Level measurement in liquids

Capacitive

VEGACAL 62
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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.

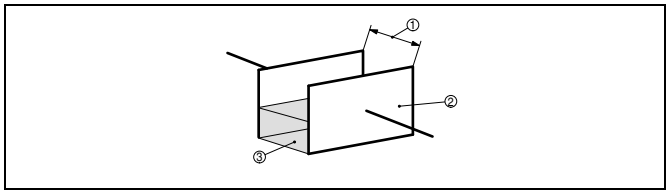

Fig. 1: Functional principle - Plate capacitor

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

Liquid vessels up to 6 m high

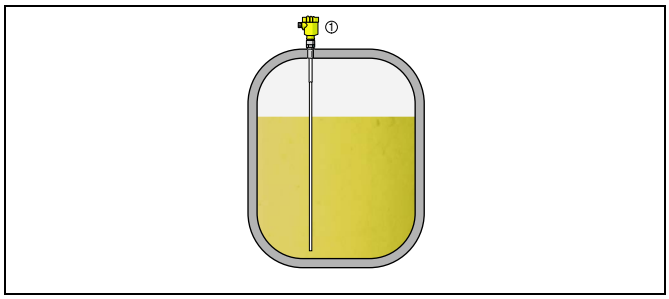

Fig. 2: Small liquid tank

1 Fully insulated rod probe VEGACAL 63

Admittance probes can be used in liquid vessels where products are stored or further processed. To avoid incorrect measuring results in applications with non-conductive products, the measured medium must always remain the same. A change of the medium (different dielectric value) necessitates a fresh calibration. When the conductivity is approx. 100 µS/cm or above, different products or even mixtures can be measured without renewed calibration.

The dielectric value determines whether a partly or fully insulated probe must be used. If the value is in the range up to 5, a partly insulated probe will be sufficient, from 5 on, a fully insulated probe should be used.

Because admittance measuring probes have no dead band and impose no restrictions on mounting, they are well suited for small vessels. The measuring probes are not affected by high sockets and wall distances upwards of approx. 100 mm.

Advantages:
- No dead bands
- Low min. distance
- Unaffected by sockets and vessel installations
- High chemical resistance

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Liquid vessels higher than 6 m and vessels in roofed-over spaces

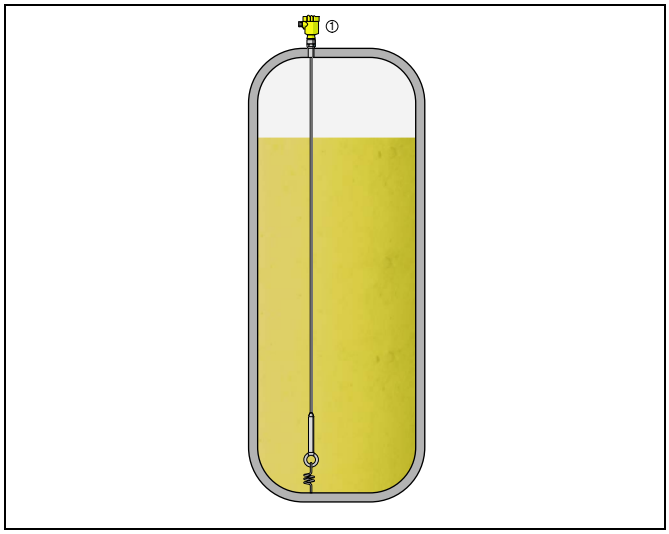

Fig. 3: High liquid tank

1 Fully insulated cable probe VEGACAL 66 mounted with straining spring

Cable measuring probes are preferred for tall vessels (higher than 6 m) and vessels situated in roofed-over spaces. Meas. lengths up to 32 m enable installation in very tall vessels. Flexible cable probes allow easy installation even in tight quarters.

Since the distance to the vessel wall should be stable,securing the gravity weight to the bottom of the vessel is recommended.

Advantages:
- Long meas. lengths
- No dead band
- Low min. distance
- Unaffected by sockets and vessel installations
- High chemical resistance

Vessel with adhesive, conductive liquids

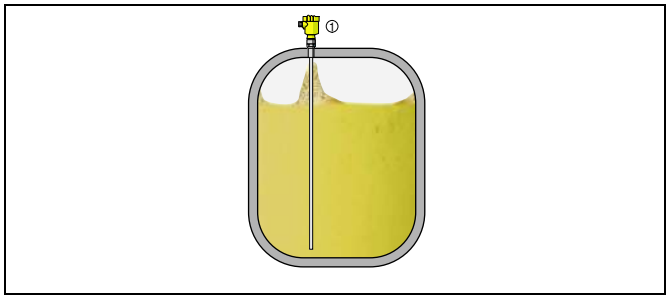

Fig. 4: Level measurement in very adhesive liquids

1 Fully insulated rod probe VEGACAL 64 for adhesive products

Whereas electrically non-conductive products are no problem for admittance measurement, adhesive, conductive products cause measurement errors. Due to the mechanical construction of VEGACAL 64 and the admittance processing, this effect is neutralised. Even strong conductive buildup is compensated and thus does not rule out good measuring results.

Advantages:
- Immune even to heavy buildup
- No dead bands
- Low min. distance
- Unaffected by sockets and vessel installations

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2 Type overview

	VEGACAL 62	VEGACAL 63	VEGACAL 64
			
Preferred application:	Liquids Non-conductive	Liquids Conductive	Liquids Conductive
Version:	Rod - partly insulated	Rod - fully insulated	Rod - fully insulated Insensitive to buildup
Insulation:	PTFE (partly insulated)	PE, PTFE	FEP
Length:	0.2 … 6 m (0.656 … 19.69 ft)	0.2 … 6 m (0.656 … 19.69 ft)	0.2 … 4 m (0.656 … 13.12 ft)
Process fitting:	Thread from G¾ A, flanges	Thread from G¾ A, flanges	Thread from G1 A, flanges
Process temperature:	-50 … +200 °C (-58 … +392 °F)	-50 … +200 °C (-58 … +392 °F) [1]	-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 66	VEGACAL 69
		
Preferred application:	Solids, liquids	Liquids
Version:	Cable - insulated	Double rod - fully insulated
Insulation:	PTFE	FEP
Length:	0.4 … 32 m (1.312 … 104.99 ft)	0.2 … 4 m (0.656 … 13.12 ft)
Process fitting:	Thread from G¾ A, flanges	Flange (PP or PTFE)
Process temperature:	-50 … +200 °C (-58 … +392 °F)	-40 … +100 °C (-40 … +212 °F)
Process pressure:	-1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psi)	-1 … 2 bar/-100 … 200 kPa (-14.5 … 29 psi)

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[1] Not with PE insulation.

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.

Measuring range
Please note that with fully insulated cable probes, measurement in the area of the gravity weight is not possible (L - length of the gravity weight).

With fully insulated rod probes, measurement is not possible within the 20 mm of the probe tip (L - 20 mm).

If necessary, use a correspondingly longer meas. probe.

Agitators
Excessive system vibration or shocks, e.g. caused by agitators or turbulence in the vessel (e.g. from fluidisation) can cause the probe of VEGACAL to vibrate in resonance. This can lead to increased material stress. Should a longer rod probe be necessary, you can provide a suitable support or guy directly above the end of the probe to stabilise it.

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.

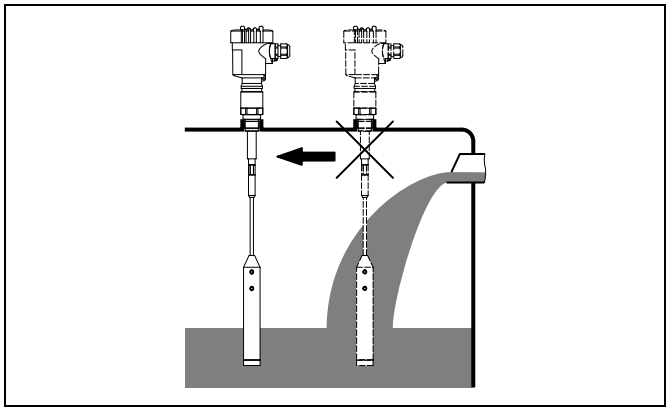

Fig. 5: Inflowing medium

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.

Use a double rod electrode, a concentric tube or linearise the measuring signal.

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. Use a double rod electrode or mount a concentric tube.

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.

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

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

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.

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).

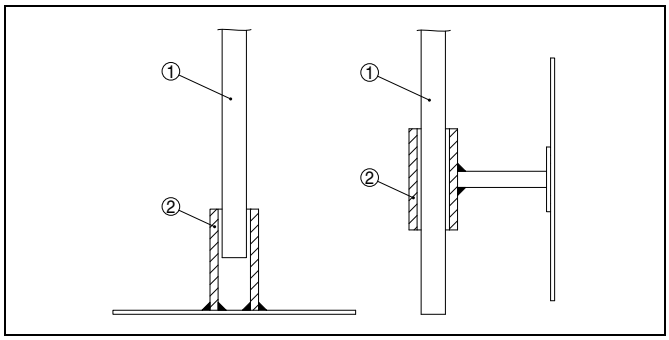

Fig. 6: Fasten the probe

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 if the forces are strong enough. 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.

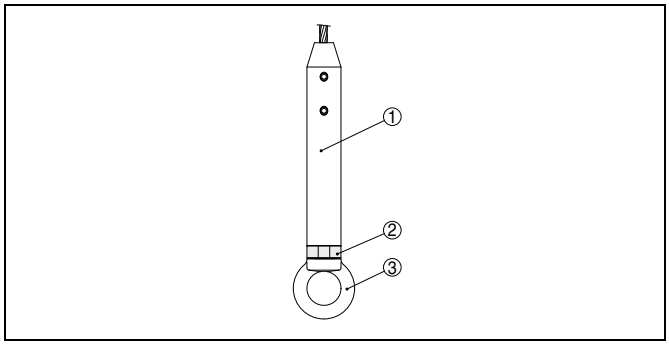

Fig. 7: Fasten the probe

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

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.

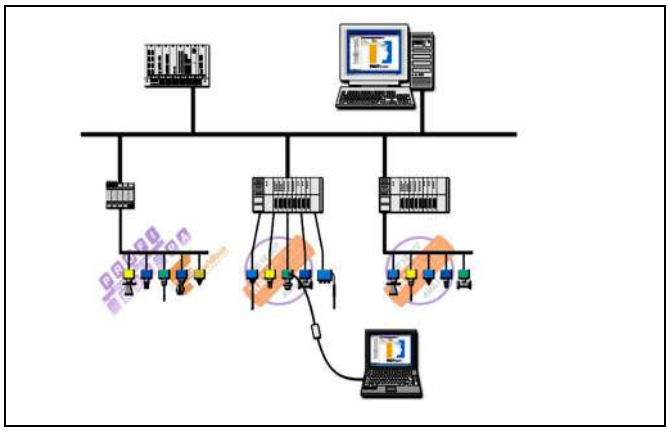

Fig. 8: Integration of instruments in a Profibus PA system via segment coupler DP/PA or data recording systems with Profibus PA input card

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

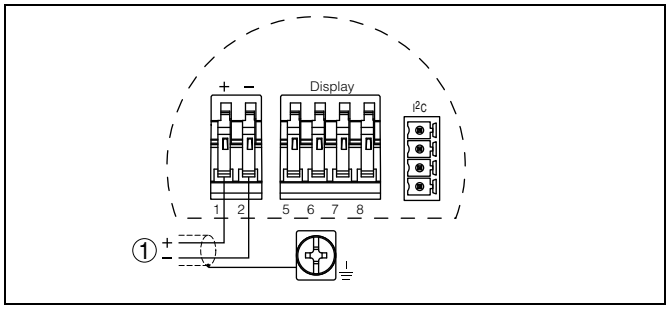

Fig. 9: Connection HART two-wire, Profibus PA, Foundation Fieldbus

1 Voltage supply and signal output

Two-wire output > 4 … < 20 mA

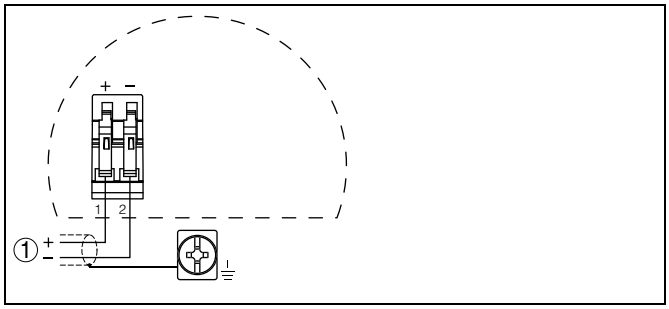

Fig. 10: Connection > 4 … < 20 mA (not standardised) for connection to a signal conditioning instrument

1 Voltage supply/Signal output

Double chamber housing - two-wire

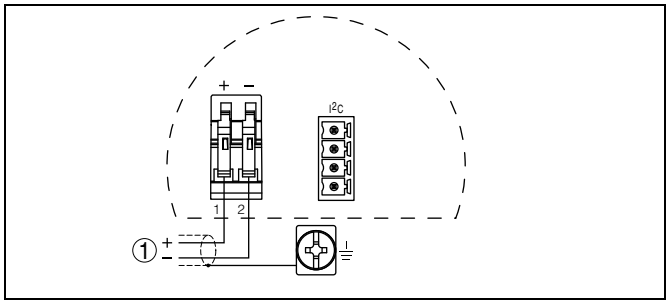

Fig. 11: Connection HART two-wire, Profibus PA, Foundation Fieldbus

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. [2)]

PLICSCOM adjustment

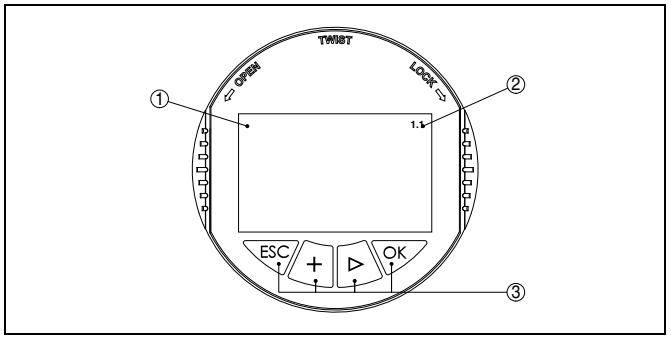

Fig. 12: Indicating and adjustment elements

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

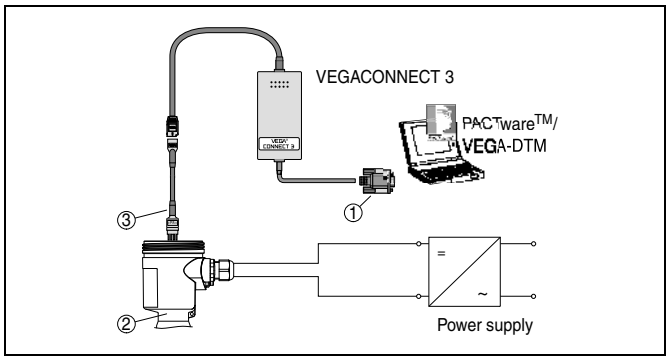

Fig. 13: Connection directly to the sensor

1 RS232 connection

2 VEGACAL

3 I²C adapter cable for VEGACONNECT 3

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

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

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

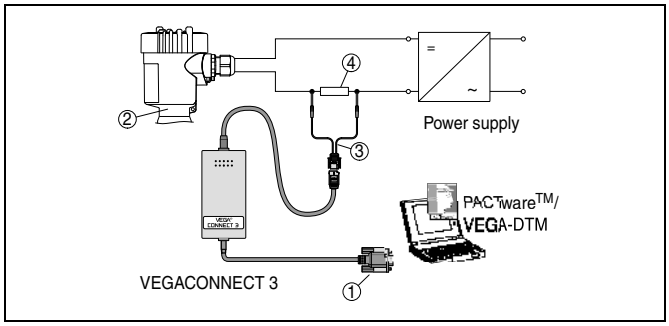

Fig. 14: Connecting the PC to the signal cable

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.

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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)	0.1 … 6 m (0.328 … 19.69 ft)
Max. lateral load	10 Nm (7.4 lbf ft)
Max. torque (process fitting - thread)	100 Nm (73 lbf ft)

VEGACAL 63

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (fully insulated)	PTFE, PE
– Probe (rod fully insulated: ø 16 mm/0.63 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 16 mm (0.63 in)	1100 g/m (12 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 64

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (fully insulated)	FEP
– Probe (rod FEP fully insulated: ø 16 mm/0.63 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 16 mm (0.63 in)	1100 g/m (12 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 66

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (fully insulated)	PTFE

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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)

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Materials, wetted parts	
– Process fitting - flange	PP or PTFE
– insulation (fully insulated)	FEP
Materials, non-wetted parts	
– Probe - double rod fully insulated: ø 14 mm (0.551 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 [3]	
– Instrument weight	0.8 … 4 kg (0.18 … 8.82 lbs)
– Rod weight: ø 14 mm (0.551 in)	2000 g/m (22 oz/ft)
Sensor length (L)	0.2 … 4 m (0.656 … 13.12 ft)
Max. lateral load	10 Nm (7.4 lbf ft)
Frequency	430 kHz

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] Flange weight not considered.

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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, 63, 64, 66	-1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psi)
– VEGACAL 69	-1 … 2 bar/-100 … 200 kPa (-14.5 … 29 psi)
Process temperature	
– VEGACAL 62 - PTFE insulation (partly insulated)	-50 … +150 °C (-58 … +302 °F)
– VEGACAL 62 - temperature adapter (option)	-50 … +200 °C (-58 … +392 °F)
– VEGACAL 63 - PE insulation	-40 … +80 °C (-40 … +176 °F)
– VEGACAL 63 - PTFE insulation	-50 … +200 °C (-58 … +392 °F), from 150 °C (302 °F) with temperature adapter
– VEGACAL 64 - FEP insulation	-50 … +150 °C (-58 … +302 °F)
– VEGACAL 66 - PTFE insulation	-50 … +200 °C (-58 … +392 °F)
– VEGACAL 69 - flange PP	0 … +60 °C (+32 … +140 °F)
– VEGACAL 69 - flange PTFE	-40 … +100 °C (-40 … +212 °F)

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

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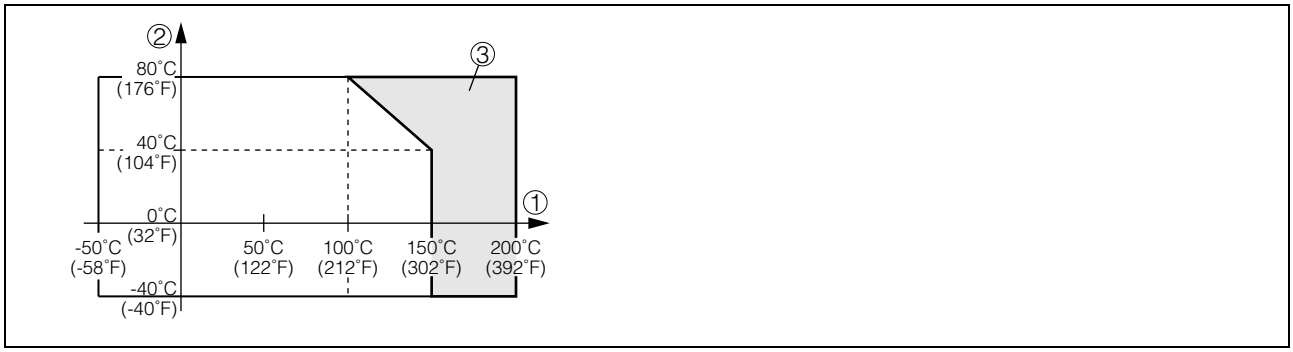

Fig. 15: VEGACAL 62, 63, 64, 66 - ambient temperature - product temperature

1 Product temperature
2 Ambient temperature
3 Temperature range with temperature adapter

Fig. 17: VEGACAL 69 - process pressure - Process temperature (flange of PP)

1 Process pressure
2 Process temperature

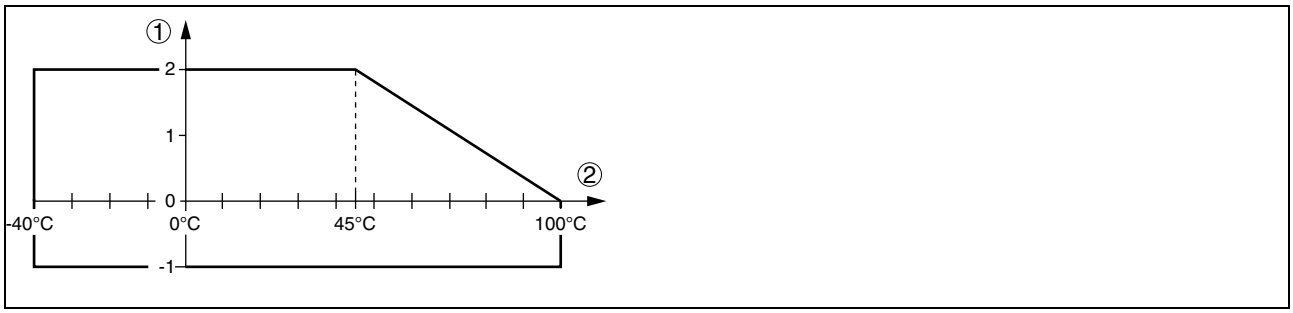

Fig. 19: VEGACAL 69 - process pressure - Process temperature (flange of PTFE)

1 Process pressure
2 Process temperature

Dielectric figure (DK value)	≥ 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

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– 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 mm^2 (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
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

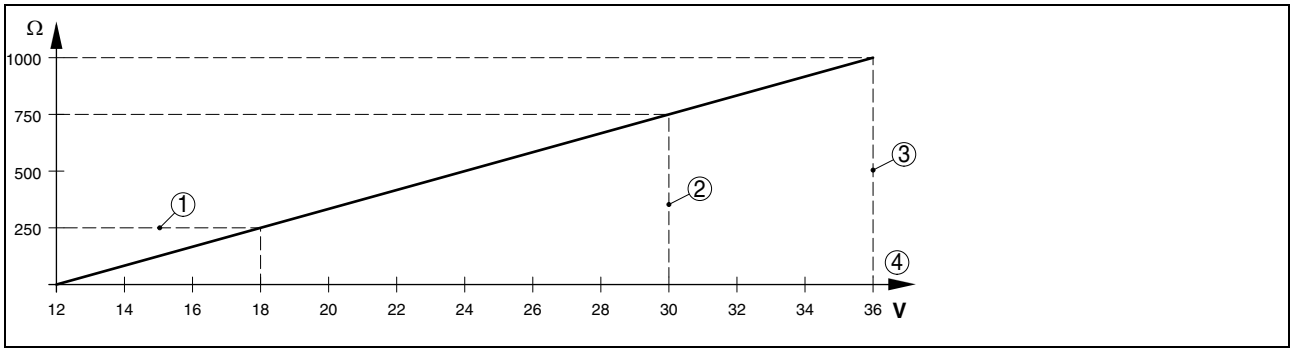

Fig. 21: Voltage diagram 4 … 20 mA/HART

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

[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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Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

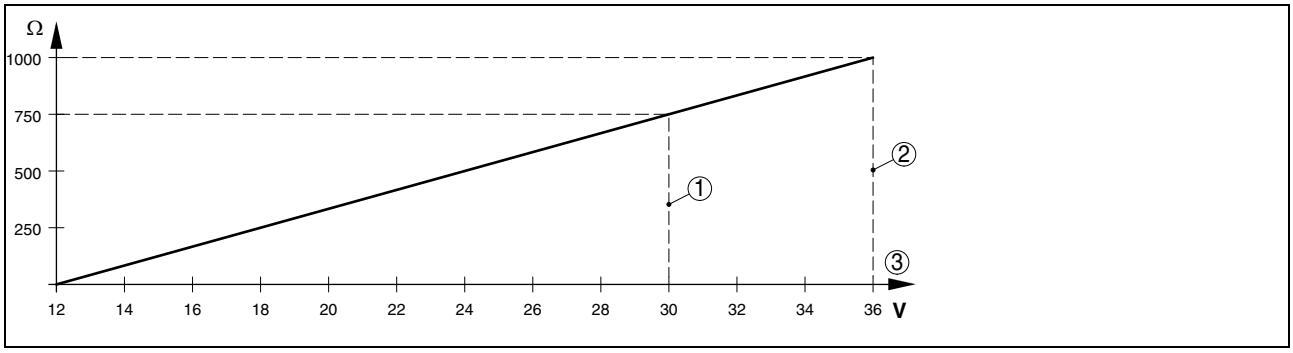

Fig. 22: Voltage diagram > 4 … < 20 mA - for connection to a signal conditioning instrument

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

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

[7] Deviating data in Ex applications: see separate safety instructions.
[8] Only in conjunction with Aluminium double chamber housing.
[9] Not in conjunction with plastic housing.

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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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[10)] Not in conjunction with plastic housing.

7 Dimensions

Housing

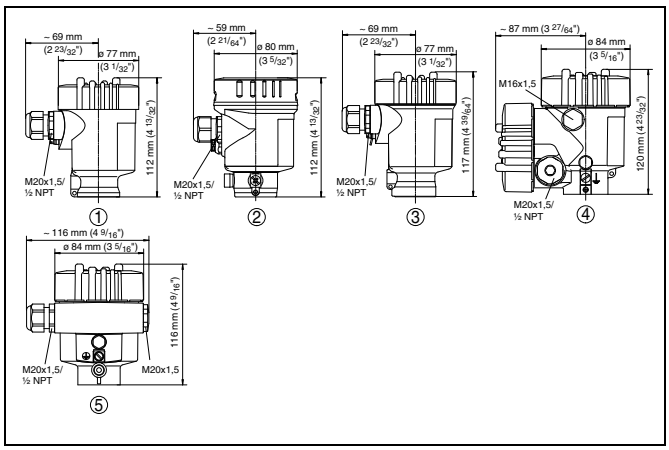


Fig. 23: Housing versions

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

VEGACAL 62

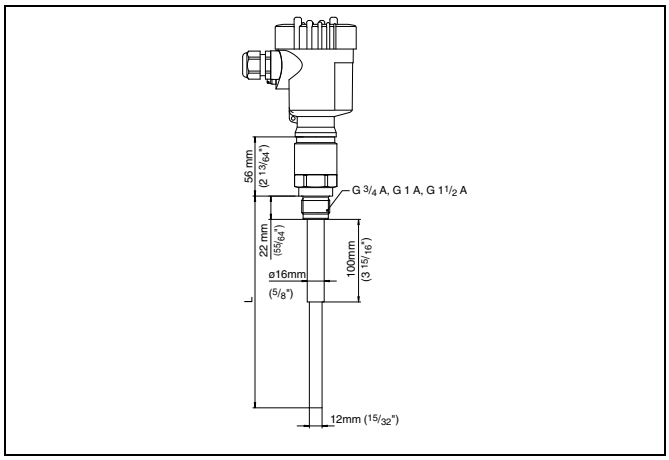


Fig. 24: VEGACAL 62 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAL 63

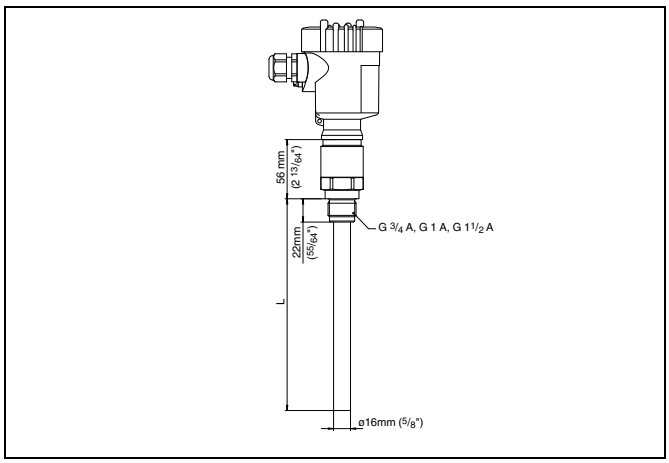


Fig. 26: VEGACAL 63 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAL 64

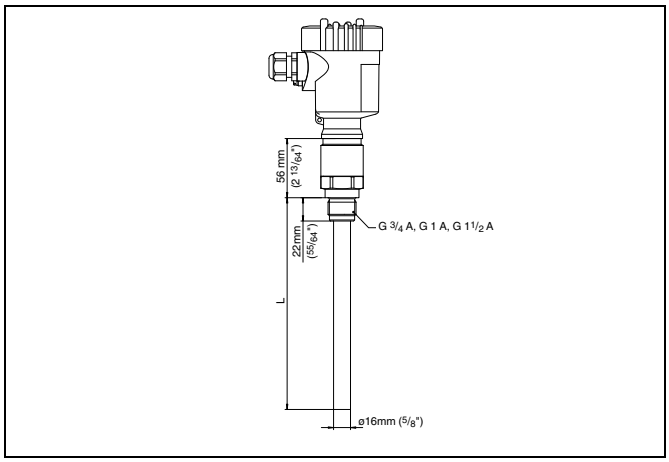


Fig. 28: VEGACAL 64 - threaded version

L Sensor length, see chapter "Technical data"

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

VEGACAL 66

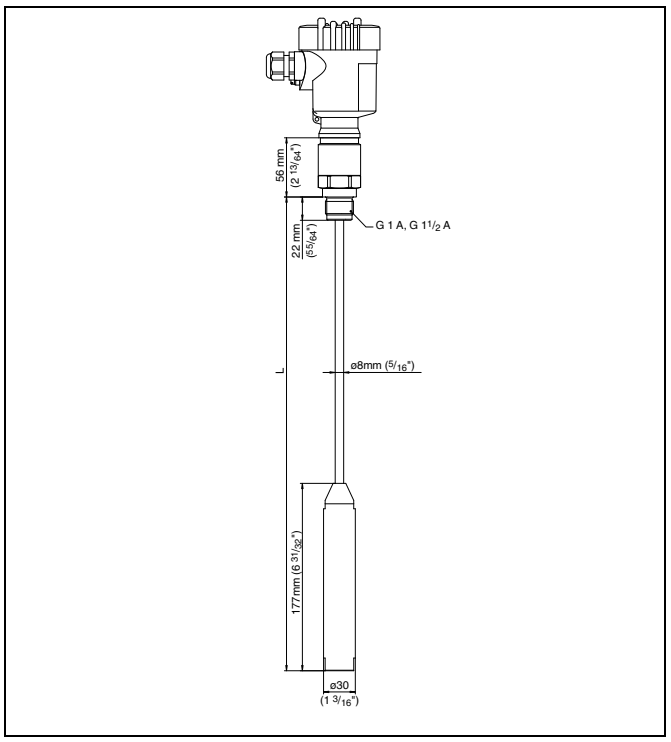


Fig. 30: VEGACAL 66 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAL 69

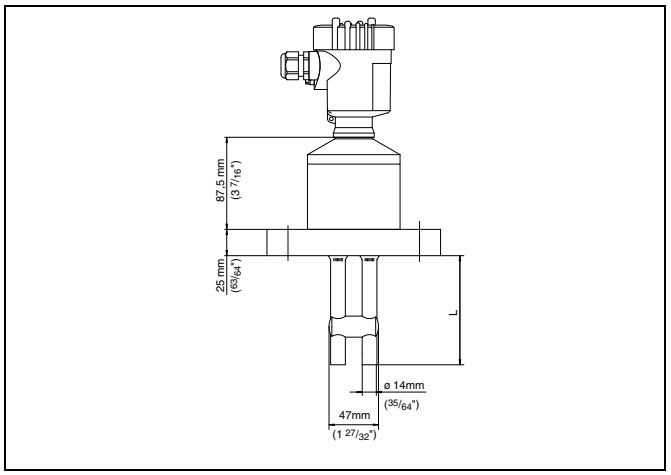
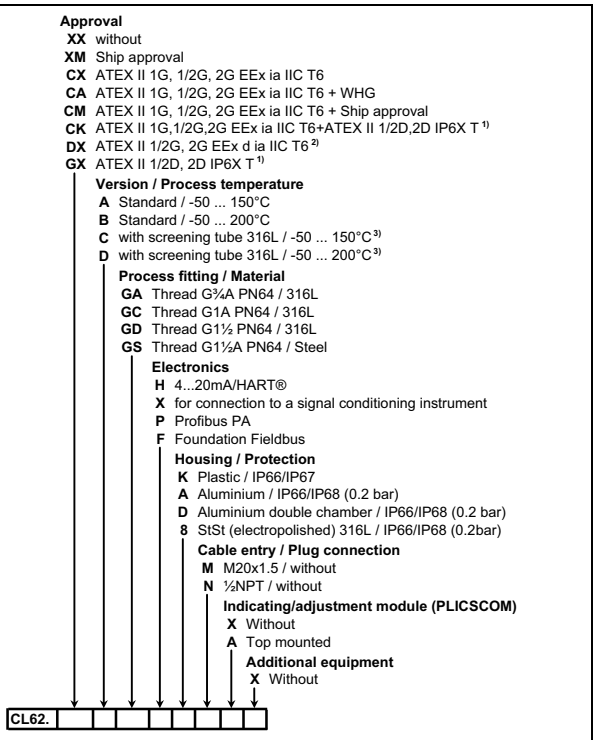


Fig. 32: VEGACAL 69

L Sensor length, see chapter "Technical data"

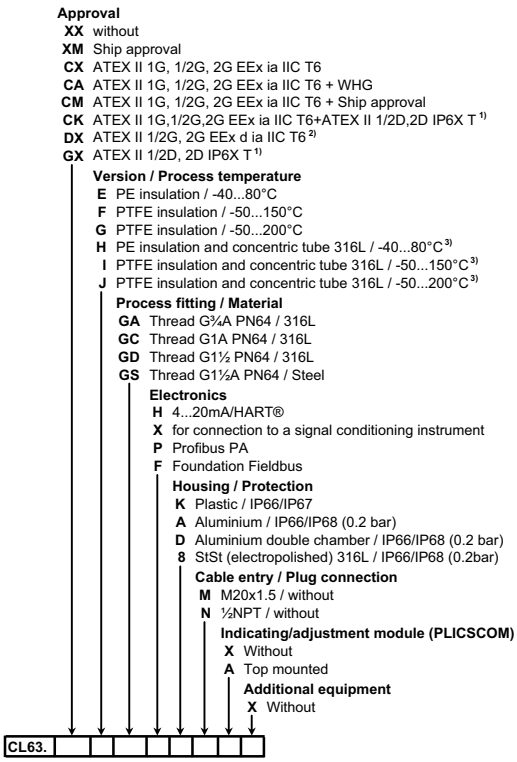
8 Product code

VEGACAL 62



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 63



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"

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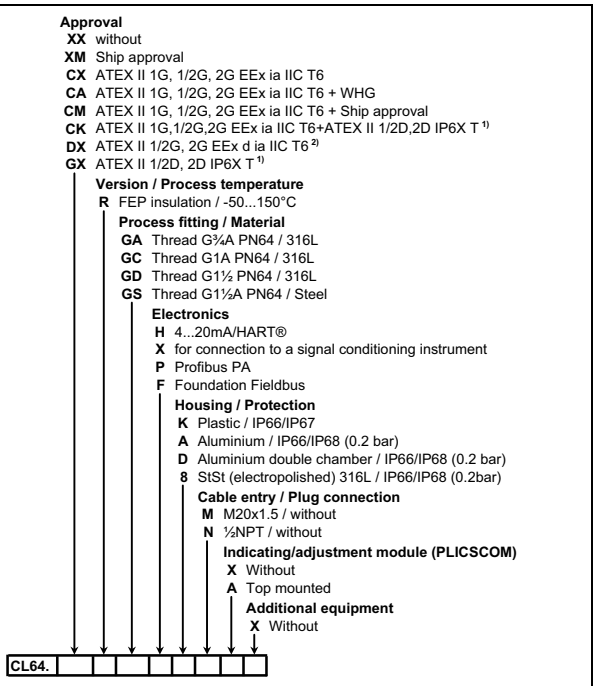
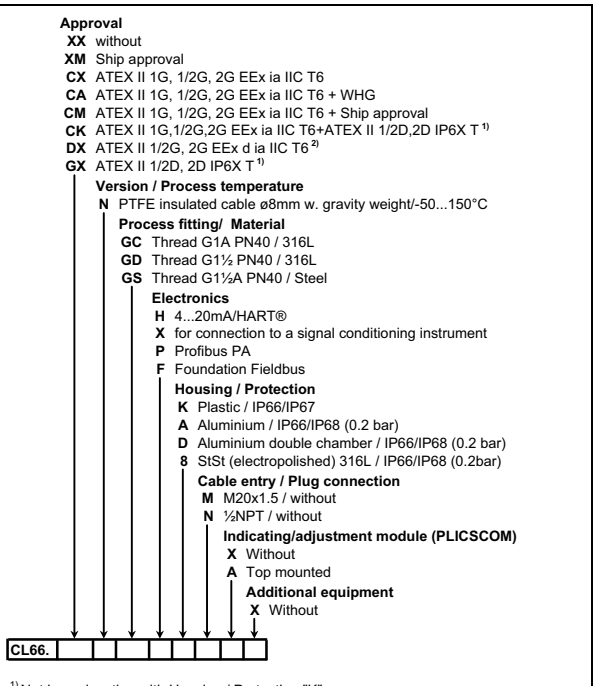
VEGACAL 64



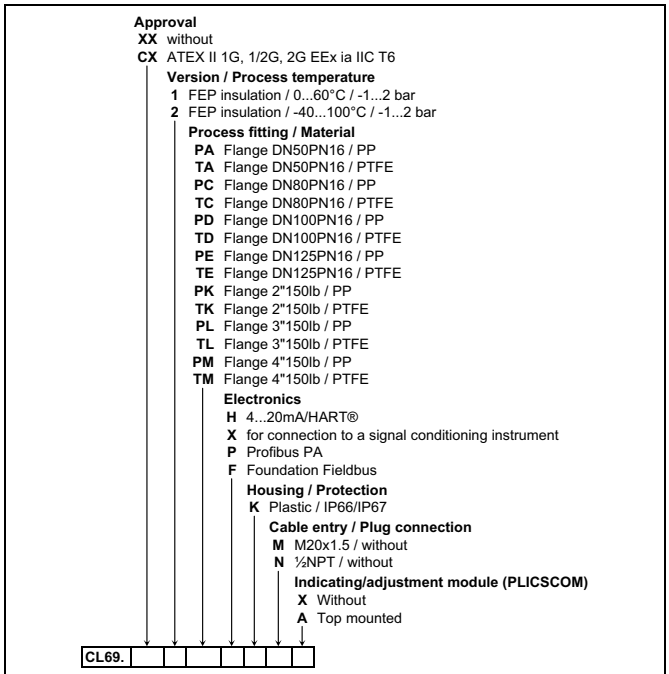
1) Not in conjunction with Housing / Protection "K"
2) Only in conjunction with Housing / Protection "D"

VEGACAL 66



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

VEGACAL 69



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VEGA

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