

Level detection in liquids

Vibration

VEGASWING 51
VEGASWING 61
VEGASWING 63



Product Information



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VEGA

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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.

1 Description of the measuring principle

Measuring principle

VEGASWING is a point level sensor with tuning fork for level detection.

It is designed for industrial use in all areas of process technology, but preferably in liquids.

The vibrating element (tuning fork) is energized piezoelectrically and vibrates at its mechanical resonance frequency. The piezos are fixed mechanically and are hence not subject to temperature shock limitations. If the vibrating element is submerged in the product, the vibrating frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

Typical applications are overfill and dry run protection. Thanks to its simple and robust measuring system, VEGASWING is virtually unaffected by the chemical and physical properties of the liquid.

It also works when subjected to strong external vibrations or changing products.

Fault monitoring

The electronics module of VEGASWING monitors continuously the following criteria:

- Strong corrosion or damage on the tuning fork
- loss of vibration
- Line break to the piezo drive

If one of the stated malfunctions is detected or in case of power failure, the electronics takes on a defined switching condition, for example, the output transistor blocks (safe condition).

Function test

The recurring function test is used to check the safety function, in order to reveal possible non-detectable dangerous faults. The function of the measuring system must be checked in regular, adequate intervals.

There are two different ways to carry out a function test:

VEGASWING 61, 63 with two-wire electronics in conjunction with a VEGATOR signal conditioning instrument.

- Test key on the VEGATOR signal conditioning instrument

VEGASWING 61, 63 with two-wire electronics in conjunction with a VEGALOG processing system or a PLC.

- Brief interruption of the connection cable to the PLC

VEGASWING 51

The small level switch model has a tuning fork 40 mm long and a small, compact stainless steel housing and is available as transistor output and contactless electronic switch versions.

VEGASWING 61, 63

VEGASWING series 60 level switches are instruments from the VEGA plics® series, which are available in standard and tube version. plics® instruments offer suitable versions for all applications thanks to the many different process fittings, housings and

electronics versions. They have all the usual approvals and the tuning fork can also be polished, e.g. for applications in the food processing industry.

VEGASWING are virtually unaffected by product properties and thus do not have to be adjusted.

The level switches are used in applications with process temperatures up to 250 °C (482 °F) and pressures of up to 64 bar (928 psig).

They detect liquids from 0.5 ... 2.5 g/cm³ (0.018 ... 0.09 lbs/in³).

All electronics are qualified for the function overfill and dry run protection according to IEC 61508 and 61511 for SIL2, in redundant version also for SIL3.

1.1 Application examples

Chemical industry - Solvents

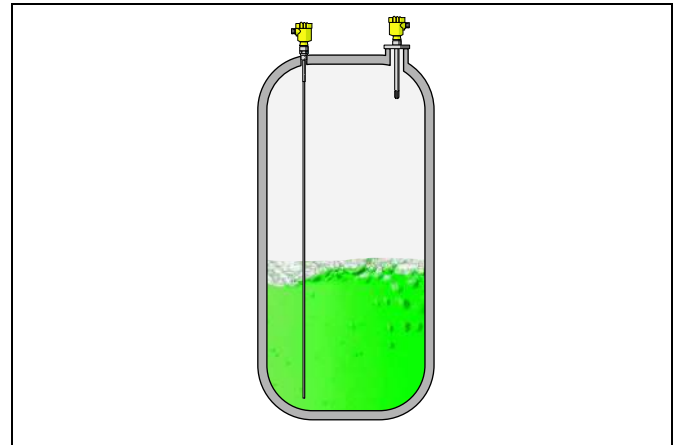


Fig. 1: Level detection in vessels with solvents

Apart from the continuous level measurement, level detection is an essential safety feature for storage tanks. Many modern sensors for continuous level measurement are actually approved as overfill protection system, however, a second, physically different measuring system provides the best safety and redundancy.

Thanks to their manifold application possibilities, VEGASWING vibrating level switches are ideal for all applications in the area of liquids warehousing. A large number of electrical and mechanical versions ensures simple integration into existing control systems.

Advantages:

- Various electrical versions
- Product-independent
- Universal level detection for all liquids

Chemical industry - reactors

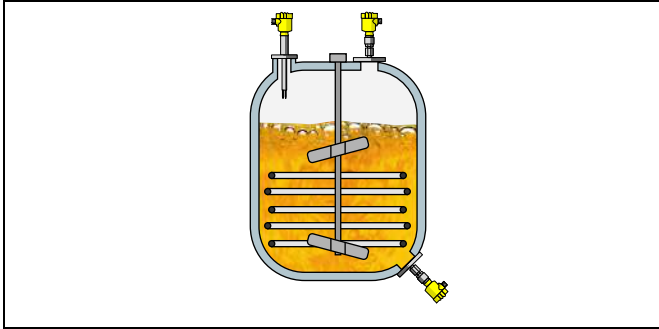


Fig. 2: Level detection in chemical reactors

Because they prevent overfilling or dry running of pumps, sensors for level detection are an important safety element in reactors. Due to their universal applicability, VEGASWING level switches are well suited for use in reaction vessels. Even high viscosities, temperatures up to 250 °C and pressure up to 64 bar do not impair their function.

To provide the required chemical resistance, high resistance materials and enamelled versions are available.

In toxic products, the VEGASWING version with metallic process separation ensures a high level of safety. To prevent product leakage even in case of corrosion on the tuning fork, a glass seal is also welded in. This guarantees optimum safety.

To provide optimal resistance to the measured medium, whatever its composition and corrosive properties may be, sensors made of 316L or Hastelloy, or sensors in plastic-coated and enamelled versions, are available.

Thanks to their manifold application possibilities, VEGASWING vibrating level switches are ideal for all applications in the area of liquids warehousing. A large number of electrical and mechanical versions ensures simple integration into existing control systems.

Advantages:

- Various electrical versions
- Product-independent
- Completely gas-tight
- High reliability
- Universal level detection for all liquids

Water/Sewage water plants

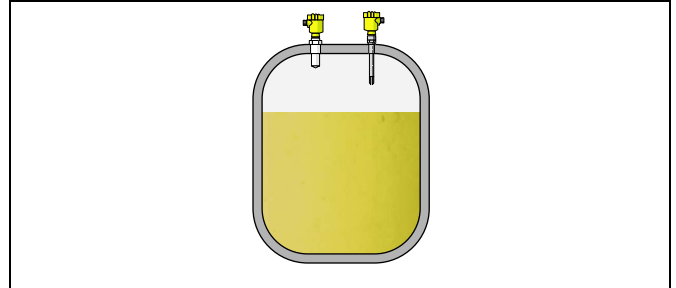


Fig. 3: Precipitants in sewage water processing

Chemicals are required for sewage water treatment. They are applied to promote chemical precipitation in the process. Phosphates and nitrates are sedimented and separated. In addition to lime water and ferric chloride, various acids and lyes are stored for use in digested sludge treatment and neutralisation.

These substances are subject to the regulations for water-endangering substances. In accordance with this, overfill protection systems have to be installed on storage tanks.

Because they prevent overfilling of vessels containing toxic products, sensors for level detection are an important safety element.

Due to their versatile nature, VEGASWING vibrating level switches are also well qualified for use with water-endangering substances. To provide optimal resistance to the measured medium, whatever its composition and corrosive properties may be, sensors made of 316L, Hastelloy, or sensors in plastic-coated or enamelled versions, are available.

Advantages:

- High reproducibility
- High resistance sensor materials such as PFA, ECTFE, Hastelloy C4, enamel

Pipelines

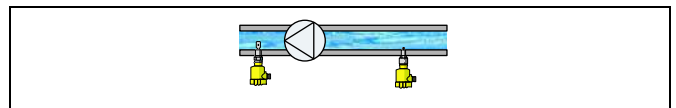


Fig. 4: Dry run protection in pipelines

Monitoring of levels is also important in pipelines, as dry running often causes damage or complete breakdown of the pumps.

The VEGASWING level switch is recommended as dry run protection system, e.g. for drinking water pumps. With a fork only 40 mm long, this level switch functions reliably, even in tubes with small diameters from DN 32.

Advantages:

- Universal level detection for all liquids
- Adjustment and maintenance-free

Food processing industry

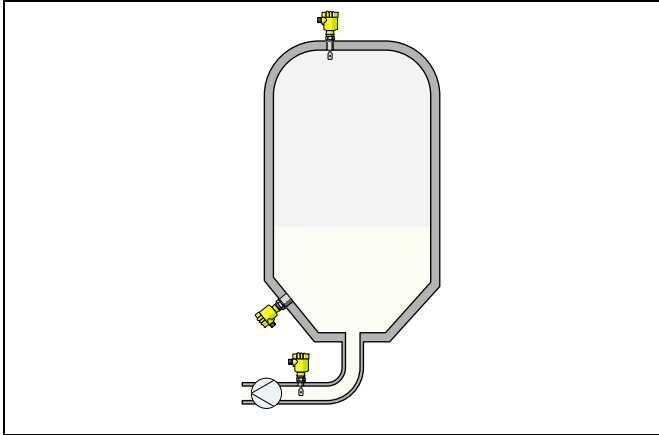


Fig. 5: Level detection and dry run protection in a tank storing milk

The processes in food processing tanks, e.g. for milk, place heavy demands on the installed measurement technology. High pressures and temperatures are generated during sterilization and cleaning of the tanks. That means that the implemented level measuring instruments and level detectors must meet the requirements of hygienic design. The innocuousness of all wetted materials must be proven and optimum cleanability must be ensured through hygienic technical design.

VEGASWING is installed for level detection and as dry run protection system. The tuning fork is highly polished for use in sensitive foodstuffs such as milk.

Advantages:

- Universal level detection for all liquids
- High resistance sensor materials such as PFA, ECTFE, Hastelloy C4, enamel
- Adjustment and maintenance-free

2 Type overview

VEGASWING 51

VEGASWING 61

VEGASWING 63


Preferred application:	Liquids	Liquids	Liquids
Length:	-	-	80 ... 6000 mm (3.15 ... 236.22 in)
Process fitting:	Thread G $\frac{3}{4}$ A, G1 A	Thread G $\frac{3}{4}$ A, G1 A, flanges, hygienic fittings	Thread G $\frac{3}{4}$ A, G1 A, flanges, hygienic fittings
Process temperature:	-40 ... +100 °C (-40 ... +212 °F) -40 ... +150 °C (-40 ... +302 °F) with temperature adapter	-50 ... +150 °C (-58 ... +302 °F) -50 ... +250 °C (-58 ... +482 °F) with temperature adapter	-50 ... +150 °C (-58 ... +302 °F) -50 ... +250 °C (-58 ... +482 °F) with temperature adapter
Process pressure:	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 64 bar (-14.5 ... 928 psig)
Signal output:	transistor output, contactless electronic switch	Relay, transistor, two-wire, NAMUR output, contactless electronic switch	Relay, transistor, two-wire, NAMUR output, contactless electronic switch
Ruggedness:	+	+	+
Sensitivity:	+	++	++
Buildup:	++	+	+
Cleanability:	++	++	++
Installation length:	++	++	++

Housing				
	Plastic	Stainless steel	Aluminium	Aluminium (double chamber)
Electronics				
	Relay output	Transistor output	Contactless electronic switch	Two-wire output
				
	NAMUR output			
Sensors				
	Tuning fork			
Approvals				
	Gas explosion protection			

3 Mounting instructions

Switching point

In general, VEGASWING can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

The tuning fork has lateral markings (notches) marking the switching point with vertical installation. The switching point refers to the medium water with basic setting of the density switch $\geq 0.7 \text{ g/cm}^3$ (0.025 lbs/in^3).

Keep in mind that foams with a density $> 0.45 \text{ g/cm}^3$ (0.016 lbs/in^3) are detected by the sensor.

Socket

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to horizontal installation and use with adhesive products.

Agitators

Due to agitators, vibrations or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long extension tube for VEGASWING 63, but check if a VEGASWING 51 or 61 level switch couldn't be used instead, mounted on the side of the vessel in horizontal position.

Extreme vibration caused by the process or the equipment, e.g. agitators or turbulence in the vessel, can cause the extension tube of VEGASWING to vibrate in resonance. This leads to increased stress on the upper weld joint. Should a longer tube version be necessary, you can provide a suitable support or guy directly above the vibrating element to secure the extension tube.



This measure applies mainly to applications in Ex areas. Make sure that the tube is not subject to bending stress due to this measure.

Inflowing medium

If VEGASWING is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGASWING at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

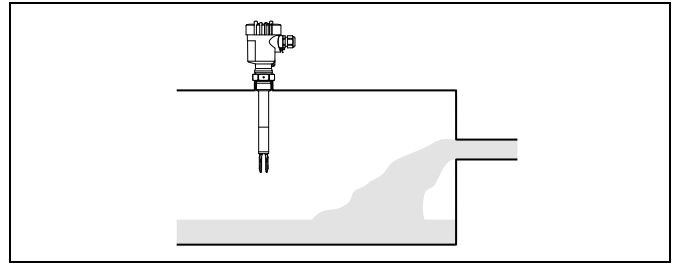


Fig. 6: Inflowing medium

Flows

To minimise flow resistance caused by the tuning fork, VEGASWING should be mounted in such a way that the surfaces of the blades are parallel to the product movement.

Lock fitting

VEGASWING in tube version can be mounted with a lock fitting for infinitely variable height adjustment. Take note of the pressure specifications of the lock fitting.

Keep in mind that the lock fitting must not be used with coated instrument versions.

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.

Protective cover

To protect the sensor against pollution and strong heat due to the sun, you can snap a weather protective cover onto the sensor housing.



Fig. 7: Weather protection cover in different versions

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 SW60R and SW60C 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 VEGASWING 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.

Data for power supply is specified in chapter "Technical data".

Selecting connection cable

VEGASWING 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 VEGASWING.

Select connection cable for Ex applications



Take note of the corresponding installation regulations for Ex applications.

4.2 Wiring plan

Relay output

VEGASWING 61, 63

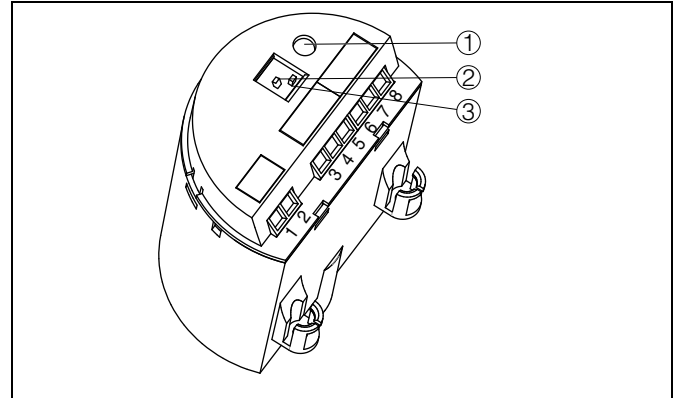


Fig. 8: VEGASWING 61, 63 - electronics module with relay output

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

We recommend connecting VEGASWING 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.

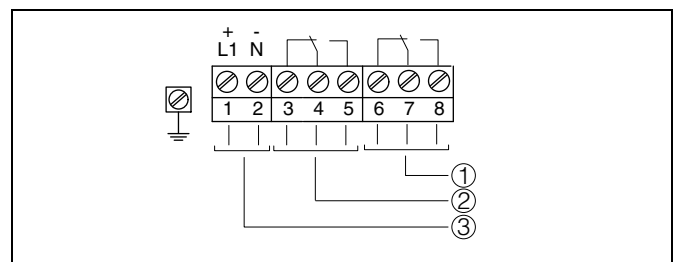


Fig. 10: VEGASWING 61, 63 - wiring plan - relay output

- 1 Relay output
- 2 Relay output
- 3 Voltage supply

Transistor output

We recommend connecting VEGASWING 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.

VEGASWING 61, 63

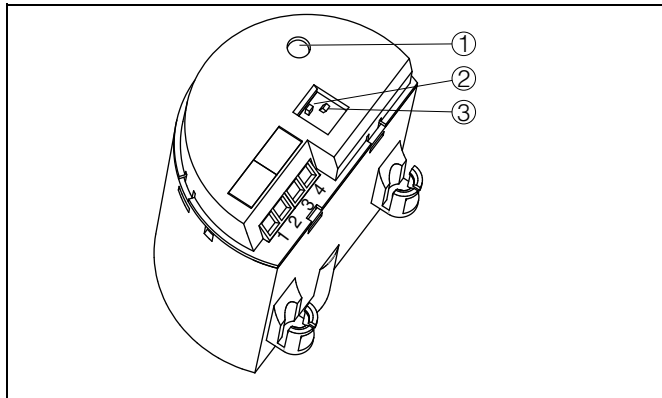


Fig. 12: VEGASWING 61, 63 - electronics module with transistor output

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

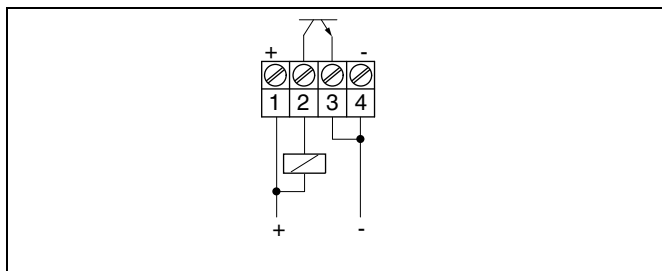


Fig. 14: VEGASWING 61, 63 - transistor output - NPN action

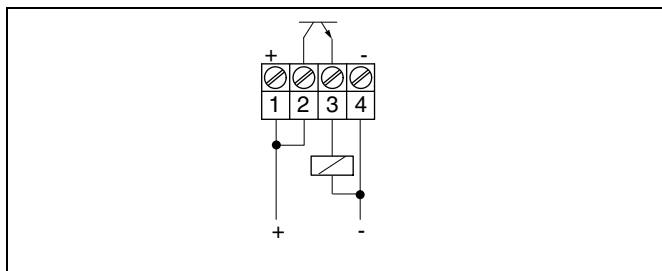


Fig. 16: VEGASWING 61, 63 - transistor output - PNP action

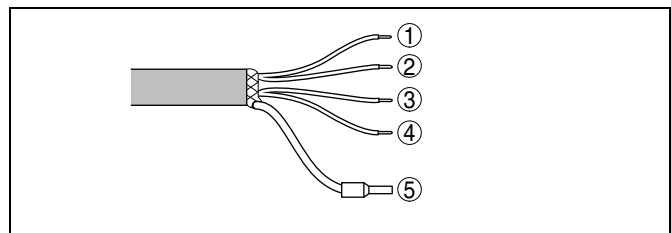


Fig. 18: Wire assignment connection cable. The numbers of the wires correspond to the terminals of the instrument.

- 1 brown (+) voltage supply
- 2 White
- 3 Yellow
- 4 blue (-) voltage supply
- 5 Shielding

VEGASWING 51

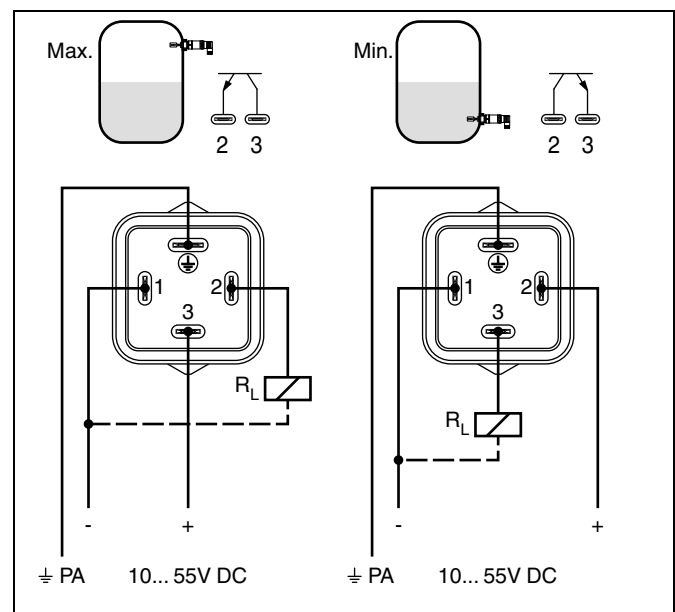


Fig. 19: VEGASWING 51 - transistor output with valve plug DIN 43650

- PA Potential equalisation
- RL Load resistance (contactor, relay, etc.)

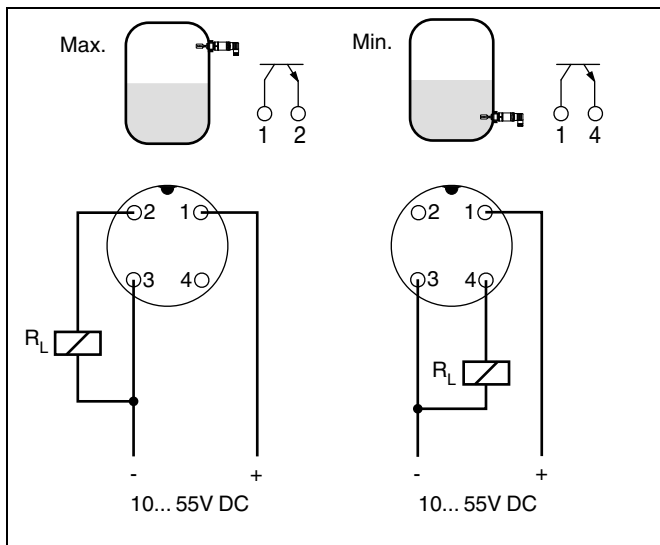


Fig. 21: VEGASWING 51 - transistor output with M12 x 1 plug connection (housing)

- 1 Brown
- 2 White
- 3 Blue
- 4 Black
- RL Load resistance (contactor, relay, etc.)

Contactless electronic switch

We recommend connecting VEGASWING 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.

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

VEGASWING 61, 63

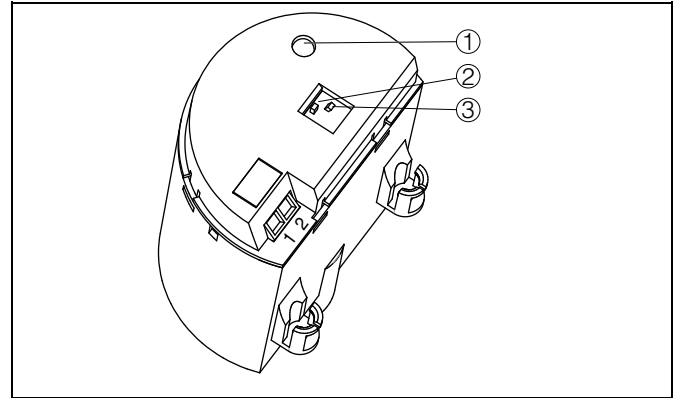


Fig. 23: VEGASWING 61, 63 - electronics module with contactless electronic switch

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

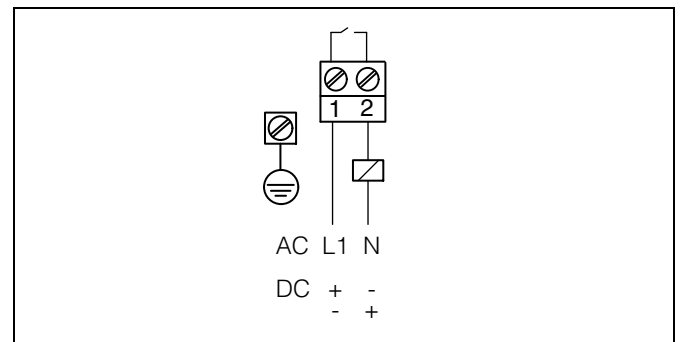


Fig. 25: VEGASWING 61, 63 - wiring plan - output, contactless electronic switch

VEGASWING 51

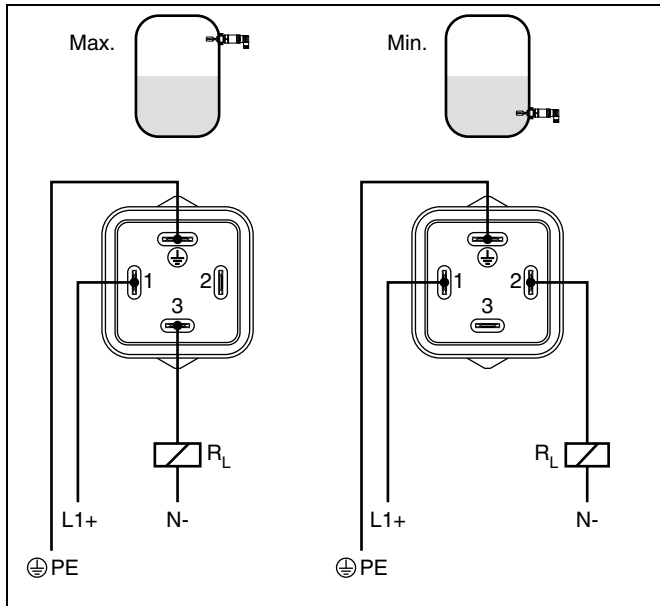


Fig. 27: VEGASWING 51 - contactless electronics switch with valve plug DIN 43650

1 Protection earth

Two-wire output

VEGASWING 61, 63

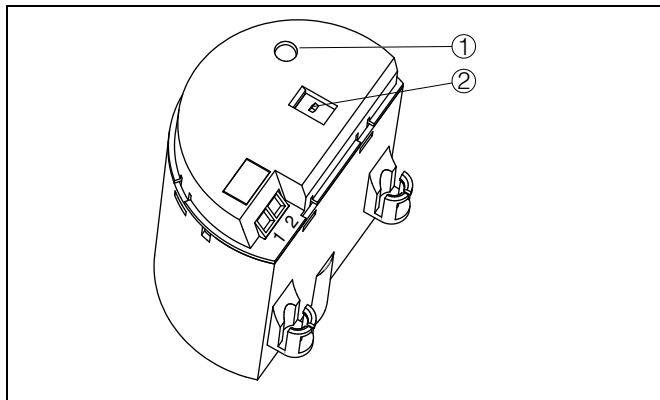


Fig. 29: VEGASWING 61, 63 - electronics module with two-wire electronics

- 1 Control lamp
- 2 DIL switch for sensitivity adjustment

We recommend connecting VEGASWING 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 signal conditioning instrument also Ex. Power supply via the connected signal conditioning instrument. For further information see chapter "Technical data".

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

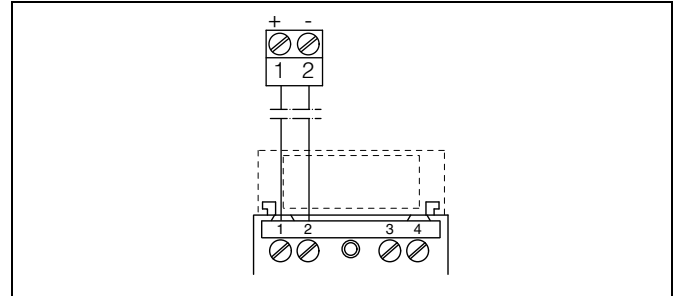


Fig. 31: VEGASWING 61, 63 - wiring plan - two-wire output

NAMUR output

VEGASWING 61, 63

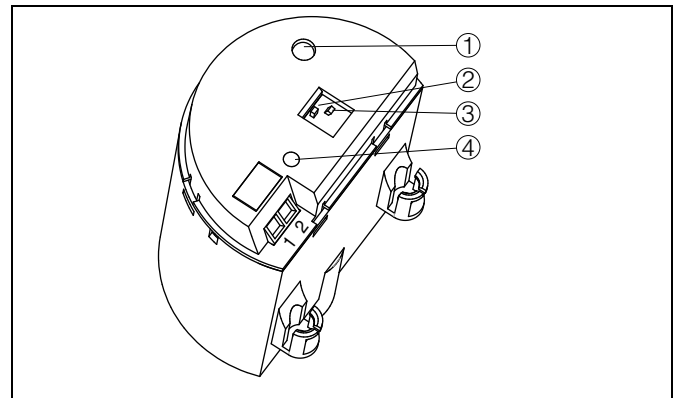


Fig. 33: VEGASWING 61, 63 - electronics module with NAMUR electronics

- 1 Control lamp
- 2 DIL switch for characteristics reversal
- 3 DIL switch for sensitivity adjustment
- 4 Simulation key

For connection of the amplifier according to NAMUR (IEC 60947-5-6, EN 50227). You can find further information in the "Technical data".

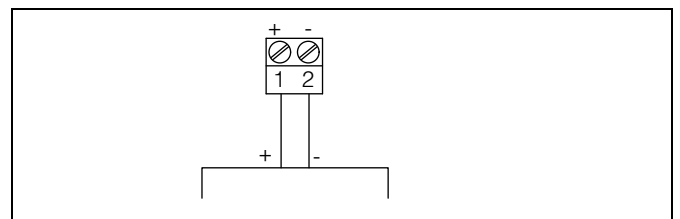


Fig. 35: Wiring plan - NAMUR output

5 Operation

5.1 Adjustment, general

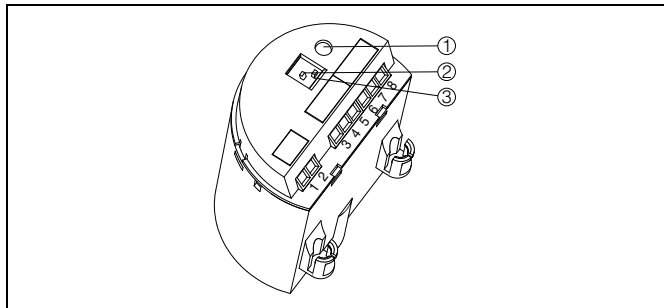


Fig. 36: Adjustment elements electronics module, e.g. VEGASWING 61, 63 relay output (SW60R)

- 1 Signal lamp (LED)
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

Switching point adaptation

VEGASWING 61, 63

With this DIL switch (2) you can set the switching point to liquids with a density between 0.5 and 0.7 g/cm³ (0.018 and 0.025 lbs/in³). In the basic adjustment, liquids with a density > 0.7 g/cm³ (0.025 lbs/in³) can be detected.

For products with lower density, you have to set the switch to > 0.5 g/cm³ (0.018 lbs/in³).

The information about the position of the switching point relates to the medium water - density value 1 g/cm³ (0.036 lbs/in³). With mediums of differing density, the switching point shifts in the direction of the fork end, depending on the density and manner of installation.

VEGASWING 51

Products with a density > 0.7 ... 2.5 g/cm³ (0.025 ... 0.09 lbs/in³) can be detected. This setting cannot be modified.

The switching status of VEGASWING can be checked when the housing is closed (signal lamp, illuminated ring below the plug).

VEGASWING has an integrated test switch which can be activated magnetically. To test the instrument, you have to hold the test magnet (accessory) to the magnet symbol on the instrument housing.

The test magnet changes the current switching condition of the instrument. You can check the change on the signal lamp. Please note that the connected instruments are activated during the test.

Mode adjustment

VEGASWING 61, 63

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

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With the correct polarity of the supply voltage, the switching condition can be defined (max. detection/min. detection). With the transistor output version, PNP or NPN action can be reached by different connection of the consumer (load).

Signal lamp (LED)

VEGASWING 61, 63

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

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The switching status of VEGASWING is visible from outside (control lamp, illuminated lens below the plug).

Simulation key

VEGASWING 61, 63 - NAMUR electronics

The simulation key is located in a recess on the upper side of the electronics module. Push the simulation key with a suitable object (screwdriver, pen, etc.).

When the key is pushed, a line break between sensor and processing unit is simulated. The signal lamp on the sensor extinguishes. The measuring system must signal a fault and take on a safe condition when the key is pushed.

Keep in mind that downstream connected instruments will be activated during operation. This allows you to check the correct function of the measuring system.

Characteristics reversal

VEGASWING 61, 63 - NAMUR electronics

The characteristics of the NAMUR electronics can be reversed with the DIL switch. You can choose between falling characteristic curve (switch position max.) and rising characteristic curve (switch position min.). This allows you to output the desired current.

Modes

- min. - rising characteristic curve (High current when immersed)
 - max. - falling characteristics (Low current when immersed)
- The NAMUR output can be switched to falling or rising characteristics.

For applications according to WHG, the DIL switch must be set to position max.

6 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

VEGASWING 51

Materials, wetted parts

- Process fitting - thread
- Process seal
- vibrating element

Materials, non-wetted parts

- Housing

Weight

Process fittings

- Thread
- hygienic fittings

Surface quality

- Standard
- Hygienic version

VEGASWING 61, 63

Materials, wetted parts

- Process fitting - thread
- Process fitting - flange

- Process seal

- Tuning fork

- Extension tube: $\varnothing$ 21.3 mm (0.839 in)

Sensor length VEGASWING 61

- Length VEGASWING 61
- switching point as VEGASWING 81 or 81A

Sensor length VEGASWING 63

- 316L, Hastelloy C4 (2.4610)
- Hastelloy C4 (2.4610) enamelled
- 316L, ECTFE coated
- 316L, PFA coated

Materials, non-wetted parts

- Housing
- Seal between housing and housing cover
- Light guide in housing cover
- Ground terminal
- Temperature adapter (optional)
- Gas-tight leadthrough (optional)

Weight

- Plastic housing
- Aluminium housing
- Stainless steel housing
- Tube extension VEGASWING 63

Surface quality

- Standard
- Hygienic version (3A)
- Hygienic version

Process fittings

- Thread
- Flanges
- hygienic fittings

Coatings

- ECTFE
- PFA
- Enamel

High voltage test (enamel)

316L

Klingsil C-4400

316L

316L and plastic PEI

250 g (9 oz)

G $\frac{3}{4}$ A, $\frac{3}{4}$ NPT, G1 A, 1 NPT

Bolting DN 25 PN 40, bolting DN 40 PN 40, Tri-Clamp 1", Tri-Clamp 1½", SMS

R_a 3.2 μ m (1.26⁻⁴ in)

R_a < 0.8 μ m (3.15⁻⁵ in)

316L, Hastelloy C4 (2.4610)

316L, 316L with Hastelloy C4 coating, steel enamelled, 316L with ECTFE coating, 316L with PFA coating

Klingsil C-4400

316L/Hastelloy C4 (2.4610)

316L, Hastelloy C4 (2.4610), Hastelloy C4 (2.4610) enamelled, 316L with ECTFE coating, 316L with PFA coating

See chapter "*Dimensions*"

Length +51 mm (+2 in)

80 ... 6000 mm (3.15 ... 236.22 in)

80 ... 1500 mm (3.15 ... 59.06 in)

80 ... 3000 mm (3.15 ... 118.11 in)

80 ... 3000 mm (3.15 ... 118.11 in)

Plastic PBT (polyester), Alu die-casting powder-coated, 316L

NBR (stainless steel housing), silicone (Alu/plastic housing)

PMMA (e.g. Makrolon)

316L

316L

316L/glass

760 g (27 oz)

1170 g (41 oz)

1530 g (54 oz)

approx. 920 g/m (9.9 oz/ft)

R_a approx. 3.2 μ m (1.26⁻⁴ in)

R_a < 0.8 μ m (3.15⁻⁵ in)

R_a < 0.3 μ m (1.18⁻⁵ in)

G $\frac{3}{4}$ A, $\frac{3}{4}$ NPT, G1 A, 1 NPT

DIN from DN 25, ANSI from 1"

Bolting DN 40 PN 40, Tri-Clamp 1", Tri-Clamp 1½" PN 10, conus DN 25 PN 40, Tuchenhausen Varivent DN 50 PN 10

0.5 ... 0.8 mm (0.02 ... 0.031 in)

0.3 ... 0.5 mm (0.01 ... 0.02 in)

0.8 mm (0.031 in)

> 5 KV

Gas-tight leadthrough (optional)

- Leakage rate
- Pressure resistance
- hygienic fittings

< 10⁻⁶ mbar l/s

PN 64

Bolting DN 40 PN 40, Tri-Clamp 1", Tri-Clamp 1½" PN 10, conus DN 25 PN 40, Tuchenhausen Varivent DN 50 PN 10

Output variable

Relay output

Output

Relay output (DPDT), 2 floating spdts

Turn-on voltage

- Min.
- Max.

10 mV

253 V AC, 253 V DC

Switching current

- Min.
- Max.

10 µA

3 A AC, 1 A DC

Breaking capacity

- Max.

1250 VA, 50 W

Contact material (relay contacts)

AgCdO and Au plated

Modes (adjustable)

Min./Max.

Delay time approx.

- When immersed
- When laid bare

0.5 s

1 s

Transistor output

Output

floating transistor output, overload and permanently shortcircuit proof

Max. load current

- VEGASWING 51
- VEGASWING 61, 63

250 mA

400 mA

Voltage loss

- VEGASWING 51
- VEGASWING 61, 63

1 V

3 V

Turn-on voltage

55 V DC

Blocking current

< 10 µA

Modes (adjustable)

Min./Max.

Delay time approx.

- When immersed
- When laid bare

0.5 s

1 s

Contactless electronic switch

Output

Contactless electronic switch

Modes (adjustable)

Min./Max.

Delay time approx.

- When immersed
- When laid bare

0.5 s

1 s

Two-wire output

Output

Two-wire output

Suitable signal conditioning instruments

VEGATOR 536 Ex, 537 Ex, 636 Ex

Output signal

- Mode min.

Vibrating element uncovered: 16 mA ± 1 mA, vibrating element covered: 8 mA ± 1 mA

- Mode max.

Vibrating element uncovered: 8 mA ± 1 mA, vibrating element covered: 16 mA ± 1 mA

- Fault message

< 2 mA

Modes (adjustable)

min./max. (changeover with the signal conditioning instrument)

Delay time approx.

- When immersed
- When laid bare

0.5 s

1 s

NAMUR output

Output

Two-wire NAMUR output

Current consumption

- Falling characteristics
- rising characteristics
- Fault message

Necessary processing system

$\geq 2.2 \text{ mA uncovered} / \leq 1 \text{ mA covered}$

$\leq 1 \text{ mA uncovered} / \geq 2.2 \text{ mA covered}$

$\leq 1 \text{ mA}$

NAMUR processing system according to IEC 60947-5-6 (EN 50227/ DIN 19234)

Modes (NAMUR output adjustable to falling or rising characteristics)

- Min.
- Max.

rising characteristic curve (High current when immersed)

falling characteristics (Low current when immersed)

Measuring accuracy

Deviation

$\pm 1 \text{ mm (0.04 in)}$

Influence of the process temperature on the switching point

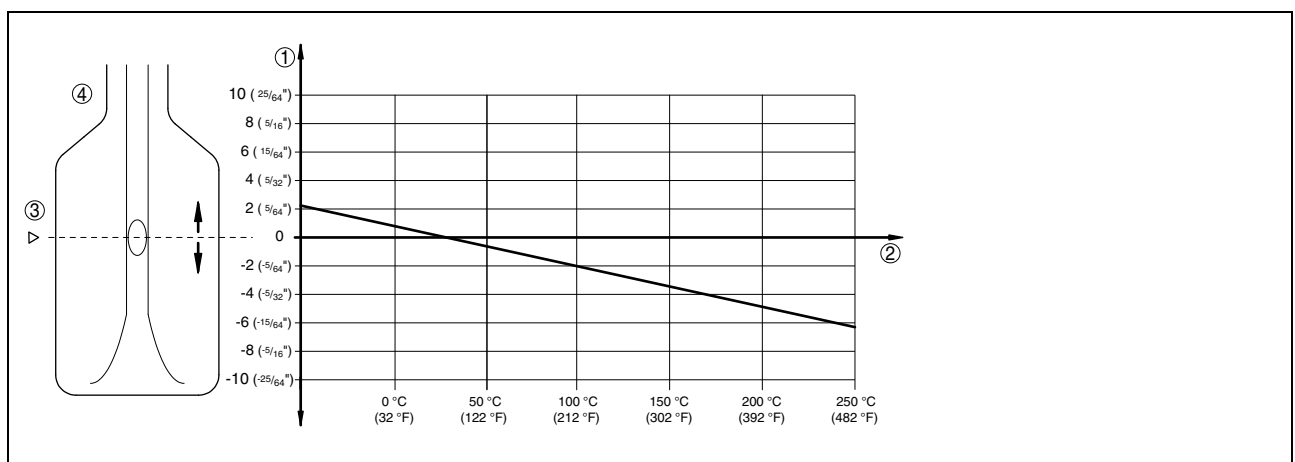


Fig. 38: Influence of the process temperature on the switching point

- 1 Shifting of the switching point in mm (in)
- 2 Process temperature in °C (°F)
- 3 Switching point at reference conditions (notch)
- 4 Tuning fork

Influence of the product density on the switching point

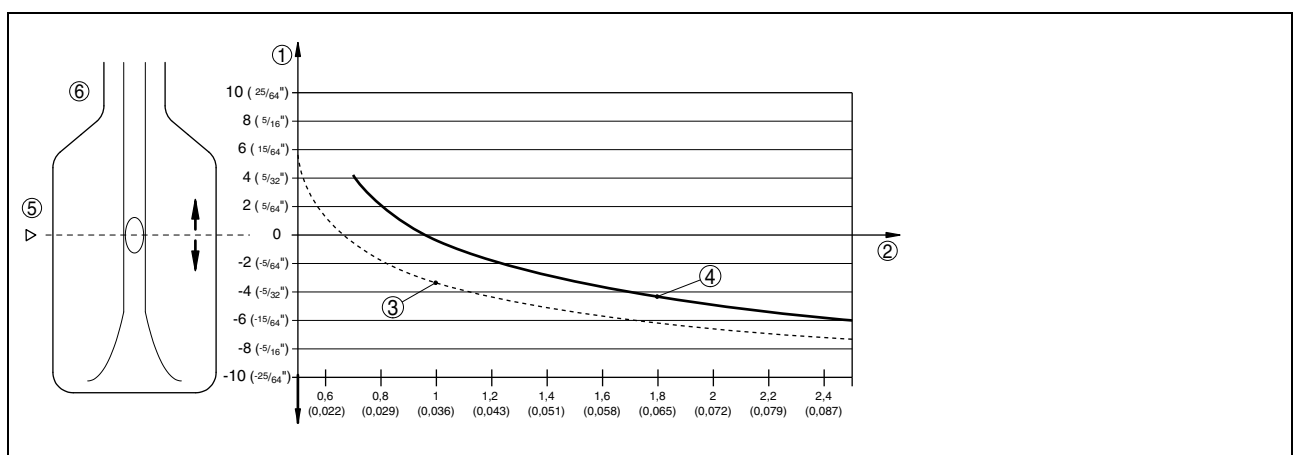


Fig. 39: Influence of the product density on the switching point

- 1 Shifting of the switching point in mm (in)
- 2 Product density in g/cm³ (lb/in³)
- 3 Switch position 0.5 g/cm³ (0.018 lb/in³)
- 4 Switch position 0.7 g/cm³ (0.025 lb/in³)
- 5 Switching point at reference conditions (notch)
- 6 Tuning fork

Influence of the process pressure to the switching point

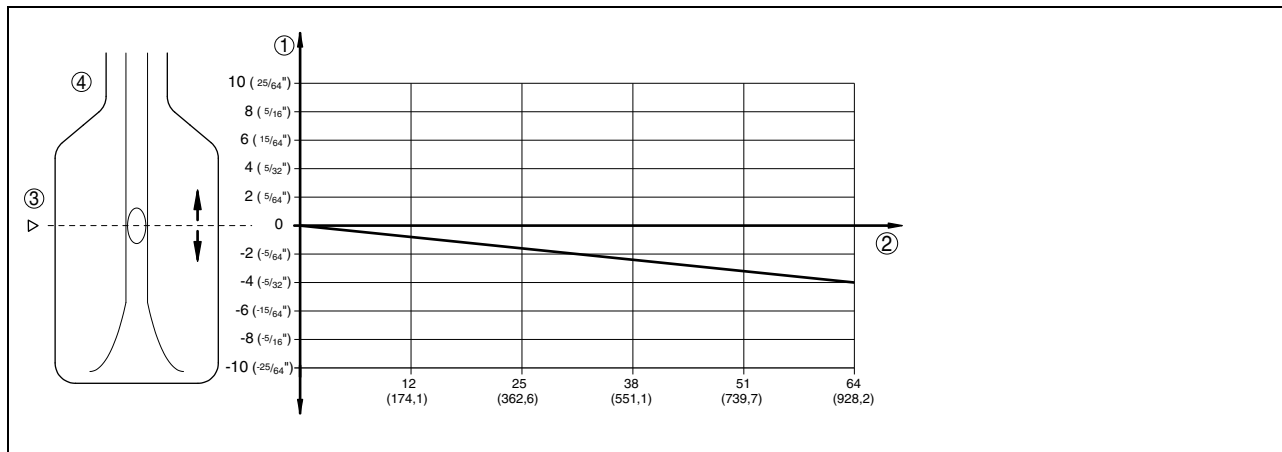


Fig. 40: Influence of the process pressure to the switching point

- 1 Shifting of the switching point in mm (in)
- 2 Process pressure in bar (psig)
- 3 Switching point at reference conditions (notch)
- 4 Tuning fork

Repeatability	0.1 mm (0.004 in)
Hysteresis	approx. 2 mm (0.08 in) with vertical installation
Switching delay	approx. 500 ms (on/off)
Frequency approx.	1200 Hz

Ambient conditions

Ambient temperature on the housing	-40 ... +70 °C (-40 ... +158 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

Process conditions

VEGASWING 51

Measured value	Limit level of liquids
Process pressure	-1 ... 64 bar/-100 ... 6400 kPa (-14.5 ... 938 psig)
Process temperature - Standard	-40 ... +100 °C (-40 ... +212 °F)

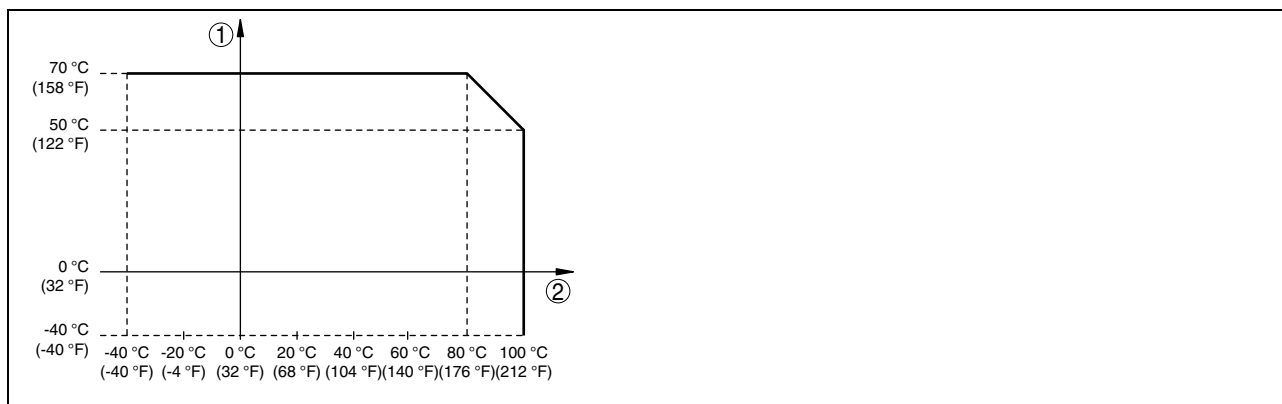


Fig. 41: Dependency ambient temperature to process temperature

- 1 Ambient temperature in °C (°F)
 - 2 Process temperature in °C (°F)
- Process temperature - High temperature version (option) -40 ... +150 °C (-40 ... +302 °F)

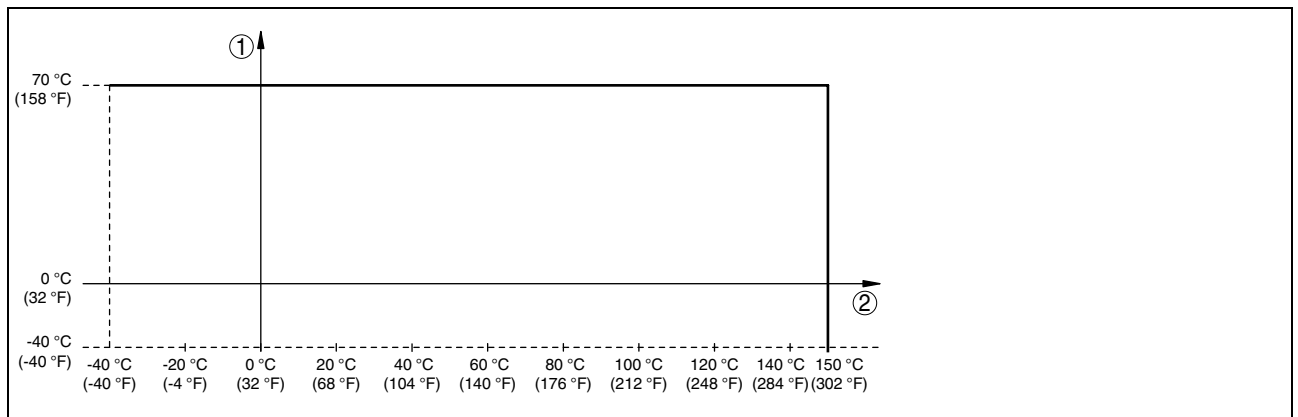


Fig. 42: Dependency ambient temperature to process temperature

1 Ambient temperature in °C (°F)

2 Process temperature in °C (°F)

Temperature shock

no limitation

Viscosity - dynamic

0.1 ... 10,000 mPa s (requirement: with density 1)

Density

> 0.7 g/cm³ (0.025 lbs/in³)**VEGASWING 61, 63**

Measured value

Limit level of liquids

Process pressure

-1 ... 64 bar/-100 ... 6400 kPa (-14.5 ... 938 psig)

Process temperature

– VEGASWING of 316L/Hastelloy C4 (2.4610)

-50 ... +150 °C (-58 ... +302 °F)

Process temperature with temperature adapter (optional)

– VEGASWING of 316L/Hastelloy C4 (2.4610)

-50 ... +250 °C (-58 ... +482 °F)

– VEGASWING enamelled

-50 ... +200 °C (-58 ... +392 °F)

– VEGASWING with ECTFE coating

-50 ... +150 °C (-58 ... +302 °F)

– VEGASWING with PFA coating

-50 ... +150 °C (-58 ... +302 °F)

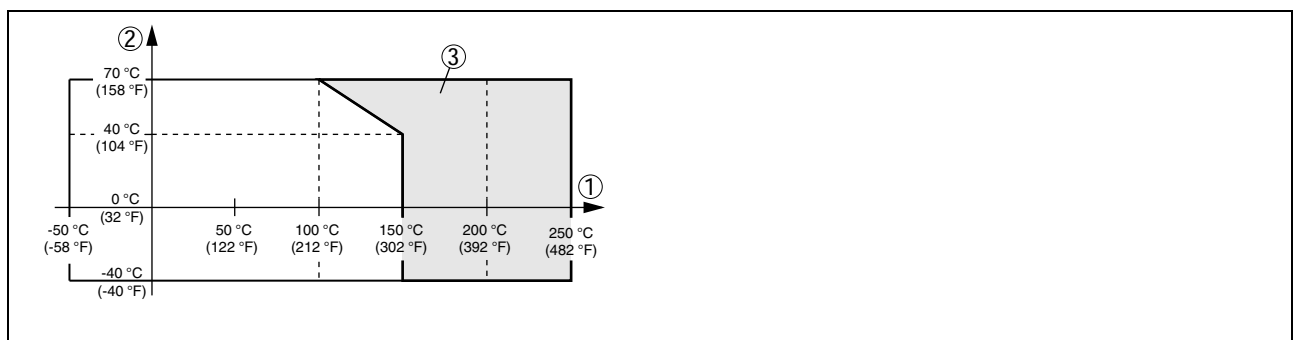


Fig. 43: Ambient temperature - Product temperature

1 Product temperature

2 Ambient temperature

3 Temperature range with temperature adapter

Temperature shock

no limitation

Viscosity - dynamic

0.1 ... 10,000 mPa s (requirement: with density 1)

Density

0.7 ... 2.5 g/cm³ (0.025 ... 0.09 lbs/in³); 0.5 ... 2.5 g/cm³ (0.018 ... 0.09 lbs/in³) by switching over**Electromechanical data****VEGASWING 51**

Plug

– Plug connection

• 1 x plug M12 x 1

Connection terminals

VEGASWING 61, 63

Cable entry/plug (dependent on the version)

– Single chamber housing

or:

- 1 x plug DIN 43650

for wire cross-section up to 1.5 mm² (AWG 16)

- 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, DIN 43650, Harting HAN7), 1 x blind stopper M20 x 1.5

Connection terminals

for wire cross-section up to 1.5 mm² (AWG 16)

Adjustment elements

VEGASWING 51

Control lamp

Illuminated lens for indication of the switching condition

Mode adjustment

Min./max. commutation through electrical connection

VEGASWING 61, 63

Control lamp

Control lamp for indication of the switching status

Density switch (electronics versions: relay output, transistor output, two-wire output, contactless electronic switch)

– 0.5

0.5 ... 2.5 g/cm³ (0.018 ... 0.9 oz/in³)

– 0.7

0.7 ... 2.5 g/cm³ (0.025 ... 0.9 oz/in³)

Mode switch (electronics versions: relay output, transistor output, contactless electronic switch)

– A

Max. detection or overflow protection

– B

Min. detection or dry run protection

Characteristics reversal (electronics version: NAMUR output)

– Max.

falling characteristics (Low current when immersed)

– Min.

rising characteristic curve (High current when immersed)

Voltage supply

Relay output

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. 1.3 W (DC)

Transistor output

Supply voltage

10 ... 55 V DC

Max. power consumption

0.5 W

Contactless electronic switch

Supply voltage

20 ... 253 V AC, 50/60 Hz, 20 ... 253 V DC

Domestic current requirement

approx. 3 mA (via load circuit)

Two-wire output

Supply voltage

10 ... 36 V DC (via the VEGA signal conditioning instrument)

NAMUR output

Supply voltage (standard characteristics)

for connection to an amplifier according to NAMUR IEC 60947-5-6, approx. 8.2 V

Open-circuit voltage

U₀ approx. 8.2 V

Shortcircuit current

I_U approx. 8.2 mA

Electrical protective measures
VEGASWING 51

Protection

- | | |
|---|-------------|
| – Valve plug | IP 65 |
| – Valve plug, IDC method of termination | IP 67 |
| – M12 x 1 plug connection (only with transistor output) | IP 66/IP 67 |

Overvoltage category

III

Protection class

- | | |
|---------------------------------|----|
| – Transistor output | II |
| – Contactless electronic switch | I |

VEGASWING 61, 63

Protection

IP 66/IP 67

Overvoltage category

III

Protection class

- | | |
|---|----|
| – Transistor, two-wire, NAMUR output | II |
| – relay output, contactless electronic switch | I |

Existing approvals or approvals applied for

- | | |
|-----------------------------------|--------------------------------------|
| Gas and dust explosion protection | e.g. according to ATEX, FM, CSA, IEC |
| Overfill protection | e.g. according to WHG |
| Ship approval | e.g. according to GL, LRS, ABS, RINA |
| Functional safety | SIL 2 IEC 61508 |
| Hygienic approval | 3A, FDA |

The available approvals can be selected via the configurator on www.vega.com.

Depending on the version, instruments with approvals can have different technical data. For these instruments, please note the corresponding approval documents. They can be downloaded in the download section on www.vega.com.

CE conformity

The instruments fulfill the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing.

SIL conformity

VEGASWING fulfills the requirements of functional safety according to IEC 61508. You can find further information in the Safety Manual "VEGASWING".

7 Dimensions

VEGASWING 51

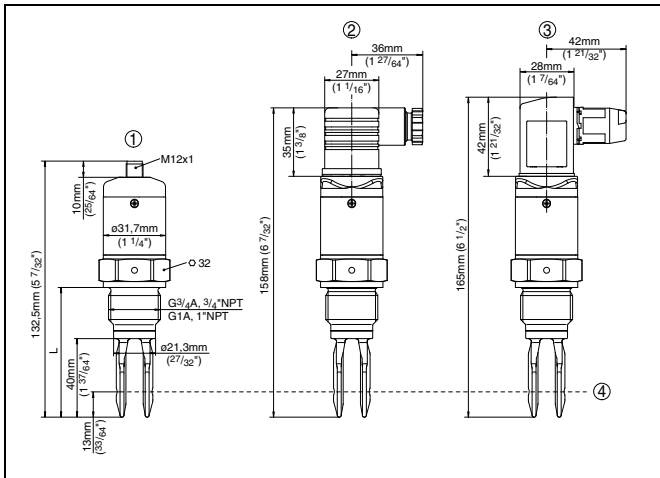


Fig. 44: VEGASWING 51 - standard version

- 1 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (M12 x 1)¹⁾²⁾
- 2 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (valve plug DIN 43650)
- 3 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (valve plug DIN 43650 with IDC method of termination)
- 4 Switching point
- L Length with G $\frac{3}{4}$ A, $\frac{3}{4}$ NPT: 66 mm (2.6 in)
- L Length with G1 A, 1 NPT: 69 mm (2.7 in)
- L Length with switching point like VEGASWING 71 or 81 = L + 48 mm (1.9 in)

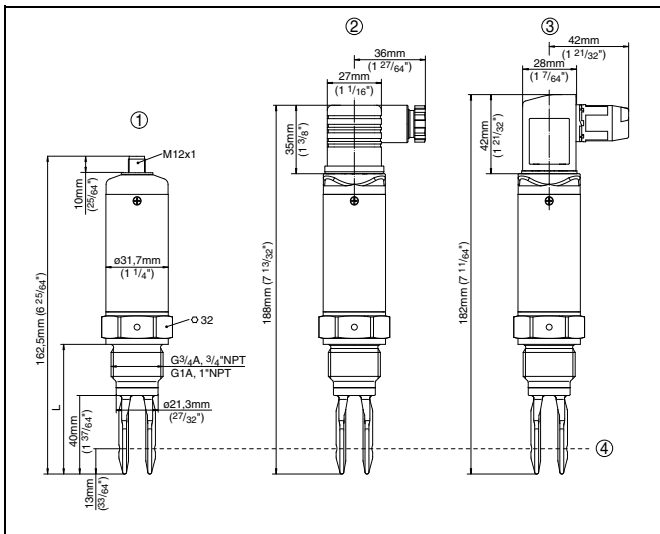


Fig. 46: VEGASWING 51 - High temperature version (optional)

- 1 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (M12 x 1)³⁾⁴⁾
- 2 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (valve plug DIN 43650)
- 3 Thread G $\frac{3}{4}$ A, G1 A, $\frac{3}{4}$ NPT or 1 NPT (valve plug DIN 43650 with IDC method of termination)
- 4 Switching point
- L Length with G $\frac{3}{4}$ A, $\frac{3}{4}$ NPT: 66 mm (2.6 in)
- L Length with G1 A, 1 NPT: 69 mm (2.7 in)
- L Length with switching point like VEGASWING 71 or 81 = L + 48 mm (1.9 in)

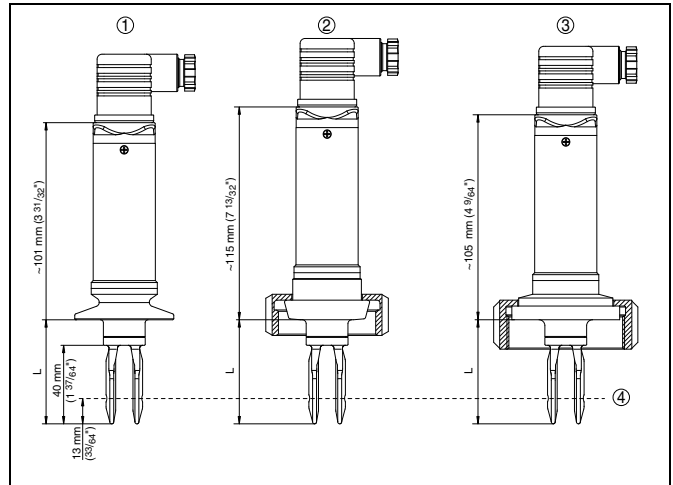


Fig. 48: VEGASWING - hygienic versions

- 1 Tri-Clamp (valve plug DIN 43650)
- 2 Bolting (valve plug DIN 43650)
- 3 SMS 1145 (valve plug DIN 43650)
- 4 Switching point
- L Length with Tri-Clamp: 53 mm (2.1 in)
- L Length with bolting: 53 mm (2.1 in)
- L Length with SMS 1145: 53 mm (2.1 in)

Housing VEGASWING 61, 63

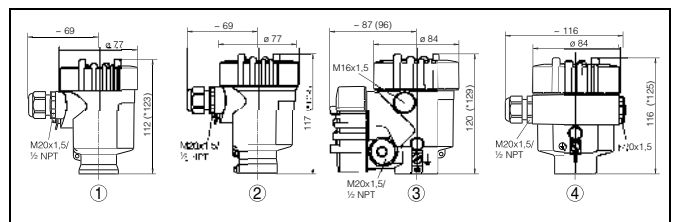


Fig. 50: Housing versions

- 1 Plastic housing
- 2 Stainless steel housing
- 3 Aluminium double chamber housing
- 4 Aluminium housing

- 1) Keep in mind that the total length is extended by the plug connection.
- 2) M12 x 1 plug connector not with version contactless electronic switch.
- 3) Keep in mind that the total length is extended by the plug connection.
- 4) M12 x 1 plug connector not with version contactless electronic switch.

VEGASWING 61

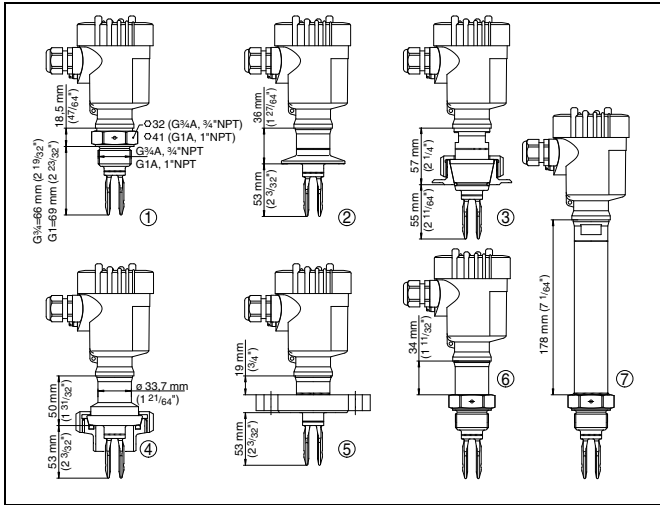


Fig. 51: VEGASWING 61

- 1 Thread
- 2 Tri-Clamp
- 3 Cone DN 25
- 4 Bolting DN 40
- 5 Flange
- 6 Gas-tight leadthrough
- 7 Temperature adapter

Temperature adapter - VEGASWING 61, 63

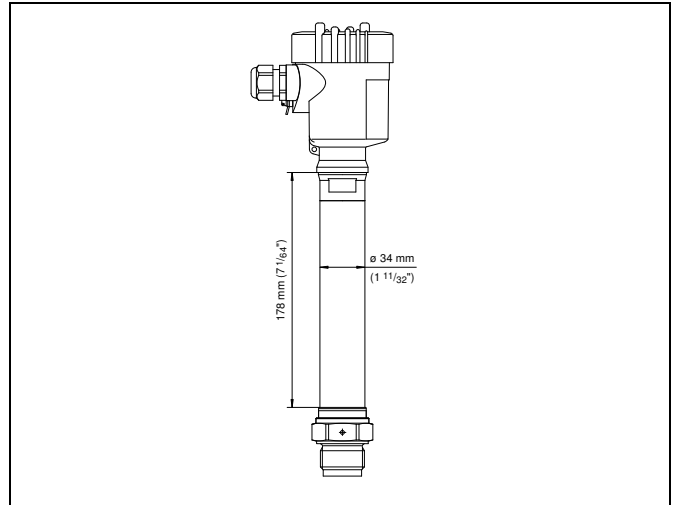


Fig. 55: Temperature adapter

VEGASWING 63

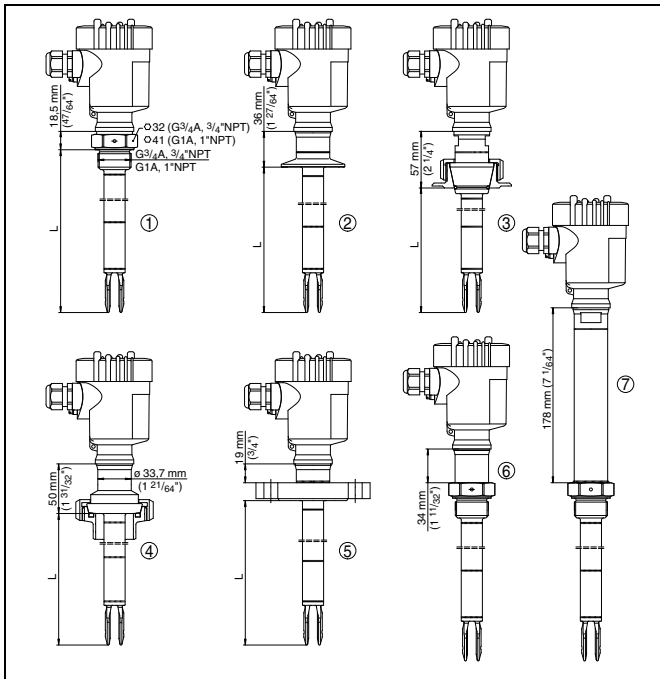


Fig. 53: VEGASWING 63

- 1 Thread
- 2 Tri-Clamp
- 3 Cone DN 25
- 4 Bolting DN 40
- 5 Flange
- 6 Gas-tight leadthrough
- 7 Temperature adapter
- L Sensor length, see chapter "Technical data"

8 Product code

VEGASWING 51

Approval	
XX	without
XM	Ship approval
XA	Overfill protection acc. to WHG
Version / Process temperature	
S	Standard / -40...100°C
T	Extended / -40...150°C
H	Hygienic applications / -40...150°C
Process fitting / Material	
GB	Thread G¾A PN64 / 316L
NB	Thread ¾NPT PN64 / 316L
GA	Thread G1A PN64 / 316L
NA	Thread 1NPT PN64 / 316L
CL	Tri-Clamp 1" PN16 / 316L Ra<0.8µm
CN	Tri-Clamp 2" PN16 / 316L Ra<0.8µm
RL	Bolting DN25PN40 DIN11851 / 316L Ra<0.8µm
RM	Bolting DN40PN40 DIN11851 / 316L Ra<0.8µm
RN	Bolting DN50PN25 DIN11851 / 316L Ra<0.8µm
Electronics	
C	Contactless electronic switch 20...253 V AC/DC
T	Transistor output PNP 10...55 V DC
Housing	
P	316L
Electrical connection / Protection	
M	M12x1 / IP67 ¹⁾
V	according to DIN 43650 incl. plug / IP 65
Switching point	
Standard	
L	Switching point as SWING71A

SG51.

¹⁾ Not in conjunction with Electronics "C"

VEGASWING 61

Approval	
XX	without
XA	Overfill protection according to WHG
CA	ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG ¹⁾
DA	ATEX II 1/2G, 2G EEx d IIC T6 + WHG ²⁾
CM	ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + ship approval
DM	ATEX II 1/2G, 2G EEx d IIC T6 + ship approval ³⁾
XM	Ship approval
CU	FM(ISO)CL I,II,III, DIV 1,GP ABCDEFG ¹⁾
DU	FM(XP) CL I, DIV1, GP ABCD (DIP) CLII,III, DIV1,GP EFG ²⁾
XU	FM(NI)CL I,DIV2,GP ABCD
Process fitting / Material	
GBV	Thread G¾A PN64 / 316L
NBV	Thread ¾NPT PN64 / 316L
GAV	Thread G1A PN64 / 316L
NAV	Thread 1NPT PN64 / 316L
CCN	Tri-Clamp 1" PN16 / 316L Ra<0.3µm
CCP	Tri-Clamp 1" PN16 / 316L Ra<0.8µm
CAN	Tri-Clamp 2" PN16 / 316L Ra<0.3µm
CAP	Tri-Clamp 2" PN16 / 316L Ra<0.8µm
RAN	Bolting DN40PN40 DIN11851 / 316L Ra<0.3µm
RAP	Bolting DN40PN40 DIN11851 / 316L Ra<0.8µm
FPV	Flange DN25PN40 Form C, DIN 2501 / 316L
FPH	Flange DN25PN40 Form C, DIN 2501 / ECTFE ³⁾
FPE	Flange DN25PN40 Form C, DIN 2501 / enamelled ⁴⁾
FEV	Flange DN50PN40 Form C, DIN 2501 / 316L
FEH	Flange DN50PN40 Form C, DIN 2501 / ECTFE ³⁾
FEF	Flange DN50PN40 Form C, DIN 2501 / PFA ³⁾
FES	Flange DN50PN40 Form B1, EN 1092-1/enamelled ⁴⁾
APV	Flange 1" 150lb ANSI B16.5 / 316L
APH	Flange 1" 150lb RF, ANSI B16.5 / ECTFE ³⁾
APE	Flange 1" 150lb RF, ANSI B16.5 / enamelled ⁴⁾
ACV	Flange 2" 150lb RF, ANSI B16.5 / 316L
ACH	Flange 2" 150lb RF, ANSI B16.5 / ECTFE ³⁾
ACE	Flange 2" 150lb RF, ANSI B16.5 / enamelled ⁴⁾
Adapter / Process temperature	
X	without / -50...150°C
T	with / -50...250°C
G	with gas-tight leadthrough / -50...150°C
D	with gas-tight leadthrough / -50...250°C
Housing / Cable entry	
P	Plastic IP66/67 / M20x1.5
M	Aluminium IP66/IP67 / M20x1.5
U	Aluminium IP66/IP67 / ½NPT
8	StSt (electropolished) 316L / IP66/IP67 / M20x1.5
Electronics	
C	Contactless electronic switch 20...250VAC/DC
R	Double relay (DPDT) 20...72VDC/20...250VAC (3A)
T	Transistor (NPN/PNP) 10...55VDC
Z	Two-wire 8/16 mA 12...36VDC
N	NAMUR signal
Switching point	
X	Standard
L	as SWING81 or 81A

SWING61.

¹⁾ Only in conjunction with Electronics "Z" and "N"

²⁾ Only in conjunction with Housing / Cable entry "U"

³⁾ Only in conjunction with process temperature -50...150°C

⁴⁾ Only in conjunction with process temperature -50...200°C and not with electronics "C" and "T"

VEGASWING 63

Approval

XX without

XA Overfill protection according to WHG

CA ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + WHG ¹⁾

DA ATEX II 1/2G; 2G EEx d IIC T6 + WHG ²⁾

CM ATEX II 1G, 1/2G, 2G EEx ia IIC T6 + ship approval

DM ATEX II 1/2G EEx d IIC T6 + ship approval ³⁾

XM Ship approval

CU FM(US)CL I,II,III, DIV 1, GP ABCDEFG ¹⁾

DU FM(XP) CL I, DIV1, GP ABCD (DIP) CLII,III, DIV1, GP EFG ²⁾

XU FM(NI)CL I, DIV2, GP ABCD

Process fitting / Material

GBV Thread G½A PN64 / 316L

NBV Thread ½NPT PN64 / 316L

GAV Thread G1A PN64 / 316L

NAV Thread 1NPT PN64 / 316L

CCN Tri-Clamp 1" PN16 / 316L Ra<0.3µm

CCP Tri-Clamp 1" PN16 / 316L Ra<0.8µm

CAN Tri-Clamp 2" PN16 / 316L Ra<0.3µm

CAP Tri-Clamp 2" PN16 / 316L Ra<0.8µm

RAN Bolting DN40PN40 DIN11851 / 316L Ra<0.3µm

RAP Bolting DN40PN40 DIN11851 / 316L Ra<0.8µm

FPV Flange DN25PN40 Form C, DIN 2501 / 316L

FPH Flange DN25PN40 Form C, DIN 2501 / ECTFE ³⁾

FEV Flange DN50PN40 Form C, DIN 2501 / 316L

FEH Flange DN50PN40 Form C, DIN 2501 / ECTFE ³⁾

FEF Flange DN50PN40 Form C, DIN 2501 / PFA ³⁾

FES Flange DN50PN40 Form B1, EN 1092-1/enamelled ⁴⁾

APV Flange 1" 150lb ANSI B16.5 / 316L

APH Flange 1" 150lb RF, ANSI B16.5 / ECTFE ³⁾

APE Flange 1" 150lb RF, ANSI B16.5 / enamelled ⁴⁾

ACV Flange 2" 150lb RF, ANSI B16.5 / 316L

ACH Flange 2" 150lb RF, ANSI B16.5 / ECTFE ³⁾

ACE Flange 2" 150lb RF, ANSI B16.5 / enamelled ⁴⁾

Adapter / Process temperature

X without / -50...150°C

T with / -50...250°C

G with gas-tight leadthrough / -50...150°C

D with gas-tight leadthrough / -50...250°C

Housing / Cable entry

P Plastic IP66/67 / M20x1.5

M Aluminium IP66/IP67 / M20x1.5

U Aluminium IP66/IP67 / ½NPT

8 StSt (electropolished) 316L / IP66/IP67 / M20x1.5

Electronics

C Contactless electronic switch 20...250VAC/DC

R Double relay (DPDT) 20...72VDC/20...250VAC (3A)

T Transistor (NPN/PNP) 10...55VDC

Z Two-wire 8/16 mA 12...36VDC

N NAMUR signal

SWING63.

¹⁾ Only in conjunction with Electronics "Z" and "N"

²⁾ Only in conjunction with Housing / Cable entry "U"; L max. = 3000 mm

³⁾ Only in conjunction with process temperature -50...150°C

⁴⁾ Only in conjunction with process temperature -50...200°C and not with electronics "C" and "T"

¹⁾ Only in conjunction with Electronics "Z" and "N"

²⁾ Only in conjunction with Housing / Cable entry "U"; L max. = 3000 mm

³⁾ Only in conjunction with process temperature -50...150°C

⁴⁾ Only in conjunction with process temperature -50...200°C and not with electronics "C" and "T"



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