

# CERTIFICATE OF CONFORMITY



1. HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS
2. Certificate No: FM16US0038X
3. Equipment: VEGASWING 66 Series, Vibrating Level Switch  
(Type Reference and Name)
4. Name of Listing Company: VEGA Grieshaber KG
5. Address of Listing Company: Am Hohenstein 113  
D-77761 Schiltach, Baden-Wuerttemberg  
Germany
6. The examination and test results are recorded in confidential report number:  
3049688 dated 6<sup>th</sup> September 2016
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:  
FM Class 3600:2011, FM Class 3610:2015, FM Class 3611:2004, FM Class 3615:2006, FM Class 3810:2005, ANSI/IEC 60529:2004, ANSI/ISA-60079-0:2013, ANSI/ISA-60079-1:2013, ANSI/ISA-60079-11:2012, ANSI/ISA-60079-26:2011, ANSI/ISA-61010-1:2012, NEMA 250:2008
8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

## Certificate issued by:

  
J.E. Marquedant  
VP, Manager, Electrical Systems

6 April 2018  
Date

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)

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## 10. **Equipment Ratings:**

In type of protection intrinsically safe apparatus, the vibrating level switch (VEGASWING 66 Series) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, with process connections suitable for use in Class I, Division 1, Groups A, B, C and D, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC, with process connections suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC, with process connections suitable for use in Class I, Zone 1, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 1, Group IIC, with process connections suitable for use in Class I, Zone 1, Group IIC, in accordance with manufacturer's Control Drawing, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -50 °C to +70 °C, indoor and outdoor (Type 4X, 6P; IP66, IP68) environments.

In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series) equipment is certified to the following classification(s).

Explosionproof equipment for use in Class I, Division 1, Groups A, B, C and D, with process connections suitable for use in Class I, Division 1, Groups A, B, C and D; equipment protection by flameproof enclosure AEx d for use in Class I, Zone 1, Group IIC, with process connections suitable for use in Class I, Zone 0/1, Group IIC; equipment protection by flameproof enclosure AEx d for use in Class I, Zone 1, Group IIC, with process connections suitable for use in Class I, Zone 1, Group IIC, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -50 °C to +60 °C, indoor and outdoor (Type 4X, 6P; IP66, IP68) environments.

In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series) equipment is certified to the following classification(s).

Nonincendive equipment for use in Class I, Division 2, Groups A, B, C and D, with non-flammable process connections suitable for use in Class I, Division 2, Groups A, B, C and D, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -50 °C to +60 °C, indoor and outdoor (Type 4X, 6P; IP66, IP68) environments.

## 11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus, the vibrating level switch (VEGASWING 66 Series) equipment is labelled with the following marking(s).

Intrinsically Safe

Class I, Division 1, Groups A, B, C, D T6...T1

Class I, Zone 0, AEx ia IIC T6...T1 Ga

Class I, Zone 0/1, AEx ia IIC T6...T1 Ga/Gb

Class I, Zone 1, AEx ia IIC T6...T1 Gb

Ta = -50 °C to +70 °C

Temperature -process: See manual and approval documents

Installation per Dwg. GE3074; Type 4X/6P; IP66/IP68

**WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS**

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In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series) equipment is labelled with the following marking(s).

Class I, Division 1, Groups A, B, C, D T6...T1

Class I, Zone 0/1, AEx d IIC T6...T1 Ga/Gb

Class I, Zone 1, AEx d IIC T6...T1 Gb

Ta = -50 °C to +60 °C

Temperature -process: See manual and approval documents

Type 4X/6P; IP66/IP68

SEAL ALL CONDUITS WITHIN 18 INCHES

WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series) equipment is labelled with the following marking(s).

Class I, Division 2, Groups A, B, C, D T6...T1

Ta = -50 °C to +60 °C

Temperature -process: See manual and approval documents

Type 4X/6P; IP66/IP68

WARNING – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT

## 12. **Description of Equipment:**

**General** – The VEGASWING 66 Series Vibrating Level Switch is designed for industrial and hazardous (classified) location applications. It is intended to be used as a universal vibrating level switch in all liquids, and is suitable for applications with process temperatures up to +450 °C and high process pressures up to 16 MPa (2,320 psig). In compact version, with or without tube extension, it detects with millimeter accuracy of the limit level. The tuning fork vibrates at its mechanical resonance frequency of approximately 1400 Hz. The frequency changes when the tuning fork is submerged in the process liquid. This change is detected by the integrated electronics module and converted into a switching command. The plics concept instrument can be used in vessels, pipelines and steam generators as an empty or full detector. The plics vibrating level switch offers a wide array of process temperatures and process pressure ranges.

The VEGASWING 66 is a vibrating level switch designed for use in all liquids at low and high temperatures, with a density less than 0.42...2.5 g/cm<sup>3</sup> (0.015...0.09 lbs/in<sup>3</sup>).

**Construction** – The compact version of the vibrating level switch is constructed from one of three different single chamber enclosure versions, each of which is permanently attached directly to the vibrating level sensor element.

The single chamber enclosure versions is comprised of aluminum with metric or NPT threaded hubs and a threaded mating cover with or without an inspection display window; or stainless steel casting with metric or NPT threaded hubs and a threaded mating cover with or without an inspection display window; or stainless steel electropolished with metric threaded hubs and a threaded mating cover with or without an inspection display window.

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The base chassis of the aluminum and stainless steel casting enclosures includes a lid lock for the single chamber enclosure version. Only the single chamber aluminum and stainless steel enclosures with an integral cover locking screw and optional tempered glass viewing window are of suitable construction for explosionproof/flameproof enclosure type of protection.

For the various enclosure designs by unscrewing the enclosure cover, the connection terminals to the signal and supply circuit are accessible. Visible are the red light-emitting diode, yellow light-emitting diode and green light-emitting diode indicators to display different operating states. Furthermore, there are holes to contact the parameterization bushing of the electronics inserts mounted on digital part behind the cover. There are two M20 x 1.5 metric or 1/2 inch NPT cable entries in the bottom of the enclosure; one of which is sealed with a certified cable gland, where permitted, or rigid conduit, and the other is sealed with a certified blanking plug. Each of the single chamber enclosures is equipped with an internal and external earthing terminal. The signal and supply circuits are electrically isolated from elements that may be earthed, while the metal elements of the vibration level switch are electrically connected to earth terminals.

The electronics assembly of the vibration level switch is constructed from one of three designs. The SG60HT-R/S indicates the electronics version for the relay (2 x SPDT) design (and additional SIL qualification, not FM verified) switches. The SG60HT-T/I indicates the electronics version for the transistor (NPN/PNP) design (and additional SIL qualification, not FM verified) switches. The SG60HT-Z/L indicates the electronics version for the 2 wire (4-20 mA) design (and additional SIL qualification, not FM verified) switches.

For more specifics concerning construction and description details of the vibrating level switch, reference the manufacturer's sales literature and specification sheets.

**Ratings** – The equipment is certified to the following ratings.

The ambient operating temperature range is -50 °C to +70 °C in type of protection intrinsically safe apparatus, and -50 °C to +60 °C in types of protection explosionproof/flameproof enclosure and nonincendive equipment; each when properly mounted and installed.

The process temperature range of the media is -196 °C to +450 °C, each depending on the process fitting, with a maximum working pressure range of -0.1 to 16 MPa (-14.5 to 2,320 psig) within a maximum measuring range of 3 m.

The equipment is marked for appliance protection class I or II, depending upon type of protection and model configuration, designated for installation transient overvoltages up to levels of overvoltage category III, and environmentally classified as pollution degree 2.

In type of protection intrinsically safe apparatus, the barrier protected vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-Z/L) equipment is connected to a certified intrinsically safe linear circuit with the following maximum entity parameter values.

Power Supply and Signal Circuit (Terminals 1, 2), single chamber enclosure version is:

$V_{max}(U_i) = 30$  VDC,  $I_{max}(I_i) = 131$  mA,  $C_i \approx 0$ ,  $L_i \approx 0$ ,  $P_i = 983$  mW

The intrinsically safe circuits for external connections are safely galvanically separated from the parts which may be earthed.

The intrinsically safe circuits to the measuring sensor are galvanically connected with earth potential.

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In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-R/S) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Voltage Supply (Terminals 1, 2), single chamber enclosure version is:

$V_{max} (U_i) = 20-253 \text{ VAC}, 50/60 \text{ Hz}, P_i = 3 \text{ VA}$  maximum

$V_{max} (U_i) = 20-72 \text{ VDC}, P_i = 1 \text{ W}$  maximum

$U_m = 253 \text{ V}$  maximum

Relay Circuit 1; Circuit 2 (Terminals 3, 4, 5; 6, 7, 8), single chamber enclosure version is:

$V_{max} (U\text{-Load}) = 253 \text{ VAC}, 50/60 \text{ Hz}, I_{max} (I\text{-Load}) = 5 \text{ A}, P_i (P\text{-Load}) = 1250 \text{ VA}$

$V_{max} (U\text{-Load}) = 253 \text{ VDC}, I_{max} (I\text{-Load}) = 1 \text{ A}, P_i (P\text{-Load}) = 40 \text{ W}$

In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-T/I) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Voltage Supply (Terminals 1, 4), single chamber enclosure version is:

$V_{max} (U_i) = 9.6-55 \text{ VDC}, P_i = 2 \text{ W}$  maximum

$U_m = 253 \text{ V}$  maximum

Load Current, Transistor Output (NPN/PNP) (Terminals 2, 3), single chamber enclosure version is:

$V_{max} (U\text{-Load}) = 55 \text{ VDC}, I_{max} (I\text{-Load}) = 400 \text{ mA}$

In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-Z/L) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Power Supply and Signal Circuit (Terminals 1, 2), single chamber enclosure version is:

$V_{max} (U_i) = 9.6-35 \text{ VDC}$

$U_m = 253 \text{ V}$  maximum

In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-R/S) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Voltage Supply (Terminals 1, 2), single chamber enclosure version is:

$V_{max} (U_i) = 20-253 \text{ VAC}, 50/60 \text{ Hz}, P_i = 3 \text{ VA}$  maximum

$V_{max} (U_i) = 20-72 \text{ VDC}, P_i = 1 \text{ W}$  maximum

$U_m = 253 \text{ V}$  maximum

Relay Circuit 1; Circuit 2 (Terminals 3, 4, 5; 6, 7, 8), single chamber enclosure version is:

$V_{max} (U\text{-Load}) = 253 \text{ VAC}, 50/60 \text{ Hz}, I_{max} (I\text{-Load}) = 5 \text{ A}, P_i (P\text{-Load}) = 1250 \text{ VA}$

$V_{max} (U\text{-Load}) = 253 \text{ VDC}, I_{max} (I\text{-Load}) = 1 \text{ A}, P_i (P\text{-Load}) = 40 \text{ W}$

In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-T/I) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Voltage Supply (Terminals 1, 4), single chamber enclosure version is:

$V_{max} (U_i) = 9.6-55 \text{ VDC}, P_i = 2 \text{ W}$  maximum

$U_m = 253 \text{ V}$  maximum

Load Current, Transistor Output (NPN/PNP) (Terminals 2, 3), single chamber enclosure version is:

$V_{max} (U\text{-Load}) = 55 \text{ VDC}, I_{max} (I\text{-Load}) = 400 \text{ mA}$

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In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series with built-in electronics insert SG60HT-Z/L) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Power Supply and Signal Circuit (Terminals 1, 2), single chamber enclosure version is:

$V_{max} (U) = 9.6-35$  VDC

$U_m = 253$  V maximum

**Model Codes** – The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following model code(s).

**VEGASWING SG66a.bcddefghij, Vibrating Level Switch.**

Reference Control Drawing No. GE3074 for Entity Parameter values

- a = Configuration: Options not affecting safety, one digit alphanumeric variable referring to shipping properties or none
- b = Geographical Designation: Options not affecting safety, one digit alphanumeric variable referring to geographical area for marketing properties
- c = Agency Approval: C, O or U
- d = Version: H, K or R
- e = Process Connection/Fitting: Two digit alphanumeric variable for connections, which represents a ASME, DIN, G, LA, NPT or TRI-CLAMP industry type flange, with pressure ratings and any type which comply with an international or national standard
- f = Process Temperature Code: A or X
- g = Electronics: L or Z
- h = Housing Type: 8, A, H or V
- i = Cable Entry: 1, D, M, N or Q
- j = Certificates: M or X

Safety Integrity Level (SIL) 2 conformity not FM verified

- \* For f = A, reference Safety Instructions No. 50278 manual for maximum permissible ambient temperature and temperature class alignment tables up to T-process = +450 °C

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In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following model code(s).

**VEGASWING SG66a.bcdghij, Vibrating Level Switch.**

- a = Configuration: Options not affecting safety, one digit alphanumeric variable referring to shipping properties or none
- b = Geographical Designation: Options not affecting safety, one digit alphanumeric variable referring to geographical area for marketing properties
- c = Agency Approval: E, Q or Z
- d = Version: H, K or R
- e = Process Connection/Fitting: Two digit alphanumeric variable for connections, which represents a ASME, DIN, G, LA, NPT or TRI-CLAMP industry type flange, with pressure ratings and any type which comply with an international or national standard
- f = Process Temperature Code: A or X
- g = Electronics: I, L, R, S, T or Z
- h = Housing Type: A, H or V
- i = Cable Entry: 1, D, M, N or Q
- j = Certificates: M or X

Safety Integrity Level (SIL) 2 conformity not FM verified

- \* For f = A, reference Safety Instructions No. 50279 manual for maximum permissible ambient temperature and temperature class alignment tables up to T-process = +450 °C

In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following model code(s).

**VEGASWING SG66a.bcdghij, Vibrating Level Switch.**

- a = Configuration: Options not affecting safety, one digit alphanumeric variable referring to shipping properties or none
- b = Geographical Designation: Options not affecting safety, one digit alphanumeric variable referring to geographical area for marketing properties
- c = Agency Approval: A or N
- d = Version: H, K or R
- e = Process Connection/Fitting: Two digit alphanumeric variable for connections, which represents a ASME, DIN, G, LA, NPT or TRI-CLAMP industry type flange, with pressure ratings and any type which comply with an international or national standard
- f = Process Temperature Code: A or X
- g = Electronics: I, L, R, S, T or Z
- h = Housing Type: A, H or V
- i = Cable Entry: 1, D, M, N or Q
- j = Certificates: M or X

Safety Integrity Level (SIL) 2 conformity not FM verified

- \* For f = A, reference Safety Instructions No. 50280 manual for maximum permissible ambient temperature and temperature class alignment tables up to T-process = +450 °C

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## 13. **Specific Conditions of Use:**

In type of protection intrinsically safe apparatus, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the process sensor probes are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC, hazardous (classified) locations.
2. Maximum permissible working pressure is 160 bar (2,320 psig).
3. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. The vibrating level switch shall be installed in such a way that contact between the measuring sensor and the tank wall will be excluded with sufficient safety, considering the tank installations and the flow conditions inside the tank.
6. The maximum permitted ambient temperature of the vibrating level switch is +70 °C. To avoid the effects of process temperatures and other thermal effects, care shall be taken to ensure the surrounding ambient temperature and the ambient temperature inside the equipment enclosure does not exceed +70 °C. Adherence to the manufacturer's installation manual must be followed for fulfillment of this requirement.

In types of protection explosionproof/flameproof enclosure, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following specific conditions of use.

1. For Division 1 and Zone 1 Approvals, the process sensor probes are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC, hazardous (classified) locations.
2. The equipment is marked for Zone 0/1, and may only be mounted through or form part of the boundary wall to Class I, Zone 0, hazardous (classified) locations when the process pressure is within the range of 0.8...1.1 bar. For other locations, the maximum permissible working pressure is 160 bar (2,320 psig).
3. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. The vibrating level switch shall be installed in such a way that contact between the measuring sensor and the tank wall will be excluded with sufficient safety, considering the tank installations and the flow conditions inside the tank.
6. The maximum permitted ambient temperature of the vibrating level switch is +60 °C. To avoid the effects of process temperatures and other thermal effects, care shall be taken to ensure the surrounding ambient temperature and the ambient temperature inside the equipment enclosure does not exceed +60 °C. Adherence to the manufacturer's installation manual must be followed for fulfillment of this requirement.
7. For information on flameproof joint dimensions and repair, contact the manufacturer using instructions given in product manual and safety instructions.

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In type of protection nonincendive equipment, the vibrating level switch (VEGASWING 66 Series) equipment is designated with the following specific conditions of use.

1. For Division 2 Approvals, the process sensor probes are suitable for non-flammable process connections to Class I, Division 2, Groups A, B, C and D, hazardous (classified) locations.
2. Maximum permissible working pressure is 160 bar (2,320 psig).
3. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
4. The vibrating level switch shall be installed in such a way that contact between the measuring sensor and the tank wall will be excluded with sufficient safety, considering the tank installations and the flow conditions inside the tank.
5. The maximum permitted ambient temperature of the vibrating level switch is +60 °C. To avoid the effects of process temperatures and other thermal effects, care shall be taken to ensure the surrounding ambient temperature and the ambient temperature inside the equipment enclosure does not exceed +60 °C. Adherence to the manufacturer's installation manual must be followed for fulfillment of this requirement.

**14. Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

**15. Schedule Drawings:**

A copy of the technical documentation has been kept by FM Approvals.

**16. Certificate History:**

Details of the supplements to this certificate are described below:

Date	Description
6 <sup>th</sup> September 2016	Original Issue.
6 <sup>th</sup> April 2018	<u>Supplement 1:</u> Report Reference: RR213456, dated 6 <sup>th</sup> April 2018. Description of the Change: Mechanical changes to the electromechanical drive system in order to improve resistance to external vibrations. Assembly document and model code update – the actual change is made to the entire certificate and the full document is issued to the holder.

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