Safety instructions
VEGADIF 85

Intrinsic safety

Two-wire 4 … 20 mA

Two-wire 4 … 20 mA/HART (with SIL qualification)

Profibus PA

Foundation Fieldbus

CE 0044

Document ID: 55006

VEGA

Contents

Supplementary documentation:

- Operating Instructions VEGADIF 85
- EU-type approval certificate TÜV 16 ATEX 190806 X (Document ID: 55007)
- EU declaration of conformity (Document ID: 55172)
- SIL-Safety Manual VEGADIF 85 (Document ID: 54894)

Editing status: 2020-09-09

55006-EN-210323

DE	Sicherheitshinweise für den Einsatz in explosionsgefährdeten Bereichen
EN	Safety instructions for the use in hazardous areas
FR	Consignes de sécurité pour une application en atmosphères explosibles
IT	Normative di sicurezza per l'impiego in luoghi con pericolo di esplosione
ES	Instrucciones de seguridad para el empleo en áreas con riesgo de explosión
PT	Normas de segurança para utilização em zonas sujeitas a explosão
NL	Veiligheidsaanwijzingen voor gebruik op plaatsen waar ontploffingsgevaar kan heersen
SV	Säkerhetsanvisningar för användning i explosiionsfarliga områden
DA	Sikkerhedsforskrifter til anvendelse i explosionsfarlig atmosfare
FI	Turvallisuusohjeet räjähdysvaarallisisssa tiloissa käyttöä varten
EL	Υποδείξεις ασΦαλείας για τη χρησιμοποίηση σε περιοχές που υπάρχει κίνδυνος έκρηξης

DE	Die vorliegenden Sicherheitshinweise sind im Download unter www.vega.com standardmäßig in den Sprachen deutsch, englisch, französisch und spanisch verfügbar. Weitere EU-Landessprachen stellt VEGA nach Anforderungen zur Verfügung.
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1 Area of applicability

These safety instructions apply to the differential pressure transmitters VEGADIF 85 of type series:

- VEGADIF DF85.*/VC/U/O/H*****Z/H/A/P/F******

with the electronics versions

- Z - Two-wire 4 … 20 mA
- H - Two-wire 4 … 20 mA/HART
- A - Two-wire 4 … 20 mA/HART with SIL qualification
- P - Profibus PA
- F - Foundation Fieldbus

According to EU type approval certificate TÜV 16 ATEX 190806 X (certificate number on the type label) and for all instruments with safety instruction 55006.

The classification as well as the respective standards are stated in the EU type approval certificate:

- EN IEC 60079-0: 2018
- EN 60079-11: 2012
- EN 60079-26: 2015

Type of protection marking:

- II 1G Ex ia IIC T6 … T1 Ga
- II 1/2G Ex ia IIC T6 … T1 Ga/Gb
- II 2G Ex ia IIC T6 … T1 Gb

2 Important specification in the type code

VEGADIF DF85(*).abe**hijk*m***

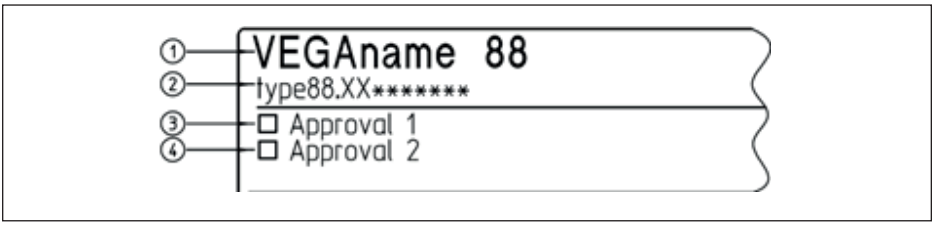
Position		Feature	Description
a	Scope	A	ATEX / Europe
		V	Combination (ATEX, IECEx, FM, CSA)
b	Approval	C	ATEX II 1G, 1/2G, 2G Ex ia IIC T6 … T1
		U	ATEX II 1G, 1/2G, 2G Ex ia IIC T6 … T1 + Overfill protection (WHG, VLAREM)
		O	ATEX II 1G, 1/2G, 2G Ex ia IIC T6 … T1 + Ship approval
		H	ATEX II 1G, 1/2G, 2G Ex ia IIC T6 … T1 + II 1D, 1/2D, 1/3D, 2D Ex ta T…°C IP 66
e	Seal	A	FKM (ERIKS 514531)
		C	PTFE
		H	Copper seal
		Z	EPDM (ERIKS 55914)
		*	Further sealings
h	Electronics	Z	Two-wire 4 … 20 mA
		H	Two-wire 4 … 20 mA/HART
		A	Two-wire 4 … 20 mA/HART with SIL qualification
		P	Two-wire Profibus PA
		F	Two-wire Foundation Fieldbus

Position		Feature	Description
i	Supplementary electronics	X	without
		Z	Additional current output 4 … 20 mA
j	Housing	K	Plastic single chamber
		A	Aluminium - single chamber
		D	Aluminium - double chamber
		V	Stainless steel single chamber (precision casting)
		8	Stainless steel single chamber (electropolished)
		W	Stainless steel double chamber housing (precision casting)
		R	Stainless steel double chamber (electropolished)
		*	Further housings with special colour
k	Housing version / Protection	I	compact / IP66/IP67; NEMA 4X
		D	compact / IP66/IP68 (0,2 bar); NEMA 6P
		N	compact / IP66/IP68 (1 bar); NEMA 6P
		M	compact / IP69K
		A	axial cable outlet IP68 (PUR) with external housing / IP66/IP67; NEMA 4X
		S	lateral cable outlet IP68 (PUR) with external housing / IP66/IP67; NEMA 4X
		K	axial cable outlet IP68 (PE) with external housing / IP66/IP67; NEMA 4X
		L	lateral cable outlet IP68 (PE) with external housing / IP66/IP67; NEMA 4X
m	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

3 Different ignition protection types

The VEGADIF DF85 can be either used in explosive dust atmospheres or in explosive gas atmospheres.

The operator must specify the selected ignition protection type before installation. The selected ignition protection must be determined by marking it firmly on the identification label of the type plate.



1 VEGADIF DF85
2 Instrument version
3 Identificatiion label: Approval in dust ignition protection type e. g. „Ex t“
4 Identificatiion label: Approval in Gas ignition protection type e. g. „Ex i“, „Ex d“

If VEGADIF DF85 is installed in a dust atmosphere, then the safety instructions and the instructions in the respective certificates must be noted:

Installation	Approval	Certificate	Safety instruction
Dust	"AH"	TÜV 16 ATEX 192998 X	55606

4 General information

VEGADIF DF85 is a differential pressure transmitter for measurement of differential pressure, flow, level, density and interface.

It consists of a differential pressure measuring cell and an electronics housing which is optionally also executed as external housing.

The display and adjustment module PLICSCOM can be mounted optionally.

The VEGADIF DF85 are suitable for applications in hazardous atmospheres of all combustible materials of explosion groups IIA, IIB and IIC.

The VEGADIF DF85 are suitable for applications requiring category 1G (EPL Ga), 1/2G (EPL Ga/Gb) or 2G (EPL Gb) instruments.

5 Application area

Category 1G (EPL Ga instruments)
The measured medium inside the sensor requires a category 1G (EPL Ga) instrument and the differential pressure measurement component or the electronics housing with separate version is in an area in which category 1G (EPL Ga) instruments are required.

Category 1/2G (EPL Ga/Gb instruments)
The measured medium inside the sensor requires a category 1G (EPL Ga) instrument or the differential pressure measurement component with separate version is in an area in which category 1G (EPL Ga) instruments are required.

The electronics housing is in an area where category 2G (EPL Gb) instruments are required.

Category 2G (EPL Gb instruments)
The measured medium inside the sensor requires a category 2G (EPL Gb) instrument and the differential pressure measurement component or the electronics housing with separate version is in an area in which category 2G (EPL Gb) instruments are required.

Note:
A direct installation in the vessel wall is not planned for this instrument!

VEGA Instrument	3G (EPL Gc)	2G (EPL Gb)	1/2G (EPL Ga/Gb)	1G (EPL Ga)
Ex Zone 2 				
Ex Zone 1 				
Ex Zone 0 				

6 Specific conditions of use ("X" identification)

The following overview is listing all special properties of VEGADIF DF85, which make a labelling with the symbol "X" behind the certificate number necessary.

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

Impact and friction sparks
The VEGADIF DF85 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.

When used as Ga/Gb or Ga/Gc instrument
The separating wall (diaphragm) to the wetted area has a wall thickness of < 1 mm due to the function. During the use it must be ensured that influence of the diaphragm, i.e. due to aggressive media or mechanical danger can be excluded.

For versions with standard process fittings, the installation must be made in such a way that at least protection rating IP67 acc. to IEC/EN 60529 is reached on the process fittings and vent holes of the differential pressure measuring cell.

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

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

Media resistance
The wetted materials must be resistant against the measured media.

7 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 respectively valid regulations, e.g. planning and installation acc. to IEC/EN 60079-14
- 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 EU type approval certificate 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 VEGADIF DF85 must be connected via suitable cable gland or conduit systems that are in conformity with the requirements of the flame proofing and the IP protection and provided with a separate type approval certificate. When connecting VEGADIF DF85 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 cable entries or closing screws suitable for the respective ignition protection type and IP protection.
- 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. 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. 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 VEGADIF DF85 has to be wired fix and in such a way that damages can be excluded.

Mounting
Keep in mind for instrument mounting

- Mechanical damage on the instrument must be avoided
- Mechanical friction must be avoided
- Process connections separating two areas of different Ex-zones must comply to valid regulations and standards and the protection rating must be in conformity to IEC/EN 60529
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label

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 VEGADIF DF85 being in contact with flammable media during operation must be included in the periodic overpressure test of the plant.

Intrinsic safety "i"

- Valid regulations for connection of intrinsically safe circuits, e.g. proof of intrinsic safety according to IEC/EN 60079-14 must be observed
- 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 an 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

Version with exchangeable cable or rod probe
Only original VEGA cable or rod probes must be mounted to VEGADIF DF85. When mounting cable or rod probes, the torques specified in the respective operating instruction manuals must be maintained. The mechanical connection must be ensured.

8 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
- 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 VEGADIF DF85

- For assessment and reduction of the explosion risk, valid standards such as for example ISO/EN 1127-1 must be taken into account

9 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.

10 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

11 Instructions for zone 0, zone 0/1 applications

The usual atmospheric conditions (in accordance with EN 60079-0 related to the properties of the explosive atmosphere) under which it is assumed that the measuring probe is operated in zone 0, are:

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

The chapter " *Thermal Data*" contains concrete notes on the use outside of this usual temperature range.

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 resp. supplementary measures such as e.g. according to ISO/EN 1127-1 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, e.g. according to the requirements of IEC/EN 60079-14.

Process fittings between two explosion protection areas require category 1G (EPL Ga) and less endangered areas must show a tightness in accordance with protection rating IP67 acc. to IEC/EN 60529.

12 Electrical data

Supply and signal circuit

Intrinsically safe power supply and signal circuit: (terminals 1, 2)	In type of protection intrinsic safety Ex ia IIC
Electronics Z/H/A:	Maximum values U_i = 30 V I_i = 131 mA P_i = 983 mW L_i = 5 µH (Einkammergehäuse) L_i = 10 µH (with connected electronics PLICSZEKX, double chamber housing) C_i = negligibly small In the version with fix connected connection cable the following values must be also taken into consideration: L_i = 0.62 µH/m $C_{i\ wire/wire}$ = 150 pF/m $C_{i\ wire/screen}$ = 270 pF/m

Electronics P/F:	Maximum values U_i = 17.5 V I_i = 500 mA P_i = 5.5 W L_i = negligibly small (single chamber housing) L_i = 5 µH (double chamber housing) C_i = negligibly small The instrument is suitable for connection to a Fieldbus system according to the FISCO model (EN 60079-11), e.g. Profibus PA. U_i = 24 V I_i = 250 mA P_i = 1.2 W In the version with fix connected connection cable the following values must be also taken into consideration: L_i = 0.62 µH/m $C_{i\ wire/wire}$ = 150 pF/m $C_{i\ wire/screen}$ = 270 pF/m

Supply and signal current circuit when installing in a double chamber housing and the supplementary electronics PLICSZEZSA (2. current output)

Intrinsically safe power supply and signal circuit I: (terminals 1[+], 2[-])	In type of protection intrinsic safety Ex ia IIC
Electronics H/A:	Maximum values U_i = 30 V I_i = 131 mA P_i = 983 mW L_i = 5 µH C_i = negligibly small In the version with fix connected connection cable the following values must be also taken into consideration: L_i = 0.62 µH/m $C_{i\ wire/wire}$ = 150 pF/m $C_{i\ wire/screen}$ = 270 pF/m
Intrinsically safe power supply and signal circuit II: (terminals 7[+], 8[-])	In type of protection intrinsic safety Ex ia IIC

Electronics H/A:	Maximum values U_i = 30 V I_i = 131 mA P_i = 983 mW L_i = 5 µH C_i = negligibly small In the version with fix connected connection cable the following values must be also taken into consideration: L_i = 0.62 µH/m $C_{i\ wire/wire}$ = 150 pF/m $C_{i\ wire/screen}$ = 270 pF/m

Intrinsically safe display and adjustment circuit

Intrinsically safe display and adjustment circuit: (terminals 5, 6, 7, 8)	In type of protection intrinsic safety Ex ia IIC For connection to the intrinsically safe circuit of the associated external indicating unit VEGADIS 61/81 (PTB 02 ATEX 2136 X). The rules for connecting intrinsically safe circuits between VEGADIF DF85 and the external display unit VEGADIS 61/81 are maintained if the following characteristic values are taken into consideration:
Electronics Z/H/A:	L_o = 330 µH C_o = 1.98 µF
Electronics P/F:	L_o = 212 µH C_o = 1.98 µF L_i and C_i of the external display unit VEGADIS 61/81 are negligibly small. When using the connection cable supplied by VEGA, the following values must be taken into consideration: L_i = 0.62 µH/m $C_{i\ wire/wire}$ = 150 pF/m $C_{i\ wire/screen}$ = 270 pF/m

Intrinsically safe circuit of the display and adjustment module

Circuit of the display and adjustment module: (spring contacts in the electronics compartment or connection compartment)	In type of protection intrinsic safety Ex ia IIC For connection to the display and adjustment module PLICSCOM or VEGACONNECT (PTB 07 ATEX 2013 X).

The metallic parts of VEGADIF DF85 are electrically connected with the earth terminals.

The intrinsically safe supply and signal circuits are galvanically separated from parts that can be grounded.

For applications requiring instruments of category 2G, 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 flame proofing identification is Ex ib IIC T6 Gb.

For applications requiring instruments of category 1G or 1/2G, the intrinsically safe power supply and signal circuit must be in conformity with protection class ia.

For applications requiring instruments of category 1G or 1/2G the VEGADIF DF85 is preferably connected to appropriate instruments with electrically isolated intrinsically safe circuits.

13 Thermal data

The following temperature table applies to all housing and electronic versions and when using the instruments acc. to instrument category 1G, 1/2G, 2G.

Temperature class	Product temperature (Tp) on the sensor	Ambient temperature (Ta)
T6 (+85 °C)	-40 … +46 °C	-40 … +46 °C
T5 (+100 °C)	-40 … +55 °C (only valid with remote sensor component)	
T4 (+135 °C)	-40 … +85 °C	-40 … +80 °C
T3 (+200 °C)		
T2 (+300 °C)		
T1 (+450 °C)		

The limits of the permissible temperature range can be limited due to the O-ring material used. The O-ring material used is specified on the type label. The limits for the temperature range depending on the materials are specified in the below table:

Name: Seal ring	Temperature range: Measuring cell	Temperature range: Seal ring
FKM	-40 … +85 °C	-40 … +220 °C
NBR	-20 … +85 °C	-20 … +120 °C
EPDM	-40 … +85 °C	-50 … +140 °C
PTFE	-40 … +85 °C	-200 … +260 °C
FFKM	-40 … +85 °C	-46 … +240 °C
Copper	-40 … +85 °C	-200 … +300 °C

In explosive steam-air mixtures, the instrument should only operated under atmospheric conditions:

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

If there is no explosive atmosphere, the permissible operating temperatures and pressures must be taken from the manufacturer specifications (operating instructions).

Printing date:

55006-EN-210323

VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
E-mail: info.de@vega.com
www.vega.com