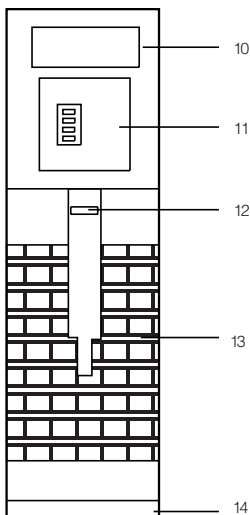
Each configuration of this kind can be extended each up to 10 instruments.

4 Setup

4.1 Indicating and adjustment elements



Top view



- 1 Potentiometer full adjustment
- 2 Potentiometer empty adjustment
- 3 LED supply voltage
- 4 Separating wall
- 5 Terminals input
- 6 Analogue display with 11 segments 0 % ... 100 %
- 7 Terminals outputs
- 8 Terminals supply voltage
- 9 LED fault signal
- 10 Bar code, serial number
- 11 DIL switch block
- 12 Screws
- 13 Ventilation opening
- 14 Transparent cover

Potentiometer

With the potentiometers (1 and 2) you can carry out the max. and min. adjustment.

Control lamps

Green (3)

- supply voltage available
- ready for operation

Red (9)

- failure indication

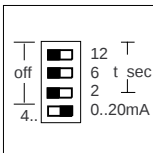
Analogue display (6)

Indication of the actual level relating to the adjustment 0 % ... 100 %. Resolution in 11 segments.

DIL switch (11)

On top, to the side - covered by the plug-in socket when the signal conditioning instrument is mounted.

Description of the DIL switch positions



With the upper three DIL switches you can set an integration time. If all three are set to position "off", the integration time is zero seconds. With switch "2" two seconds are set, with switch "6" six seconds are set, etc. If several switches are set to "on", the time intervals will be summed up. It is therefore possible to set 2, 6, 8, 12, 18 or 20 seconds as integration time.

With the fourth DIL switch you choose if you want to have a 4 ... 20 mA or a 0 ... 20 mA current output.

4.2 Setup sequence

The following list gives you a short description of the setup steps

- mount the plug-in socket
- wire the plug-in socket acc. to your control requirements
- cover the input terminals with the separating wall (4)
- set the range of the current output on the DIL switch (11)
- set the integration time on the DIL switch (11) to "off"
- now mount the module unit into the plug-in socket
- switch on the power supply, the green LED (3) lights
- carry out the adjustment acc. to "Section 4.3"
- if an integration time is necessary, the instrument must be removed again and the respective setting must be made on the DIL switch.

4.3 Adjustment

The adjustment of the empty and full levels is made via two spindle potentiometers. For the adjustment procedure, it is useful to connect a voltmeter to the voltage output 0 ... 10 V.

This means:

- empty adjustment, vessel empty corresponds to 0.0 Volt or level 0 %
- full adjustment, vessel full corresponds to 10.0 Volt or level 100 %

Note the following adjustment examples. As a rule, the potentiometer 1 must first be turned approx. 22 revolutions clockwise before the empty and full adjustment is carried out.

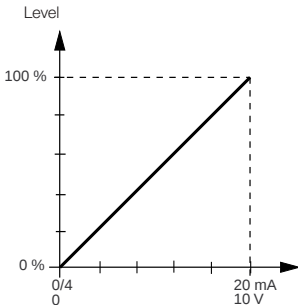
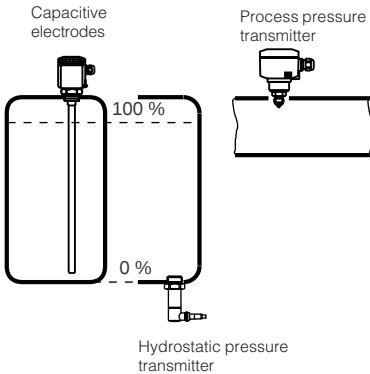
As an additional aid to adjustment, the lowest segment of the analogue display flashes at 0.0 V and the highest at 10.0 V.

Adjustment example 1

The vessel can be emptied to min. level and filled to max. level.

Sensor:

- vertically mounted capacitive measuring probe
- hydrostatic pressure transmitter
- process pressure transmitter



Procedure:

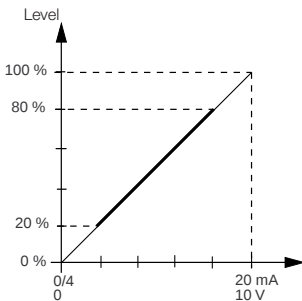
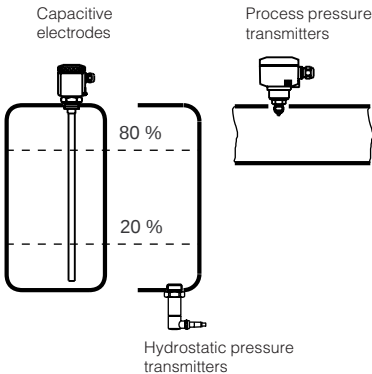
- First of all, turn the potentiometer full adjustment (1) approx. 22 revolutions clockwise.
- Fill the vessel to the requested minimum level.
- Set with the potentiometer empty adjustment (2) the display of the connected measuring instrument to 0.0 V, this corresponds to 0 %.
- Fill the vessel to the requested max. level.
- Set with the potentiometer full adjustment (1) the display of the connected measuring instrument to 10.0 V by turning anticlockwise, this corresponds to 100 %.
- The signal conditioning instrument is adjusted and ready for operation. Please cover with the transparent cover (14).

Adjustment example 2

The vessel cannot be emptied to min. level and also cannot be filled to max. level.

Sensor:

- vertically installed capacitive measuring probe
- hydrostatic pressure transmitter
- process pressure transmitter



Procedure

- First of all, turn the potentiometer full adjustment (1) clockwise by approx. 22 revolutions.
- Empty the vessel to the lowest possible level and sound the contents (e.g. 20 %).
- Set with the potentiometer empty adjustment (2) the display of the connected measuring instrument to 0.0 V.
- Fill the vessel to the highest possible level and sound the contents (e.g. 80 %).
- Calculate the value to be adjusted for the potentiometer full adjustment (1).
Example: 80 % (filled) – 20 % (emptied) = 60 %.
- Set with the potentiometer full adjustment (1) the display of the connected measuring instrument to 6.0 V by turning anticlockwise.
- Now set with the potentiometer empty adjustment (2) the actual level (example 80 %).
- The signal conditioning instrument is adjusted and ready for operation.
Please cover with the transparent cover (14).

5 Diagnostics

5.1 Maintenance

The instrument is maintenance-free.

5.2 Repair

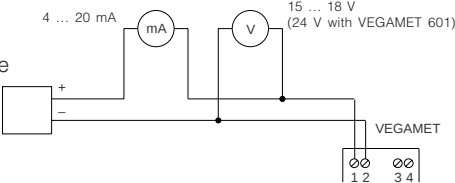
To correct possible defects, the instrument must be opened. For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out only by qualified VEGA personnel.

In case of a defect, please return the affected instrument with a short description of the error to our repair department.

Failures are brief instrument malfunctions which are caused by wrong adjustment or defects in the sensor or the connection cables.

Failures, their possible causes and their elimination are listed under "5.3 Failure rectification".

5.3 Failure rectification

Failure	Rectification/Measure
Instrument does not function/Green operating control lamp extinguishes	Check the supply voltage and the mains connections by noting the "Wiring instructions". If the instrument still does not function, call our service department.
Function of VEGA-MET 601 is wrong or failed	Check the sensor inputs for the following causes of failures: - shortcircuit on the input - sensor not correctly connected, i.e. polarity reversed - sensor cable interrupted - supply voltage too low
Red failure LED of VEGAMET 602 lights	Check if the sensor is connected correctly. - failures in the sensor, effecting a current change below 2 mA or above 23 mA, cause a fault signal in VEGAMET. Measure the current on the connection cable leading to the sensor.  With Ex systems, make sure that the Ex protection is not degraded by the measuring instruments.

Failure	Rectification/Measure
Function of VEGA-MET 601 is wrong or failed Red failure LED of VEGAMET 602 lights	a. Current value < 2 mA - Check the supply voltage on the connection cable leading to the sensor. The voltage should be at least 17 V. Should you measure a value below 17 V, this indicates defect in the signal conditioning instrument. In this case, send the instrument for repair to VEGA. - If at least 17 V are present, separate the signal conditioning instrument from the connection cable and connect a resistor of 2.2 kOhm to the sensor input of the signal conditioning instrument. If the failure lamp continues to light, the signal conditioning instrument is defective. In this case, send the instrument for repair to VEGA. - Should the failure lamp extinguish, connect the signal conditioning instrument again. Separate the sensor from the connection cable and connect instead a resistor of 2.2 kOhm. - If the failure lamp continues to light, probably the connection cable is interrupted. Check the connection cable leading to the sensor. - If the failure lamp extinguishes, the sensor is defective. Check the connected sensor. b. Current value > 23 mA - Check all connections and the connection cable leading to the sensor. - Should the red failure lamp continue to light, separate the sensor from the connection cable and connect instead a resistor of 2.2 kOhm. If the failure lamp extinguishes, the sensor is defective. Check the connected sensor. - Should the failure lamp continue to light, reconnect the sensor. Separate the signal conditioning instrument from the connection cable and connect to its sensor input a resistor of 2.2 kOhm. - Should the failure lamp continue to light, the signal conditioning instrument is defective. In this case, return the instrument for repair to VEGA. - If the failure lamp extinguishes, there is probably a shortcircuit in the connection cable. Check the connection cable leading to the sensor.



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

Technical data subject to alterations