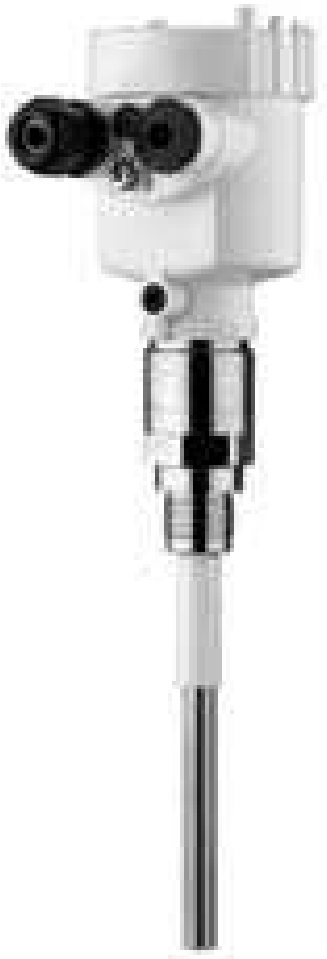
Limit level measurement with bulk solids

Capacitive

VEGACAP 62
VEGACAP 65
VEGACAP 66
VEGACAP 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

The VEGACAP series consists of capacitive sensors for level detection.

The instruments are designed for industrial use in all areas of process technology and are universally applicable.

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

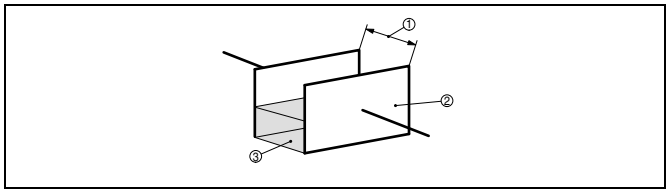

Fig. 1: Functional principle - Plate capacitor

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.

A level change causes a change in capacitance which is processed by the electronics and converted into an appropriate switching command.

The more constant the conductivity, bulk density and temperature of a product, the better the conditions for capacitive 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.

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

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

1.1 Application examples

Light-weight solids

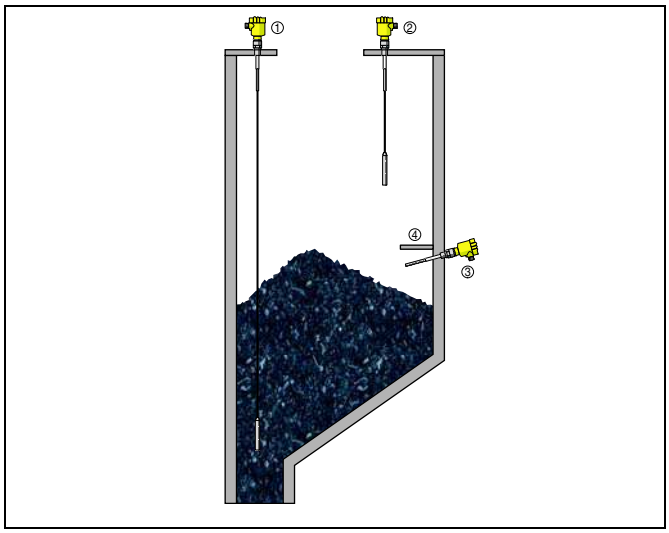

Fig. 2: Level switches in light solids

1 VEGACAP 65 level switch for empty signalling
2 VEGACAP 65 level switch for full signalling/overfill protection
3 VEGACAP 62 level switch for level detection - laterally mounted
4 Protective cover above the probe

Cable probes should generally be preferred over rod probes for use in bulk solids. Cable probes can follow the movements of the bulk material and thus have a considerably longer service life in abrasive and highly agitated bulk solids. The switching point is usually on the gravity weight, which provides very high measuring sensitivity due to its larger surface. This is especially advantageous for products with small DK value.

If the level detector has to be mounted laterally, a VEGACAP 65 cable probe or a VEGACAP 62 rod probe can be used. Due to the lateral mounting, VEGACAP 62 yields very high switching accuracy even if the product characteristics are constantly changing. The instrument should be mounted slightly inclined (approx. 20 … 30°) to avoid possible buildup. Depending on the vessel height and position of the filling stream, VEGACAP 62 should be protected from mechanical impact with a protective cover.

If there is heavy condensation on the vessel ceiling, and thus on the measuring probe, a protective tube approx. 300 mm long should be applied.

Advantages:
- Shortenable probe
- Insensitive to buildup
- Easy setup
- Rugged construction

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Heavy solids

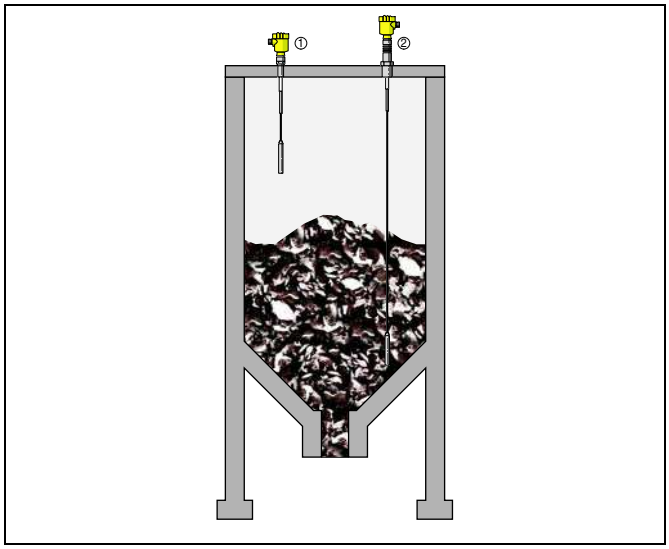

Fig. 3: Level switch in heavy solids

1 VEGACAP 65 level switch for full signalling/overfill protection
2 VEGACAP 65 level switch for empty signalling

Typical heavy solids are e.g. cement, sand, filler, gravel or flour.

Cable probes should be preferred over rod probes, especially for use in very heavy bulk materials. Cable probes can follow the movements of bulk material and thus have a considerably longer service life in abrasive and highly agitated bulk solids.

Ruggedness is very important for applications in heavy solids. The capacitive measuring principle lends itself well here. VEGACAP excels in such applications because of its robust mechanical construction and easy setup and commissioning.

Advantages:
- Very rugged construction
- Easy setup
- Shortenable probe
- Insensitive to buildup

Backup detection

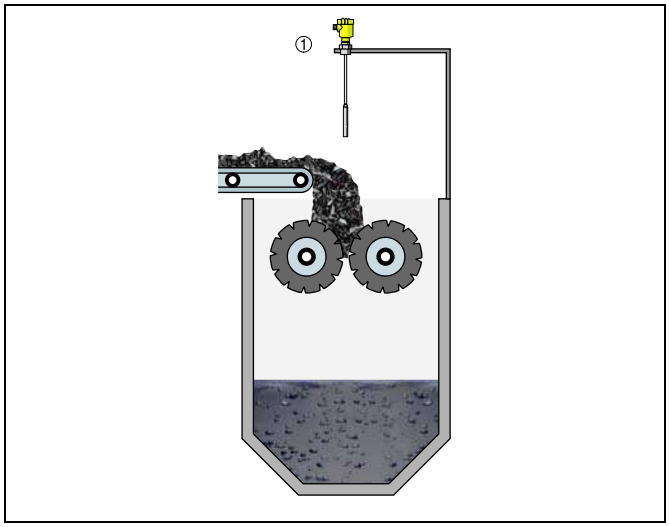

Fig. 4: Backup detection on conveyor belt/inlet funnel

1 VEGACAP 65 level switch for full signalling/overfill protection

Bulk solids reach the inlet funnel or buffer vessel via belt or spiral conveyors. The VEGACAP capacitive probe signals and prevents a possible backup or an overfilling of the inlet funnel. Depending on the temperature and kind of bulk material, steam or dust may be generated in the buffer vessel. VEGACAP is not affected by this and continues to function reliably.

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

In solids with a low DK value, lateral installation is recommended - a horizontally mounted rod gets covered quickly over its entire length and thus provides much more reliable switching. A suitable guard plate should be mounted above the rod of the probe to protect it against damage from falling solids. If the rod is mounted slightly inclined to the bottom, buildup can slide off more easily. The bulk material should not be too coarse or heavy.

Advantages:
- Simple mounting
- Wide application range
- Very rugged construction
- Maintenance-free

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2 Type overview

	VEGACAP 62	VEGACAP 65	VEGACAP 66
			
Preferred application:	Solids, non-conductive liquids	Solids, non-conductive liquids	Solids, liquids
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 … +150 °C (-58 … +302 °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)

	VEGACAP 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

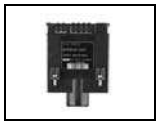

Plastic

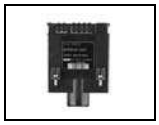

Stainless steel

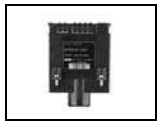

Aluminium

Electronics


Relay output


Transistor output


Contactless electronic switch


Two-wire output

Sensors


Probe

Approvals


Gas-explosion protection


Dust-explosion protection

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3 Mounting instructions

Switching point
VEGACAP can be mounted in any position.

In case of horizontal installation, the instrument must be mounted in such a way that the probe is at the height of the requested switching point.

In case of vertical installation, the instrument must be mounted so that the probe is immersed approx. 50 … 100 mm in the product when the desired switching point is reached.

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.

Filling opening
Install the meas. probe in such a way that the probe does not protrude directly into the filling stream. Should such an installation location be necessary, mount a suitable baffle above or in front of the probe.

Horizontal mounting
To achieve a very precise switching point, you can install VEGACAP horizontally. However, if the switching point can have a tolerance of a few centimeters, we recommend mounting VEGACAP approx. 20° inclined to the vessel bottom to avoid buildup.

Install rod probes in such a way that the probe projects freely into the vessel. When the instrument is mounted in a tube or socket, buildup can form which impairs the measurement. This applies mainly to adhesive products.

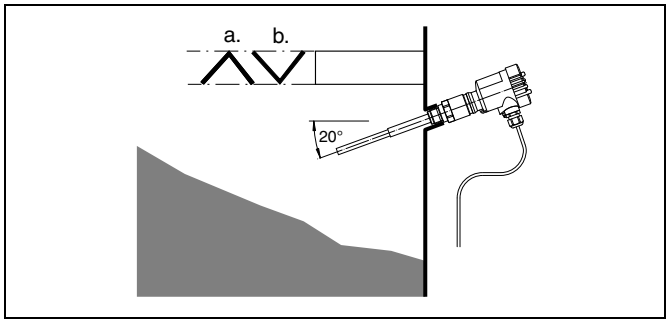

Fig. 5: Horizontal mounting

Material cone
Material cones can form in silos for bulk solids, thereby altering the switching point. Please keep this in mind when installing the probe 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 the measuring error caused by the material cone in cylindrical vessels, the probe must be mounted at a distance of d/6 from the vessel wall.

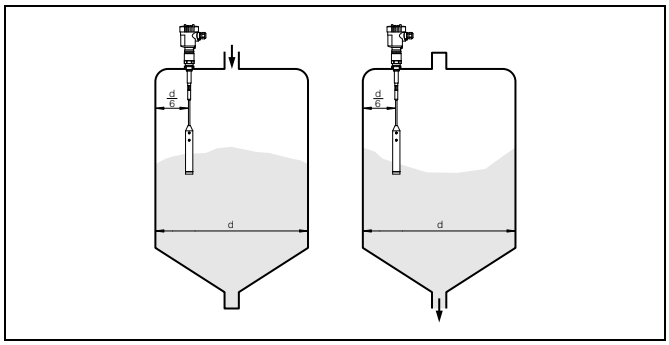

Fig. 6: Filling and emptying centered

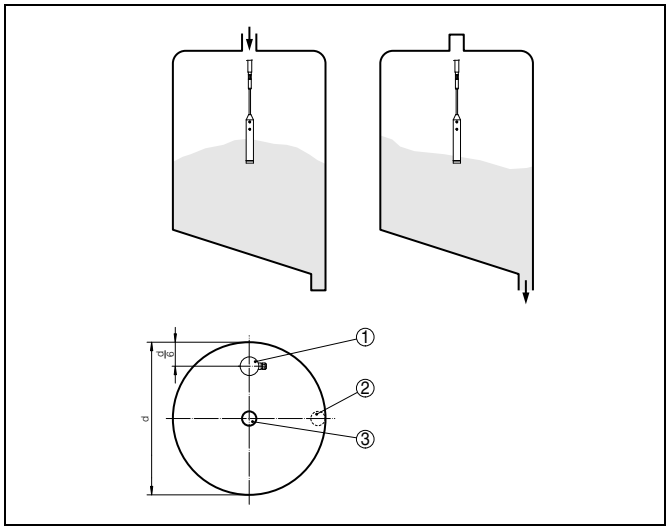

Fig. 7: Filling in the center, emptying laterally

1 VEGACAP
2 Emptying opening
3 Filling opening

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*".

Inflowing medium
If VEGACAP is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGACAP 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.

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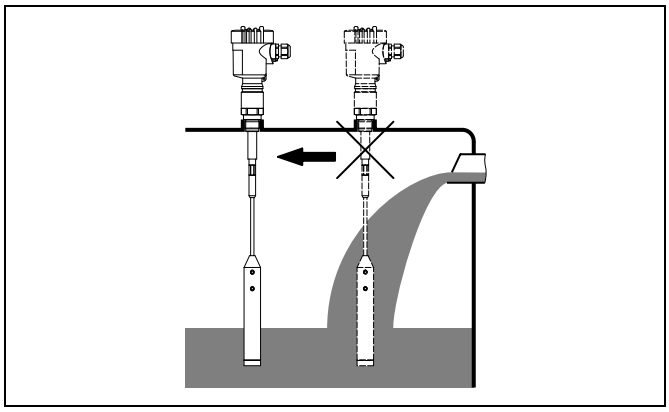

Fig. 8: Inflowing medium

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.

Length of the level detection probe
Keep in mind when ordering the instrument that when the switching point is reached the probe must be sufficiently immersed according to the desired filling level, and that the depth of immersion depends on the electrical properties (DK value) of the medium. An electrode for level detection in oil (εr ~2) requires a considerably deeper immersion than one used in water (εr ~81).

As a rule:
- non-conductive products > 50 mm
- conductive products > 30 mm

Lateral load
Make sure that the probe is not subjected to strong lateral forces. Mount the probe at a position in the vessel where no interfering influence, e.g. from agitators, filling opening etc. can occur. This applies particularly to very long rod and cable probes.

Product movement
Mount the probe in such a way that the probe cannot touch the vessel wall and that the screening tube cannot be bent or broken.

Shorten the probe
Partly insulated cable or rod probes can be shortened afterwards. Keep in mind that shortening the probe can change the inherent capacitance of the instrument, which can in turn change the switching point.

The probe is compensated to the respective probe length. Therefore you should state in your order if you intend to shorten the probe.

Tractive forces
If strong tractive forces arise, e.g. during filling or inflowing solids, high tensile loads can be caused. In such cases and for short meas. lengths, use a rod probe as the rod is generally more stable.

If due to the length or mounting location, a cable probe should be necessary, the probe should be strained because the cable can more easily follow the product movements. Make sure that the probe cable is not in contact with the vessel wall.

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, lead etc.

Insulating measures such as e.g. covering the thread with teflon tape can interrupt the necessary electrical connection. If this is necessary, use the ground terminal on the housing to connect the instrument with the vessel.

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 the metal supporting structure of the vessel or similar. When using a standard probe, it is necessary to attach a suitable grounding surface. Attach a very broad grounding surface outside on the vessel wall, e.g. wire braiding laminated into the vessel wall or a metal foil glued to the outside of the vessel.

Connect the grounding surface to the ground terminal on the housing.

Conductivity of the product
In special cases, partly insulated probes can be used for level detection in conductive products. The electronics of the probe is short-circuit proof.

Influencing factors
In practice, the dielectric value is subject to certain fluctuations. The following factors can influence of the capacitive measuring principle:
- Bulk density
- Concentration (mixing ratio of the product)
- Temperature
- Conductivity

The more constant the above mentioned factors, the better the conditions for capacitive measurement. Changes in the conditions are generally not critical in products with high dielectric values.

If a very precise switching point is required, or if the the product changes or has a low low dielectric value, we recommend lateral mounting - a horizontally mounted rod gets covered quickly over its entire length and has a much more reliable switching function.

You can either mount a standard measuring probe laterally or use an angled measuring probe.

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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*".

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

Dielectric figure (DK value)
In products with low dielectric value and slight level changes you should try to increase the capacitance change. If the dielectric value is less than 1.5, special measures are necessary to ensure that the level is detected reliably. E.g. additional surfaces can be attached or a screening tube used with high sockets, etc.

For applications with high sockets and products with low dielectric value you can compensate the strong influence of the metal socket with a concentric tube.

Electrically conductive products react like products with very high dielectric value.

A detailed list with dielectric values is available on our homepage under "*Services - Downloads- Lists of measured products*".

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.

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4 Electrical connection

4.1 Preparing the connection

Note safety instructions
Always keep in mind the following safety instructions:
- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

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

Select power supply
Connect the power supply according to the following diagrams. Oscillators with relay output and contactless electronic switch are designed in protection class 1. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations. As a rule, connect VEGACAP to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

The data for voltage supply are specified in chapter "*Technical data*".

Selecting connection cable
VEGACAP is connected with standard cable with round cross section. An outer cable diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland.

If cable with a different diameter or wire cross section is used, exchange the seal or use an appropriate cable connection.

In hazardous areas, only use approved cable connections for VEGACAP.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

4.2 Wiring plan

Relay output
We recommend connecting VEGACAP in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

The relays are always shown in non-operative condition.

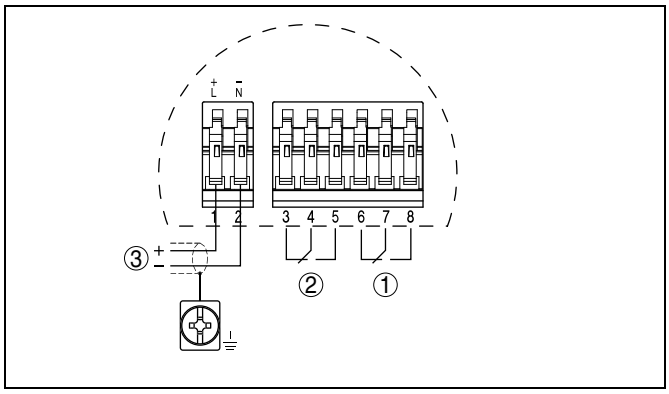

Fig. 9: Wiring plan, single chamber housing

1 Relay output
2 Relay output
3 Voltage supply

Transistor output
We recommend connecting VEGACAP in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

The instrument is used to control relays, contactors, magnet valves, warning lights, horns as well as PLC inputs.

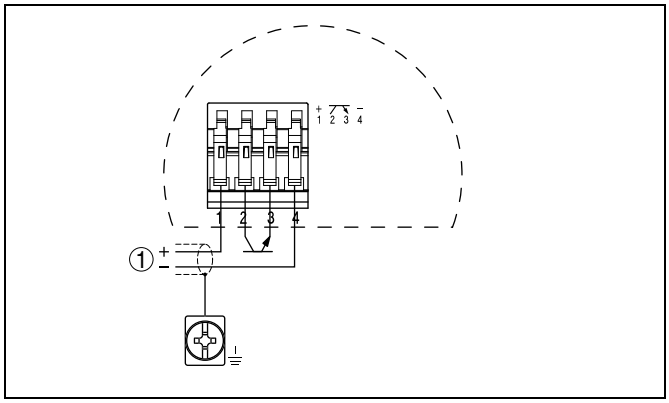

Fig. 10: Wiring plan, single chamber housing

1 Voltage supply

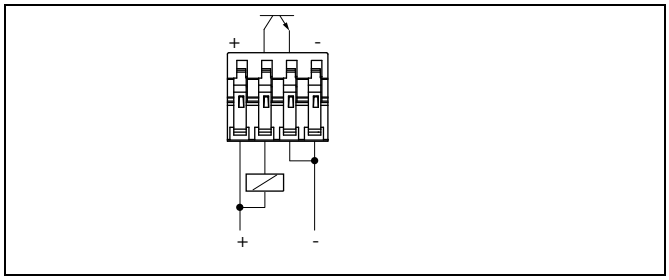

Fig. 11: NPN action

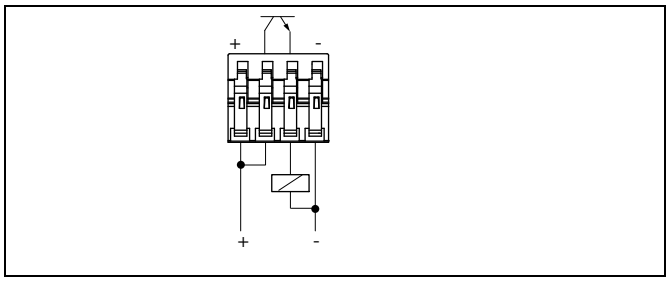

Fig. 12: PNP action

Contactless electronic switch
We recommend connecting VEGACAP in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

The contactless electronic switch is always shown in non-operative condition.

The instrument is used for direct control of relays, contactors, magnet valves, warning lights, horns etc. It must not be operated without an intermediately connected load, because the electronics would be destroyed if connected directly to the mains. It is not suitable for connection to low voltage PLC inputs.

Domestic current is temporarily lowered below 1 mA after switching off the load so that contactors, whose holding current is lower than the constant domestic current of the electronics, are reliably switched off.

When VEGACAP is used as part of an overfill protection system according to WHG, also note the regulations of the general type approval.

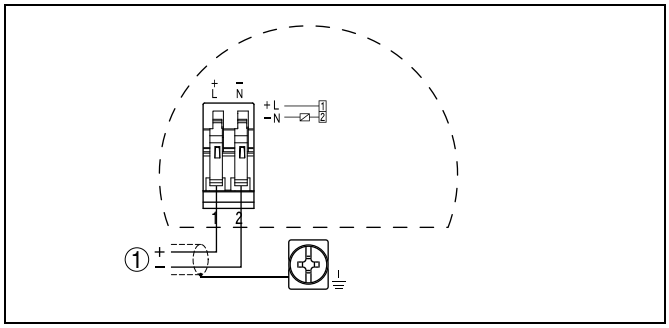

Fig. 13: Wiring plan, single chamber housing

1 Voltage supply

Two-wire output
We recommend connecting VEGACAP in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

For connection to a VEGATOR signal conditioning instrument dto. Ex. The sensor is powered by the connected VEGATOR signal conditioning instrument. Further information is available in chapter "*Technical data*", "*Ex-technical data*" are available in the supplied "*Safety information manual*".

The wiring example is applicable for all suitable signal conditioning instruments.

Take note of the operating instructions manual of the signal conditioning instrument. Suitable signal conditioning instruments are listed in chapter "*Technical data*".

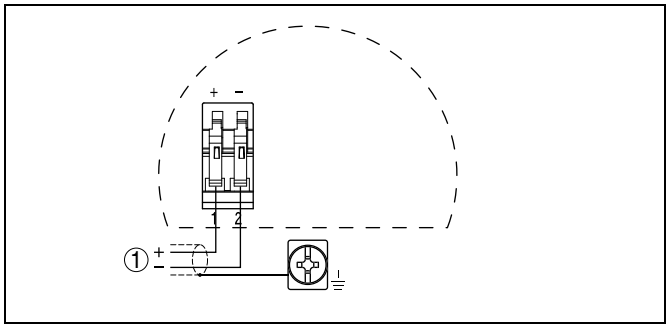

Fig. 14: Wiring plan, single chamber housing

1 Voltage supply

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5 Operation

5.1 Adjustment, general

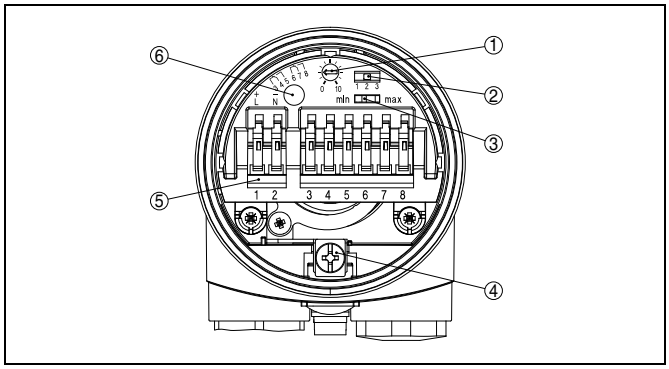

Fig. 15: Adjustment elements electronics module, e.g. relay output (CP60R)

1 Potentiometer for switching point adaptation (not with two-wire electronics)
2 Range switch
3 DIL switch for mode adjustment (not with two-wire electronics)
4 Ground terminal
5 Connection terminals
6 Control lamp

Switching point adaptation (1)
By using the potentiometer you can adapt the switching point of VEGACAP to the medium.

With two-wire electronics the switching point is adjusted on the signal conditioning instrument. For that reason there is no potentiometer.

Range switch (2)
Select the capacitance range of the probe with the mode switch.

With the potentiometer (1) and the mode switch (2) you can change the switching point of the probe or adapt the sensitivity of the probe to the electrical properties of the product and the conditions in the vessel.

This is required to enable the level switch to reliably detect products with very low or very high dielectric value reliably (DK = dielectric value).

Capacitance range
- Range 1: 0 … 20 pF (sensitive)
- Range 2: 0 … 85 pF
- Range 3: 0 … 450 pF (insensitive)

Examples of dielectric values: air = 1, oil = 2, acetone = 20, water = 81 etc.

Turn the potentiometer (1) anticlockwise to make the probe more sensitive.

Mode adjustment (3)
With the mode adjustment (min./max.) you can change the switching condition of the output. You can set the required mode (max. - max. detection or overfill protection, min. - min. detection or dry run protection).

With two-wire electronics the mode is selected on the signal conditioning instrument. For that reason there is no mode switch.

LED display (6)
Diode for indication of the switching status (with plastic housing visible from outside).

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6 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

VEGACAP 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)

VEGACAP 65

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (partly insulated)	PA, PTFE
– Probe (cable PTFE partly insulated: ø 6 mm/0.236 in)	316L
– Probe (cable PA partly insulated: ø 8 mm/0.315 in)[1)]	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)	0.4 … 32 m (1.3 … 105 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)

VEGACAP 66

Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– insulation (fully insulated)	PTFE
– Probe (cable PTFE fully insulated: ø 8 mm/0.315 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)
– Gravity weight	900 g (32 oz)
– Cable weight: ø 8 mm (0.315 in)	200 g/m (2.1 oz/ft)
Sensor length (L)	0.4 … 32 m (1.3 … 105 ft)
Max. tensile load (cable)	10 KN (2248 lbs)
Max. torque (process fitting - thread)	100 Nm (73 lbf ft)

[1)] Cable connected electrically conductive with the gravity weight.

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VEGACAP 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)[2)]	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 … 131.29 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

Relay output

Output	Relay output (DPDT), 2 floating spdts
Turn-on voltage	
– Min.	10 mV
– Max.	253 V AC, 253 V DC
Switching current	
– Min.	10 µA
– Max.	3 A AC, 1 A DC
Breaking capacity	
– Max.	1250 VA, 50 W
– Min.	50 mW
Contact material (relay contacts)	AgCdO and Au plated
Modes (adjustable)	min./max.
Integration time approx.	
– When immersed	0.5 s
– When laid bare	0.5 s
– In case of failure	1 s

Transistor output

Output	floating transistor output, overload and permanently shortcircuit proof
Max. load current	400 mA
Max. turn-on voltage	55 V DC
Blocking current	< 100 µA
Modes (adjustable)	min./max.
Integration time approx.	
– When immersed	0.5 s
– When laid bare	0.5 s
– In case of failure	1 s

Contactless electronic switch

Output	Contactless electronic switch
Modes (adjustable)	min./max.

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

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Integration time approx.	
– When immersed	0.5 s
– When laid bare	0.5 s
– In case of failure	1 s

Two-wire output

Output	Two-wire output
Suitable signal conditioning instruments	VEGATOR 521, 527, 620, 621, 622
Modes	adjustable via the signal conditioning instrument
Output signal	> 4 … < 20 mA (not standardised)
Fault message	< 2.3 mA
Integration time approx.	
– When immersed	0.5 s
– When laid bare	0.5 s
– In case of failure	1 s

Ambient conditions

Ambient temperature on the housing	-40 … +80 °C (-40 … +176 °F)
Storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions

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

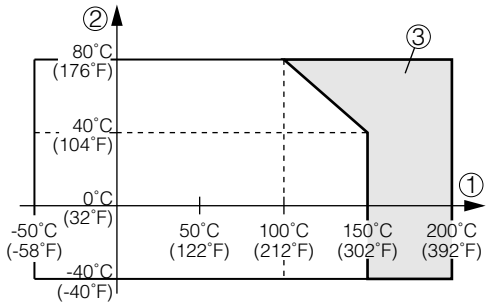

Fig. 16: VEGACAP 62, 65, 65 - ambient temperature - product temperature

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

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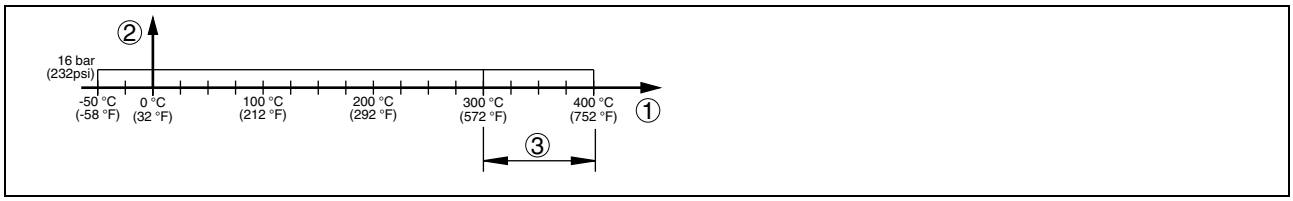

Fig. 17: VEGACAP 67 - process temperature - process pressure

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; attached 1 x cable entry M20 x 1.5 or: • 1 x cable entry ½ NPT, 1 x blind stopper ½ NPT, 1 x cable entry ½ NPT or: • 1 x plug M12 x 1; 1 x blind stopper M20 x 1.5
Spring-loaded terminals	for wire cross-section up to 1.5 mm² (AWG 16)

Adjustment elements

Mode switch (not with two-wire electronics)	
– Min.	Min. detection or dry run protection
– Max.	Max. detection or overfill protection
Meas. range switch	
– range 1	0 … 20 pF (sensitive)
– range 2	0 … 85 pF
– range 3	0 … 450 pF (insensitive)
– Fault message	< 2.3 mA
Switching point adjustment	Potentiometer (not with two-wire electronics)

Voltage supply

Relay output (R)

Supply voltage	20 … 253 V AC, 50/60 Hz, 20 … 72 V DC (at U > 60 V DC, the ambient temperature can be max. 50 °C/122 °F)
Power consumption	1 … 8 VA (AC), approx. 1 W (DC)

Transistor output (T)

Supply voltage	10 … 55 V DC
Max. power consumption	0.5 W

Contactless electronic switch (C)

Supply voltage	20 … 253 V AC, 50/60 Hz, 20 … 253 V DC
Domestic current requirement	approx. 3 mA (via load circuit)
Load current	
– Min.	10 mA
– Max.	400 mA (at I > 300 mA the ambient temperature can be max. 60 °C/140 °F) max. 4 A up to 40 ms

Two-wire output (Z)

Supply voltage	10 … 36 V DC (via the signal conditioning instrument)

Electrical protective measures

Electronics versions - relay output, contactless electronic switch

Protection	IP 66/IP 67

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Overvoltage category	III
Protection class	I

Electronics versions - transistor output, two-wire output

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

Approvals[3)]

Electronics versions - relay, transistor output, contactless electronic switch
Overfill protection according to WHG

ATEX
– ATEX II 1/2D 2D IP6X T
Ship approvals

Electronics version - two-wire output
Overfill protection according to WHG

ATEX
– ATEX II 1G, 1/2G, 2G EEx ia IIC T6
– ATEX II 1/2D 2D IP6X T
IEC
– IEC Ex ia IIC T6
FM
– FM (NI) CL I, DIV2, GP ABCD (DIP) CL II, III, DIV1, GP EFG
Ship approvals

CE conformity

EMVG (89/336/EWG), Emission: EN 61326: 2004 (class B),
Susceptibility: EN 61326: 2004 (Supplement A)
LVD (73/23/EWG), EN 61010-1: 2001

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3) VEGACAL 67 only without approvals.

7 Dimensions

Housing

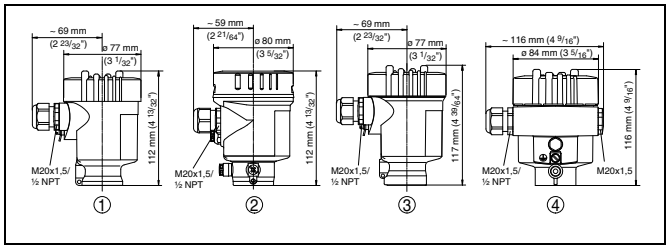

Fig. 18: Housing versions

1 Plastic housing
2 Stainless steel housing
3 Stainless steel housing - precision casting
3 Aluminium housing

VEGACAP 62

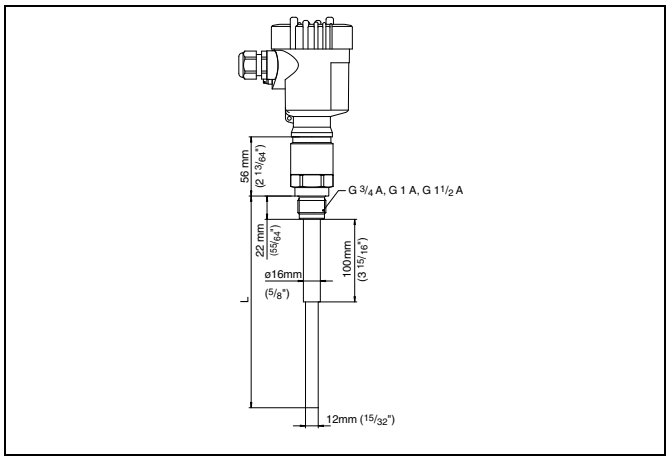

Fig. 19: VEGACAP 62 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAP 65

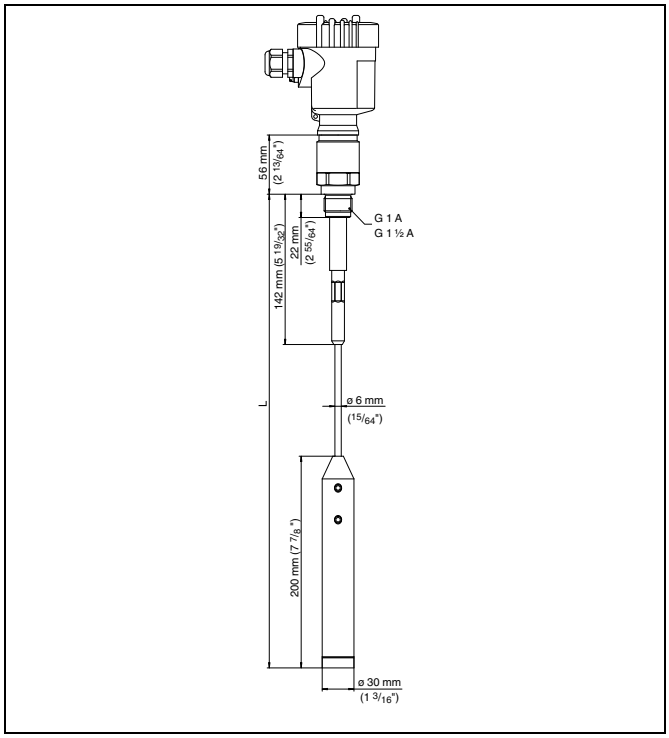

Fig. 20: VEGACAP 65 - threaded version

L Sensor length, see chapter "Technical data"

VEGACAP 66

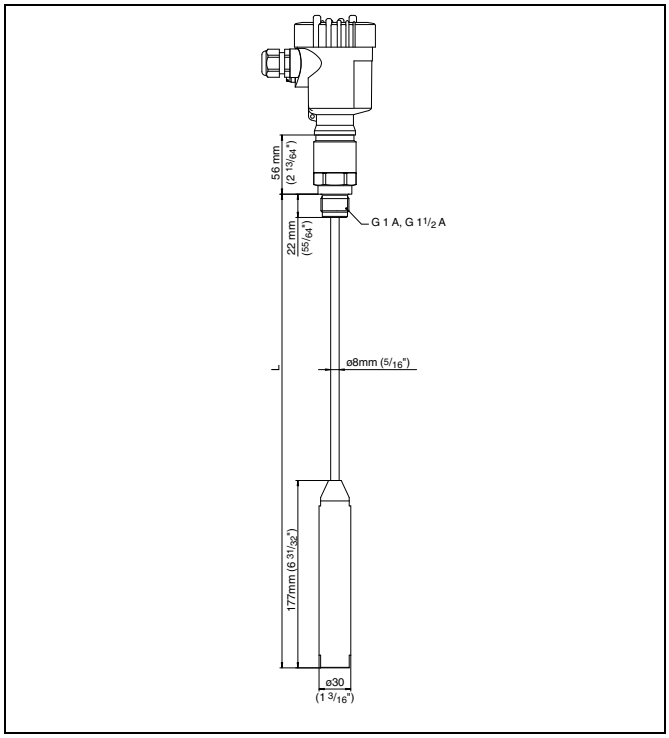

Fig. 21: VEGACAP 66 - threaded version

L Sensor length, see chapter "Technical data"

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VEGACAP 67

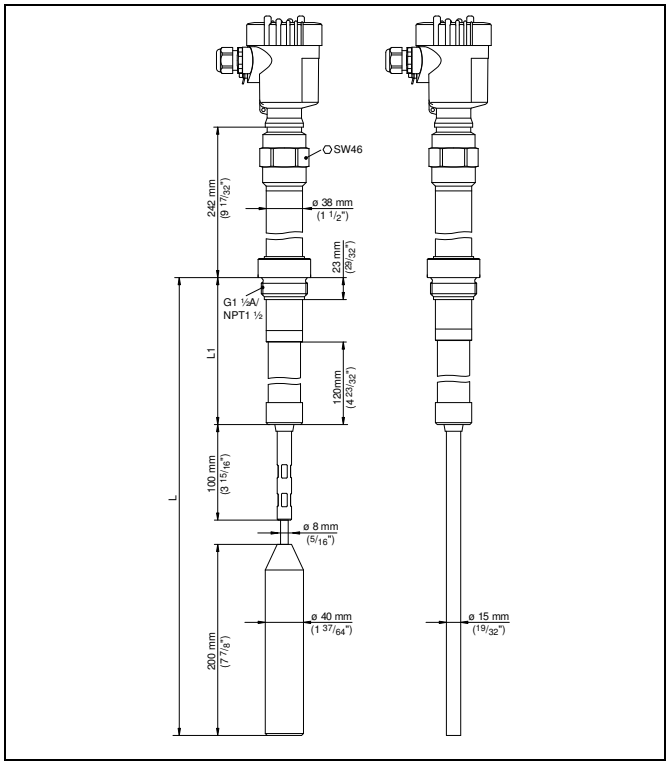


Fig. 22: VEGACAP 67 - threaded version G1½ A and 1½ NPT, -50 … +300 °C (-58 … +572 °F)

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

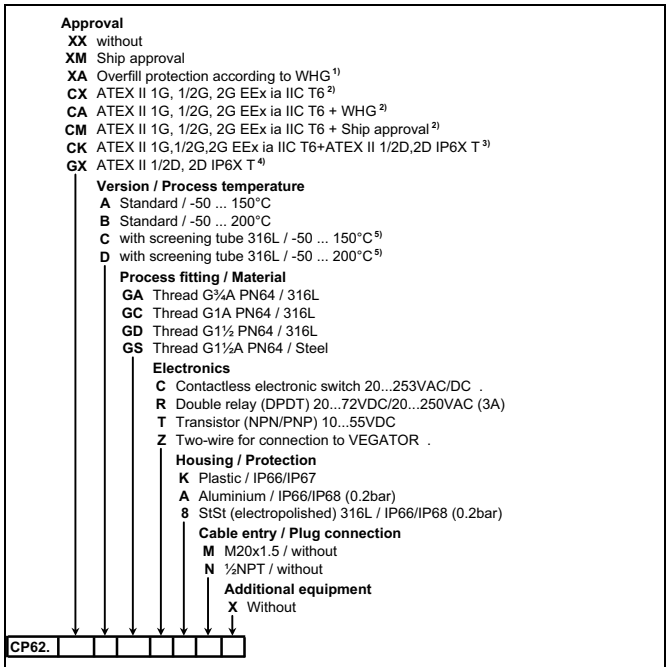
See supplementary instructions manual "Remote housing - VEGACAP, VEGACAL"

L Sensor length, see chapter "Technical data"

L1 Supporting tube length, see chapter "Technical data"

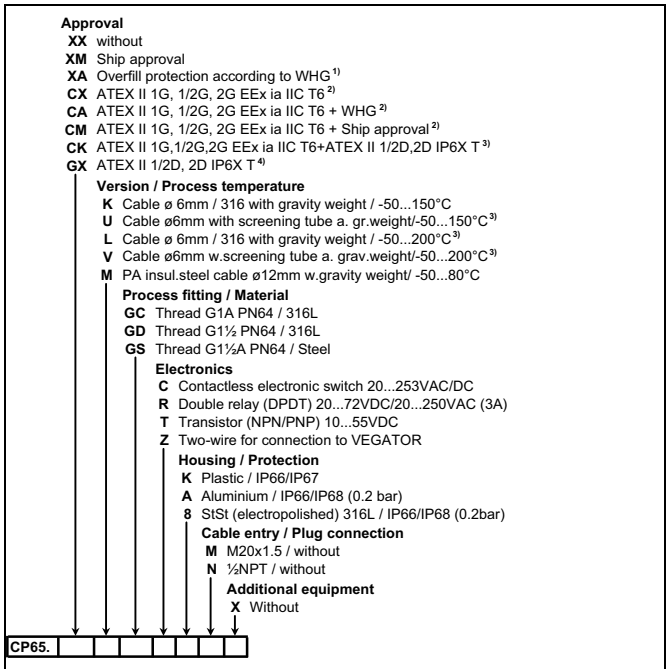
8 Product code

VEGACAP 62



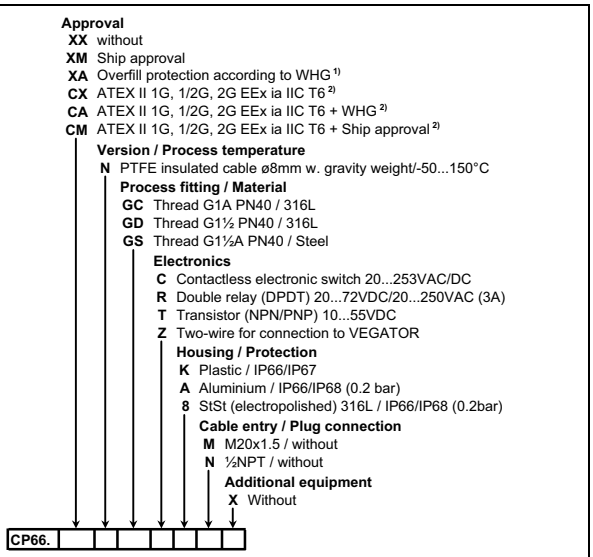
1) Only in conjunction with Electronics "C", "R" and "T"
2) Only in conjunction with Electronics "Z"
3) Not in conjunction with Housing / Protection "K" and only with Electronics "Z"
4) Not in conjunction with Housing / Protection "K"
5) Not in conjuction with Process fitting / Material "GA", "GS"

VEGACAP 65



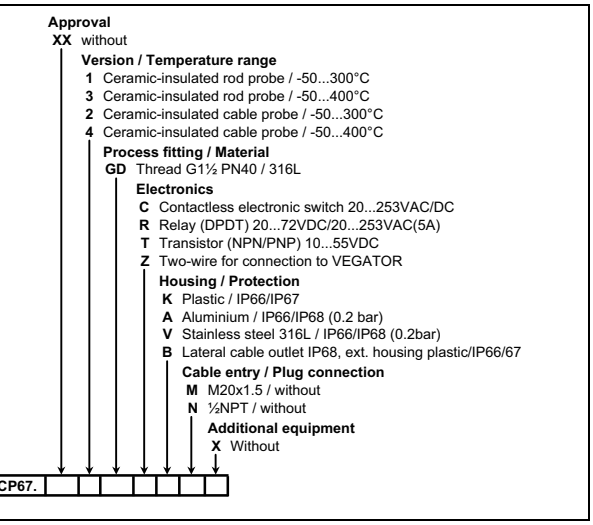
1) Only in conjunction with Electronics "C", "R" and "T"
2) Only in conjunction with Electronics "Z"
3) Not in conjunction with Housing / Protection "K" and only with Electronics "Z"
4) Not in conjunction with Housing / Protection "K"

VEGACAP 66



1) Only in conjunction with Electronics "C", "R" and "T"
2) Only in conjunction with Electronics "Z"

VEGACAP 67



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VEGA

VEGA Grieshaber KG

- certificates
- approvals

and much, much more