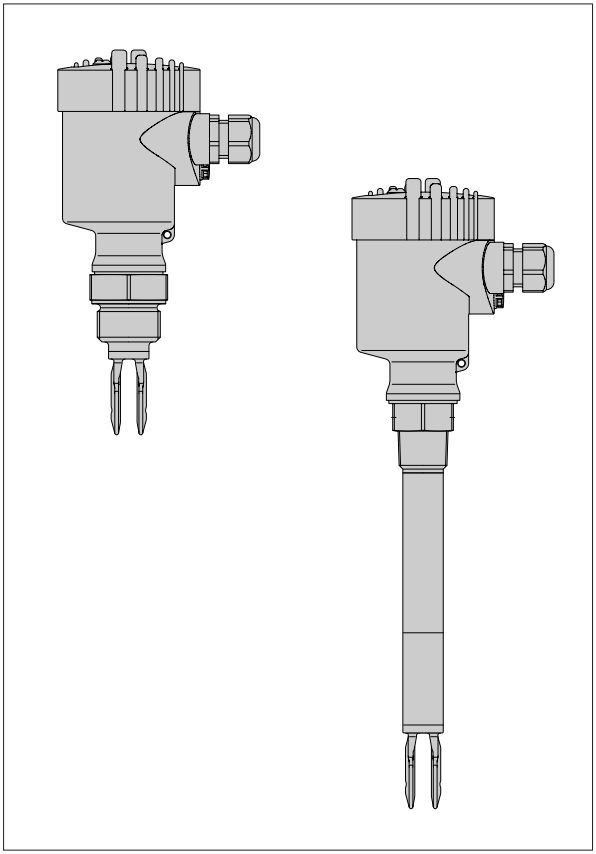
Operating Instructions

VEGASWING 61, 63 with oscillator SW E60N (EX)



Contents

Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VEGA regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.
For safety and warranty reasons, only qualified VEGA personnel must carry out any internal work on the instruments, apart from that involved in normal installation and electrical connection.

Note Ex area

Please note the attached safety instructions, containing important information on installation and operation in Ex areas.
These safety instructions are part of the operating instructions manual and come with the Ex approved instruments.

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1 Product description

VEGASWING 61 and 63

VEGASWING 61/63 vibrating level switches are used for level detection of liquids.

Typical applications are overfill and dry run protection. Using a tuning fork with a length of only 40 mm, VEGASWING 61 opens up new areas of application, e.g. in pipelines from DN 25. Power supply and output signal correspond to the Namur interface acc. to IEC 60947-5-6 (EN 50227).

VEGASWING series 60 vibrating level switches detect levels of liquids with a viscosity of 0.1 ... 10.000 mPa s and a density of ≥ 0.5 g/cm³. Modular construction enables their use in vessels, tanks and pipelines.

Thanks to its simple and rugged measuring system, VEGASWING is virtually unaffected by the chemical and physical properties of the liquid. It does its job even under unfavourable conditions such as turbulences, air bubbles, foam generation, buildup, strong external vibration or constantly changing products.

- Tuning fork with only 40 mm length.
- Thread from ¾ and flanges from DN 25 (ANSI 1").
- Process temperature -50°C ... +250°C without shock limitation.
- Insensitive to external vibration.
- Process pressure up to 64 bar.
- Also ECTFE or PFA coated or enamelled.
- Viscosity 0.1 ... 10000 mPa s.
- Density range 0.5 g/cm³ ... 2.5 g/cm³.
- NAMUR output.
- Ex-Zone 0/1
  ATEX II 1G or 1/2G EEx ia IIC T6
  ATEX II 1/2G or 2G EEx d IIC T6
- Overfill protection acc. to WHG.
- Integrated fault monitoring.
- Fixed, exactly reproducible switching point.
- Switching point visible with closed instrument (LED).
- Set-up without adjustment.
- Installation in any position.
- Min. or max. mode.

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2 Function and application

2.1 Principle of operation

VEGASWING vibrating level switches detect levels in almost all liquids.
Viscosity: 0.1 ... 10.000 mPa s
Density: 0.5 ... 2.5 g/cm³

VEGASWING measuring principle

The tuning fork is piezoelectrically energised and vibrates at its mechanical resonance frequency of approx. 1200 Hz. The piezoelectric elements are fastened mechanically and are therefore not subject to temperature shock limitations. When the tuning fork is submerged in the product, the frequency changes. This change is detected by the integrated oscillator and converted into a switching command.

The integrated fault monitoring detects:
- interruption of the connection cable to the piezoelectric elements
- extreme wear on the tuning fork
- break of the tuning fork
- absence of vibration.

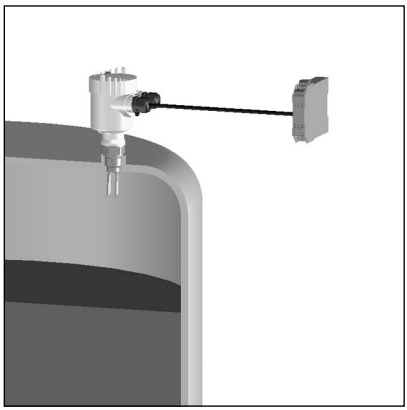
In case of failure, a defined current (≤ 1.0 mA) is impressed on the cable to the NAMUR amplifier.

Compact instrument with NAMUR output

The oscillator delivers as output signal a current jump acc. to IEC 60947-5-6. The switching signal is further processed via complementary NAMUR processing systems, e.g. PLC input card or remote I/O.

2.2 Measuring system

Level detection of liquids with NAMUR compact instrument



Measuring system with VEGASWING as NAMUR compact instrument

A measuring system consists of:
- a VEGASWING vibrating level switch with integrated oscillator SW E60N
- a NAMUR amplifier acc. to IEC 60947-5-6 (EN 50 227 / DIN 19 234).

3 Types and versions

3.1 Overview

Version	61	63	61 ExD	63 ExD
Standard (fixed installation length)	•		•	
Tube version		•		•
Approvals (SW E60N)				
Ex-Zone 0 acc. to ATEX 100a II 1G or 1/2G EEx ia IIC T6	•	•		
Ex-Zone 0 acc. to ATEX 100a II 1/2G or 2G EEx d IIC T6			•	•
Overfill protection acc. to WHG	•	•	•	•
Mechanical connection				
G¾A	•	•	•	•
¾ NPT	•	•	•	•
G 1 A	•	•	•	•
1 NPT	•	•	•	•
Flange from DN 25, ANSI 1"	•	•	•	•
Tri-Clamp 1"	•	•	•	•
Tri-Clamp 1½"	•	•	•	•
Bolting DN 40	•	•	•	•
Tuchenhagen Varivent	•	•	•	•
Tuning fork material				
1.4435 (316 L)	•	•	•	•
2.4610 (Hastelloy C4)	•	•	•	•
Material, mechanical connection				
1.4435 (316 L)	•	•	•	•
2.4610 (Hastelloy C4)	•	•	•	•
Coating				
ECTFE (Halar)	•	•	•	•
PFA	•	•	•	•
Enamel	•	•	•	•
Oscillator				
Two-wire output (SW E60N) NAMUR acc. to IEC 60947-5-6	•	•	•	•
Adapters				
Temperature adapter 1.4435 (316 L) up to 250°C	•	•	•	•
Gastight leadthrough	•	•		

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3.2 Technical data

VEGASWING 61 and 63

Housing

Housing material	PBT (Polyester), Aluminium (plastic coated)
Protection	IP 66 and IP 67 (meets both requirements)
Cable entry	2 x M20 x 1.5 or 2 x ½ NPT
Terminals	max. 1 x 1.5 mm^2

Adapters

Gastight leadthrough (option)	
- material	1.4435 (316 L) / glass
- leakage rate	< 10^{-6} mbar l/sec
- pressure resistance	PN 64
Temperature adapter (option)	
- material	1.4435 (316 L)

Process fitting

Thread	G¾A, ¾ NPT, G 1 A or 1" NPT PN 64
- material	1.4435 (316 L) or 2.4610 (Hastelloy C4)
Flanges	DIN from DN 25 and ANSI ab 1"
- material	1.4435 (316 L), 1.4435 (316 L) with Hastelloy C4 coating, enamelled steel, 1.4435 (316 L) ECTFE or PFA coated
Hygienic fittings	
- material	1.4435 (316 L)
- bolting	DN 40 PN 40
- Tri-Clamp	1", 1½" PN 10
- conus	DN 25 PN 40
- Tuchenhagen Varivent	DN 50 PN 10
Supplied process seal	Klingersil

Extension tube (VEGASWING 63)

Material	1.4435 (316 L), 2.4610 (Hastelloy C4), Hastelloy C4 enamelled 1.4435 (316 L) with ECTFE or PFA coating
Length	
- 1.4435 (316 L), 2.4610 (Hastelloy C4)	80 mm ... 6000 mm
- Hastelloy C4 enamelled	80 mm ... 1500 mm
- 1.4435 (316 L) ECTFE coated	80 mm ... 3000 mm
- 1.4435 (316 L) PFA coated	80 mm ... 3000 mm

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Tuning fork

Material	1.4435 (316 L), 2.4610 (Hastelloy C4), 2.4610 Hastelloy C4 enamelled, 1.4435 (316 L) with ECTFE or PFA coating
Coating thicknesses	
- ECTFE	approx. 0.5 … 0.8 mm
- PFA	approx. 0.3 … 0.5 mm
- enamel	approx. 0.8 mm
High voltage test (enamel)	max. 5 KV
Surface quality (option)	
- standard	Ra ≤ 3.2 µm
- hygienic version (3A)	Ra ≤ 0.8 µm

Weight

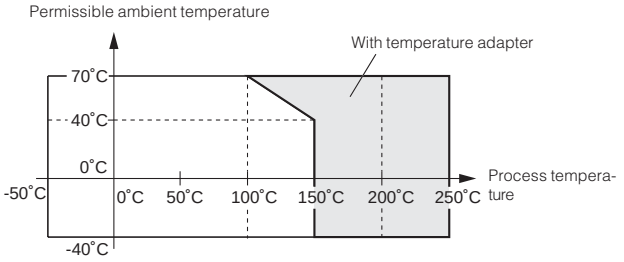
Basic weight	
- with Aluminium housing	approx. 980 g
- with plastic housing	approx. 480 g
Tube extension (VEGASWING 63A)	approx. 0.11 kg/m

Product

Viscosity	
- dynamic	0.1 … 10.000 mPa s (requirement: with density 1)
Density	0.7 … 2.5 g/cm³ (0.5 … 0.7 g/cm³ by switching over)

Ambient conditions

Ambient temperature on the housing	-40°C … 70°C
Storage and transport temperature	-40°C … 80°C
Process temperature	-50°C … 150°C
Process temperature with temperature adapter (option)	
- uncoated	-50°C … 250°C
- enamelled	-50°C … 200°C
Temperature shock	without limitation



Process pressure

Process pressure	max. 64 bar depending on the mechanical connection

Function

Modes	min. rising characteristics (High current with submersion) max. falling characteristics (Low current with submersion) NAMUR output switchable to falling or rising characteristics
Integration time	approx. 500 ms
Frequency	approx. 1200 Hz
Hysteresis	approx. 2 mm with vertical installation
Control lamp	
- SW E60N	single colour LED red ≥ 2.2 mA = High current dark ≤ 1.0 mA = Low current red flashing ≤ 1.0 mA = failure

CE conformity CE

VEGASWING 61 and 63 vibrating level switches meet the protective regulations of EMC (89/336/EWG) and NSR (73/23/EWG). Conformity has been judged acc. to the following standards:

EMC	Emission	EN 61 326/A1: 1998 (class B)
	Susceptibility	EN 61 326/A1: 1998
NSR		EN 61 010 - 1: 1993

Oscillators

Two-wire NAMUR output (SW E60N)

Power supply (standard characteristics)	for connection to amplifier acc. to NAMUR IEC 60947-5-6, approx. 8.2 V
- open circuit voltage	U_O ~ 8.2 V
- short-circuit current	I_U ~ 8.2 mA
Output	two-wire NAMUR output
Required processing system	NAMUR processing system acc. to IEC 60947-5-6 (EN 50 227 / DIN 19 234)
Current consumption	
- falling characteristics	≥ 2.2 mA uncovered/≤ 1 mA covered
- rising characteristics	≤ 1 mA uncovered/≥ 2.2 mA covered
- fault signal	≤ 1 mA
Protection class	II
Overvoltage category	III
Modes	falling or rising characteristics selectable on the oscillator

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Approvals VEGASWING 61 and 63

Water Resources Law (WHG)

Approval as part of an overfill protection system acc. to the Water Resources Law (WHG)

Ambient temperature on the housing	-40°C ... 70°C
Process temperature	-50°C ... 150°C
- test report	VEGASWING 61 EX and 63 EX with oscillator SW E60N EX and suitable signal conditioning instrument
- with temperature adapter	up to 250°C
Process pressure	max. 64 bar

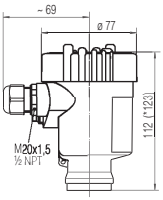
Explosion protection VEGASWING 61 EX0, 63 EX0

Certificate	EC type approval certificate acc. to ATEX 100 a
Flame proofing	ATEX II 1/2G EEx d IIC T6 ATEX II 1G or 1/2G or 2G EEx d IIC T6
Permissible application range	Ex Zone 0
Ambient temperature depending on temperature class and Ex-Zone:	see safety instructions
Electrical safety-relevant characteristics:	see safety instructions

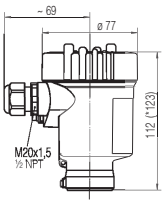
3.3 Dimensions

VEGASWING 61

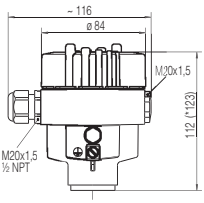
Plastic housing



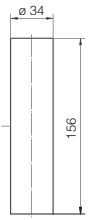
Stainless steel housing



Aluminium housing



Gastight leadthrough of 1.4435 (316 L) (option), length with thread 37 mm



Temperature adapter of 1.4435 (316 L) (option) in conjunction with thread L = 180 mm

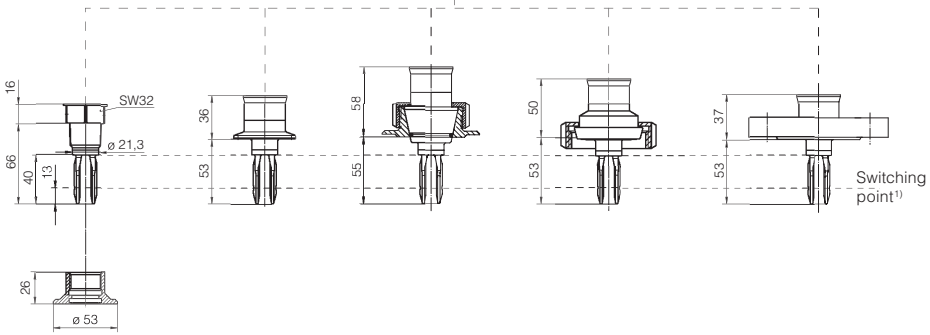
Thread G¾A or ¾ NPT

Tri-Clamp 1½"

Conus DN 25

Bolting DN 40

Flange DN 25 PN 40

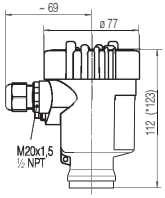


* with display

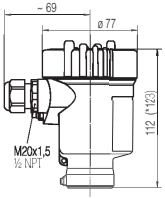
1) Also in version with switching point extension to VEGASWING 81A.

VEGASWING 63

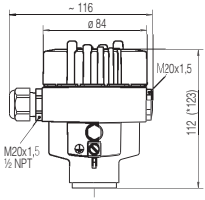
Plastic housing



Stainless steel housing



Aluminium housing



Gastight leadthrough of 1.4435 (316 L) (option), length with thread 37 mm

Temperature adapter of 1.4435 (316 L) (option) in conjunction with thread and flange enamelled L = 180 mm

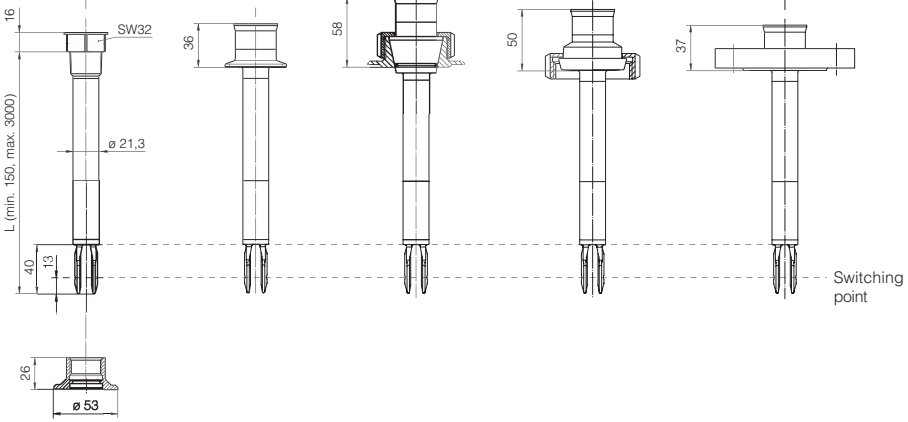
Thread G¾A or ¾ NPT

Tri-Clamp 1½"

Conus DN 25

Bolting DN 40

Flange DN 25 PN 40



* with display

4 Mounting

4.1 VEGASWING

In principle, VEGASWING can be mounted in any position. The instrument must be mounted such that the tuning fork is at the height of the required switching point. Note the following installation instructions.

Transport

Do not hold VEGASWING on the tuning fork. Especially with flange and tube versions, the tuning fork can be damaged simply by the weight of the instrument. Transport enamelled and ECTFE coated instruments very carefully and avoid touching the tuning fork.

Switching point

The tuning fork is provided with lateral markings (notches), marking the switching point with vertical installation. The switching point refers to the medium water at the basic setting of the density switch ≥ 0.7 g/cm³. Make sure when mounting VEGASWING that this marking is at the height of the requested level. Note that the switching point of the instrument shifts when the medium has a density other than that of water (water = 1.0 g/cm³). For products < 0.7 g/cm³ the density switch has to be set to ≥ 0.5 g/cm³.

Direct exchange of a VEGASWING 81A or 71A (with thread G1A)

If VEGASWING 61 with a sensor length the same as VEGASWING 81A or 71A is mounted into an existing mounting boss G1A, it is ensured that VEGASWING 61 will seal correctly.

Vertical installation

from top, from bottom

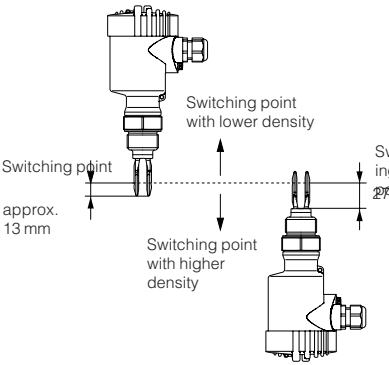
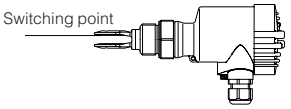


Fig. 2.1

Horizontal installation



recommended installation position for adhesive products:

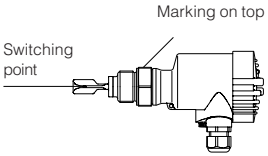


Fig. 2.2

Adhesive products

In case of horizontal mounting in adhesive and viscous products, the surfaces of the tuning fork should be vertical in order to reduce buildup on the tuning fork (see fig. 2.2). The orientation of the tuning fork is marked by a notch on the hexagon of VEGASWING. With this you can check the orientation of the tuning fork when screwing it in. When the hexagon touches the seal, the thread can still be turned by approx. half a turn. This is sufficient to reach the recommended installation position.

In case of adhesive and viscous products, the tuning fork should protrude into the vessel to avoid buildup. Sockets for flanges and mounting bosses should therefore not exceed a certain length. The tuning fork should protrude into the vessel/pipeline.

Pressure

When there is gauge pressure or underpressure in the vessel, the mounting boss must be sealed on the thread. Cover the thread with teflon tape, hemp or similar material or use a sufficiently resistant seal ring.

Vibrations

Extreme vibrations and shocks, e.g. caused by stirrers and turbulence in the vessel, can cause the extension tube of VEGASWING 63 to vibrate. This will cause increased stress on the upper weld joint.

To counteract this, provide a support or straining directly above the tuning fork to firmly hold the extension tube (see fig. 2.3).

This applies mainly to applications in Ex areas category 1G or WHG. Make sure that the tube is not subjected to bending forces.

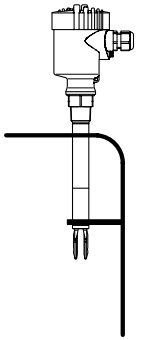


Fig. 2.3

Stirrers

Through the action of stirrers or similar devices, the level switches can be subjected to strong lateral forces. For this reason, do not use an overlong extension tube for VEGASWING 63, but check if it is possible to mount a VEGASWING 61 level switch on the side of the vessel in horizontal position.

Cable entries

Use a cable with round wire cross-section and tighten the cable entry firmly. The cable entry is suitable fro cable diameters from 5 mm to 9 mm.

Moisture

Turn the cable entries of horizontally mounted instruments downwards to avoid moisture ingress. For this purpose the plastic housing can be rotated by approx. 330°. For vertically installed instruments, loop the cable connected to the instrument housing downwards so that rain and condensation water can drain off. This applies mainly when mounting outdoors, in humid areas (e.g. by cleaning processes) or on cooled or heated vessels (see fig. 2.4).

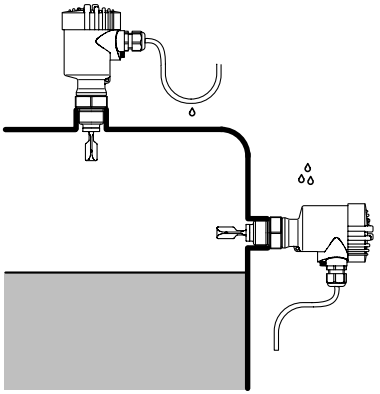


Fig. 2.4

Lateral load

Make sure that the vibrating element is not subjected to lateral forces. To assure this, mount the instrument at a location in the vessel where no adverse conditions, e.g. caused by stirrers, filling openings etc. can occur. This applies mainly to instrument types with extension tube (see fig. 2.5). The surfaces of the tuning fork should be parallel to the product movement.

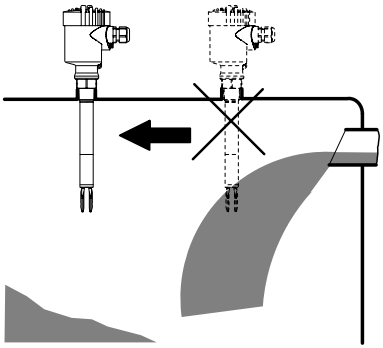


Fig. 2.5

Chemical resistance

When applied in Ex areas zone 0, VEGASWING must be used only in combustible liquids against which the materials of the tuning fork system are sufficiently chemically resistant.

VEGASWING with enamel

Treat instruments with enamel coating very carefully and avoid shocks. Unpack VEGASWING directly before installation. Insert VEGASWING carefully into the vessel opening and avoid touching any sharp vessel parts.

Flow

(e.g. in tubes)
When mounting in pipelines or in vessels having a certain flow direction, VEGASWING should be installed such that the surfaces of the tuning fork are aligned with that direction.

Mounting boss

VEGASWING's thread starting point is defined. This means that every VEGASWING is in the same position after being screwed in. Remove therefore the supplied seal from the thread of VEGASWING. This seal is not required when using a welded socket. Screw VEGASWING into the welded socket.

You can determine the subsequent position of VEGASWING before welding (see fig. 2.2). Mark the appropriate position of the welded socket. Before welding, unscrew VEGASWING and remove the rubber ring from the socket.

The welded socket has a marking (notch). Weld the socket with the notch facing upwards, or in the case of pipelines, aligned with the direction of flow (see fig. 2.6).

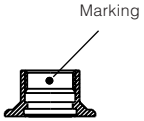


Fig. 2.6

5 Electrical connection

5.1 VEGASWING 61 and 63

Note
Switch off the power supply before starting connection work.

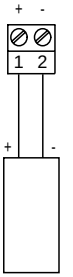
Connect supply voltage according to the following wiring diagrams.

As a rule, connect VEGASWING to vessel ground (PA) or, in plastic vessels, to the nearest ground potential. For this purpose, a grounding terminal is provided between the cable entries on the side of the housing. This connection serves to drain off electrostatic charges.

In Ex applications, it is also necessary to note the installation regulations for hazardous areas.

Two-wire NAMUR output (SW E60N)

For connection to isolation amplifiers acc. to NAMUR (IEC 60947-5-6, EN 50227)
(for further information see 3.2 Technical data)



Switching amplifier
acc. to NAMUR
(IEC 60947-5-6)

6 Set-up

6.1 VEGASWING 61 and 63

The numbers in brackets relate to the following illustration.

Display and adjustment elements

The switching status of the electronics can be checked when the housing is closed (LED display).
In basic adjustment, products with a density > 0.7 g/cm³ can be detected. For products with lower density, the switch must be set to > 0.5 g/cm³.
The following display and adjustment elements are located on the oscillator:
- LED display (1)
- DIL switch for adaptation of the switching point (3) and characteristics reversal (2)
- test key (4)

Note:
When testing, always immerse the tuning fork of VEGASWING into a liquid. Do not test the functionality of VEGASWING by touching it. This can damage the sensor.

Characteristics reversal (2)
Characteristics reversal is possible with the DIL switch. You can choose between falling characteristics (switch position max.) and rising characteristics (switch position min.). The requested current can thus be outputted.
min. rising characteristics (High current when immersed)
max. falling characteristics (Low current when immersed)
NAMUR output switchable to falling or rising characteristics (see also „6.2 Function chart). In applications acc. to WHG, the DIL switch must be set to position max.

Switching point adaptation (3)

With this DIL switch (3) you can set the switching point for liquids with a density between 0.5 and 0.7 g/cm³. In the basic setting, liquids with a density > 0.7 g/cm³ can be detected. For products with lower density, you have to set the switch to > 0.5 g/cm³. The information on the position of the switch point relates to water as the medium (density value 1.0 g/cm³). In products with a different density the switching point shifts, depending on density and type of installation, either in the direction of the housing or the tuning fork end. See also 4 Mounting - Switching point.

Fault monitoring

The oscillator of VEGASWING monitors the instrument continuously. The following criteria will be checked:
- corrosion or damage to the tuning fork
- failure of the tuning fork
- line break to the actuation.

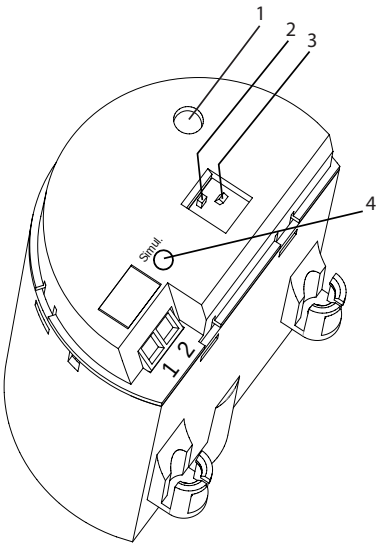
LED display (1)

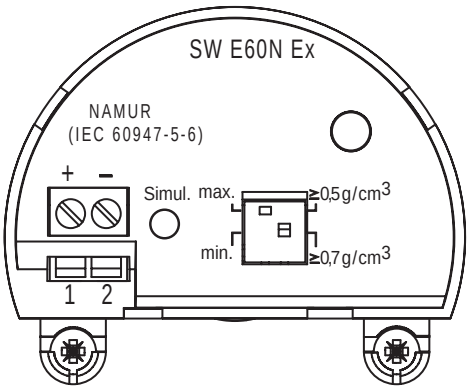
red	=	High current ≥ 2.2 mA
off	=	Low current ≤ 1 mA
flashing	=	failure ≤ 1 mA

Simulation key (4)
The simulation key is lowered in the upper side of the oscillator. Press the simulation key with a suitable object (screwdriver, ball pen, etc.)

When the key is pressed, a line break between sensor and processing unit is simulated.
The LED on the sensor extinguishes.
When the key is pressed, the system must signal failure and switch to a safe condition.

Make sure that all connected devices are activated when the key is pressed. By doing this, you can check the proper function of the measuring system.

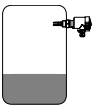
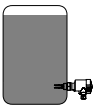
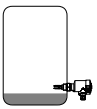




1 LED display
2 DIL switch - characteristics reversal
3 DIL switch - switching point adaptation
4 Simulation key

6.2 Function chart

The following chart provides an overview of the switching conditions depending on the adjusted mode and level.

	Level	Signal current VEGA-SWING	Control lamp (red)
Falling characteristics max.		≥ 2.2 mA	
		≤ 1.0 mA	○
Rising characteristics min.		≥ 2.2 mA	
		≤ 1.0 mA	○
Failure	any	≤ 1.0 mA	 flashing

Note:
The mode setting on the NAMUR switching amplifier must allow the switching output to assume safe status in case of failure (I ≤ 1.0 mA).

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

Technical data subject to alterations

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