Safety instructions
VEGASWING 66

FM16US0038X

Intrinsic safety (IS)

Document ID: 50278

Contents

Supplementary documents:

- Operating Instructions VEGASWING 66
- Certificate of Conformity FM16US0038X (Document ID: 50281)

Editing status: 2018-03-15

50278-EN-180607

1 Area of applicability

These safety instructions apply to the vibrating level switches VEGASWING SG66(*).FC/O with integrated electronics Z (4 … 20 mA) or L (4 … 20 mA with SIL qualification) according to Certificate of Conformity FM16US0038X and for all instruments with the number of the safety instruction (50278) on the type label.

2 General information

The vibrating level switch measuring instruments VEGASWING SG66(*).FC/O are used for monitoring or control of level measurement in hazardous areas.

The measured products can also be combustible liquids, gases, mist or vapour (Division and Zone applications).

The VEGASWING SG66(*).FC/O consist of an electronics housing with integrated electronics module, a process connection element and a sensor.

The VEGASWING SG66(*).FC/O are suitable for use in hazardous atmospheres of all combustible materials of explosion groups A, B, C and D for applications requiring Class I, Division 1 or 2 instruments (National Electrical Code® (ANSI/NFPA 70 (NEC®), Article 500) or of explosion groups IIC, IIB or IIA for applicaions requiring Class I, Zone 0, 0/1, 1 AEx ia IIC Ga, Ga/Gb, Gb instruments (National Electrical Code® (ANSI/NFPA 70 (NEC®), Article 505).

If the VEGASWING SG66(*).FC/O are installed and operated in hazardous areas, the general Ex installation regulations as well as these safety instructions must be observed.

The operating instructions as well as the installation regulations and standards that apply for explosion protection of electrical systems must always be observed.

The installation of explosion-endangered systems must always be carried out by qualified personnel.

The equipment is not intended to be used as personal protective equipment. To pevent injury, read the manual before use.

Operating temperature range (* Referance section 4 "Application condtions")
-50 … +70 °C

Maximum working pressure range (* Referance section 4 "Application condtions")
FM3810: 2005, ISA-61010-1: 2012

-0.1 … 16 MPa (-14.5 … 2.320 psig)

Environmental designation
ANSI/IEC 60529: 2004, NEMA 250: 2008

IP 66, IP 68; Type 4X, Type 6P

Hazardous locations designation
FM3600: 2011, FM3610: 2010, ANSI/ISA-60079-0: 2013, ANSI/ISA-60079-11: 2012

Intrinsically Safe for use in Class I, Division 1 or 2, Groups A, B, C and D

Intrinsically Safe for use in Class I, Zone 0, 0/1, 1, AEx ia IIC Ga, Ga/Gb, Gb

3 Technical data

VEGASWING SG66(*).FC/O with integrated electronics Z (4 … 20 mA) or L (4 … 20 mA with SIL qualification)

Electrical data
VEGASWING SG66(*).FC/O with integrated electronics Z (4 … 20 mA) or L (4 … 20 mA with SIL qualification), version with single chamber housing A, V or 8

Supply and signal circuit: (terminals 1[+], 2[-])	In ignition protection type intrinsic safety Ex ia IIC/IIB Only for connection to a certified, intrinsically safe circuit. Maximum values: • U_i = 30 V • I_i = 131 mA • P_i = 983 mW

The intrinsically safe circuits for internal and external connections are electrically separated from parts which can be grounded.

The intrinsically safe circuits to the sensor are galvanically connected to ground potential.

The metallic parts of VEGASWING SG66(*).FC/O are electrically connected with the earth terminals.

For applications requiring equipment of type Class I, Division 1/Zone 0, Ga, the intrinsically safe power supply and signal circuit must correspond to type of protection Ex ia.

For applications requiring equipment of type Class I, Division 1 or 2/Zone 0/1, Ga/Gb, the intrinsically safe power supply and signal circuit may correspond the type of protection Ex ia or Ex ib. For connection to a circuit with type of protection Ex ib, the ignition protection type is Ex ib.

For applications requiring equipment of type Class I Division 2/Zone 1, Gb, the intrinsically safe power supply and signal circuit may correspond to type protection Ex ia or Ex ib. For connection to a circuit with type of protection Ex ib, the ignition protection type is Ex ib.

For applications requiring Class I, Division 1 or 2/Zone 0, 0/1, Ga, Ga/Gb instruments the VEGASWING SG66(*).FC/O is preferably connected to appropriate instruemtns with electrically isolated, intrinsically safe circuits.

4 Application conditions

VEGASWING SG66(*).FC/O with integrated electronics Z (4 … 20 mA) or L (4 … 20 mA with SIL qualification)
The application conditions when operating in the absence of explosive mixtures can be found in the manufacturer's operating instruction information.

Hazards related to the control of external processes under measurement are beyond the scope of content described in the documentation.

The maximum permissible ambient temperatures depending on the temperature classes are specified in the following tables.

Class I, Division 1 applications; Class I, Zone 0, Ga applications

Temperature class	Permissible ambient temperature on the electronics	Permissible ambient temperature on the sensor
T6	-50 … +33 °C	-20 … +33 °C
T5	-50 … +45 °C	-20 … +45 °C

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Temperature class	Permissible ambient temperature on the electronics	Permissible ambient temperature on the sensor
T4, T3, T2, T1	-50 … +60 °C	-20 … +60 °C

Class I, Division 1 or 2 applications; Class I, Zone 0/1, Ga/Gb applications

Temperature class	Permissible ambient temperature on the electronics	Permissible ambient temperature on the sensor
T6	-50 … +49 °C	-20 … +60 °C
T5	-50 … +64 °C	-20 … +60 °C
T4, T3, T2, T1	-50 … +70 °C	-20 … +60 °C

If the sensors of VEGASWING SG66(*).FC/O are operated at temperatures higher than those specified in the above table, please make sure by means of appropriate measures that there is no danger of ignition from the hot surfaces. The maximum permissible temperature on the electronics/housing should not exceed the values specified in the above table. The application conditions when operation with no explosive mixtures are stated in the manuacturer's operating instruction information.

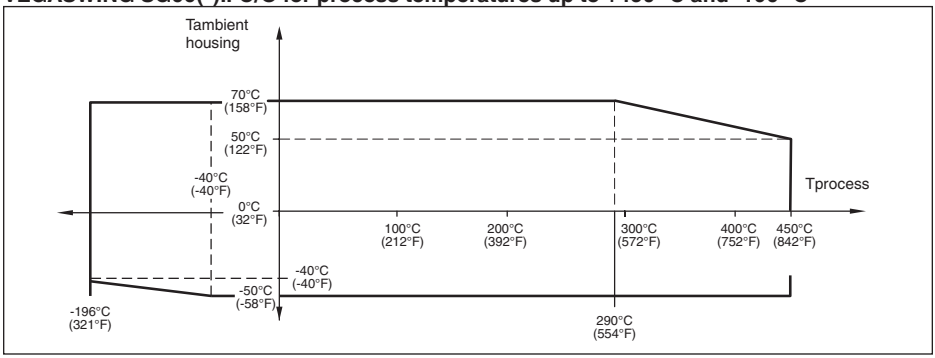
Class I, Division 2 applications; Class I, Zone 1, Gb applications

Temperature class	Permissible ambient temperature on the electronics	Permissible ambient temperature on the sensor
T6	-50 … +49 °C	-196 … +85 °C
T5	-50 … +64 °C	-196 … +100 °C
T4	-50 … +70 °C	-196 … +135 °C
T3	-50 … +70 °C	-196 … +200 °C
T2	-50 … +70 °C	-196 … +300 °C
T1	-50 … +70 °C	-196 … +450 °C

If the sensors of VEGASWING SG66(*).FC/O are operated at temperatures higher than those specified in the above table, please make sure by means of appropriate measures that there is no danger of ignition from the hot surfaces. The maximum permissible temperature on the electronics/housing should not exceed the values specified in the above table. The application conditions when operation with no explosive mixtures are stated in the manuacturer's operating instruction information.

Temperature derating

VEGASWING SG66(*).FC/O for process temperatures up to +450 °C and -196 °C



The temperature ranges for operation specified in the operating instructions must not be exceeded.

5 Protection against static electricity

The VEGASWING SG66(*).FC/O in versions with electrostatically chargeable plastic parts, such as e.g. metal housing with inspection window, with plastic coated sensor or distance tube, have a caution label pointing out the safety measures that must be taken with regard to electrostatic charges during operation.

Caution: Plastic parts! Danger of electrostatic charging!

- Avoid friction
- No dry cleaning
- Do not mount in areas with flowing, non-conductive products

Erection/Installation: The VEGASWING SG66(*).FC/O must be erected/installed in such a way that

- Electrostatic charges are ruled out during operation, maintenance and cleaning.
- Process-related electrostatic charges, e.g. by measuring media flowing past, are ruled out

6 Use of an overvoltage arrester

If necessary, a suitable overvoltage arrester can be connected in front of the VEGASWING SG66(*).FC/O.

When used as Class I, Zone 0, 0/1, Ga, Ga/Gb instrument, as far as necessary analogue, a suitable overvoltage arrester must be connected in front as protection against voltage surges.

7 Grounding

In order to avoid the danger of electrostatic charging of the metallic parts, the VEGASWING SG66(*).FC/O must be electrostatically connected to the local potential equalization (transfer resistance ≤ 1 MΩ), e.g. via the ground terminal.

8 Impact and friction sparks

The VEGASWING SG66(*).FC/O in aluminum/titanium versions must be mounted in such a way

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that sparks from impact and friction between aluminum/titanium and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

9 Material resistance

The VEGASWING SG66(*).FC/O must only be used in products against which the wetted materials are sufficiently resistant.

10 Installation/mounting

The VEGASWING SG66(*).FC/O have to be mounted such that the sensor is effectively secured against bending, oscillating, or touching the vessel wall, under consideration of other vessel installations and flow conditions in the vessel.

11 Type and size of the threads for the cable entries

The electronics connection compartment of VEGASWING SG66(*).FC/O with cable entry type M has cable entries M20 x 1.5.

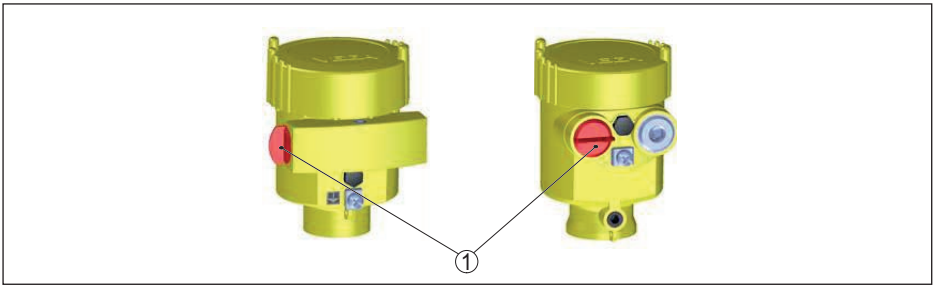
The electronics connection compartment of VEGASWING SG66(*).FC/O with cable entry type N has cable entries ½-14 NPT.

12 Removing and replacing the red thread/dust cover

The red thread covers screwed in when the instrument is shipped (depending on the version) must be removed before setup. The openings must be closed before setup by a way approved for the enclosure and environmental protection rating. Approved and suitable conduits or cable glands (Division and Zone applications) or blind plugs must be installed according to the supplied documents. Before setting up VEGASWING SG66(*).FC/O you have to check if all other openings are closed in a way approved for intrinsic safety protection.

The sealing plugs included by VEGA meet the necessary requirements.

VEGASWING SG66(*).FC/O - Single chamber housing with thread cover



1 Red thread cover must be removed before setup. The opening must be closed before setup by a way approved for intrinsic safety

13 Installation, maintenance and inspection

- Intrinsically Safe Apparatus can be a source of ignition if internal spacings are shorted or connections opened.
- Although intrinsically safe circuits are inherently low energy, they may still present a shock hazard because of the operating voltage.
- Refer to manufacturer's written instructions before working on associated apparatus.

- Inspection should be performed periodically to ensure that intrinsic safety has not been compromised. Inspections should include reviewing for unauthorized modifications, corrosion, accidental damage, change of flammable materials, and the effects of aging.
- User replaceable parts of an intrinsically safe system should not be replaced with other than the manufacturer's direct equivalent.
- Maintenance work may be performed on energized apparatus in hazardous areas subject to the conditions as follows:
  - Disconnection of, and removal or replacement of, items of electrical apparatus and cabling if such action will not result in shorting of different intrinsically safe circuits.
  - Adjustment of any control that is necessary for the calibration of the electrical apparatus or system.
  - Only test instruments specified in the written instructions should be used.
  - Performance of other maintenance activities specifically permitted by the relevant control drawing and instruction manual.
- Maintenance of Associated Apparatus and parts of intrinsically safe circuits located in unclassified areas should be restricted to that described in a way such that electrical apparatus or parts of circuits remain interconnected with parts of intrinsically safe systems located in hazardous areas. Safety barrier ground connections should not be removed without first disconnecting the hazardous-area circuits.
- Other maintenance work on Associated Apparatus or parts of an intrinsically safe circuit mounted in an unclassified area should be performed only if the electrical apparatus or part of a circuit is disconnected from the part of the circuit located in a hazardous area.
- The location classification and the suitability of the intrinsically safe system for that classification should be verified. This includes verifying that the class, group, and temperature ratings of both the Intrinsically Safe Apparatus and the Associated Apparatus agree with the actual classification of the location.
- Prior to energizing, an intrinsically safe system should be inspected to ensure the following:
  - Installation is in compliance with the documentation
  - Intrinsically safe circuits are properly separated from non-intrinsically safe circuits
  - Cable shields are grounded in accordance with the installation documentation
  - Modifications have been authorized
  - Cables and wiring are not damaged
  - Bonding and grounding connections are tight
  - Bonding and grounding hardware is not corroded
  - Resistance of any grounding conductor, including termination resistance from shunt-type-Associated Apparatus to the grounding electrode does not exceed one ohm
  - Protection has not been defeated by bypassing; and
  - Check for signs of corrosion on the equipment and connections.
- All deficiencies should be corrected.

14 Installation diagram

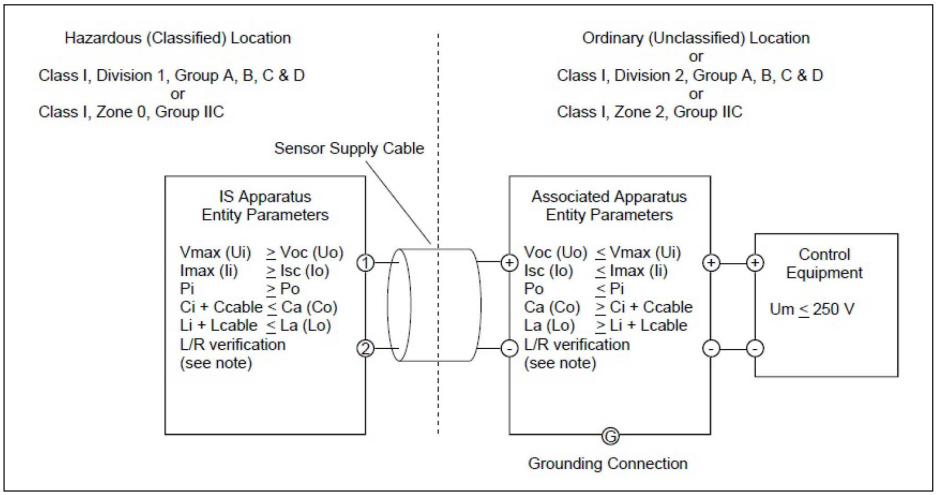
VEGASWING SG66(*).FC/O with integrated electronics, compact or remote sensor and display with factoryinstalled cabling

Installation Control Diagram, Class I, Division 1, Groups A, B, C, D; Class I, Zone 0, AEx ia IIC

VEGASWING SG66(*).FC/O including:

- Compact sensor and compact display (following figure)

VEGASWING SG66(*).FC/O (Electronics 4 … 20 mA/HART) - Compact sensor and compact display version



General

The Intrinsic Safety Entity concept allows the interconnection of two intrinsically safe devices FM Approved with entity parameters not specifically examined in combination as a system when:

- Uo or Voc or Vt ≤ Vmax
- Io or Isc or It ≤ Imax
- Po ≤ Pi
- Ca or Co ≥ Ci + Ccable
- La or Lo ≥ Li + Lcable

The configuration of Field Device must be FM Approved under Entity Concept.

The Field Device manufacturer's installation drawing shall be followed when installing this equipment.

The installation must be in accordance with the National Electrical Code® (ANSI/NFPA 70 (NEC®)), Articles 504 and 505, and ANSI/ISA-RP12.06.01.

Resistance between intrinsically safe ground and earth ground must be less than one ohm.

For Class I, Zone 0 and Division 1 locations, installation of the VEGASWING 66 Series should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70 (NEC®).

Substitution of components may impair suitability for hazardous locations.

Barriers and instruments incorporated into the system are required to carry same Agency Approval.

Control Equipment

Control equipment connected to the Associated Apparatus shall not use or generate more than 250 VAC or VDC.

Associated Apparatus

The configuration of Associated Apparatus must be FM Approved under the Entity Concept.

Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.

The VEGASWING 66 Series are FM Approved for Class I, Zone 0 and Division 1 applications. If connecting [AEx ib] Associated Apparatus to the VEGASWING 66 Series, the above system is only suitable for Class I, Zone 1, or Division 2 hazardous (classified) locations, and is not suitable for Class I, Zone 0, or Division 1 hazardous (classified) locations.

For Division 2 installations, the Associated Apparatus is not required to be FM Approved under Entity Concept if the VEGASWING 66 Series is installed in accordance with the National Electrical Code® (ANSI/NFPA 70 (NEC®)), Articles 504 and 505, for Division 2 wiring methods excluding nonincendive field wiring.

VEGA Sensor
The VEGA Sensor is a VEGASWING SG66(*).FC/O.

VEGA Sensor Supply Cable
The regulations for the interconnection of intrinsically safe circuits between VEGASWING SG66(*). FC/O and the Associated Apparatus are complied with if the total inductance and total capacity of the connection cable between VEGASWING SG66(*).FC/O and the barrier La or Lo ≥ Li + Lcable and Ca or Co ≥ Ci + Ccable are not exceeded.

VEGASWING SG66(*).FC/O (Electronics 4…20 mA/HART)
- Ui = 30 V
- Ii = 131 mA
- Pi = 983 mW

The effective internal capacitance is Ci is negligibly small.

The effective internal inductance is Li ≤ 5 µH.

For the version with fixed cable:

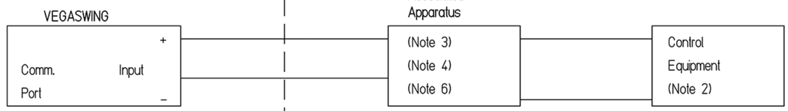
- Li´ = 0,62 µH/m
- Ci´wire/wire = 150 pF/m
- Ci´´wire/screen = 270 pF/m

These values must be taken into the account.

Hazardous (Classified) Location

Class I, Zone 0, 0/1, 1 Group IIC
Class I, Division 1, Groups A, B, C, and D
T... see Ambient Temperature / Temperature Class Tables (below)

Unclassified Location



Entity Parameters:

Input: Vmax=30V, Imax=131mA, Pi=0.983W, Ci and Li negligibly low

NOTES:

1. The Intrinsic Safety Entity concept allows the interconnection of two FM approved Intrinsically safe deviceswith entity parameters not specifically examined in combination as a system when: Uo or Voc or Vt ≤ Vmax, Io or Isc or It ≤ Imax, Ca or Co ≥ Ci + Ccable, La or Lo ≥ Li + Lcable, Po ≤ Pi.
2. Control equipment connected to the Associated Apparatus shall not use or generate more than 250 Vrms or Vdc.
3. Installation should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the the National Electrical Code (ANSI/NFPA 70 (NEC®), Articles 504 and 505).
4. The configuration of associated Apparatus shall be FM approved under Entity Concept.
5. Associated Apparatus manufacturer's installation drawing shall be followed when installing this equipment.
6. The VEGASWING 66 Series are FM Approved for Class I, Zone 0 and Division 1 applications. If connecting [AEx ib] Associated Apparatus to the VEGASWING 66 Series, the above system is only suitable for Class I, Zone 1, or Division 2 hazardous (classified) locations, and is not suitable for Class I, Zone 0, or Division 1 hazardous (classified) locations.
7. When cable parameters are unknown, the following may be used: Capacitance = 197 pF/m (60 pF/ft.); Inductance = 0.66 μH/m (0.20 μH/ft.)
8. Resistance between intrinsically safe ground and earth ground must be less than one ohm.
9. No revision to drawing without prior Agency Approval.
10. Warning: Substitution of components may impair suitability for intrinsic safety and hazardous locations.
11. Reference Safety Instructions Manual - Two-Wire, VEGASWING SG66 (*) . FC/O No. 50278 for additional information necessary for proper installation.

Class I, Division 1 applications; Class I, Zone 0, Ga applications:

Temperature class	Ambient temperature on the electronics	Ambient temperature on the sensor
T6	-50...+33 °C	-20...+33 °C
T5	-50...+45 °C	-20...+45 °C
T4, T3, T2, T1	-50...+60 °C	-20...+60 °C

Class I, Division 1 or 2 applications; Class I, Zone 0/1, Ga/Gb applications: (Note 6)

Temperature class	Ambient temperature on the electronics	Ambient temperature on the sensor
T6	-50...+49 °C	-20...+60 °C
T5	-50...+64 °C	-20...+60 °C
T4, T3, T2, T1	-50...+70 °C	-20...+60 °C

Class I, Division 2 applications; Class I, Zone 1, Gb applications: (Note 6)

Temperature class	Ambient temperature on the electronics	Ambient temperature on the sensor
T6	-50...+49 °C	-196...+85 °C
T5	-50...+64 °C	-196...+100 °C
T4	-50...+70 °C	-196...+135 °C
T3	-50...+70 °C	-196...+200 °C
T2	-50...+70 °C	-196...+300 °C
T1	-50...+70 °C	-196...+450 °C

– INITIAL RELEASE 24.04.2013 ilchovskin dieterlen
INITIAL RELEASE

Passmaß/tol.dimens. | Abmaß/allowance | Änderung / revision | Änd. Nr. ECN no. | Datum / Date | gezeichnet / freigegeben drawn / checked

Freimaßtoleranz general tolerance | gezeichnet drawn | Datum/Date 24.04.2013 | Name/Name ilchovskin
freigegeben checked | 04.02.2015 | dieterlen

Benennung: VEGASWING66 INSTALLATION CONTROL DIAGRAM
Description: VEGASWING66 INSTALLATION CONTROL DIAGRAM

Werkstoff / Material
Maßstab Scale
Originalformat size of origin B
Blatt / Sheet 1 von of 1

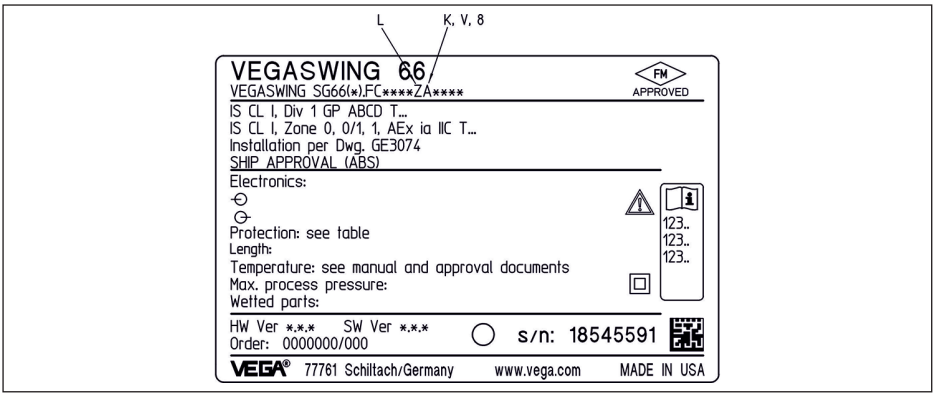
VEGA Americas Inc.
4241 Allendorf Drive
Cincinnati, Ohio
45209 USA

Art.Nr. / Art.No. GE3074
Zchngs.-Nr. / Drawing No. GE3074
Änd.-Zust. / Rev. –
Var.Fam.:
Var.Fam.2:
Teil ähnl. / sim. part
Ersatz f./replacement f.
Arb.Anw. / work.instr.

15 Cautionary notes, warnings and markings

Hazardous location notes

- For guidance on US installations, see ANSI/ISA-RP12.06.01, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations.
- Installations in the US shall comply with the relevant requirements of the National Electrical Code® (ANSI/NFPA 70 (NEC®)).
- Wiring methods must conform to all local and national codes governing the installation, and wiring must be rated for at least +10 °C above the highest expected ambient temperature.
- Where the protection type allows and depends on wiring glands, the glands must be certified for the type of protection required and area classification identified on the equipment or system nameplate.
- The internal grounding terminal shall be used as the primary equipment grounding means and the external grounding terminal is only for a supplemental (secondary) bonding connection where local authorities permit or require such a connection.
- Approved seals against ingress of water or dust are required and the NPT or metric thread fittings must be sealed with tape or thread sealant in order to meet the highest level of ingress protection.
- When the equipment is supplied with plastic dust plugs in the conduit/cable gland entries; it is the end-user's responsibility to provide cable glands, adaptors and/or blanking plugs suitable for the environment in which the equipment is installed. When installed in a hazardous (classified) location, the cable glands, adaptors and/or blanking plugs shall additionally be suitable for the hazardous (classified) location, the product certification, and acceptable to the local authority having jurisdiction for the installation.
- The end-user must consult the manufacturer for repair disclaimers, and only certified parts, such as entry plugs, mounting and cover lock screws and o-rings, supplied by the manufacturer are permitted. No substitutions with nonmanufacturer supplied parts are permitted.
- Tighten cover screws to 3 N·m (26.5 lb·in.). Overtorquing may cause enclosure breakage.
- The minimum tightening torque for M4 (No. 6) binding screw protective conductor terminals is 1.13 N·m (10 lb·in.) or greater, as specified.
- Care must be taken during installation to avoid impacts or friction that could create an ignition source.
- Use copper, copper-clad aluminum or aluminum conductors only.
- Tampering and replacement with non-factory components may adversely affect the safe use of the system.
- Insertion or withdrawal of removable electrical connectors is to be accomplished only when the area is known to be free of flammable vapors.
- Substitution of components may impair intrinsic safety.
- Do not open when an explosive atmosphere is present.
- Explosion hazard, do not disconnect while circuit is live unless area is known to be non-hazardous.
- Explosion hazard, substitution of components may impair suitability for Class I, Division 2.
- The VEGASWING SG66(*).FC/O intrinsically safe apparatus bears the following label marking:



16 IP Testing conditions

For IPX8 the testing was conducted to simulate a depth of 2 meters for 30 min.

Printing date:

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