



## Safety instructions

### VEGAFLEX 81, 82, 83, 86

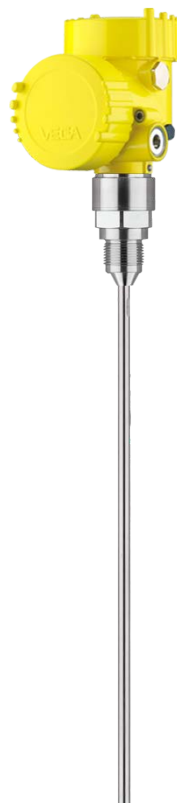
Flameproof/Explosionproof, Intrinsic safety

Two-wire 4 ... 20 mA/HART

Two-wire 4 ... 20 mA/HART with SIL qualification

Four-wire 4 ... 20 mA/HART

Modbus



Document ID: 46265



# VEGA

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Supplementary documentation:

- Operating instructions VEGAFLEX 81, 82, 83, 86
- Quick setup guide VEGAFLEX 81, 82, 83, 86
- Certificate of Compliance CSA23CA2515397 (Document ID: 49453)

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## 1 Area of applicability

These safety instructions apply to the VEGAFLEX 81, 82, 83, 86 of type series:

- VEGAFLEX FX8\*(\*).C/VD/I/P\*\*\*\*A/H/B/I/UX\*\*\*\*

With the electronics versions:

- H - Two-wire 4 ... 20 mA/HART
- A - Two-wire 4 ... 20 mA/HART with SIL qualification
- B - Four-wire 4 ... 20 mA/HART; 90 ... 253 V AC; 50/60 Hz
- I - Four-wire 4 ... 20 mA/HART; 9,6 ... 48 V DC; 20 ... 42 V AC
- U - Four-wire Modbus (converter in second chamber)

According to Certificate of Compliance CSA23CA2515397 (certificate number on the type label) and for all instruments with safety instruction 46265.

The classification as well as the respective standards are stated in the Certificate of Conformity:

Type of protection marking:

- CL I, DIV 1, GP ABCD T6 ... T1
- CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb
- CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb

## 2 Important specification in the type code

### VEGAFLEX FX81(a).bcdefghijklm

Position		Feature	Description
a			One or two-digit alphanumeric variable, for production control. Optional, not safety-relevant.
b	Scope	C	cCSAus
		V	Combination (Europe, world-wide, USA, CSA)
c	Approval	D	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb
		P	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb + Ship approval

Position		Feature	Description
d	Version / Material	3	exchangeable coated cable (ø 4 mm) with uncoated centering weight / PFA and 316
		6	exchangeable rod (ø 8 mm) / Duplex (1.4462)
		7	exchangeable cable (ø 2 mm) with gravity weight / Alloy C276 (2.4819)
		A	exchangeable cable (ø 4 mm) with gravity weight / 316
		B	exchangeable cable (ø 2 mm) with gravity weight / 316
		C	exchangeable cable (ø 4 mm) with centering weight / 316
		D	exchangeable cable (ø 2 mm) with centering weight / 316
		E	exchangeable rod (ø 8 mm) / 316L
		F	exchangeable rod (ø 12 mm) / 316L
		G	exchangeable rod (ø 8 mm) / 304L
		H	Coax (ø 21.3 mm) with single hole / 304L
		I	exchangeable cable (ø 4 mm) with gravity weight / Alloy C22 (2.4602)
		J	exchangeable cable (ø 4 mm) with centering weight / Alloy C22 (2.4602)
		K	Coax (ø 21.3 mm) with single hole / 316L
		L	Coax (ø 21.3 mm) with multiple hole / 316L
		N	Coax (ø 21.3 mm) with multiple hole / 304L
		O	exchangeable rod (ø 12 mm) / Alloy C22 (2.4602)
		P	Coax (ø 42.2 mm) with multiple hole / 316L
		Q	Coax (ø 21.3 mm) with multiple hole / Alloy C22 (2.4602)
		R	Coax (ø 42.2 mm) with multiple hole / Alloy C22 (2.4602)
S	exchangeable rod (ø 8 mm) / Alloy C22 (2.4602)		
U	exchangeable cable (ø 4 mm) without weight / 316		
V	exchangeable rod (ø 12 mm) / Alloy 400 (2.4360)		
W	exchangeable rod (ø 8 mm) / Alloy C276 (2.4819)		
		*	further approved Versions / Materials
ef	Process fitting / Material	**	Two-digit alphanumeric variables for process fittings according to industry standard

Position		Feature	Description
g	Seal / Second line of defense / Process temperature	A	FKM (SHS EPM 70C3 GLT) / without / -40 ... +80 °C
		B	EPDM (A+P 70.10-02) / without / -40 ... +80 °C
		D	FFKM (Kalrez 6375) / without / -10 ... +150 °C
		D	FFKM (Kalrez 6375) / without / -20 ... +150 °C
		F	FKM (SHS FPM 70C3 GLT) / without / -40 ... +150 °C
		G	FKM (SHS FPM 70C3 GLT) / with / -40 ... +150 °C
		H	EPDM (A+P 70.10-02) / without / -40 ... +150 °C
		I	Silicone FEP coated (A+P FEP-O-SEAL) / without / -40 ... +150 °C
		J	Borosilicate glass for slightly volatile substances, e.g. ammonia / with / -60 ... +150 °C
		K	FFKM (Kalrez 6375) / without / -10 ... +200 °C
		K	FFKM (Kalrez 6375) / without / -20 ... +200 °C
		L	FFKM (Kalrez 6375) / with / -10 ... +200 °C
		L	FFKM (Kalrez 6375) / with / -20 ... +200 °C
		M	EPDM (A+P 70.10-02) / with / -40 ... +150 °C
		N	Silicone FEP coated (A+P FEP-O-SEAL) / with / -40 ... +150 °C
		O	Silicone FEP coated (A+P FEP-O-SEAL) / without / -40 ... +80 °C
		P	FFKM (Kalrez 6375) / with / -10 ... +150 °C
		P	FFKM (Kalrez 6375) / with / -20 ... +150 °C
		Q	FKM (SHS EPM 70C3 GLT) / with / -40 ... +80 °C
		R	EPDM (A+P 70.10-02) / with / -40 ... +80 °C
S	Silicone FEP coated (A+P FEP-O-SEAL) / with / -40 ... +80 °C		
*	Other seals suitable for process temperature, IP or NEMA protection and environmental conditions, see operating instructions.		
h	Electronics	H	Two-wire 4 ... 20 mA/HART
		A	Two-wire 4 ... 20 mA/HART with SIL qualification
		B	Four-wire 4 ... 20 mA/HART; 90 ... 253 V AC; 50/60 Hz
		I	Four-wire 4 ... 20 mA/HART; 9.6 ... 48 V DC; 20 ... 42 V AC
		U	Four-wire Modbus (converter in second chamber)
i	Supplementary electronics	X	without
j	Housing / Protection	D	Aluminium double chamber / IP66/IP68 (0.2 bar)
		L	Cable outlet IP68 with external Aluminium double chamber / IP66/IP67
		M	Cable outlet IP68 with external stainless steel double chamber / IP66/IP67
		S	Special colour Aluminium double chamber / IP66/IP68 (0.2 bar)
		T	Cable outlet IP68 with external special colour Aluminium double chamber / IP66/IP67
		W	Stainless steel double chamber / IP66/IP68 (0.2 bar)

Position		Feature	Description
k	Cable entry / Connection	1	M20 x 1.5 / without
		D	M20 x 1.5 / Blind plug
		N	½ NPT / Blind plug
		Q	½ NPT / without
		*	Respectively approved cable glands and blind plugs correspond to the ignition protection type
l	Display and adjustment module PLICSCOM	X	without
		A	mounted
		F	without; lid with inspection window
		B	Laterally mounted
		K	mounted; with Bluetooth, magnetic pen operation
		L	laterally mounted; with Bluetooth, magnetic pen operation
m	Certificates	M	Yes
		X	No

### VEGAFLEX FX82(a).bcdefghijklm

Position		Feature	Description
a			One or two-digit alphanumeric variable, for production control. Optional, not safety-relevant.
b	Scope	C	cCSAus
		V	Combination (Europe, world-wide, USA, CSA)
c	Approval	D	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb
		P	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb + Ship approval
d	Version / Material	A	exchangeable cable (ø 4 mm) / 316
		F	exchangeable rod (ø 6 mm) / 316
		E	exchangeable steel cable (ø 6 mm with gravity weight / PA coated)
		G	exchangeable steel cable (ø 11 mm with gravity weight / PA coated)
		H	exchangeable rod (ø 16 mm) / 316L
		T	exchangeable rod (ø 16 mm) / Alloy C22 (2.4602)
		*	further approved Versions / Materials
ef	Process fitting / Material	**	Two-digit alphanumeric variables for process fittings according to industry standard
g	Seal / Process temperature	F	FKM (SHS FPM 70C3 GLT) / -40 ... +150 °C
		H	EPDM (A+P 70.10-02) / -40 ... +150 °C
		K	FFKM (Kalrez 6375) / -20 ... +200 °C
		*	Other seals suitable for process temperature, IP or NEMA protection and environmental conditions, see operating instructions.

Position		Feature	Description
h	Electronics	H	Two-wire 4 ... 20 mA/HART
		A	Two-wire 4 ... 20 mA/HART with SIL qualification
		B	Four-wire 4 ... 20 mA/HART; 90 ... 253 V AC; 50/60 Hz
		I	Four-wire 4 ... 20 mA/HART; 9.6 ... 48 V DC; 20 ... 42 V AC
		U	Four-wire Modbus (converter in second chamber)
i	Supplementary electronics	X	without
j	Housing / Protection	D	Aluminium double chamber / IP66/IP68 (0.2 bar)
		L	Cable outlet IP68 with external Aluminium double chamber / IP66/IP67
		M	Cable outlet IP68 with external stainless steel double chamber / IP66/IP67
		S	Special colour Aluminium double chamber / IP66/IP68 (0.2 bar)
		T	Cable outlet IP68 with external special colour Aluminium double chamber / IP66/IP67
		W	Stainless steel double chamber / IP66/IP68 (0.2 bar)
k	Cable entry / Connection	1	M20 x 1.5 / without
		D	M20 x 1.5 / Blind plug
		N	½ NPT / Blind plug
		Q	½ NPT / without
		*	Respectively approved cable glands and blind plugs correspond to the ignition protection type
l	Display and adjustment module PLICSCOM	X	without
		A	mounted
		F	without; lid with inspection window
		B	Laterally mounted
		K	mounted; with Bluetooth, magnetic pen operation
		L	laterally mounted; with Bluetooth, magnetic pen operation
m	Certificates	M	Yes
		X	No

## VEGAFLEX FX83(a).bcdefghijklm

Position		Feature	Description
a			One or two-digit alphanumeric variable, for production control. Optional, not safety-relevant.
b	Scope	C	cCSAus
		V	Combination (Europe, world-wide, USA, CSA)

Position		Feature	Description
c	Approval	D	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb
		P	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb + Ship approval
d	Version / Material	B	exchangeable cable (ø 4 mm) with gravity weight / PFA
		F	exchangeable rod (ø 8 mm) / 1.4435 (BN2), (Ra<0,76µm)
		G	exchangeable rod (ø 8 mm) / 1.4435 (BN2), can be autoclaved (Ra<0,76µm)
		E	Rod (ø 10 mm) / PFA
		H	exchangeable rod (ø 8 mm) / 1.4435 (BN2), electropolished (Ra<0,38µm)
		I	exchangeable rod (ø 8 mm) / 1.4435 (BN2), electropolished, can be autoclaved (Ra<0,38µm)
		*	further approved Versions / Materials
ef	Process fitting / Material	**	Two-digit alphanumeric variables for process fittings according to industry standard
g	Seal / Process temperature	X	without / -40 ... +150 °C
		E	FFKM (Kalrez 6221) / -20 ... +150 °C
		C	EPDM (Freudenberg 70, EPDM 291) / -20 ... +130 °C
		T	FEPM (Vi 602 Extreme-ETP, COG) / -10 ... +150 °C
		*	Other seals suitable for process temperature, IP or NEMA protection and environmental conditions, see operating instructions.
h	Electronics	H	Two-wire 4 ... 20 mA/HART
		A	Two-wire 4 ... 20 mA/HART with SIL qualification
		B	Four-wire 4 ... 20 mA/HART; 90 ... 253 V AC; 50/60 Hz
		I	Four-wire 4 ... 20 mA/HART; 9.6 ... 48 V DC; 20 ... 42 V AC
		U	Four-wire Modbus (converter in second chamber)
i	Supplementary electronics	X	without
		Z	Additional current output 4 ... 20 mA
j	Housing / Protection	D	Aluminium double chamber / IP66/IP68 (0.2 bar)
		L	Cable outlet IP68 with external Aluminium double chamber / IP66/IP67
		M	Cable outlet IP68 with external stainless steel double chamber / IP66/IP67
		S	Special colour Aluminium double chamber / IP66/IP68 (0.2 bar)
		T	Cable outlet IP68 with external special colour Aluminium double chamber / IP66/IP67
		W	Stainless steel double chamber / IP66/IP68 (0.2 bar)



Position		Feature	Description
k	Cable entry / Connection	1	M20 x 1.5 / without
		D	M20 x 1.5 / Blind plug
		N	½ NPT / Blind plug
		Q	½ NPT / without
		*	Respectively approved cable glands and blind plugs correspond to the ignition protection type
l	Display and adjustment module PLICSCOM	X	without
		A	mounted
		F	without; lid with inspection window
		B	Laterally mounted
		K	mounted; with Bluetooth, magnetic pen operation
		L	laterally mounted; with Bluetooth, magnetic pen operation
m	Certificates	M	Yes
		X	No

## VEGAFLEX FX86(a).bcdefghijklm

Position		Feature	Description
a			One or two-digit alphanumeric variable, for production control. Optional, not safety-relevant.
b	Scope	C	cCSAus
		V	Combination (Europe, world-wide, USA, CSA)
c	Approval	D	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb
		P	CL I, DIV 1, GP ABCD T6 ... T1; CL I Zone 0/1 AEx/Ex ia/db [ia] IIC T6 ... T1 Ga/Gb; CL I Zone 1 AEx/Ex db [ia] IIC T6 ... T1 Gb + Ship approval

Position		Feature	Description
d	Version / Material	4	Coax (ø 42.2 mm) with multiple hole and reference distance / 316L
		5	Coax (ø 42.2 mm) with multiple hole and reference distance / Alloy C22 (2.4602)
		6	exchangeable rod (ø 8 mm) / Duplex (1.4462)
		A	exchangeable cable (ø 4 mm) with gravity weight / 316
		B	exchangeable cable (ø 2 mm) with gravity weight / 316
		C	exchangeable cable (ø 4 mm) with centering weight / 316
		D	exchangeable cable (ø 2 mm) with centering weight / 316
		E	exchangeable rod (ø 8 mm) / 316L
		H	exchangeable rod (ø 16 mm) / 316L
		I	exchangeable cable (ø 4 mm) with gravity weight / Alloy C22 (2.4602)
		J	exchangeable cable (ø 4 mm) with centering weight / Alloy C22 (2.4602)
		L	Coax (ø 21.3 mm) with multiple hole / 316L
		P	Coax (ø 42.2 mm) with multiple hole / 316L
		R	Coax (ø 42.2 mm) with multiple hole / Alloy C22 (2.4602)
		T	exchangeable rod (ø 16 mm) / Alloy C22 (2.4602)
		W	exchangeable rod (ø 8 mm) / Alloy C276 (2.4819)
	*	further approved Versions / Materials	
ef	Process fitting / Material	**	Two-digit alphanumeric variables for process fittings according to industry standard
g	Seal / Second line of defense / Process temperature	1	Ceramic-graphite / with / -196 ... +280 °C
		2	Ceramic-graphite / with / -196 ... +400 °C
		2	Ceramic-graphite / with / -196 ... +450 °C
		3	PEEK-FFKM (Kalrez 6375) / with / -20 ... +250 °C
		*	Other seals suitable for process temperature, IP or NEMA protection and environmental conditions, see operating instructions.
h	Electronics	H	Two-wire 4 ... 20 mA/HART
		A	Two-wire 4 ... 20 mA/HART with SIL qualification
		B	Four-wire 4 ... 20 mA/HART; 90 ... 253 V AC; 50/60 Hz
		I	Four-wire 4 ... 20 mA/HART; 9.6 ... 48 V DC; 20 ... 42 V AC
		U	Four-wire Modbus (converter in second chamber)
i	Supplementary electronics	X	without

Position		Feature	Description
j	Housing / Protection	D	Aluminium double chamber / IP66/IP68 (0.2 bar)
		L	Cable outlet IP68 with external Aluminium double chamber / IP66/IP67
		M	Cable outlet IP68 with external stainless steel double chamber / IP66/IP67
		S	Special colour Aluminium double chamber / IP66/IP68 (0.2 bar)
		T	Cable outlet IP68 with external special colour Aluminium double chamber / IP66/IP67
		W	Stainless steel double chamber / IP66/IP68 (0.2 bar)
k	Cable entry / Connection	1	M20 x 1.5 / without
		D	M20 x 1.5 / Blind plug
		N	½ NPT / Blind plug
		Q	½ NPT / without
		*	Respectively approved cable glands and blind plugs correspond to the ignition protection type
l	Display and adjustment module PLICSCOM	X	without
		A	mounted
		F	without; lid with inspection window
		B	Laterally mounted
		K	mounted; with Bluetooth, magnetic pen operation
		L	laterally mounted; with Bluetooth, magnetic pen operation
m	Certificates	M	Yes
		X	No

Multiple listed characteristics according to the dependencies of the device configuration.

In the following, all above mentioned versions are called VEGAFLEX 81, 82, 83, 86. If parts of these safety instructions refer only to certain versions, then these will be mentioned explicitly with their type code.

### 3 General information

The level measuring instruments VEGAFLEX 81, 82, 83, 86 as guided radar sensors are used to detect the distance between medium 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 medium surface to calculate the distance to the medium surface.

The VEGAFLEX 81, 82, 83, 86 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.

### 4 Application area

The VEGAFLEX 81, 82, 83, 86 are suitable for use in explosive atmospheres of all combustible materials of explosion group IIA, IIB, IIC, which require class I, Zone 0/1, 1 Ex ia/db Ga/Gb or zone 1, Ex db [ia] Gb devices.

The VEGAFLEX 81, 82, 83, 86 are suitable for use in Class I and Class II in explosive atmospheres

of all flammable substances of explosion groups A, B, C, D which require DIV1 instruments.

The VEGAFLEX 81, 82, 83, 86 are installed with the mechanical fastening element (process fitting) in the partition wall between zone 1 and zone 0, which separates areas from each other where category EPL Gb or EPL Ga instruments are required.

The VEGAFLEX 81, 82, 83, 86 with the mechanical fixing element (process fitting) are installed in hazardous areas of zone 1 requiring EPL Gb instruments.

The VEGAFLEX 81, 82, 83, 86 with the mechanical fixing element (process fitting) are installed in hazardous areas requiring DIV1.

If the VEGAFLEX 81, 82, 83, 86 are installed and operated in hazardous areas, the general Ex installation regulations, Canadian Electrical Code or National Electrical Code, further national and regional regulations as well as these safety instructions must be observed.

## 5 Special operating conditions

The following overview is listing all special properties of VEGAFLEX 81, 82, 83, 86, which make a labelling with the symbol "X" behind the certificate number necessary.

### Electrostatic charging (ESD)

You can find the details in chapter "*Electrostatic charging (ESD)*" of these safety instructions.

### Ambient temperature

You can find the details in chapter "*Thermal data*" of these safety instructions.

### Impact and friction sparks

The VEGAFLEX 81, 82, 83, 86 in light metal versions (e.g. aluminium, titanium, zircon) must be mounted in such a way that sparks from impact and friction between light metals and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

### Non-grounded, metallic parts

The resistance between aluminium housing to metal measuring point identification plate is  $> 10^9$  Ohm.

The capacitance of the metal measuring point identification plate was measured as follows:

Measurement loop identification label	Capacitance
45 x 23 mm (standard)	21 pF
100 x 30 mm	52 pF
73 x 47 mm	61 pF

### For versions with external housing

For the version with external housing, the potential equalization must be provided in the complete range of the connection cable between electronics housing and transmitter housing.

Make sure that the coaxial connection cable between electronics housing and sensor housing cannot get damaged.

## 6 Important information for mounting and maintenance

### General instructions

The following requirements must be fulfilled for mounting, electrical installation, setup and maintenance of the instrument:

- The staff must be qualified according the respective tasks
- The staff must be trained in explosion protection

- The staff must be familiar with the relevant valid regulations which are necessary for the safe installation and operation of the device.
- Make sure when working on the instrument (mounting, installation, maintenance) that there is no explosive atmosphere present, the supply circuits should be voltage-free, if possible
- The instrument has to be mounted according to the manufacturer specifications, the Certificate of Conformity, National Electrical Code and the valid regulations and standards
- Modifications on the instrument can influence the explosion protection and hence the safety, therefore repairs are not permitted to be conducted by the end user
- Modifications must only be carried out by employees authorized by VEGA company
- Use only approved spare parts
- Components for installation and connection not included in the approval documents are only permitted if these correspond technically to the latest standard mentioned on the cover sheet. They must be suitable for the application conditions and have a separate certificate. The special conditions of the components must be noted and if necessary, the components must be integrated in the type test. This applies also to the components already mentioned in the technical description.
- Vessel installations and probable flow must be taken into account

### **Cable and wire entries**

- The VEGAFLEX 81, 82, 83, 86 must be connected via suitable cable gland or conduit systems that are in conformity with the requirements of the type of protection and the IP protection or NEMA rating and provided with a separate type approval certificate. When connecting VEGAFLEX 81, 82, 83, 86 to conduit systems, the corresponding sealing facility must be connected directly to the housing.
- The red thread or/dust covers screwed in when the instruments are shipped (depending on the version) must be removed before setup and replaced by approved cable entries or closing screws suitable for the respective ignition protection type and IP protection or NEMA rating.
- Note type and size of the thread: A label with the respective thread name is in the area of the respective thread
- Threads must have no damages
- Cable entries and closing screws should be mounted correctly and according to the safety instructions of the manufacturer to ensure the specified ignition protection type and IP protection rating or NEMA rating. When using certified or suitable cable glands, closing screws or plug connections, it is absolutely necessary to note the corresponding certificates/documents. Supplied cable entries or closing screws meet these requirements.
- Unused openings must be closed with plugs suitable for the ignition protection type and IP protection or NEMA rating. Supplied plugs meet these requirements.
- Cable or wire entries resp. the closing screws must be tightly screwed into the housing
- The connection cables resp. pipeline sealing facilities must be suitable for the application conditions (e.g. temperature range) of the application
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions
- The connection cable of VEGAFLEX 81, 82, 83, 86 has to be wired fix and in such a way that damages can be excluded.

## Double chamber housing



- 1 Lid, optionally with inspection window
- 2 Electronics compartment
- 3 Screw plug
- 4 Connection compartment
- 5 Transport protection, replace with installation  
Red threaded or dust protection cap
- 6 Label: Thread type
- 7 Locking screws of the lid for lid locking
- 8 Lid, optionally with inspection window
- 9 Locking screws of the lid for lid locking

## Mounting

When installing the device, observe the following:

- The instrument must be connected to the grounding system (via the process fitting or an external grounding clamp)
- Mechanical damage on the instrument must be avoided
- Impact and friction sparks are to be avoided
- If the device is used as a partition wall device, the operator must observe the valid applicable installation regulations and ensure a sufficiently tight joint (IP66 or IP67) between the less hazardous area and zone 0 are requiring EPL Ga

With single-chamber housing versions, the lid must be screwed in to the stop and secured with the locking device before setup and use of VEGAFLEX 81, 82, 83, 86 in hazardous atmospheres.

With double-chamber housing versions, the lid of the connection compartment and the lid of the electronics compartment must be screwed in to the stop and secured with the corresponding locking device before setup and use of VEGAFLEX 81, 82, 83, 86 in hazardous atmospheres.

## Maintenance

To ensure the functionality of the device, periodic visual inspection is recommended for:

- Secure mounting
- No mechanical damages or corrosion
- Worn or otherwise damaged cables
- No loose connections of the line connections, equipotential bonding connections
- Correct and clearly marked cable connections

The parts of the VEGAFLEX 81, 82, 83, 86 being in contact with flammable media during operation must be included in the periodic overpressure test of the plant.

## Intrinsic safety "i"

- Observe the valid regulations for the interconnection of intrinsically safe circuits.
- The instrument is only suitable for connection to certified, intrinsically safe instruments
- When connecting a circuit with protection level Ex ib, the device, the sensor meas. system of the device must no more be used in hazardous areas of zone 0.
- When connecting an intrinsically safe instruments with classification mark Ex ia to a circuit with protection level Ex ib, then the classification mark of the instrument changes to Ex ib. After the use as instrument with Ex ib power supply, the instrument must no more be used in circuits with protection level Ex ia
- When connecting an intrinsically safe instrument to a non-intrinsically safe circuit, the instrument must be no longer used in intrinsically safe circuits
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions

## Flameproof "Ex db", Explosionproof "XP"

- The terminals for connecting the operating voltage or signal circuits are integrated in the connection compartment with type of protection Flameproof "Ex db", Explosionproof "XP".
- The thread gaps between housing and cover as well as between threaded fitting and container are flameproof joints
- It is not allowed to repair the flameproof joints.
- Cable, wire entries and closing screws must be certified acc. to ignition protection type Flameproof "Ex db", Explosionproof "XP". Cable, wire entries and closing screws of simple design must not be used.
- Separately certified cable and wire entries can determine the permissible ambient temperature range or the temperature classes
- Only one threaded adapter is allowed per thread, when using a closing screw, threaded adapters are not allowed
- Lids must not be opened if there is a hazardous atmosphere. The housing lids are marked with the warning label:



WARNING -- DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

AVERTISSEMENT -- NE PAS OUVRIR SI UNE ATMOSPHÈRE EXPLOSIVE PEUT ÊTRE PRÉSENTE

## Version with exchangeable cable or rod probe

Only original VEGA cable or rod probes must be mounted to VEGAFLEX 81, 82, 83, 86. When mounting cable or rod probes, the torques specified in the respective operating instruction manuals must be maintained. The mechanical connection must be ensured.

## 7 Safe operating mode

### General operating conditions

- Do not operate the instrument outside the electrical, thermal and mechanical specifications of the manufacturer
- Use the instrument only in media against which the wetted parts are sufficiently resistant
- To assess and reduce the explosion risk, the National Electrical Code applicable regulations, rules and standards must be taken into account
- For process pressures outside the standard atmospheric conditions of 80 kPa (0.8 bar) to 110 kPa (1.1 bar) additional requirements can be valid

- Note the relation between process temperature on the sensor/antenna and the permissible ambient temperature on the electronics housing. For permissible temperatures, see the respective temperature tables. See chapter "*Thermal data*".
- If necessary, a suitable overvoltage arrester can be connected in front of the VEGAFLEX 81, 82, 83, 86

**Connection conditions**

The connection cable of VEGAFLEX 81, 82, 83, 86 has to be wired fix and in such a way that damages can be excluded

If the temperature at the entry parts exceeds 70 °C, temperature-resistant connection cables must be used

**8 Potential equalization/Grounding**

- Integrate the instruments into the local potential equalisation, e.g. via the internal or external earth terminal
- The potential equalization terminal must be secured against loosening and twisting
- If grounding of the cable screening is necessary, this must be carried out acc. to the valid standards and regulations, e.g. acc. to IEC/EN 60079-14
- The intrinsically safe input and the intrinsically safe output circuits are ground-free. The voltage resistance against ground is min. 500 Veff.

**9 Electrostatic charging (ESD)**

In case of instrument versions with electrostatically chargeable plastic parts, the danger of electrostatic charging and discharging must be taken into account!

The following parts can charge and discharge:

- Lacquered housing version or alternative special lacquering
- Plastic housing, plastic housing parts
- Metal housing with inspection window
- Plastic process fittings
- Plastic-coated process fittings and/or plastic-coated sensors
- Connection cable for separate versions
- Type label
- Isolated metallic labels (measuring point identification plate)

Take note in case of danger of electrostatic charges:

- Avoid friction on the surfaces
- Do not dry clean the surfaces

The instruments must be mounted/installed in such a way that the following can be ruled out:

- electrostatic charges during operation, maintenance and cleaning.
- process-related electrostatic charges, e.g. by measuring media flowing past

The warning label indicates danger:



WARNING -- POTENTIAL ELECTROSTATIC CHARGING  
HAZARD -- SEE INSTRUCTIONS

AVERTISSEMENT -- DANGER POTENTIEL DE CHARGES  
ÉLECTROSTATIQUES -- VOIR INSTRUCTIONS



## 10 Instructions for zone 0, zone 0/1 applications

In hazardous areas, the instrument, sensor measuring system in zone 0 should only be operated under atmospheric conditions:

- Temperature: -20 ... +60 °C.
- Pressure: 80 ... 110 kPa (0.8 ... 1.1 bar)
- Air with normal oxygen content, normally 21 %

The operator must ensure that the medium temperature in zone 0 is not higher than 80 % of the self-ignition temperature of the concerned medium (in °C) and does not exceed the max. permissible flange temperature depending on the temperature class. The parts of the sensor which during operation are in contact with flammable products, must be integrated in the periodic overpressure test of the plant.

If no explosive mixtures or additional application conditions are certified or supplementary measures have been taken, then the instruments can be also operated according to the manufacturer specification outside atmospheric conditions.

If there is a risk of dangerous potential differences inside zone 0, then suitable measures for circuits in zone 0 must be taken.

Process fittings between two explosion protection areas require category EPL Ga and less endangered areas must show a tightness in accordance with protection rating IP67 acc. to IEC/EN 60529.

## 11 Electrical data

### VEGAFLEX FX8\*(\*).C/VD/P\*\*\*\*A/HX\*\*\*\*

Supply and signal circuit in the Ex db/XP connection compartment, double chamber housing:	
Terminals 1[+], 2[-]	$U = 15 \dots 35 \text{ V DC}$ $U_m = 253 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA (with superimposed HART signal)}$

### VEGAFLEX FX8\*(\*).C/VD/P\*\*\*\*BX\*\*\*\*

Supply circuit in the Ex db/XP connection compartment of the double chamber housing:	
Terminals 1[+], 2[-]	$U = 90 \dots 253 \text{ V AC}$ $U_m = 253 \text{ V AC/DC}$

Active 4 ... 20 mA signal circuit in the Ex db/XP connection compartment, double chamber housing:	
Terminals 5[+], 7[-]	$U_m = 60 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA (with superimposed HART signal)}$

Passive 4 ... 20 mA signal circuit in the Ex db/XP connection compartment, double chamber housing:	
Terminals 6[+], 7[-]	$U_m = 60 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA (with superimposed HART signal)}$

### VEGAFLEX FX8\*(\*).C/VD/P\*\*\*\*IX\*\*\*\*

Supply circuit in the Ex db/XP connection compartment of the double chamber housing:	
Terminals 1[+], 2[-]	$U = 9.6 \dots 48 \text{ V DC}; 42 \text{ V AC}$ $U_m = 253 \text{ V AC}$

<b>Active 4 ... 20 mA signal circuit in the Ex db/XP connection compartment, double chamber housing:</b>	
Terminals 5[+], 7[-]	$U_m = 60 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA}$ (with superimposed HART signal)

<b>Passive 4 ... 20 mA signal circuit in the Ex db/XP connection compartment, double chamber housing:</b>	
Terminals 6[+], 7[-]	$U_m = 60 \text{ V AC/DC}$ $I \leq 3.5 \dots 22.5 \text{ mA}$ (with superimposed HART signal)

### VEGAFLEX FX8\*(\*)C/VD/P\*\*\*\*UX\*\*\*\*

<b>Supply circuit in the Ex db/XP connection compartment of the double chamber housing:</b>	
Terminals 1[+], 2[-]	$U = 8 \dots 32 \text{ V DC}$ $U_m = 253 \text{ V AC}$

<b>Signal circuit in the Ex db/XP connection compartment of the double chamber housing:</b>	
Terminals MB[+], MB[-]	$U = 5 \text{ V}$ with Modbus signal (telegram) $U_m = 253 \text{ V AC}$
USB connection: (6-pole mini USB socket)	$U_{max} = 5 \text{ V}$ with USB signal (USB protocol) $U_m = 253 \text{ V AC}$

<b>Display and adjustment circuit in the Ex db/XP connection compartment:</b>	
Terminals 5, 6, 7, 8	For connection to the circuit of the passive indicating unit VEGADIS 81 in ignition protection type flameproof enclosure "d".

<b>Intrinsically safe circuit for the external display and adjustment unit in the electronics compartment:</b>	
Terminals 5, 6, 7, 8	In type of protection intrinsic safety Ex ia IIC.
	For connection to the intrinsically safe circuit of the corresponding external indicating unit VEGADIS 81 in ignition protection type Intrinsic safety "i".
	The proof for intrinsic safety of the interconnection rendered if the total inductance and total capacitance of the connection cable $L_{cable} = 212 \mu\text{H}$ and $C_{cable} = 1.98 \mu\text{F}$ is not exceeded
	When using the supplied VEGA connection cable, then the permissible cable length is $L_{zul} = 341 \text{ m}$ .

<b>Display and adjustment circuit:</b>	
Spring contacts in the Ex db/XP connection compartment	Only for connection to the display and adjustment module PLICSCOM or for service purposes the interface adapter VEGACONNECT, if it is ensured that no explosive atmosphere is present.
Spring contacts in the Ex i electronics compartment	In type of protection Intrinsic safety
	Only for connection to the display and adjustment module PLICSCOM.

The circuits of VEGAFLEX 8\*(\*)C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* are galvanically separated from ground.

The metal parts of VEGAFLEX 8\*(\*)C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* are electrically connected to the ground terminals.

## 12 Mechanical data

The following mechanical data are valid for all housing and electronics versions.

<b>Mechanical data</b>	
Ground terminal (connection cross-section)	≥ 4 mm <sup>2</sup>
Overtoltage category	See operating instructions VEGAFLEX 81, 82, 83, 86, chapter "Technical data"
Pollution degree	2
<ul style="list-style-type: none"> <li>● Materials</li> <li>● Max. tensile load on the cable or rod probe</li> <li>● Potential connections and electrical separating measures in the instrument</li> <li>● Electromechanical data</li> <li>● Electrical protective measures</li> </ul>	Are described in the operating instructions VEGAFLEX 81, 82, 83, 86 in chapter "Technical data".

## 13 Thermal data

The following temperature tables are valid for all housing and electronics versions.

The relationship between the permissible ambient temperature for the electronics housing depending on the area of application and the maximum surface temperatures, temperature classes, can be seen in the following tables.

### VEGAFLEX FX8\*(\*).C/VD/P\*\*\*\*A/H/B/I/U\*\*\*\*

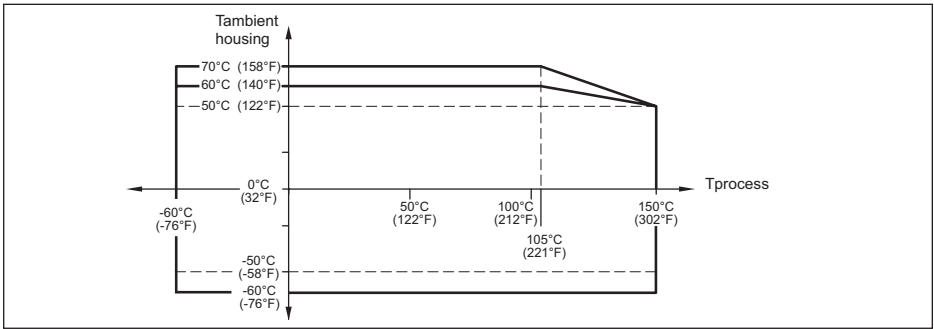
Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T6	-60 ... +80 °C	-40 ... +46 °C
T5	-60 ... +95 °C	-40 ... +60 °C
T4	-60 ... +130 °C	-40 ... +60 °C
T3	-60 ... +195 °C	-40 ... +60 °C
T2	-60 ... +290 °C	-40 ... +60 °C
T1	-60 ... +440 °C	-40 ... +60 °C

### VEGAFLEX FX8\*(\*).C/VD/P\*\*\*\*A/H/B/I/U\*\*\*\*, low temperature version down to -196 °C

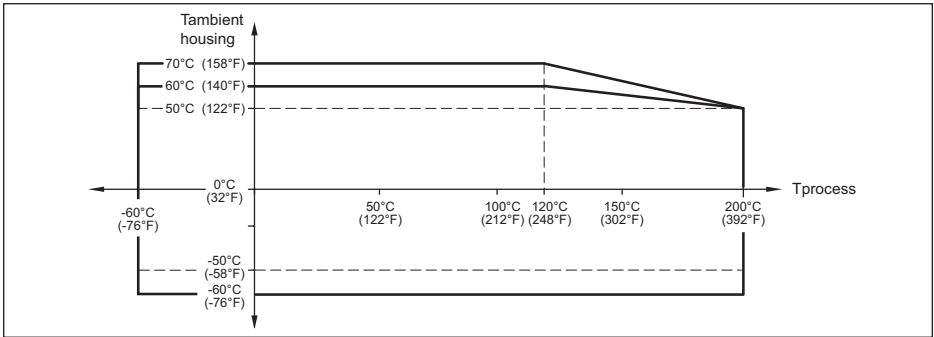
Temperature class	Temperature on the sensor (measuring cable, rod)	Ambient temperature on the electronics
T6	-196 ... +80 °C	-40 ... +46 °C
T5	-196 ... +95 °C	-40 ... +60 °C
T4	-196 ... +130 °C	-40 ... +60 °C
T3	-196 ... +195 °C	-40 ... +60 °C
T2	-196 ... +290 °C	-40 ... +60 °C
T1	-196 ... +440 °C	-40 ... +60 °C

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

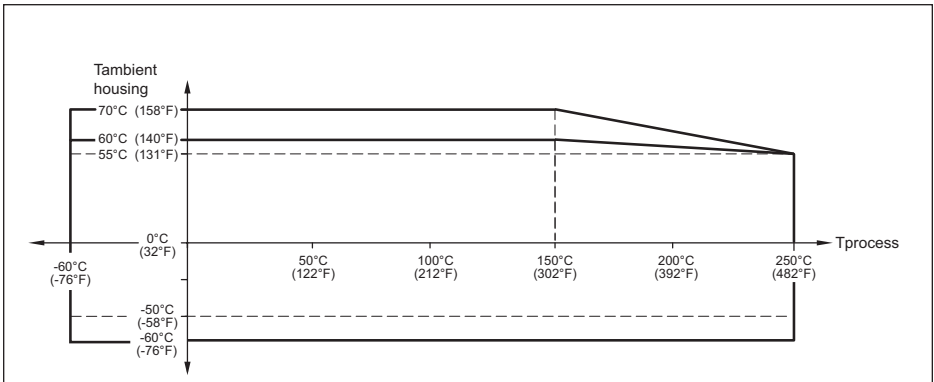
**Versions for process temperatures up to +150 °C**



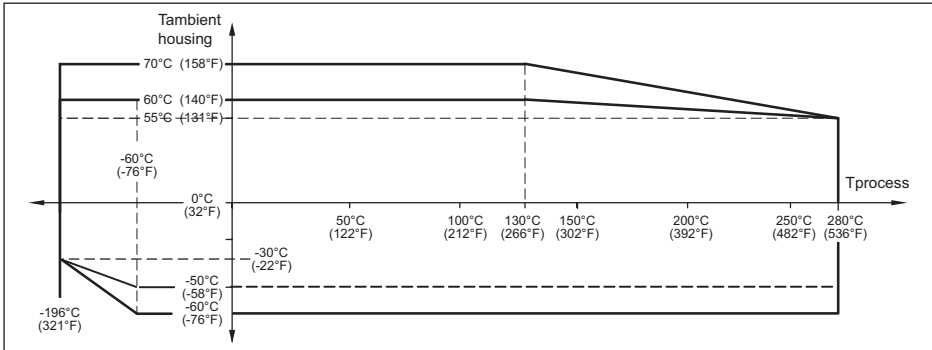
**Versions for process temperatures up to +200 °C**



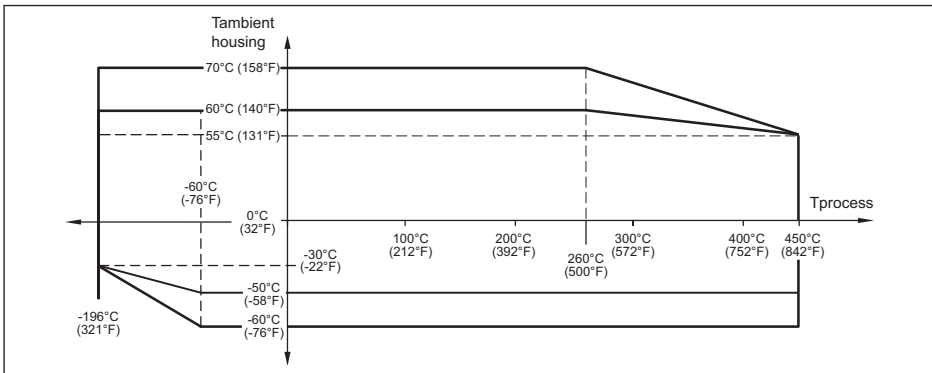
**Versions for process temperatures up to +250 °C**



## Versions for process temperatures up to +280 °C



## Versions for process temperatures up to +450 °C



## 14 Tensile force on the measuring cable/ rod

The permissible tensile force is

- VEGAFLEX FX81.CD/P\*\*\*\*H/A/B/I/U\*\*\*\*\*
  - Diameter 4 mm: F = 2.5 kN
  - Diameter 2 mm: F = 1.5 kN
- VEGAFLEX FX82.CD/P\*\*\*\*H/A/B/I/U\*\*\*\*\*
  - 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.CD/P\*\*\*\*H/A/B/I/U\*\*\*\*\*
  - Diameter 4 mm: F = 2 kN
  - Exchangeable rod: F = 4.5 kN
- VEGAFLEX FX86.CD/P\*\*\*\*H/A/B/I/U\*\*\*\*\*
  - Diameter 4 mm: F = 2.5 kN
  - Diameter 2 mm: F = 1.5 kN

## 15 Ignition protection type explosion proof enclosure

The terminals for connecting to the operating voltage, i.e. signal circuits, are integrated in the connection compartment according to protection type explosion proof enclosure "d".

The gap between housing and cover is a flameproof gap.

The explosion proof connection compartment is provided with a M20 x 1.5 or ½ NPT thread for connection to a certified "Conduit" system or for mounting of a certified explosion proof cable entry (only for zones applications). Cable entries of simple construction may not be used. When connecting to a "Conduit" system the appropriate seal facility must be located directly on the explosion proof connection compartment.

Unused openings must be sealed accordingly.

Before opening or in case of the lid of the explosion proof connection compartment is open (e. g. during connection or service work), make sure that either the supply line is voltage free or no explosive atmosphere is present.

The flameproof terminal box of this equipment must be provided with cable entries and filter plugs resp. conduits which are certified according to CAN/CSA C22.260079-0: 15 and CAN/CSA C22.2 60079-1: 16.

The connection cables, the cable entries and filter plugs resp. the conduits have to be suitable for the lowest ambient temperature.

When wiring the connection line to the explosion proof connection compartment, it must be sufficiently secured against damage.

The cover of the explosion proof connection compartment must be screwed in completely before commissioning and secured by screwing out the lid locking screw all the way to the stop.

The cover of the explosion proof connection compartment with the caution label "Do not open when an explosive atmosphere is present" and the cover of the intrinsically safe connection compartment without caution label must not be exchanged. The covers must be mounted on the corresponding connection compartments.

### Double chamber housing with explosion proof connection compartment



- 1 Intrinsically safe connection compartment with electronics module
- 2 Locking screw of the cover
- 3 Explosion proof connection compartment with integrated barrier
- 4 Locking screw of the cover

## 16 Installation Diagram

### Installation Control Diagram

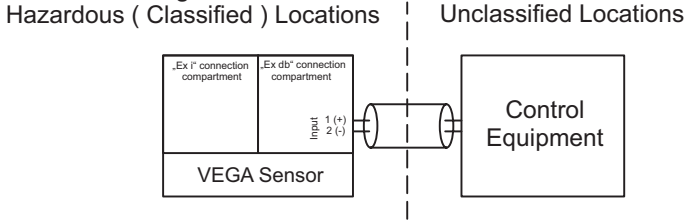


Fig. 1: VEGAFLEX FX8(\*)*.C/VD/P\*\*\*\*/H/A\*\*\*\*\** (Electronics 4 ... 20 mA/HART - Two-wire)

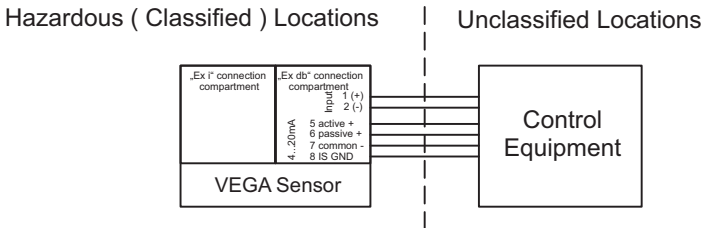


Fig. 2: VEGAFLEX FX8(\*)*.C/VD/P\*\*\*\*/B\*\*\*\*\** (Electronics 4 ... 20 mA/HART - Four - wire)

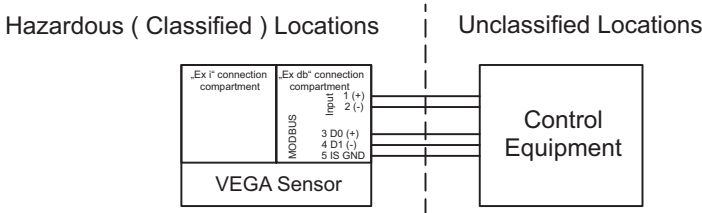


Fig. 3: VEGAFLEX FX8(\*)*.C/VD/P\*\*\*\*/U\*\*\*\*\** (Electronics ModBus)

### 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:

$$U_o \text{ or } V_{oc} \text{ or } V_t \leq V_{max}$$

$$I_o \text{ or } I_{sc} \text{ or } I_t \leq I_{max}$$

$$P_o \leq P_i$$

$$C_a \text{ or } C_o \geq C_{cable}$$

$$L_a \text{ or } L_o \geq L_{cable}$$

Division 1 Installation requirements must be complied with if one or more of the following are located in a Division 1 hazardous location: Sensor, Probe or Field Device.

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

**WARNING:** Do not open when an explosive atmosphere is present.

Barriers and instruments to carry same Agency Approval.

## Control Equipment

For Division 1 installations, Control equipment shall not use or generate more than 253 Vrms or Vdc.

## VEGA Sensor

For Division 2 Installations, the Sensor shall be installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) or Canadian Electrical Code, CSA C22.1 Part 1 Appendix F for division 2 wiring methods.

## Sensor Supply Cable

For Division 1 Installations, the Sensor shall be installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) or Canadian Electrical Code, CSA C22.1 Part 1 Appendix F for division 1 wiring methods, excluding intrinsic safety.

For Division 2 Installations, the Sensor shall be installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) or Canadian Electrical Code, CSA C22.1 Part 1 Appendix F for division 2 wiring methods, excluding nonincendive field wiring.

## VEGA Display

The VEGA Display is a VEGADIS 81.

The VEGA Display is a VEGADIS 81 is only applicable with VEGAFLEX FX8\*(\*) .C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* (Electronics 4 ... 20 mA/HART - Two-wire)

The configuration of Field Device must be NRTL approved/certified under Entity Concept.

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

For Division 2 Installations, the Sensor shall be installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) or Canadian Electrical Code, CSA C22.1 Part 1 Appendix F for division 2 wiring methods.

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/NFPA 70) or Canadian Electrical Code.

For Division 1 Installations, the terminal marked sign "earth" shall be grounded per ANSI/NFPA 70 article 504.50 or CSA C22.1 Part 1 Appendix F F3.2.2 and the Field Device wiring shall be segregated from the supply wiring.

For Division 2 Installations, the Field Device shall be installed in accordance with the National Electrical Code ® (ANSI/NFPA 70) or Canadian Electrical Code, CSA C22.1 Part 1 Appendix F for Division 2 wiring methods including Nonincendive Field Wiring when using the parameters shown.

## Display Cable

The regulations for the interconnection of intrinsically safe circuits between VEGAFLEX FX8\*(\*) .C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* and the external indication and adjustment unit are complied with if the total inductance and total capacity of the connection cable between VEGAFLEX FX8\*(\*) .C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* and the external indication and adjustment unit  $L_{\text{cable}} = 100 \mu\text{H}$  and  $C_{\text{cable}} = 1.98 \mu\text{F}$  are not exceeded.

The indication and adjustment module integrated in VEGAFLEX FX8\*(\*) .C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* and the connected interface converter are taken into account.

In case of using the display connection cable delivered from VEGA between the VEGAFLEX FX8\*(\*) .C/VD/P\*\*\*\*H/A/B/I/U\*\*\*\*\* and the display VEGADIS 61 or VEGADIS 81 the following parameters has to be considered:

$$L' = 0.62 \mu\text{H/m}$$

$$C'_{\text{wire/wire}} = 132 \text{ pF/m}$$

$$C'_{\text{wire/screen}} = 208 \text{ pF/m}$$









Printing date:

**VEGA**

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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