Level measurement in bulk solids

Capacitive

VEGACAL 62
VEGACAL 65
VEGACAL 66
VEGACAL 67

Product Information

Content

Take note of safety instructions for Ex applications

Please note the Ex specific safety information which you can find on our homepage www.vega.com\services\downloads and which comes with every instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

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1 Description of the measuring principle

Measuring principle

Probe, measured product and vessel wall form an electrical capacitor. The capacitance is influenced by three main factors.

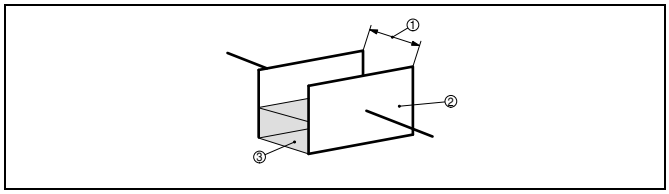

Fig. 1: Functional principle - Plate capacitor

1 Distance between the electrode surfaces
2 Size of the electrode surfaces
3 Type of dielectric between the electrodes

The probe and the vessel wall are the capacitor plates. The measured product is the dielectric. Due to the higher dielectric constant (DK value) of the product compared to air, the capacitance increases as the probe is gradually covered.

The capacitance as well as the resistance change are converted by the electronics module into a level-proportional signal.

The more constant the conductivity, concentration and temperature of a product, the better the conditions for admittance measurement. Changes in the measuring conditions are generally less critical when detecting materials with high DK values.

The sensors are maintenance free and rugged and can be implemented in all areas of industrial measurement engineering.

Admittance probes have no minimum distances or dead band in which measurement is not possible.

Whereas partly insulated versions are predominantly used for solids, fully insulated versions are preferred for liquids.

Corrosive and adhesive products

Implementation in very adhesive or corrosive products is no problem. Since the admittance measuring principle places no special requirements on mounting, a host of different applications can be equipped with VEGACAL series 60 probes.

Wide application range

With measuring ranges up to 32 m (105 ft), the sensors are well suited for tall vessels. Temperatures up to 200 °C (392 °F) and pressures from vacuum to 64 bar (928 psi) cover a wide range of applications.

1.1 Application examples

Bulk solids silo

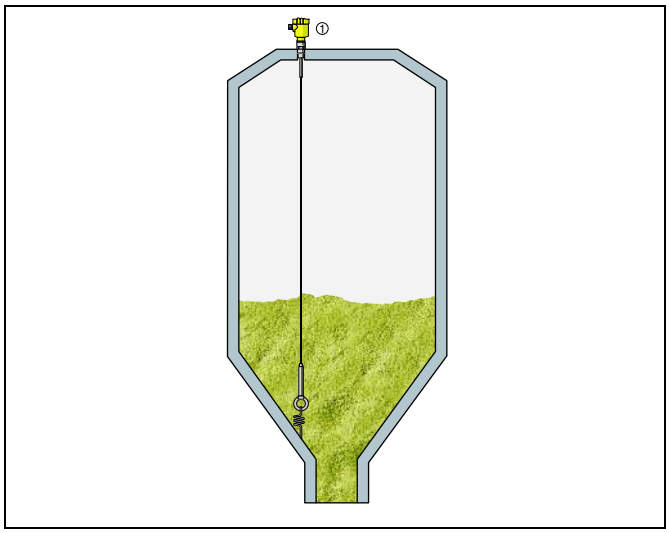

Fig. 2: High solid silo

1 VEGACAL 65 in solid silo

In the building industry, cement and additives are stored in tall silos. VEGACAL admittance sensors are used in silos up to 32 m (105 ft) high. In smaller silos where no lateral forces arise, it is also possible to use rod probes.

During the filling of the silo, large amounts of dust and noise are generated. Depending on the consistency of the solid and the kind of filling, the material cones that form can be very different. Admittance probes are not influenced by these conditions, and as a result, filling levels are always measured reliably.

The flexible suspension cable avoids excessive mechanical loads caused by movements of the bulk material.

To prevent the electrode from touching the vessel wall, the cable probe should be firmly anchored. In our line of accessories, you can find a straining spring which can be applied to avoid cable overload when anchoring.

Advantages:
- Insensitive to filling noise
- Wide application range
- Rugged construction
- High abrasion resistance

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Wall mounting

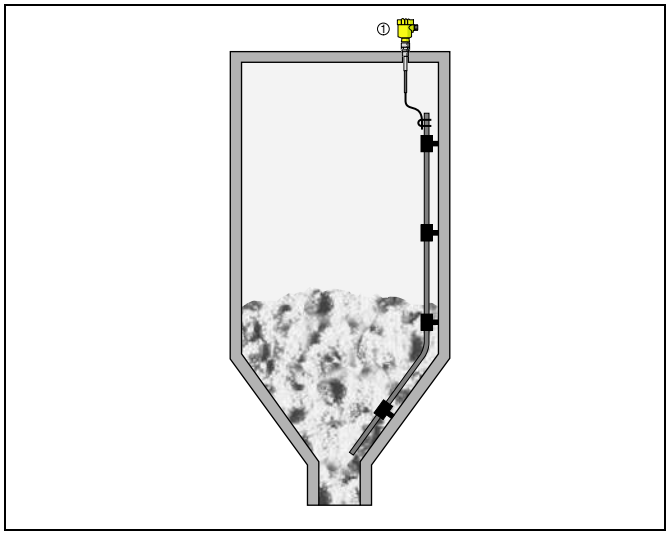

Fig. 3: Lateral wall mounting in the solid silo

1 VEGACAL 65 with probe by the customers

If strong abrasion is expected in the silo or the mechanical forces acting on the probe are too large, an electrode built by the user can be implemented to increase the service life of the measuring system. The contact to the measuring probe is usually made at the top, and is accomplished with e.g. pipe clamps or a screwed fastening. But it can actually be located anywhere along the entire length of the electrode (brought in laterally or from below). It is only important that electrode be completely isolated from the vessel and installed at a min. distance of approx. 200 mm from the wall.

Advantages:

- Rugged - therefore long service life
- independent of the mounting position
- Unaffected by the shape of the material cone
- No dead bands
- Low min. distance

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2 Type overview

	VEGACAL 62	**VEGACAL 65**	**VEGACAL 66**
			
Preferred application:	Bulk solids	Bulk solids	Bulk solids
Version:	Rod - partly insulated	Cable - partly insulated	Cable - insulated
Insulation:	PTFE	PA	PTFE
Length:	0.2 … 6 m (0.656 … 19.69 ft)	0.4 … 32 m (1.312 … 104.99 ft)	0.4 … 32 m (1.312 … 104.99 ft)
Process fitting:	Thread from G¾ A, flanges	Thread from G1 A, flanges	Thread from G¾ A, flanges
Process temperature:	-50 … +200 °C (-58 … +392 °F)	-50 … +200 °C (-58 … +392 °F)	-50 … +200 °C (-58 … +392 °F)
Process pressure:	-1 … 64 bar-100 … 6400 kPa (-14.5 … 928 psi)	-1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psi)	-1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psi)

	VEGACAL 67
	
Preferred application:	Bulk solids under high temperatures
Version:	Rod - partly insulated, cable - partly insulated
Insulation:	Ceramic
Length:	Rod: 0.28 … 6 m (0.919 … 19.69 ft) Cable: 0.5 … 40 m (1.64 … 131.23 ft)
Process fitting:	Thread from G1½ A
Process temperature:	-50 … +400 °C (-58 … +752 °F)
Process pressure:	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psi)

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Housing	 Plastic	 Stainless steel	 Aluminium	 Aluminium (double chamber)
Electronics	 4 … 20 mA/HART two-wire	 Two-wire > 4 … < 20 mA	 Profibus PA	 Foundation Field-bus
Process fitting	 Thread	 Flange		
Sensors	 Probe			
Approvals	 Gas-explosion pro-tection	 Dust-explosion pro-tection		

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3 Mounting instructions

Pressure/Vacuum
The process fitting must be sealed if there is gauge or low pressure in the vessel. Check if the seal material is resistant against the measured product and the process temperature.

Insulating measures in metal vessels such as e.g. covering the thread with teflon tape can interrupt the necessary electrical connection to the vessel. Ground the probe on the vessel.

Socket
In adhesive products, the probe should protrude into the vessel (horizontal mounting), to avoid buildup. In such cases, avoid sockets for flanges and threaded fittings.

Inflowing medium
If VEGACAL is mounted into the filling stream, this can cause unwanted false measurements. Therefore mount VEGACAL at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

This applies particularly to instrument versions with a longer probe.

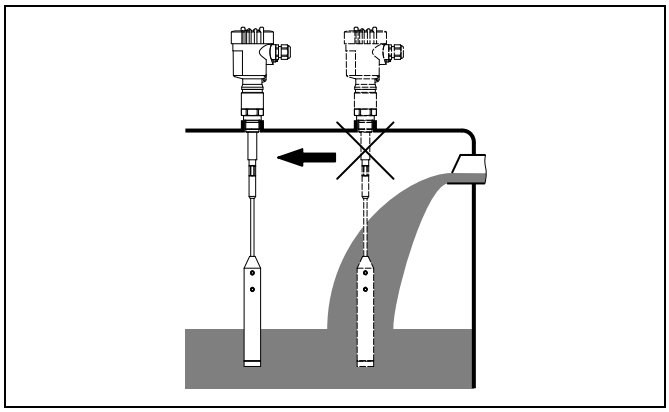

Fig. 4: Inflowing medium

Tensile load
If the cable version is used, make sure the max. tensile load of the suspension cable is not exceeded. Also keep the permissible roof load of your vessel in mind. This should be considered especially when using the instrument for very heavy solids and long meas. lengths. The max. permissible tensile load is stated in chapter "*Technical data*".

Material cone
Material cones can form in silos for bulk solids, thereby altering the measuring result. Please keep this in mind when installing the sensor in the vessel. We recommend selecting an installation location where the probe detects an average value of the material cone.

The probe must be mounted in a way that takes the arrangement of the filling and emptying apertures into account.

To compensate measurement errors caused by the material cone in cylindrical vessels, the sensor must be mounted at a distance of d/6 from the vessel wall.

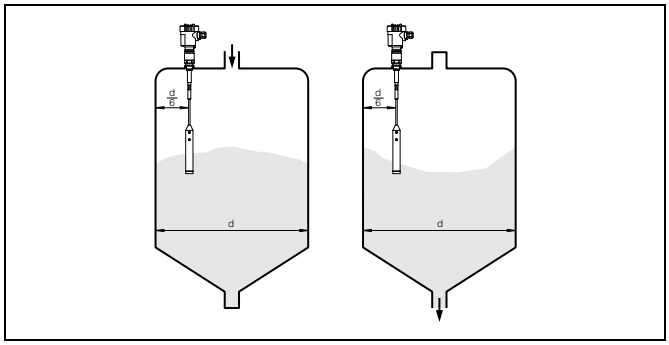

Fig. 5: Filling and emptying centered

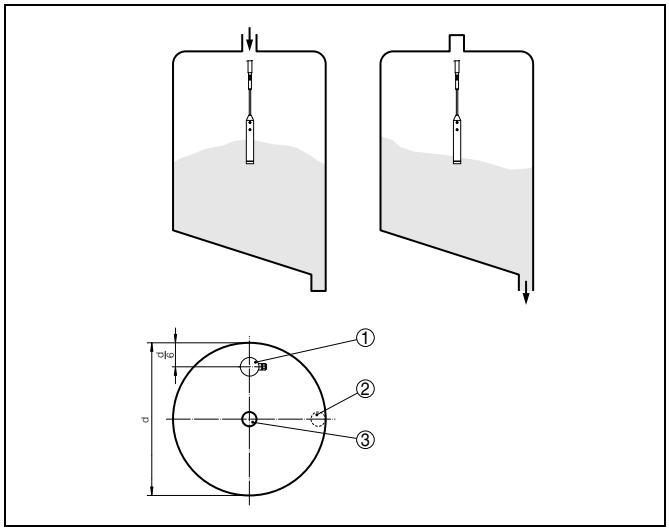

Fig. 6: Filling in the center, emptying laterally

1 VEGACAL
2 Emptying opening
3 Filling opening

Vessel forms
If possible, the admittance probe should be mounted vertically or parallel to the counter electrode. This applies particularly to applications in non-conductive products.

In cylindrical tanks, spherical tanks or other asymmetrical tank forms, nonlinear level values are generated due to the varying distance to the vessel wall.

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Vessel material

Metal vessel

Make sure that the mechanical connection of the probe to the vessel is electrically conductive to ensure sufficient grounding.

Use conductive seals such as e.g. copper or lead etc. Insulating measures, such as covering the thread with Teflon tape, can interrupt the necessary electrical connection with metal vessels. For this reason, ground the probe on the vessel or use a conductive seal material.

Non-conductive vessels

In non-conductive vessels, e.g. plastic tanks, the second pole of the capacitor must be provided separately, e.g. in the form of a concentric tube.

To ensure sufficient grounding in concrete vessels, you should connect the ground terminal of the measuring probe to the steel reinforcement of the vessel.

Corrosive, abrasive products

Various isolating materials are available for very corrosive or abrasive products. If metal is not chemically resistant to the medium, use a plated flange.

Condensation

If condensation forms on the vessel top, the resulting liquid draining off can cause measurement errors (bridging) particularly with partly insulated probes.

For that reason, use a screening tube. The screening tube is permanently attached to the probe and must be specified in the order. The length of the screening tube depends on the amount of condensate and its flow behaviour.

Operating temperatures

If the housing is subject to high ambient temperatures, you have to either use a temperature adapter or disconnect the electronics from the probe and install it in a separate housing at a cooler place (from a process temperature of 200 °C).

With process temperatures up to 300 °C you can use a high temperature probe. With temperatures up to 400 °C, the electronics must be additionally located in a separate housing.

Make sure that the probe is not covered by an existing vessel insulation.

The temperature ranges of the probes are listed in chapter "*Technical data*".

Fixing

Rod versions

During operation, the probe must not touch any installations or the vessel wall. The measured value can also change if the distance to the vessel wall changes considerably. If necessary, secure the end of the probe (insulated).

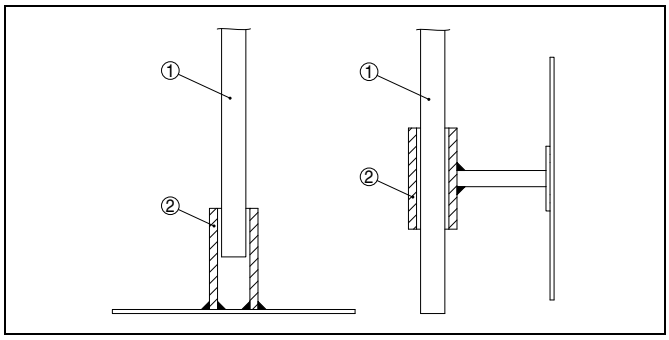

Fig. 7: Fasten the probe

1 Probe - fully insulated
2 Metal socket
3 Probe - bare
4 Plastic or ceramic socket

Cable versions

Long cable versions are particularly susceptible to product movement, i.e. they may touch the vessel wall or "swim" to the top of the measured product. For that reason, the measuring probe should be firmly secured.

In the gravity weight there is a thread (M12), e.g. for a ring bolt (article no. 2.27424). The thread is already insulated in the gravity weight.

Make sure that the probe cable is not completely taut. Avoid tensile loads on the cable. In our line of accessories you will find a straining spring that can be applied to avoid cable overload.

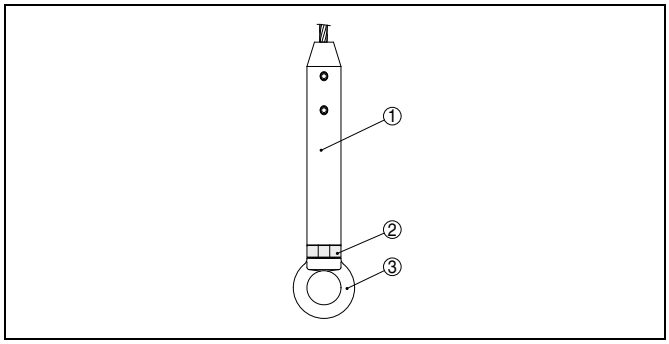

Fig. 8: Fasten the probe

1 Gravity weight (316L)
2 Threaded insert M12 insulated, of PEEK
3 Ring bolt M12 of 316L (article no. 2.27423)

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In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the vessel bottom.

Measurement is not possible over the length of the gravity weight of the fully insulated probe. The measuring range of the probe ends at the upper edge of the gravity weight.

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4 Electrical connection

4.1 General prerequisites

The supply voltage range can differ depending on the instrument version. You can find exact specifications in chapter "*Technical data*".

The national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

4.2 Voltage supply

Generally
Supply voltage and current signal are carried on the same two-wire cable. The requirements on the power supply are specified in chapter "*Technical data*".

Two-wire 4 … 20 mA/HART, > 4 … < 20 mA
The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as VEGAMET signal conditioning instruments are suitable for power supply. When one of these instruments is used, a reliable separation of the supply circuits from the mains circuits according to DIN VDE 0106 part 101 is ensured for the sensor.

Profibus PA
Power is supplied by a Profibus DP/PA segment coupler or a VEGALOG 571 EP input card.

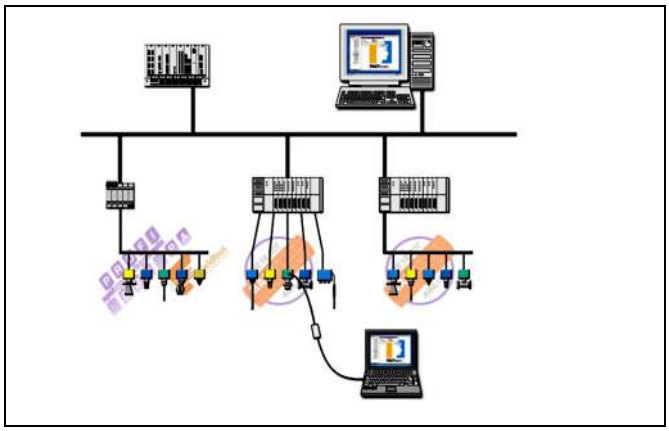

Fig. 9: Integration of instruments in a Profibus PA system via segment coupler DP/PA or data recording systems with Profibus PA input card

Foundation Fieldbus
Power supply via the H1 Fieldbus cable.

4.3 Connection cable

Generally
The sensors are connected with standard cable without screen. An outer cable diameter of 5 … 9 mm ensures the seal effect of the cable entry.

Two-wire 4 … 20 mA/HART, > 4 … < 20 mA
If electromagnetic interference is expected, screened cable should be used for the signal lines.

Profibus PA, Foundation Fieldbus
The installation must be carried out according to the appropriate bus specification. The sensor is connected respectively with screened cable according to the bus specification. Make sure that the bus is terminated via appropriate terminating resistors.

For power supply, an approved installation cable with PE conductor is also required.

In Ex applications, the corresponding installation regulations must be noted for the connection cable.

4.4 Connection of the cable screen and grounding

Two-wire 4 … 20 mA/HART, > 4 … < 20 mA
The cable screen must be connected on both ends to ground potential. If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V).

Profibus PA, Foundation Fieldbus
In systems with potential separation, the cable screen is connected directly to ground potential on the power supply unit, in the connection box and directly on the sensor.

In systems without potential equalisation, connect the cable screen directly to ground potential only at the power supply unit and at the sensor - do not connect to ground potential in the connection box or T-distributor.

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4.5 Wiring plan

Single chamber housing

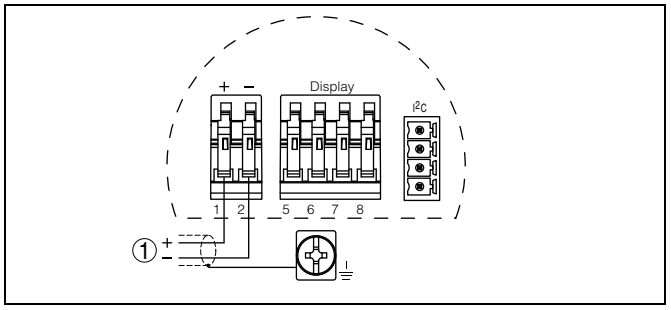

Fig. 10: Connection HART two-wire, Profibus PA, Foundation Fieldbus

1 Voltage supply and signal output

Two-wire output > 4 … < 20 mA

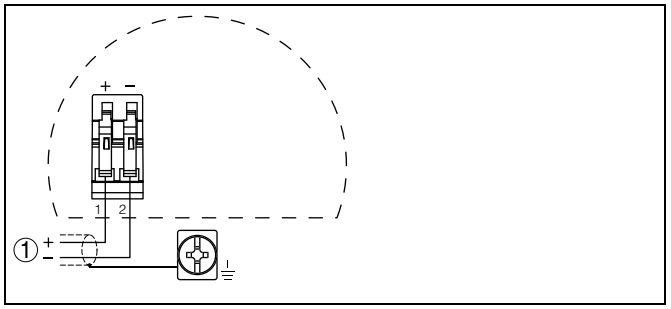

Fig. 11: Connection > 4 … < 20 mA (not standardised) for connection to a signal conditioning instrument

1 Voltage supply/Signal output

Double chamber housing - two-wire

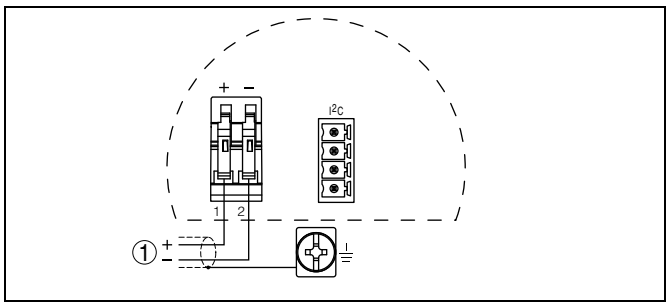

Fig. 12: Connection HART two-wire, Profibus PA, Foundation Fieldbus

1 Voltage supply and signal output

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5 Operation

5.1 Adjustment, general

Per the electronics version, VEGACAL can be adjusted with the following adjustment media:

- With the indicating and adjustmnt module PLICSCOM (4 … 20 mA/HART; PA; FF)
- With an adjustment software according to FDT/DTM standard, e.g. PACTware™ and PC (4 … 20 mA/HART; PA; FF)
- a HART handheld (4 … 20 mA/HART)
- a configuration tool (Foundation Fieldbus)
- the Simatic adjustment program PDM (Profibus PA)
- an external indication instrument (two-wire electronics > 4 … < 20 mA)

The entered parameters are generally saved in VEGACAL, optionally also in PLICSCOM or in PACTware™.

5.2 Adjustment with the indicating and adjustment module PLICSCOM

Setup and indication

PLICSCOM is a pluggable indication and adjustment module for plics® sensors. It can be placed in four different positions on the instrument (each displaced by 90°). Indication and adjustment are carried out via four keys and a clear, graphic-capable dot matrix display. The adjustment menu with language selection is clearly structured and enables easy setup. After setup, PLICSCOM serves as indicating instrument: through the screwed cover with glass insert, measured values can be read directly in the requested unit and presentation style.

The integrated background lighting of the display can be switched on via the adjustment menu. [1)]

PLICSCOM adjustment

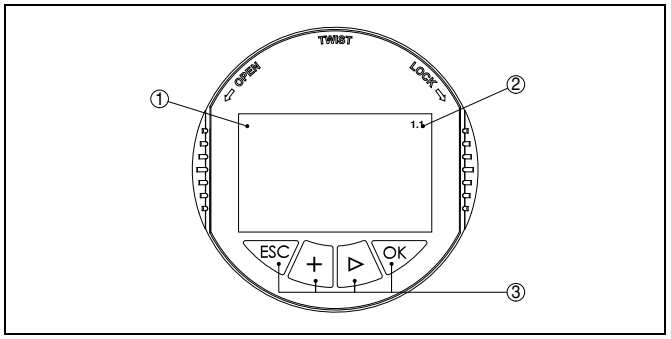

Fig. 13: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

5.3 Adjustment with PACTware™

PACTware™/DTM

The sensors VEGACAL can be adjusted via PACTware™ using the signal outputs 4 … 20 mA/HART, Profibus PA or Foundation Fieldbus directly on the instrument. To adjust with PACTware™, an instrument driver for the particular VEGACAL model is required.

All currently available VEGA DTMs are provided as DTM Collection with the current PACTware™ version on CD. They are available from the responsible VEGA agency for a token fee. The basic version of this DTM Collection incl. PACTware™ is available as a free-of charge download from the Internet.

To use the entire range of functions of a DTM, incl. project documentation, a DTM licence is required for that particular instrument family, e.g. VEGACAL. This licence can be bought from the VEGA agency serving you.

Connecting the PC directly to the sensor

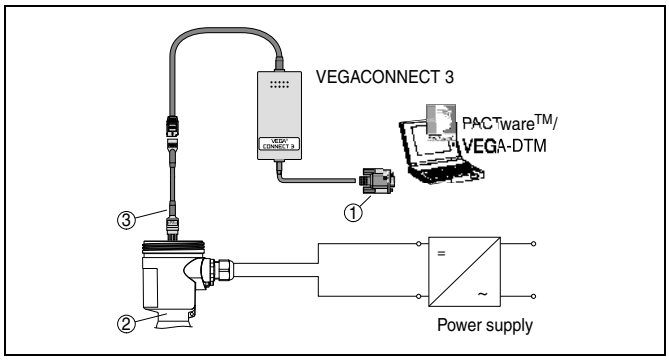

Fig. 14: Connection directly to the sensor

1 RS232 connection

2 VEGACAL

3 I²C adapter cable for VEGACONNECT 3

[1)] For instruments with national approvals such as e.g. according to FM or CSA only available at a later date.

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To adjust with PACTware™, a VEGACONNECT 3 with I^2C adapter cable (art. no. 2.27323) as well as a power supply unit is necessary in addition to the PC and the suitable VEGA-DTM.

Connecting the PC to the signal cable (4 … 20 mA/HART)

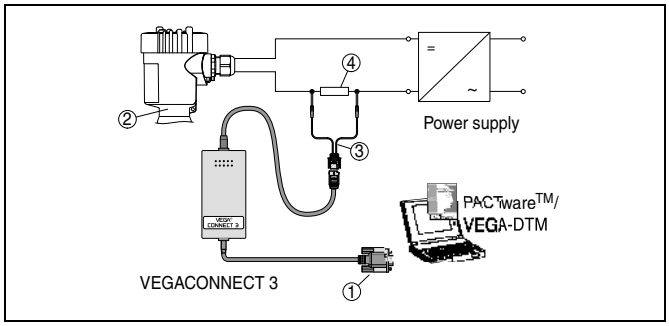

Fig. 15: Connecting the PC to the signal cable

1 RS232 connection

2 VEGACAL

3 HART adapter cable for VEGACONNECT 3

4 HART resistor 250 Ω

To adjust with PACTware™, a VEGACONNECT 3 with HART adapter cable (art. no. 2.25397) as well as a power supply unit and a HART resistor with approx. 250 Ω is required in addition to the PC and the suitable VEGA DTM.

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ω), an additional external resistance is not necessary (e. g. VEGATRENN 149A, VEGADIS 371, VEGAMET 381/624/625, VEGASCAN 693). In such cases, VEGACONNECT can be connected parallel to the 4 … 20 mA cable.

6 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

VEGACAL 62

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (partly insulated)	PTFE
– Electrode (rod PTFE partly insulated: ø 12 mm/0.472 in)	316L
Materials, non-wetted parts	
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Ground terminal	316L
Weight	
– Instrument weight	1 … 3 kg (2.2 … 6.6 lbs)
– Rod weight: ø 12 mm (0.472 in)	900 g/m (10 oz/ft)
Sensor length (L)	0.2 … 6 m (0.656 … 19.69 ft)
Max. lateral load	10 Nm (7.4 lbf ft)
Max. torque (process fitting - thread)	100 Nm (73 lbf ft)

VEGACAL 65

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (partly insulated)	PA, PFTE
– Probe (cable PTFE partly insulated: ø 6 mm/0.236 in)	316L
– Probe (cable PA partly insulated: ø 8 mm/0.315 in) [2]	316L
Materials, non-wetted parts	
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Ground terminal	316L
Weight	
– Instrument weight	1 … 3 kg (2.2 … 6.6 lbs)
– Gravity weight	900 g (32 oz)
– Cable weight: ø 6 mm (0.236 in)	180 g/m (1.9 oz/ft)
– Cable weight: ø 8 mm (0.315 in)	220 g/m (2.1 oz/ft)
Sensor length (L)	0,2 … 32 m (0.656 … 104.99 ft)
Max. tensile load (cable)	
– PTFE partly insulated: ø 6 mm (0.236 in)	10 KN (2248 lbs)
– PA partly insulated: ø 8 mm (0.315 in)	10 KN (2248 lbs)
Max. torque (process fitting - thread)	100 Nm (73 lbf ft)

VEGACAL 66

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (fully insulated)	PTFE
Materials, non-wetted parts	
– Probe (cable PTFE fully insulated: ø 8 mm/0.315 in)	316L
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Ground terminal	316L
Weight	
– Instrument weight	1 … 3 kg (2.2 … 6.6 lbs)
– Gravity weight	900 g (32 oz)
– Cable weight: ø 8 mm (0.315 in)	180 g/m (1.9 oz/ft)
Sensor length (L)	0.4 … 32 m (1.312 … 104.99 ft)
Max. tensile load (cable)	
– PTFE fully insulated: ø 8 mm (0.315 in)	10 KN (2248 lbs)
Max. torque (process fitting - thread)	100 Nm (73 lbf ft)

[2] Cable connected electrically conductive with the gravity weight.

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VEGACAL 67

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (partly insulated)	Ceramic (KER 221 according to DIN 40685)
– Probe - rod, ceramic partly insulated (ø 15 mm/0.591 in)	316L
– Probe - cable, ceramic partly insulated (ø 8 mm/0.315 in) [3]	316 (1.4401)
Materials, non-wetted parts	
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Ground terminal	316L
Weight	
– Instrument weight	1 … 3 kg (2.2 … 6.6 lbs)
– Gravity weight	1800 g (64 oz)
– Rod weight: ø 15 mm (0.591 in)	1400 g/m (15 oz/ft)
– Cable weight: ø 8 mm (0.315 in)	400 g/m (4.3 oz/ft)
Sensor length (L)	
– Rod (ø 15 mm/0.591 in)	0.28 … 6 m (0.919 … 19.69 ft)
– Cable (ø 8 mm/0.315 in)	0.5 … 40 m (1.64 … 131.23 ft)
Supporting tube length L1	0.2 … 1.7 m (0.656 … 5.577 ft)
Max. lateral load	10 Nm (7.4 lbf ft)
Max. tensile load (cable)	
– Ceramic partly insulated ø 8 mm (0.315 in)	10 KN (2248 lbf)
Max. torque (process fitting - thread)	80 Nm (58 lbf ft)

Output variable

4 … 20 mA/HART

Output signal	4 … 20 mA/HART
Resolution	1.6 µA
Fault message	Current output unchanged 20.5 mA, 22 mA, < 3.6 mA (adjustable)
Current limitation	22 mA
Load	see load diagram under Power supply
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Rise time	500 ms (ti: 0 s, 0 … 100 %)
Fulfilled NAMUR recommendations	NE 43

Two-wire output > 4 … < 20 mA

Output signal	in the range of > 4 … < 20 mA (not standardised) - for connection to a signal conditioning instrument
Suitable signal conditioning instruments	VEGAMET 381, 513, 514, 515, 624
Fault message	> 22 mA
Current limitation	28 mA
Load	see load diagram under Power supply
Integration time (63 % of the input variable)	0.1 s
Fulfilled NAMUR recommendations	NE 43

Profibus PA

Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	constantly 10 mA, ±0.5 mA
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Rise time	500 ms (ti: 0 s, 0 … 100 %)

Foundation Fieldbus

Output	
– Signal	digital output signal, Foundation Fieldbus protocol
– Physical layer	according to IEC 61158-2

[3] Cable connected electrically conductive with the gravity weight.

Channel numbers	
– Channel 1	Primary Value
– Channel 2	Secondary Value 1
– Channel 3	Secondary Value 2
Transmission rate	31.25 Kbit/s
Current value	10 mA, ±0.5 mA
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Rise time	500 ms (ti: 0 s, 0 … 100 %)

Input variable

4 … 20 mA/HART, Profibus PA, Foundation Fieldbus

Parameter	Continuous level value
Measuring principle	phase-selective admittance processing (PSA)
Measuring range	0 … 3000 pF
Frequency	270 kHz

Two-wire output > 4 … < 20 mA

Parameter	Continuous level value
Measuring principle	phase-selective admittance processing (PSA)
Measuring range	
– range 1	0 … 120 pF
– range 2	0 … 600 pF
– range 3	0 … 3000 pF
Frequency	430 kHz

Accuracy (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1	
– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psi)
Temperature error	
– < 120 pF	< 1 pF
– > 120 pF	1 pF, +0.25 % of the current measured value
Linearity error	< 0.25 % of the complete measuring range
Accuracy	0.025 % of the current measured value

Ambient conditions

Ambient, storage and transport temperature	
– without PLICSCOM	-40 … +80 °C (-40 … +176 °F)
– with PLICSCOM [4)]	-20 … +70 °C (-4 … +158 °F)

Process conditions

Process pressure	The max. permissible pressure and max. permissible temperature depend on the process fitting used.
– VEGACAL 62, 65, 66	-1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psi)
– VEGACAL 67	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psi)
Process temperature	
– VEGACAL 62 - PTFE insulation	-50 … +200 °C (-58 … +392 °F), from 150 °C (302 °F) with temperature adapter
– VEGACAL 65 - PTFE insulation	-50 … +200 °C (-58 … +392 °F), from 150 °C (302 °F) with temperature adapter
– VEGACAL 65 - PA insulation	-50 … +80 °C (-58 … +176 °F)
– VEGACAL 66 - PTFE insulation	-50 … +150 °C (-58 … +302 °F)
– VEGACAL 67 - ceramic insulation - standard	-50 … +300 °C (-58 … +572 °F)
– VEGACAL 67 - ceramic insulation - with remote housing	-50 … +400 °C (-58 … +752 °F)

[4)] Not with electronics version two-wire output > 4 … < 20 mA.

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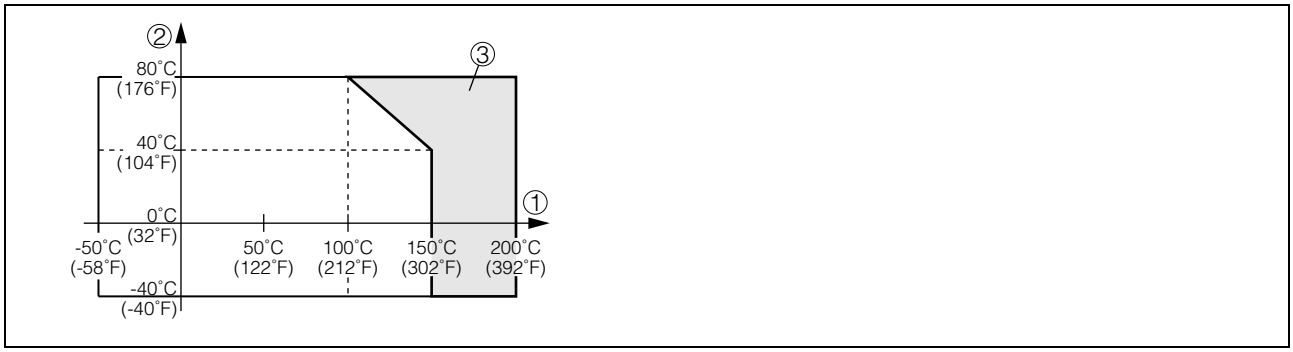

Fig. 16: VEGACAL 62, 65, 66 - ambient temperature - product temperature

1 Product temperature
2 Ambient temperature
3 Temperature range VEGACAL (insulation: PTFE) with temperature adapter

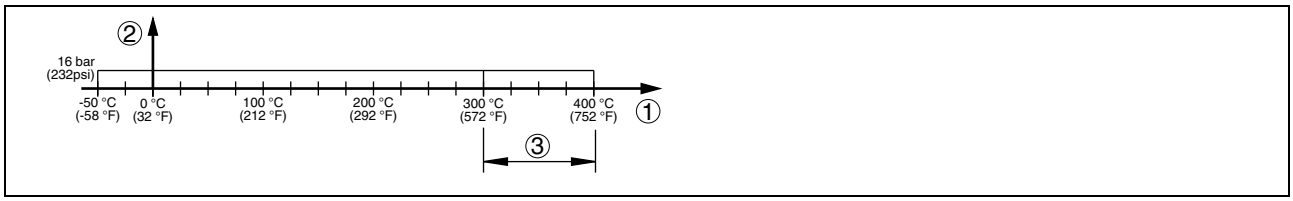

Fig. 17: VEGACAL 67 - process temperature - process pressure

1 Process temperature
2 Process pressure
3 Temperature range with remote housing

Dielectric figure	≥ 1.5

Electromechanical data

Cable entry/plug (dependent on the version)	
– Single chamber housing	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: • 1 x plug M12 x 1; 1 x blind stopper M20 x 1.5
– Double chamber housing [5]	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 or: • 1 x closing cap ½ NPT, 1x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 or: • 1 x plug M12 x 1; 1 x blind cover M20 x 1.5; plug M12 x 1 for VEGADIS 61
Spring-loaded terminals	for wire cross-section up to 2.5 mm² (AWG 14)

Indicating and adjustment module PLICSCOM [6]

Power supply and data transmission	through sensor via gold-plated sliding contacts (I^2C bus)
Indication	LC display in Dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40

[5] Not with electronics version two-wire output > 4 … < 20 mA.
[6] Not with electronics version two-wire output > 4 … < 20 mA.

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Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Two-wire output 4 … 20 mA/HART

Supply voltage	
– Non-Ex instrument	12 … 36 V DC
– EEx-ia instrument	12 … 30 V DC
– EEx-d-ia instrument	18 … 36 V DC
Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

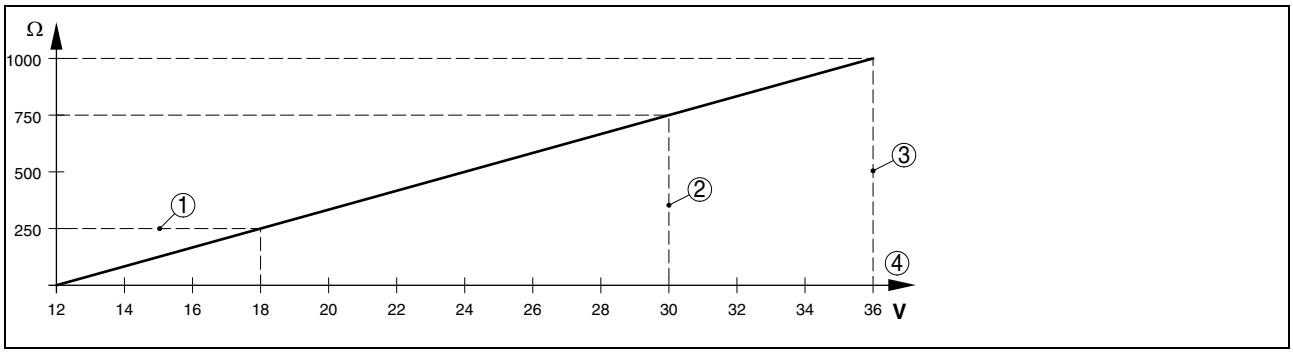

Fig. 18: Voltage diagram 4 … 20 mA/HART

1 HART load
2 Voltage limit EEx-ia instrument
3 Voltage limit non-Ex/Exd instrument
4 Supply voltage

Two-wire output > 4 … < 20 mA - for connection to a signal conditioning instrument

Supply voltage	
– Non-Ex instrument	12 … 36 V DC
– EEx-ia instrument	12 … 30 V DC
– EEx-d-ia instrument	18 … 36 V DC
Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

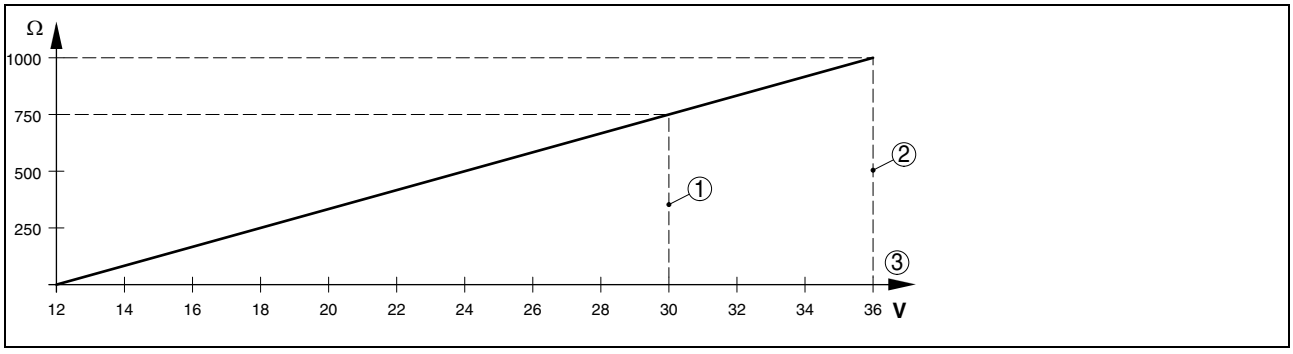

Fig. 19: Voltage diagram > 4 … < 20 mA - for connection to a signal conditioning instrument

1 Voltage limit EEx-ia instrument
2 Voltage limit non-Ex/Exd instrument
3 Supply voltage

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Profibus PA

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

Foundation Fieldbus

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
Power supply by/max. number of sensors	
– H1 voltage supply	max. 32 (max. 10 with Ex)

Electrical protective measures

Protection	IP 66/IP 67
Overvoltage category	III
Protection class	II

Approvals [7]

Electronics versions - 4 … 20 mA/HART, Profibus PA, Foundation Fieldbus
Overfill protection according to WHG

ATEX
- ATEX II 1G, 1/2G, 2G EEx ia IIC T6
- ATEX II 1/2G, 2G EEx d ia IIC T6 [8]
- ATEX II 1/2D 2D IP6X T [9]

Ship approvals

Electronics version - two-wire output, > 4 … < 20 mA
Overfill protection according to WHG

ATEX
- ATEX II 1G, 1/2G, 2G EEx ia IIC T6
- ATEX II 1/2D 2D IP6X T [10]

Ship approvals

CE conformity

EMC (89/336/EWG)

Emission EN 61326: 2004 (class B)

Susceptibility EN 61326: 2004 incl. supplement A

LVD (73/23/EWG), EN 61010-1: 2001

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[7] VEGACAL 67 only without approvals
[8] Only in conjunction with Aluminium double chamber housing.
[9] Not in conjunction with plastic housing.
[10] Not in conjunction with plastic housing.

7 Dimensions

Housing

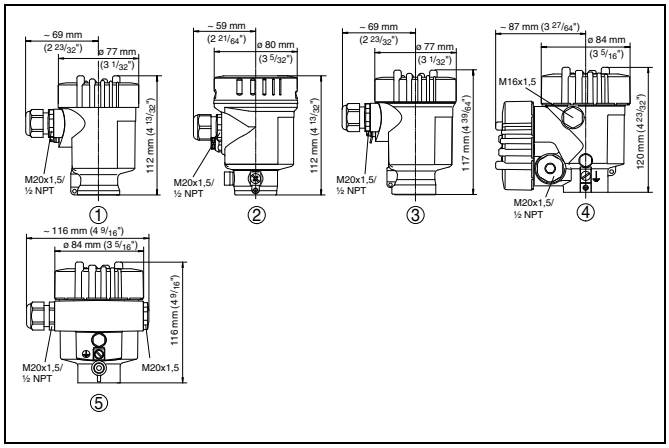

Fig. 20: Housing versions

1 Plastic housing
2 Stainless steel housing
3 Stainless steel housing - precision casting
4 Aluminium double chamber housing [11)]
5 Aluminium housing

VEGACAL 62

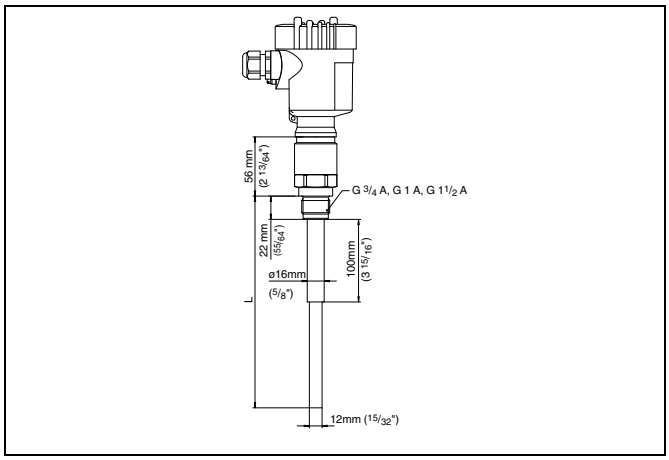

Fig. 21: VEGACAL 62 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAL 65

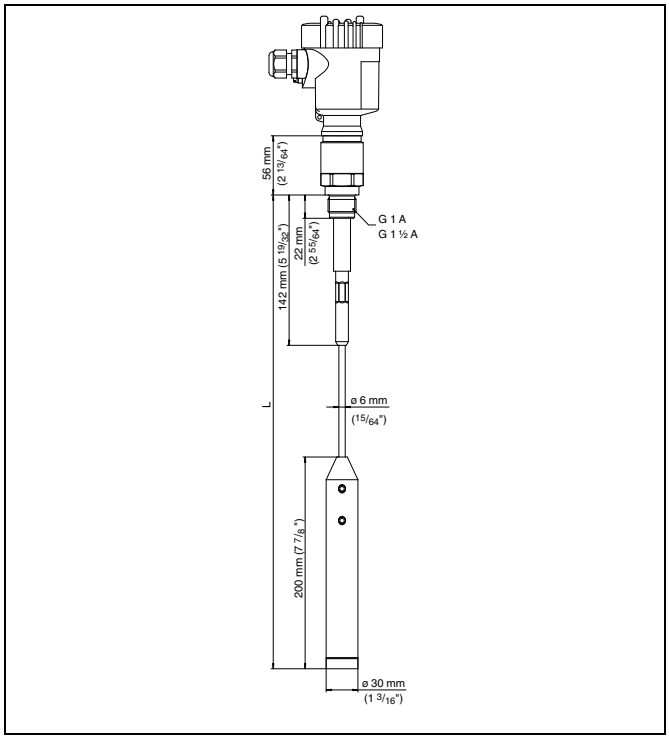

Fig. 23: VEGACAL 65 - threaded version

VEGACAL 66

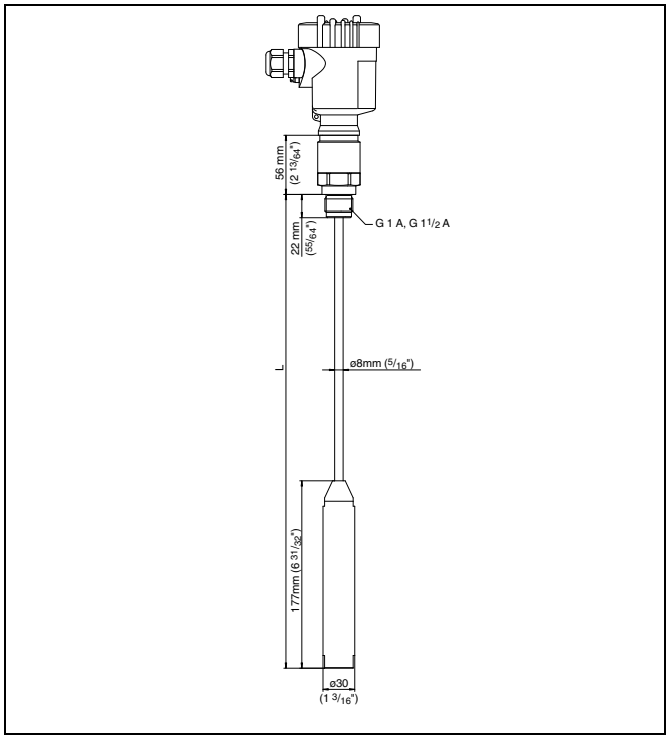

Fig. 25: VEGACAL 66 - threaded version

L Sensor length, see chapter "Technical data"

11) Not with electronics version two-wire output > 4 … < 20 mA.

VEGACAL 67

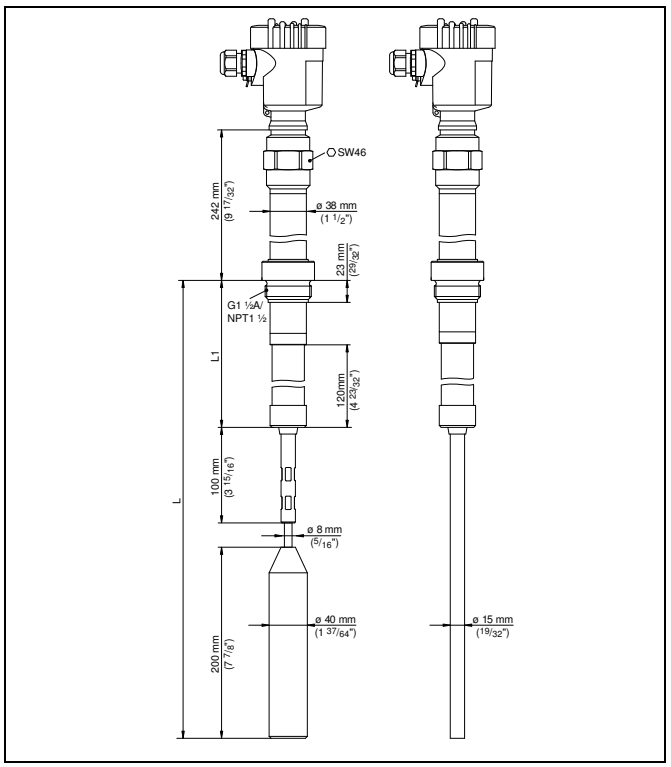

Fig. 27: VEGACAL 67 - threaded version G1½ A and 1½ NPT, -50 … +300 °C (-58 … +572 °F)

Version -50 … +400 °C (-58 … +752 °F) only with remote housing.

See supplementary instructions manual "Remote housing - VEGACAP, VEGACAL"

L Sensor length, see chapter "Technical data"

L1 Supporting tube length, see chapter "Technical data"

8 Product code

VEGACAL 62

Approval
XX without
XM Ship approval
CX ATEX II 1G, 1/2G, 2G EEx ia IIC T6
CA ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG
CM ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + Ship approval
CK ATEX II 1G,1/2G,2G EEx ia IIC T6+ATEX II 1/2D,2D IP6X T [1)]
DX ATEX II 1/2G, 2G EEx d ia IIC T6 [2)]
GX ATEX II 1/2D, 2D IP6X T [1)]
Version / Process temperature
A Standard / -50 ... 150°C
B Standard / -50 ... 200°C
C with screening tube 316L / -50 ... 150°C [3)]
D with screening tube 316L / -50 ... 200°C [3)]
Process fitting / Material
GA Thread G¾A PN64 / 316L
GC Thread G1A PN64 / 316L
GD Thread G1½ PN64 / 316L
GS Thread G1½A PN64 / Steel
Electronics
H 4...20mA/HART®
X for connection to a signal conditioning instrument
P Profibus PA
F Foundation Fieldbus
Housing / Protection
K Plastic / IP66/IP67
A Aluminium / IP66/IP68 (0.2 bar)
D Aluminium double chamber / IP66/IP68 (0.2 bar)
8 StSt (electropolished) 316L / IP66/IP68 (0.2bar)
Cable entry / Plug connection
M M20x1.5 / without
N ½NPT / without
Indicating/adjustment module (PLICSCOM)
X Without
A Top mounted
Additional equipment
X Without

CL62. | | | | | | | | |

[1)] Not in conjunction with Housing / Protection "K"
[2)] Only in conjunction with Housing / Protection "D"
[3)] Not in conjuction with Process fitting / Material "GA", "GS"

VEGACAL 65

Approval
XX without
XM Ship approval
CX ATEX II 1G, 1/2G, 2G EEx ia IIC T6
CA ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG
CM ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + Ship approval
CK ATEX II 1G,1/2G,2G EEx ia IIC T6+ATEX II 1/2D,2D IP6X T [1)]
DX ATEX II 1/2G, 2G EEx d ia IIC T6 [2)]
GX ATEX II 1/2D, 2D IP6X T [1)]
Version / Process temperature
K Cable ø 6mm / 316 with gravity weight / -50...150°C
U Cable ø6mm with screening tube a. gr.weight/-50...150°C [3)]
L Cable ø 6mm / 316 with gravity weight / -50...200°C [3)]
V Cable ø6mm w.screening tube a. grav.weight/-50...200°C [3)]
Process fitting / Material
GC Thread G1A PN64 / 316L
GD Thread G1½ PN64 / 316L
GS Thread G1½A PN64 / Steel
Electronics
H 4...20mA/HART®
X for connection to a signal conditioning instrument
P Profibus PA
F Foundation Fieldbus
Housing / Protection
K Plastic / IP66/IP67
A Aluminium / IP66/IP68 (0.2 bar)
D Aluminium double chamber / IP66/IP68 (0.2 bar)
8 StSt (electropolished) 316L / IP66/IP68 (0.2bar)
Cable entry / Plug connection
M M20x1.5 / without
N ½NPT / without
Indicating/adjustment module (PLICSCOM)
X Without
A Top mounted
Additional equipment
X Without

CL65. | | | | | | | | |

[1)] Not in conjunction with Housing / Protection "K"
[2)] Only in conjunction with Housing / Protection "D"
[3)] Not in conjuction with Process fitting / Material "GS"

VEGACAL 66

Approval
XX without
XM Ship approval
CX ATEX II 1G, 1/2G, 2G EEx ia IIC T6
CA ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG
CM ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + Ship approval
CK ATEX II 1G,1/2G,2G EEx ia IIC T6+ATEX II 1/2D,2D IP6X T [1)]
DX ATEX II 1/2G, 2G EEx d ia IIC T6 [2)]
GX ATEX II 1/2D, 2D IP6X T [1)]
Version / Process temperature
N PTFE insulated cable ø8mm w. gravity weight/-50...150°C
Process fitting/ Material
GC Thread G1A PN40 / 316L
GD Thread G1½ PN40 / 316L
GS Thread G1½A PN40 / Steel
Electronics
H 4...20mA/HART®
X for connection to a signal conditioning instrument
P Profibus PA
F Foundation Fieldbus
Housing / Protection
K Plastic / IP66/IP67
A Aluminium / IP66/IP68 (0.2 bar)
D Aluminium double chamber / IP66/IP68 (0.2 bar)
8 StSt (electropolished) 316L / IP66/IP68 (0.2bar)
Cable entry / Plug connection
M M20x1.5 / without
N ½NPT / without
Indicating/adjustment module (PLICSCOM)
X Without
A Top mounted
Additional equipment
X Without

CL66. | | | | | | | | |

[1)] Not in conjunction with Housing / Protection "K"
[2)] Only in conjunction with Housing / Protection "D"

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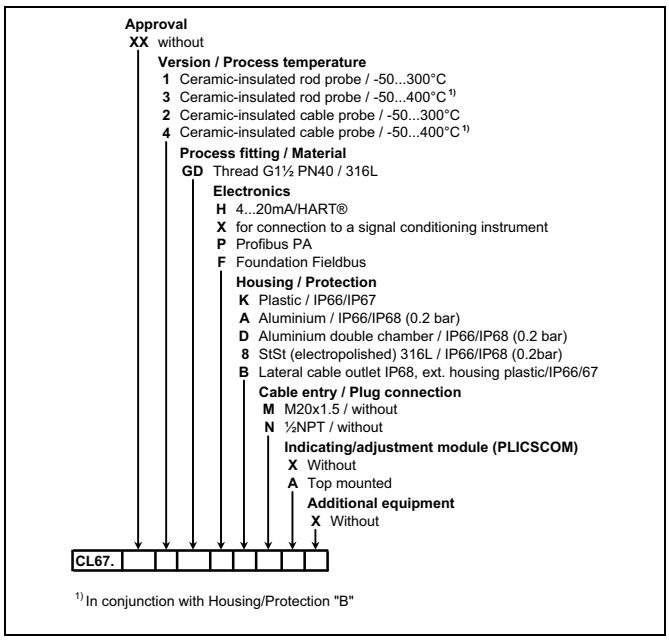
VEGACAL 67


Approval
XX without
Version / Process temperature
1 Ceramic-insulated rod probe / -50...300°C
3 Ceramic-insulated rod probe / -50...400°C 1)
2 Ceramic-insulated cable probe / -50...300°C
4 Ceramic-insulated cable probe / -50...400°C 1)
Process fitting / Material
GD Thread G1½ PN40 / 316L
Electronics
H 4...20mA/HART®
X for connection to a signal conditioning instrument
P Profibus PA
F Foundation Fieldbus
Housing / Protection
K Plastic / IP66/IP67
A Aluminium / IP66/IP68 (0.2 bar)
D Aluminium double chamber / IP66/IP68 (0.2 bar)
8 StSt (electropolished) 316L / IP66/IP68 (0.2bar)
B Lateral cable outlet IP68, ext. housing plastic/IP66/67
Cable entry / Plug connection
M M20x1.5 / without
N ½NPT / without
Indicating/adjustment module (PLICSCOM)
X Without
A Top mounted
Additional equipment
X Without
CL67.
1) In conjunction with Housing/Protection "B"

VEGA

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