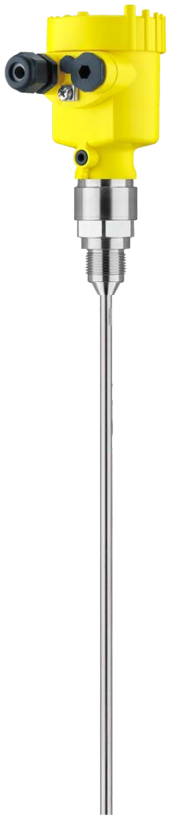
Safety instructions
VEGAFLEX FX8*(*).CC/ O****A/H*****



CSA No. 2515397 (LR 108043)

Ex [ia] IIC Ga; Class I Zone 0 AEx [ia] IIC Ga

Ex [ia] IIC Gb; Class I Zone 0 AEx [ia] IIC Gb

CL I, DIV 1, GP A,B,C,D

CL II, DIV 1, GP E,F,G

CL III

Document ID: 46264

Contents

Please note:

These safety instructions are part of the documentation:

- VEGAFLEX Serie 80
  - 41824 - VEGAFLEX 81 - 4 … 20 mA/HART - Two-Wire
  - 42279 - VEGAFLEX 81 - 4 … 20 mA/HART - Two-Wire - Coaxial Measuring Probe
  - 41829 - VEGAFLEX 82 - 4 … 20 mA/HART - Two-Wire
  - 41834 - VEGAFLEX 83 - 4 … 20 mA/HART - Two-Wire
  - 41839 - VEGAFLEX 83 - 4 … 20 mA/HART - Two-Wire - Polished Version
  - 41844 - VEGAFLEX 86 - 4 … 20 mA/HART - Two-Wire
  - 42284 - VEGAFLEX 86 - 4 … 20 mA/HART - Two-Wire - Coaxial Measuring Probe
- 49453 - CSA Certificate 2515397 (LR 108043)

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1 Area of applicability

These safety instructions apply to Guided Wave Radar series VEGAFLEX FX8*(*).CC/O****A/H***** according to CSA Certificate 2515397 (LR 108043)and for all instruments with the number of the safety instructions (46264) on the type label.

2 General information

The level measuring instruments VEGAFLEX FX8*(*).CC/O****A/H***** as guided radar sensors are used to detect the distance between product surface and sensor by means of high frequency electromagnetic waves in the GHz range. The electronics uses the running time of the signals reflected by the product surface to calculate the distance to the product surface.

The VEGAFLEX FX8*(*).CC/O****A/H***** consist of an electronics housing, a process connection element and a sensor, i.e. a measuring cable or a measuring rod. As an option, the display and adjustment module can also be installed in the instrument.

The VEGAFLEX FX8*(*).CC/O****A/H***** are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring instruments of EPL-Ga, EPL-Ga/Gb oder EPL-Gb.

The measured products can also be combustible liquids, gases, mist or vapour.

If the VEGAFLEX FX8*(*).CC/O****A/H***** are installed and operated in hazardous areas, the general Ex installation regulations IEC 60079-14 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.

Hazardous locations designation

Intrinsically Safe

- Ex [ia] IIC Ga; Class I Zone 0 AEx [ia] IIC Ga
- Ex [ia] IIC Gb; Class I Zone 0 AEx [ia] IIC Gb
- CL I, DIV 1, GP A,B,C,D
- CL II, DIV 1, GP E,F,G
- CL III

3 Technical data

3.1 Supply and signal circuit

VEGAFLEX FX8*.CC/O**H/A*A/K/V/8***, single chamber housing, "Ex-i" electronics compartment**

Power supply and signal circuit: (terminals 1[+], 2[-] in the "Ex-i" electronics compartment)	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 effective internal capacitance C_i is negligibly small. In the version with permanently mounted connection cable, $C_{i\ wire/wire}$ = 58 pF/m and $C_{i\ wire/screen}$ = 270 pF/m must be taken into account. The effective inner inductance L_i is $L_i \leq 5$ µH. In the version with permanently mounted connection cable, L_i = 0.55 µH/m must also be taken into account.

VEGAFLEX FX8*.CC/O**H/A*D/W/R/Y/Q/X***, double chamber housing, "Ex-i" connection compartment**

Power supply and signal circuit: (terminal 1[+], 2[-] in the "Ex-i" connection compartment)	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 effective internal capacitance C_i is negligibly small. In the version with permanently mounted connection cable, $C_{i\ wire/wire}$ = 58 pF/m and $C_{i\ wire/screen}$ = 270 pF/m must be taken into account. The effective inner inductance L_i with the double chamber version is $L_i \leq 10$ µH. In the version with permanently mounted connection cable, L_i = 0.55 µH/m must also be taken into account.

3.2 Intrinsically safe display and adjustment circuit

VEGAFLEX FX8*.CC/O**H/A*A/K/V/8***, single chamber housing, "Ex-i" electronics compartment**

Display and adjustment circuit: (terminals 5, 6, 7, 8 in the "Ex-i" electronics housing or plug connection)	In ignition protection type intrinsic safety Ex ia IIC For connection to the intrinsically safe circuit of the associated external indicating instrument VEGADIS 61/81 (IECEx PTB 06.0048 X). The rules for the interconnection of intrinsically safe circuits between VEGAFLEX FX8*.CC/O****H/A*A/K/V/8*** and the external display and adjustment unit VEGADIS 61/81 are fulfilled, provided that the total inductance and total capacitance of the connection cable between VEGAFLEX FX8*.CC/O****H/A*A/K/V/8*** and the external display unit VEGADIS 61, L_{cable} = 212 µH and C_{cable} = 1.98 µF, is not exceeded. When using the enclosed VEGA connection cable between VEGAFLEX FX8*.CC/O****H/A*A/K/V/8*** and the external indicating unit VEGADIS 61/81, the following listed cable inductances L_i and cable capacitances C_i must be taken into account. ● L_i = 0.62 µH/m ● $C_{i\ wire/wire}$ = 132 pF/m ● $C_{i\ wire/screen}$ = 208 pF/m

VEGAFLEX FX8*.CC/O**H/A*D/W/R***, double chamber housing, "Ex-i" connection compartment**

Indicating and adjustment circuit: (terminals 5, 6, 7, 8 in "Ex-i" electronics compartment)	In ignition protection type intrinsic safety Ex ia IIC For connection to the intrinsically safe circuit of the associated external indicating instrument VEGADIS 61/81 (IECEx PTB 06.0048 X). The rules for the interconnection of intrinsically safe circuits between VEGAFLEX FX8*.CC/O****H/A*D/W/R*** and the external display and adjustment unit VEGADIS 61/81 are fulfilled, provided that the total inductance and total capacitance of the connection cable between VEGAFLEX FX8*.CC/O****H/A*D/W/R*** and the external display unit VEGADIS 61, L_{cable} = 212 µH and C_{cable} = 1.98 µF, is not exceeded. When using the enclosed VEGA connection cable between VEGAFLEX FX8*.CC/O****H/A*D/W/R*** and the external indicating unit VEGADIS 61/81, the following listed cable inductances L_i and cable capacitances C_i must be taken into account. ● L_i = 0.62 µH/m ● $C_{i\ wire/wire}$ = 132 pF/m ● $C_{i\ wire/screen}$ = 208 pF/m

VEGAFLEX FX8*.CC/O**H/A*Y/Q/X***, double chamber housing**

Indicating and adjustment circuit: (terminals 5, 6, 7, 8 in "Ex-i" electronics compartment)	In ignition protection type intrinsic safety Ex ia IIC
Display and adjustment circuit: ("Ex-i" electronics compartment)	In ignition protection type intrinsic safety Ex ia IIC Each for connection to the intrinsically safe circuit of the associated external indicating instrument VEGADIS 61/81 (IECEx PTB 06.0048 X). The rules for the interconnection of intrinsically safe circuits between VEGAFLEX FX8*.CC/O****H/A*Y/Q/X*** and the external display and adjustment unit VEGADIS 61/81 are fulfilled, provided that the total inductance and total capacitance of the connection cable between VEGAFLEX FX8*.CC/O****H/A*Y/Q/X*** and the external display unit VEGADIS 61, L_{cable} = 212 µH and C_{cable} = 1.98 µF, is not exceeded. When using the enclosed VEGA connection cable between VEGAFLEX FX8*.CC/O****H/A*Y/Q/X*** and the external indicating unit VEGADIS 61/81, the following listed cable inductances L_i and cable capacitances C_i must be taken into account. • L_i = 0.62 µH/m • $C_{i\ wire/wire}$ = 132 pF/m • $C_{i\ wire/screen}$ = 208 pF/m

3.3 Intrinsically safe circuit for the display and adjustment module

VEGAFLEX FX8*.CC/O**H/A*A/K/V/8***, single chamber housing, "Ex-i" electronics compartment**

Circuit for the display and adjustment module: (spring contacts in the "Ex-i" electronics compartment)	In ignition protection type intrinsic safety Ex ia IIC For connection to the display and adjustment module PLICSCOM or VEGACONNECT.

VEGAFLEX FX8*.CC/O**H/A*D/W/R***, double chamber housing**

Circuit for the display and adjustment module: (spring contacts in the "Ex-i" connection compartment)	In ignition protection type intrinsic safety Ex ia IIC For connection to the display and adjustment module PLICSCOM or VEGACONNECT.
and	
Circuit for the display and adjustment module: (spring contacts in the "Ex-i" electronics compartment)	In ignition protection type intrinsic safety Ex ia IIC For connection to the display and adjustment module PLICSCOM or VEGACONNECT.

VEGAFLEX FX8*.CC/O**H/A*Y/Q/R***, double chamber housing, "Ex-i" connection compartment**

Circuit for the display and adjustment module: (spring contacts in the "Ex-i" connection compartment)	In ignition protection type intrinsic safety Ex ia IIC For connection to the display and adjustment module PLICSCOM or VEGACONNECT.

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3.4 Intrinsically safe HF circuit

VEGAFLEX FX8*(*).CC/O**A/H*****

HF circuit	In ignition protection type intrinsic safety Ex ia IIC The length of the coax connection cable between the electronics housing and the sensor housing may not exceed L_{cable} = 50 m for all versions of VEGAFLEX FX8*(*). CC/O****A/H***** with separate sensor.

The intrinsically safe circuits are electrically separated from parts which can be grounded.

For applications requiring instruments of EPL-Gb, the intrinsically safe power supply and signal circuit can correspond to protection class ia or ib. For connection to a circuit with protection class ib, the ignition protection type identification is Ex ib IIC T6 … T1.

For applications requiring equipment of type EPL-Ga or EPL-Ga/Gb, the intrinsically safe power supply and signal circuit must correspond to protection class ia.

For applications requiring instruments of type EPL-Ga resp. EPL-Ga/Gb the VEGAFLEX FX8*(*). CC/O****A/H***** is preferably connected to appropriate equipment with galvanically isolated, intrinsically safe circuits.

4 Application conditions

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

EPL-Ga instrument

Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T5	-20 … +42 °C	-20 … +42 °C
T4, T3, T2, T1	-20 … +60 °C	-20 … +60 °C

The process pressure of the medium must be between 0.8 … 1.1 bar for applications requiring EPL-Ga instruments. The permissible operating temperatures and pressures for operation are listed in the manufacter specification.

EPL-Ga/Gb instrument

Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T6	-20 … +60 °C	-50 … +46 °C
T5	-20 … +60 °C	-50 … +61 °C
T4, T3, T2, T1	-20 … +60 °C	-50 … +70 °C

For applications requiring EPL-Ga/Gb instruments the process pressure of the media must be between 0.8 … 1.1 bar. If the VEGAFLEX FX8*(*).CC/O****A/H***** are operated at temperatures higher than those specified in the above table, please make sure through appropriate measures that there is no danger of ignition from the hot surfaces. The maximum temperature on the electronics/ housing should not exceed the values specified in the above table. The application conditions during operation in areas with no explosive mixtures are stated in the manufacturer information.

EPL-Gb / Division 1 instrument

Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T6	-60 … +85 °C	-50 … +46 °C
T5	-60 … +100 °C	-50 … +61 °C
T4	-60 … +135 °C	-50 … +70 °C
T3	-60 … +200 °C	-50 … +70 °C
T2	-60 … +300 °C	-50 … +70 °C
T1	-60 … +450 °C	-50 … +70 °C

If the VEGAFLEX FX8*(*).CC/O****A/H***** are operated at temperatures higher than those specified in the above table, please make sure through appropriate measures that there is no danger of ignition from the hot surfaces. The maximum temperature on the electronics/housing should not exceed the values specified in the above table. The permissible operating temperatures and pressures are stated in the manufacturer information.

VEGAFLEX FX86(*).CC/O**A/H*****, low temperature version up to -196 °C**

EPL-Gb / Division 1 instrument

Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T6	-196 … +85 °C	-50 … +46 °C
T5	-196 … +100 °C	-50 … +61 °C
T4	-196 … +135 °C	-50 … +70 °C
T3	-196 … +200 °C	-50 … +70 °C
T2	-196 … +300 °C	-50 … +70 °C
T1	-196 … +450 °C	-50 … +70 °C

If the VEGAFLEX FX86(*).CC/O****A/H***** are operated at temperatures higher than those specified in the above table, please make sure through appropriate measures that there is no danger of ignition from the hot surfaces. The maximum temperature on the electronics/housing should not exceed the values specified in the above table. The permissible operating temperatures and pressures are stated in the manufacturer information.

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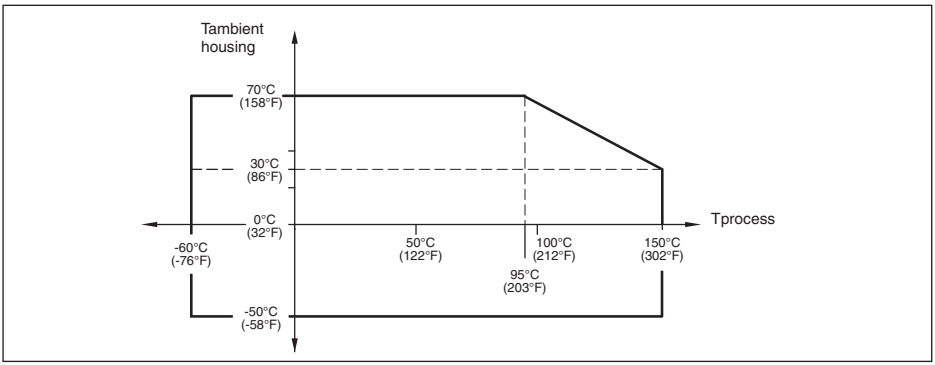
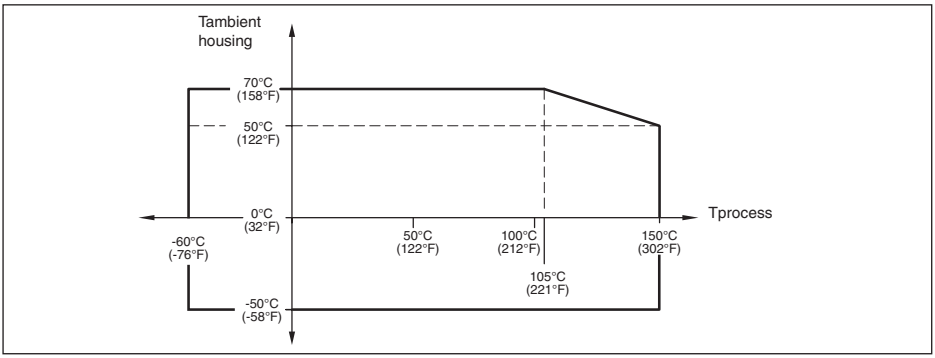
Temperature derating for process temperatures up to +150 °C, +200 °C, +250 °C, +280 °C, +450 °C and -196 °C

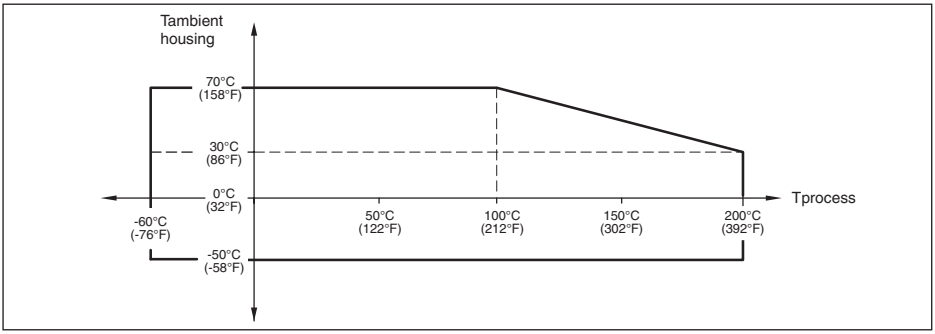
Versions for process temperatures up to +150 °C with plastic housing



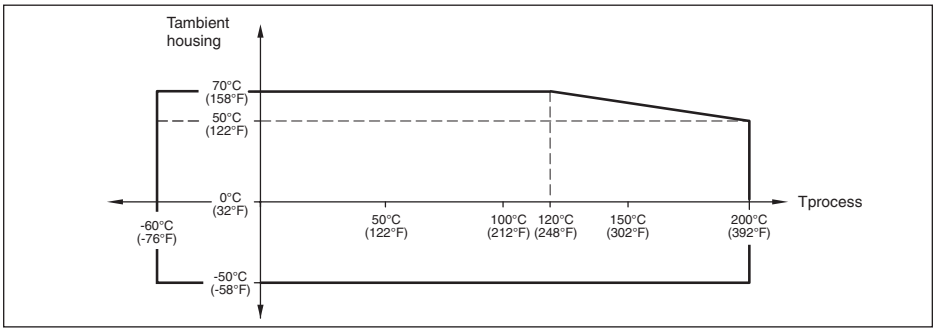
Versions for process temperatures up to +150 °C with metal housing



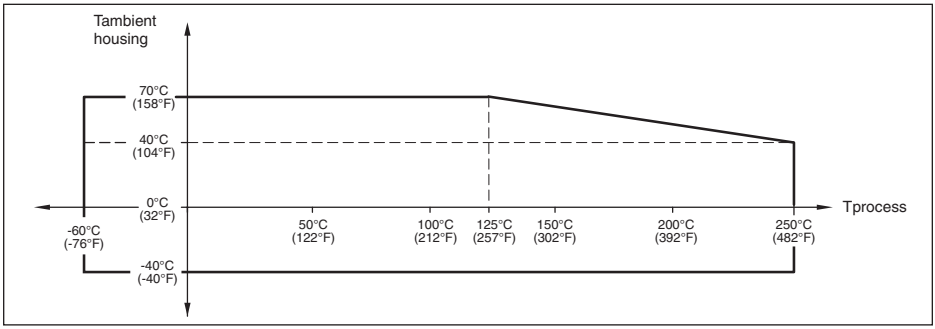
Versions for process temperatures up to +200 °C with plastic housing



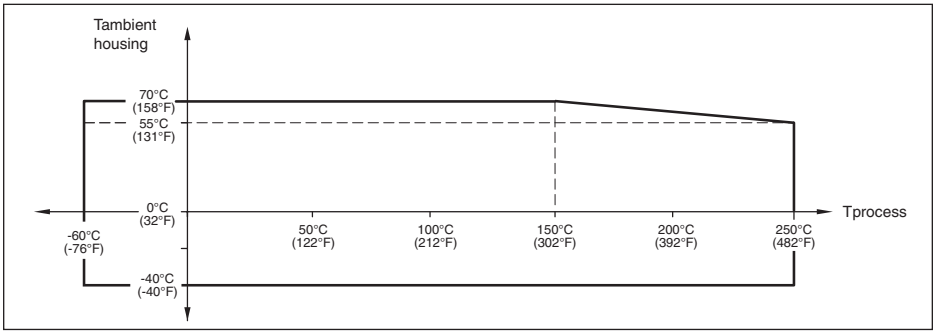
Versions for process temperatures up to +200 °C with metal housing



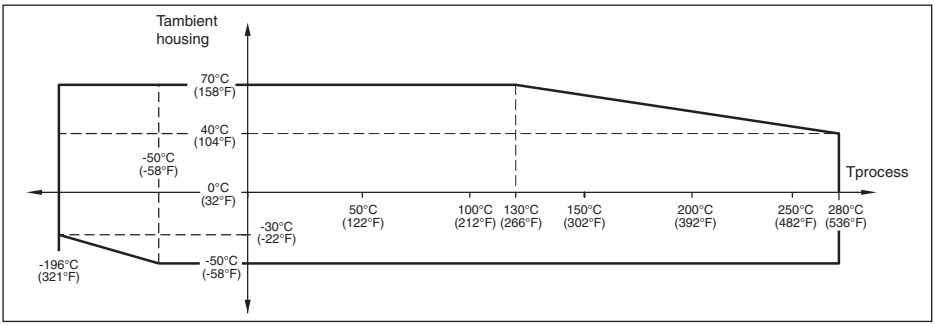
Versions for process temperatures up to +250 °C with plastic housing



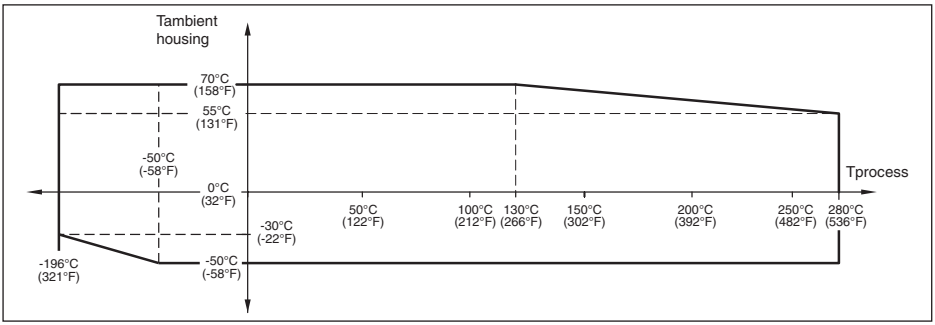
Versions for process temperatures up to +250 °C with metal housing



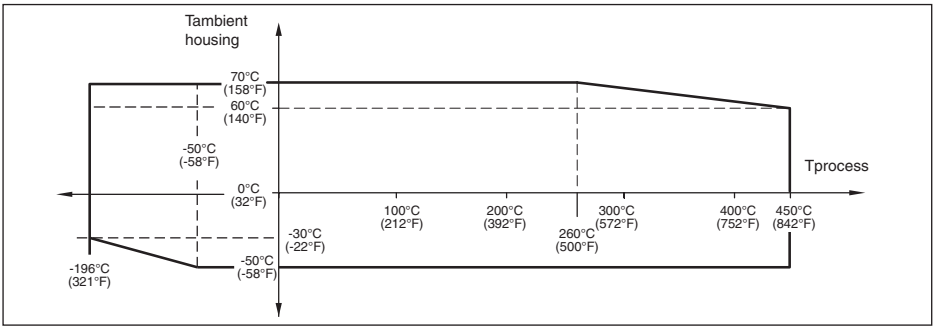
Versions for process temperatures up to +280 °C with plastic housing



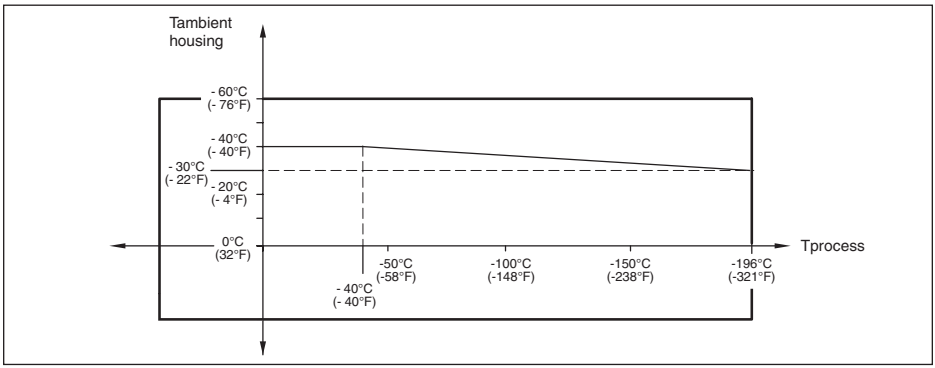
Versions for process temperatures up to +280 °C with metal housing



Versions for process temperatures up to +450 °C with plastic and metal housing



Versions for process temperatures down to -196 °C with plastic and metal housing



5 Protection against static electricity

The VEGAFLEX FX8*(*).CC/O****A/H***** in versions with electrostatically chargeable plastic parts, such as e.g. plastic housing, metal housing with inspection window or connection cable with the separated version, 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 static charge!

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

6 Use of an overvoltage arrester

If necessary, the VEGAFLEX FX8*(*).CC/O****A/H***** can be connected to an overvoltage arrester, e. g. type B62-36G from VEGA.

When used as EPL-Ga or EPL-Ga/Gb instrument, a suitable overvoltage arrester, e. g. type B62-36G of VEGA (IECEx TUN 07.0002) must be connected as far as this is required according to IEC 60079-14 chapter 12.3, for protection against surges.

7 Installation of the sensors

When used as EPL-Ga or EPL-Ga/Gb instruments, the sensors of VEGAFLEX FX8*(*).CC/O****A/H***** should be mounted such that the measuring cable/rod is effectively secured against bending or touching the vessel wall, under consideration of other vessel installations and flow conditions in the vessel. This applies especially to measuring probes over 3 m long.

8 XX. versions with exchangeable cable or rod probe; versions with probe length "Length 0"

The following must be taken into account for VEGAFLEX FX8*(*).CC/O****A/H***** versions with exchangeable cable or rod probe and for VEGAFLEX FX8*(*).CC/O****A/H***** versions probe length "Length 0":

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- On certified VEGAFLEX FX8*(*).CC/O****A/H***** only original VEGA cable or rod probes must be mounted
- When mounting cable or rod probes, the torques specified in the respecitive operating instruction manuals must be maintained
- The mechanical connection must be ensured

9 Grounding

VEGAFLEX FX8*(*).CC/O****A/H***** must be electrostatically (transition resistance ≤ 1 MΩ) grounded, e.g. via a ground connection terminal.

10 Impact and friction sparks

When used as zone 0 instruments, the VEGAFLEX FX8*(*).CC/O****A/H***** in aluminium/titanium versions must be mounted in such a way that sparks from impact and friction between aluminium/titanium and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

11 Material resistance

The VEGAFLEX FX8*(*).CC/O****A/H***** must only be used in media against which the materials of the wetted parts are sufficiently resistant.

12 Mounting with external indicating unit VEGADIS 61 or VEGADIS 81

The intrinsically safe signal circuit between VEGAFLEX FX8*(*).CC/O****A/H***** and the external indicating unit VEGADIS 61 or VEGADIS 81 should be set up without grounding. The required insulation voltage is > 500 V AC. When using VEGA connection cable, this requirement is fulfilled.

13 Installation Diagram

Installation Control Diagram

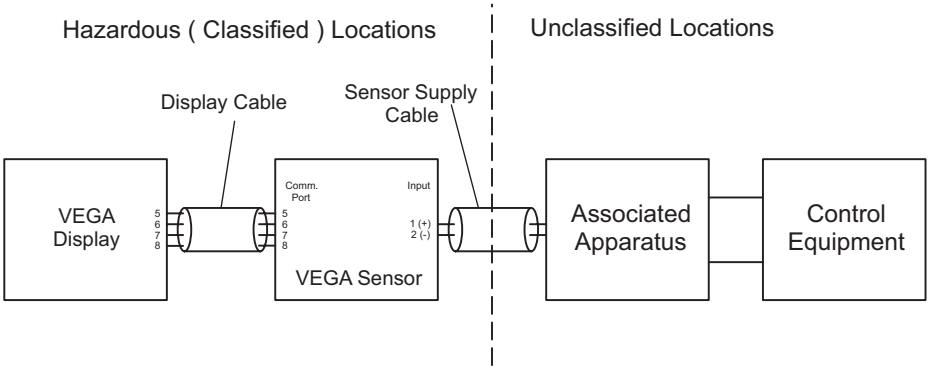

Fig. 12: VEGAFLEX FX8(*).CC/O****A/H***** (Electronics 4 … 20 mA/HART) - Single chamber housing*

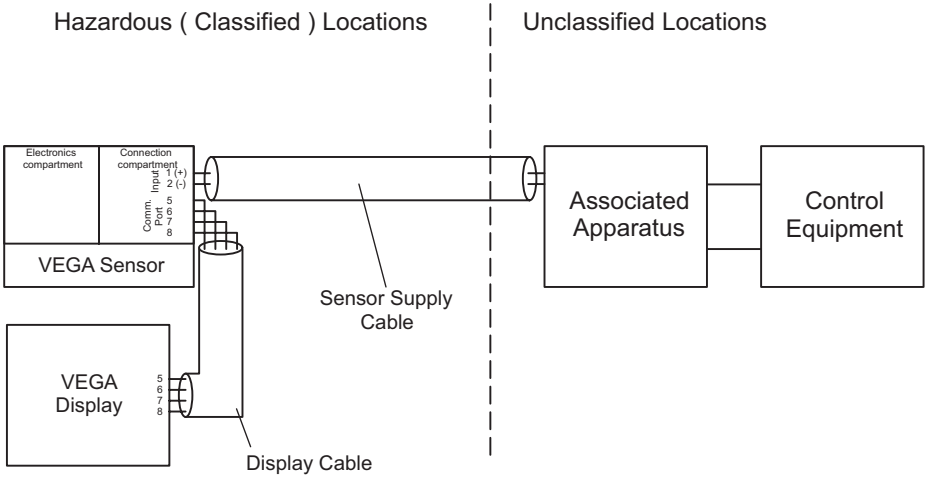

Fig. 13: VEGAFLEX FX8(*).CC/O****A/H***** (Electronics 4 … 20 mA/HART) - Double chamber housing*

General

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

U_O or V_{OC} or $V_t \leq V_{max}$

I_O or I_{SC} or $I_t \leq I_{max}$

$P_O \leq P_i$

C_a or $C_O \geq C_{cable}$

L_a or $L_O \geq L_{cable}$

For Division 2 installations, the Associated Appartus is required to be Fm approved or CSA Certified when installed in Canada under Entity Concept if the VEGAFLEX 80 Series is installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) od Canadian Electrial Code, CSA C22.1 Part 1 Appendix F, for division 2 wiring methods excluding Nonincendive field wiring.

Dust-tight conduit seal shall be used when installed in Class II and Class III enviroments.

Division 1 installations 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/NRPA 70) od Canadian Electrical Code.

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

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

The VEGAFLEX FX80 Series are FM Approved / CSA Certified for Class I, Zone 0, application. If connecting [Ex ib] / [AEx ib] Associated Apparatus or Ex ib / AEx ib I.S. Field Device to the VEGAFLEX FX80 Series, the above system is only suitable for Class I, Zone 1, and is not suitable for Class I, Zone 0 Hazardous (Classified) Locations.

WARNING: Substitution of components may impair suitability for hazardous locations.

Barriers and instruments to carry same Agency Approval.

Control Equipment
Control equipment connected to the Associated Apparatus shall not use or generate more than 253 Vrms or Vdc.

Associated Apparatus
For Division 1 installations, the configuration of associated Apparatus shall be FM approved / CSA Certified under Entity Concept.

Associated Apparatus manufacurer's installation drawing shall be followed when installing this equipment.

The VEGAFLEX FX80 Series are FM Approved / CSA Certified for Class I, Zone 0, application. If connecting [Ex ib] / [AEx ib] Associated Apparatus or Ex ib / AEx ib I.S. Field Device to the VEGAFLEX FX80 Series, the above system is only suitable for Class I, Zone 1, and is not suitable for Class I, Zone 0 Hazardous (Classified) Locations.

VEGA Sensor
The VEGA Sensor is a VEGAFLEX FX8*(*).CC/O****A/H*****.

VEGAFLEX FX8*(*).CC/O**A/H***** (Electronics 4 … 20 mA/HART)**

U_i = 30 V

I_i = 131 mA

P_i = 983 mW

The effective internal capacitance is C_i is negligibly small.

The effective internal inductance is $L_i \leq 5$ µH.

In the double chamber version is the effective internal inductance $L_i \leq 10$ µH.

For the version with fixed cable:

$L_i' = 55$ µH/m

$C_{i\ wire/wire}' = 58$ pF/m

$C_{i\ wire/screen}'' = 270$ pF/m

These values must be taken into the account.

Sensor Supply Cable

VEGA Display
The VEGA Display is a VEGADIS 61 or VEGADIS 81.

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

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

The VEGAFLEX FX80 Series are FM Approved / CSA Certified for Class I, Zone 0, application. If connecting [Ex ib] / [AEx ib] Associated Apparatus or Ex ib / AEx ib I.S. Field Device to the VEGAFLEX FX80 Series, the above system is only suitable for Class I, Zone 1, and is not suitable for Class I, Zone 0 Hazardous (Classified) Locations.

Display Cable
The regulations for the interconnection of intrinsically safe circuits between VEGAFLEX FX8*(*).CC/O****A/H***** and the external indication and adjustment unit are complied with if the total inductance and total capacity of the connection cable between VEGAFLEX FX8*(*).CC/O****A/H***** and the external indication and adjustment unit L_{cable} = 100 µH and C_{cable} = 1.98 µF are not exceeded. The indication and adjustment module integrated in VEGAFLEX FX8*(*).CC/O****A/H***** and the connected interface converter are taken into account.

In case of using the display connection cable delivered from VEGA between the VEGAFLEX

FX8*(*).CC/O****A/H***** and the display VEGADIS 61 or VEGADIS 81 the following parameters has to be considered:

$L_i' = 0.62\ \mu H/m$

$C_{i\ wire/wire}' = 132\ pF/m$

$C_{i\ wire/screen}' = 208\ pF/m$

14 Tensile force on the measuring cable/ rod

The permissible tensile force is

- VEGAFLEX FX81.CC/O****A/H*****
  - Diameter 4 mm: F = 2.5 kN
  - Diameter 2 mm: F = 1.5 kN
- VEGAFLEX FX82.CC/O****A/H*****
  - Diameter 4 mm: F = 12 kN
  - Diameter 6 mm coated: F = 8 kN
  - Diameter 6 mm: F = 30 kN
  - Diameter 11 mm coated: F = 30 kN
- VEGAFLEX FX83.CC/O****A/H*****
  - Diameter 4 mm: F = 2 kN
- VEGAFLEX FX86.CC/O****A/H*****
  - Diameter 4 mm: F = 2.5 kN
  - Diameter 2 mm: F = 1.5 kN

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

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