



Safety instructions

Radar sensor

VEGAPULS 6X

Intrinsic safety "i"

Two-wire 4 ... 20 mA/HART

Two-wire 4 ... 20 mA/HART with overvoltage
arrester



Document ID: 66245



VEGA

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Supplementary documentation:

- Operating Instructions VEGAPULS 6X
- Quick setup guide VEGAPULS 6X
- Certificate of Conformity FM 22 CA 0026 X, FM 22 US 0038 X (Document ID: 66246)
- SIL Safety Manual (Document ID: 66494)
- Further related documentation is available by entering the serial number of the device in the search field on "www.vega.com"

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1 Area of applicability

These safety instructions apply to the VEGAPULS 6X of type series:

- PS6X(*)..2*W**B/T/F/C*****H*C/H*****
- PS6X(*)..2*W**B/T/F/C*****A*C/H*****

With the electronics versions:

- H - Two-wire 4 ... 20 mA/HART
- A - Two-wire 4 ... 20 mA/HART with overvoltage arrester

The VEGAPULS 6X are approved acc. to c-FM-us:

FM 22 CA 0026 X, FM 22 US 0038 X (certificate number on the type label)

Approved standards: see certificate

2 Type code specification

In the following, all versions are called VEGAPULS 6X. If parts of these safety instructions refer only to certain versions, then these will be mentioned explicitly with their type code.

VEGAPULS 6X with type code PS6X(*)..a-b-c-de-f-g-hi-j-k-l-m-no-p-q-r-s-t-u

a	Generation
2	Second generation

b	Application
*	One-digit code for preselection, not relevant for approval

c	Radar technology
W	80 GHz

de	Process fitting / Material
XX	universal, plastic horn antenna / PP/PBT
XC	Mounting strap, length: 170 mm / 316L/316L
XD	Mounting strap, length: 300 mm / 316L/316L
**	Other process fittings that comply with national or international standards

f	Antenna version
B	Plastic horn antenna
T	with integrated antenna system
F	Flange with plastic plating
C	with lens antenna

g	Additional equipment
X	without
K	with rinsing air connection
V	with purging connection with reflux valve
1	Antenna system DD-lacquered

hi	Material / Seal / Process temperature
AA	PEEK/FKM (SHS FPM 70C3 GLT) / -40 ... +150 °C
AB	PEEK/FKM (SHS FPM 70C3 GLT) / -40 ... +200 °C
AC	PEEK/FFKM (Kalrez 6230) / -15 ... +150 °C
AD	PEEK/FFKM (Kalrez 6230) / -15 ... +250 °C
AE	PEEK/FFKM (Kalrez 6375) / -20 ... +150 °C
AF	PEEK/FFKM (Kalrez 6375) / -20 ... +250 °C
AG	PEEK/FFKM (Perlast G75B) / -15 ... +150 °C
AH	PEEK/FFKM (Perlast G75B) / -15 ... +250 °C
AJ	PEEK/FFKM (Perlast G74S) / -15 ... +150 °C
AK	PEEK/FFKM (Perlast G74S) / -15 ... +250 °C
AL	PEEK/EPDM (COG AP302) / -40 ... +150 °C (for lens antennas)
AL	PEEK/EPDM (A+P 70.10-02) / -55 ... +150 °C (for threaded version)
AT	PP/PP / -40 ... +80 °C
AU	PP/FKM (SHS FPM 70C3 GLT) / -40 ... +80 °C
AV	PP/EPDM (COG AP310) / -40 ... +80 °C
AW	PTFE/PTFE / -60 ... +150 °C
A4	PTFE/PTFE / -60 ... +200 °C
AX	PTFE/PTFE / -196 ... +200 °C
AY	PTFE (8 mm)/PTFE / -60 ... +150 °C
A5	PTFE (8 mm)/PTFE / -60 ... +200 °C
AZ	PTFE (8 mm)/PTFE / -196 ... +200 °C
A2	PFA (8 mm)/PFA / -60 ... +150 °C
A3	PFA (8 mm)/PFA / -60 ... +200 °C

j	Housing / Protection
A	Aluminium single chamber / IP66/IP68 (0.2 bar)
H	Special colour Aluminium single chamber / IP66/IP68 (0.2 bar)
3	Aluminium single chamber / IP66/IP68 (1 bar)
D	Aluminium double chamber / IP66/IP68 (0.2 bar)
S	Special colour Aluminium double chamber / IP66/IP68 (0.2 bar)
4	Aluminium double chamber / IP66/IP68 (1 bar)
V	Stainless steel single chamber (precision casting) / IP66/IP68 (0.2 bar)
5	Stainless steel single chamber (precision casting) / IP66/IP68 (1 bar)
8	Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar)
Z	Stainless steel single chamber (electropolished) / IP66/IP68 (0.2 bar), IP69K
W	Stainless steel double chamber / IP66/IP68 (0.2 bar)

k	Cable entry / Connection
D	M20 x 1.5 / Blind plug
1	M20 x 1.5 / without
N	½ NPT / Blind plug
Q	½ NPT / without
*	Other certified connection or cable gland suitable for the application

l	Display, adjustment or radio module
X	without display, adjustment or radio module, standard lid
A	Display and adjustment module PLICSCOM3
F	without display, adjustment or radio module, lid with inspection window
B	Display/adjustment module PLICSCOM3, laterally mounted
K	Display/adjustment module PLICSCOM3, with Bluetooth
L	Display/adjustment module PLICSCOM3, laterally mounted; with Bluetooth

m	Electronics
H	Two-wire 4 ... 20 mA/HART
A	Two-wire 4 ... 20 mA/HART with overvoltage arrester

no	Explosion protection
FC, VC	Intrinsic safety gas
FH, VH	Intrinsic safety gas + Intrinsic safety dust

p	Functional safety SIL (IEC 61508)
X	without
*	with

q	IT Security (IEC 62443-4-2)
X	without
*	with

r	Overfill protection
X	without
*	with

s	Food/pharmaceutical certificate
X	without
*	with

t	Ship approval
X	without
*	with

u	Secondary Line of Defense
X	without
S	with

3 Application area

Overview of the different application areas:

VEGA Instrument	EPL Gc, Dc	EPL Gb, Db or DIV2	EPL Ga/Gb, Da/Db	EPL Ga, Da or DIV1
Ex Zone 2, 22 or DIV2 				
Ex Zone 1, 21 or DIV2 				
Ex Zone 0, 20 or DIV1 				

Application area of the VEGAPULS 6X without overvoltage arrester (electronics version H) and with overvoltage arrester (electronics version A):

Type code	Explosion group	Type of protection marking
Electronics version "H" - Two-wire 4 ... 20 mA/HART		
PS6X(*).2*W**B/T/F/C*****H* C*****	IIA, IIB, IIC A, B, C, D	Intrinsic Safe for CI I, Div 1, Gp ABCD T6 or CI I, Zn 0 AEx/Ex ia IIC T6 Ga or CI I, Zn 0/1 AEx/Ex ia IIC T6 Ga/Gb

Type code	Explosion group	Type of protection marking
PS6X(*).2*W**B/T/F/C*****H* H*****	IIA, IIB, IIC IIIA, IIIB, IIIC A, B, C, D, E, F, G	Intrinsic Safe for CI I, Div 1, Gp ABCD T6 CI II, Div 1 Gp EFG, CI III T4, T _a = -40 °C to +80 °C or CI I, Zn 0 AEx/Ex ia IIC T6 Ga or CI I, Zn 0/1 AEx/Ex ia IIC T6 Ga/Gb or Zn 20 AEx/Ex ia IIIC T ₂₀₀ 102 °C Da or Zn 20/21 Ex ia IIIC T* °C Da/Db or Zn 21 AEx/Ex ia IIIC T111 °C Db T* see chapter " 9.3 Thermal data - Dust"
Electronics version "A" - Two-wire 4 ... 20 mA/HART with overvoltage arrester		
PS6X(*).2*W**B/T/F/C*****A* C*****	IIA, IIB, IIC A, B, C, D	Intrinsic Safe for CI I, Div 1, Gp ABCD T6 or CI I, Zn 0/1 AEx/Ex ia IIC T6 Ga/Gb or CI I, Zn 1 AEx/Ex ia IIC T6 Gb
PS6X(*).2*W**B/T/F/C*****A* H*****	IIA, IIB, IIC IIIA, IIIB, IIIC A, B, C, D, E, F, G	Intrinsic Safe for CI I, Div 1, Gp ABCD T6 CI II, Div 1 Gp EFG, CI III T4, T _a = -40 °C to +80 °C or CI I, Zn 0/1 AEx/Ex ia IIC T6 Ga/Gb or CI I, Zn 1 AEx/Ex ia IIC T6 Gb Zn 20/21 Ex ia IIIC T* °C Da/Db or Zn 21 AEx/Ex ia IIIC T111 °C Db T* see chapter " 9.3 Thermal data - Dust"

VEGAPULS 6X without overvoltage arrester: PS6X(*).2*W***H*******

The voltage resistance against ground is min. 500 V_{eff}.

VEGAPULS 6X with overvoltage arrester: PS6X(*).2*W***A*******

The built-in overvoltage arrester type Bourns 2036-60 has the following characteristic values:

DC Sparkover = 600 V ± 20 % @ 100 V/s

Impulse Sparkover = 850 V @ 100 V/μs

Impulse Sparkover = 1100 V @ 1000 V/μs

Further characteristic data can be found in the data sheet of the Bourns 2036-60.

The voltage resistance against ground is min. 340 V_{eff}.

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4 Specific conditions of use ("X" identification)

The following list describes the special operating conditions of VEGAPULS 6X.

In the application as zone 0 instrument, the following applies to radar sensors VEGAPULS 6X in the versions with Aluminium/Titanium:

Installation must be carried out in such a way that the generation of sparks as a result of impact and friction processes between Aluminium/Titanium and steel is excluded. This excludes stainless steel without rust particles.

Certain components of the radar sensor VEGAPULS 6X can charge electrostatically. These include: Plastic housings, non-grounded metal parts, plastic antennas. For details, refer to chapter " *Electrostatic charge (ESD)*" of these safety instructions.

To avoid the risk of electrostatic charging of metal parts, the VEGAPULS 6X must be connected to the potential equalization (transition resistance $\leq 1 \text{ M}\Omega$).

All parts of VEGAPULS 6X in contact with the medium must only be used in such a medium against which the materials are sufficiently resistant.

VEGAPULS 6X with rinsing connection: It must be ensured that the IP67 degree of protection is provided at the connection to the reflux valve when used as zone 0/1 equipment. After removing the reflux valve or the rinsing facility on the refölux valve, the opening must be closed with a suitable screw plug so that the IP67 degree of protection is maintained.

VEGAPULS 6X with swivelling holder: It must be ensured that the IP67 degree of protection is maintained when operating as zone 0/1 instrument after aligning the antenna using the swivelling holder and after screwing on the tension flange.

Ambient temperature

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

5 Installation

- The installation of the device must only be carried out by qualified personnel.
- The staff must be trained in explosion protection and familiar with the relevant valid regulations.
- Install the instrument in accordance with the manufacturer specification and the applicable national regulations, e.g. planning and installation in accordance with IEC/EN 60079-14.
- The devices must be integrated into the local potential equalization.
- 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.
- For devices with integrated overvoltage protection the lower voltage resistance against ground of $340 \text{ V}_{\text{eff}}$ must be observed.
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label.

6 Operation

- Do not operate the device outside the electrical and thermal specifications given in this safety instruction
- 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*".
- The information on mechanical wear in the operating instructions must be observed
- The continuous operating temperature of the connection cable must be suitable for the temperature range of the application
- Only original spare parts or spare parts approved for the purpose may be used for repairs

- When connecting a VEGAPULS 6X to an non-intrinsically safe circuit, it must be no longer be used in intrinsically safe circuits.
- If overvoltage protection is required, e.g. against atmospheric overvoltages, all circuits leaving the housing of the VEGAPULS 6X must be protected against overvoltages
- Modifications on the instrument can influence the explosion protection and hence the safety
- Modifications must only be carried out by employees authorized by VEGA

7 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
- Plastic process fittings
- Plastic-coated process fittings and/or plastic-coated sensors
- Type label

The instruments must be 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

8 Electrical data

The following applies to the VEGAPULS 6X in type of protection intrinsic safety (Ex ia IIC, IIIC):

Power supply and signal circuit: terminals 1, 2

The following values must be observed or taken into account:

- $U_i \leq 30 \text{ V DC}$
- $I_i \leq 131 \text{ mA}$
- $P_i \leq 983 \text{ mW}$
- Characteristics: individual
- $C_i = 0$ (no effective inner capacitance)
- $L_i = 0$ (no effective inner inductance)

Indicating and adjustment circuit: terminals 5, 6, 7, 8

For connection to the intrinsically safe circuit of the corresponding external display unit VEGADIS 81. For the connection, the intrinsic safety is verified if $L_{\text{Cable}} = 130 \mu\text{H}$ and $C_{\text{Cable}} = 600 \text{ nF}$ are not exceeded.

When using the VEGA connection cable supplied with certain versions, the following values for cable inductance L_i and cable capacitance C_i must be observed.

- $L_i = 0.62 \mu\text{H/m}$
- $C_{\text{wire/wire}} = 150 \text{ pF/m}$
- $C_{\text{wire/screen}} = 270 \text{ pF/m}$

Indication and adjustment circuit: spring contacts

Only for connection to the display and adjustment module PLICSCOM3.

9 Thermal data

9.1 Thermal data - General regulations

The approval (FM 22 CA 0026 X, FM 22 US 0038 X) is valid under the following conditions:

- Compliance with the temperature ranges for the various versions as indicated in the tables below.
- Pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar), and
- Air with an oxygen content of 21 % (v/v)

Additional measures are required for operation of the VEGAPULS 6X outside these conditions.

The operation of the VEGAPULS 6X outside the above conditions is the sole responsibility of the operator.

The thermal measurements for determining the following temperature tables were carried out for process temperatures above +150 °C with insulation. Thermal measurements up to +150 °C were carried out without insulation.

Data sheets of the insulation used:

		SiBa 20/150a/ALU50	SiBa/-a
Data sheet extract insulation		Aluminium foil embossed Basalt/silica compound fleece	Basalt/silica compound fleece
General technical data		SiBa 20/150a/ALU50 is a mechanically bonded needlefelt based on a mixture of endless drawn basalt fibres and silica fibres, laminated with an aluminium foil (thickness approx. 50 µm).	It is a mechanically bonded needlefelt based on a mixture of continuously drawn basalt fibres (approx. 70 %) and silica fibres (approx. 30 %).
Thickness	[mm]	approx. 20	approx. 20
Grammage	[kg/m²]	approx. 3	approx. 3
Bulk density	[kg/m³]	approx. 150	approx. 150
Heat resistance in the long term	[°C]	up to 700 Radiant heat on aluminium max. 250	up to 700
Heat resistance in the short term	[°C]	up to 700	up to 700
Cold resistance	[°C]	up to -40	up to -40
Heat conductivity	[W/mK]	0.05 (at 200 °C) 0.15 (at 600 °C)	0.05 (at 200 °C) 0.15 (at 600 °C)
Vibration behaviour		Resistant	Resistant
Physiological behaviour		Harmless	Harmless
Toxicological behaviour		Not dangerous	Not dangerous
Filament diameter	[µm]	> 6	> 6
Flammability		Fire-proof	Fire-proof

For measurements with insulation, a layer thickness of 8 cm SiBa 20/150a was applied. Looking from the surface of the tank, a 6 cm layer of SiBa 20/150a was first applied. A 2 cm layer of SiBa 20/150a/ALU50 was then finally applied on top of this layer.

9.2 Thermal data - Gas

VEGAPULS 6X with plastic horn antenna for process temperature up to max. +80 °C

PS6X(*).2*WB*AT/AU/AV*******

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +40 °C
T5	-40 ... +80 °C	-40 ... +58 °C
T4 ... T1	-40 ... +76 °C	-40 ... +76 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +39 °C
T5	-40 ... +80 °C	-40 ... +57 °C
T4 ... T1	-40 ... +76 °C	-40 ... +76 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +38 °C
T5	-40 ... +80 °C	-40 ... +56 °C
T4 ... T1	-40 ... +76 °C	-40 ... +76 °C

VEGAPULS 6X with flange with plastic plating or with integrated antenna system (threaded connection) for process temperatures up to max. +150 °C

PS6X(*).2*WF*AW/AY/A2*******

PS6X(*).2*WT*AA/AC/AE/AG/AJ/AL *******

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +32 °C
T5	-xx ... +95 °C	-40 ... +47 °C

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T4	-xx ... +130 °C	-40 ... +57 °C
T3 ... T1	-xx ... +150 °C	-40 ... +48 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +30 °C
T5	-xx ... +95 °C	-40 ... +45 °C
T4	-xx ... +130 °C	-40 ... +47 °C
T3 ... T1	-xx ... +150 °C	-40 ... +34 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +29 °C
T5	-xx ... +95 °C	-40 ... +44 °C
T4	-xx ... +130 °C	-40 ... +36 °C
T3 ... T1	-xx ... +150 °C	-40 ... +19 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AA** PEEK/FKM (SHS FPM 70C3-GLT) / **-40 ... +150 °C**
- **AC** PEEK/FFKM (Kalrez 6230) / **-15 ... +150 °C**
- **AE** PEEK/FFKM (Kalrez 6375) / **-20 ... +150 °C**
- **AG** PEEK/FFKM (Perlast G75B) / **-15 ... +150 °C**
- **AJ** PEEK/FFKM (Perlast G74S) / **-15 ... +150 °C**
- **AL** PEEK/EPDM (A+P 70.10-02) / **-55 ... +150 °C**
- For xx = AW, AY, A2 -40 °C as lower limit value applies

VEGAPULS 6X with flange with plastic plating or with integrated antenna system (threaded connection) or with lens antenna for process temperatures up to max. +195 °C

PS6X(*).2*WF*AX/AZ/A3/A4/A5*******

PS6X(*).2*WT*AB*******

PS6X(*).2*WC*AB*******

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +41 °C
T5	-40 ... +95 °C	-40 ... +56 °C

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T4	-40 ... +130 °C	-40 ... +72 °C
T3 ... T1	-40 ... +195 °C	-40 ... +62 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +40 °C
T5	-40 ... +95 °C	-40 ... +55 °C
T4	-40 ... +130 °C	-40 ... +66 °C
T3 ... T1	-40 ... +195 °C	-40 ... +49 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-40 ... +80 °C	-40 ... +41 °C
T5	-40 ... +95 °C	-40 ... +56 °C
T4	-40 ... +130 °C	-40 ... +66 °C
T3 ... T1	-40 ... +195 °C	-40 ... +47 °C

VEGAPULS 6X with flange with plastic plating for process temperatures up to -196 °C (low temperature version)

PS6X(*).2*W**F*AX/AZ*****

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-196 ... +80 °C	-10 ... +41 °C
T5	-196 ... +95 °C	-10 ... +56 °C
T4	-196 ... +130 °C	-10 ... +72 °C
T3 ... T1	-196 ... +195 °C	-10 ... +62 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-196 ... +80 °C	-10 ... +40 °C
T5	-196 ... +95 °C	-10 ... +55 °C

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T4	-196 ... +130 °C	-10 ... +66 °C
T3 ... T1	-196 ... +195 °C	-10 ... +49 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-196 ... +80 °C	-10 ... +41 °C
T5	-196 ... +95 °C	-10 ... +56 °C
T4	-196 ... +130 °C	-10 ... +66 °C
T3 ... T1	-196 ... +195 °C	-10 ... +47 °C

VEGAPULS 6X with lens antenna for process temperatures up to max. +150 °C

PS6X(*).2*W**C*AA/AC/AE/AG/AJ/AL *****

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +36 °C
T5	-xx ... +95 °C	-40 ... +51 °C
T4	-xx ... +130 °C	-40 ... +65 °C
T3 ... T1	-xx ... +150 °C	-40 ... +58 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +35 °C
T5	-xx ... +95 °C	-40 ... +50 °C
T4	-xx ... +130 °C	-40 ... +57 °C
T3 ... T1	-xx ... +150 °C	-40 ... +48 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +32 °C
T5	-xx ... +95 °C	-40 ... +47 °C
T4	-xx ... +130 °C	-40 ... +46 °C

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T3 ... T1	-xx ... +150 °C	-40 ... +33 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AA** PEEK/FKM (SHS FPM 70C3-GLT) / **-40 ... +150 °C**
- **AC** PEEK/FFKM (Kalrez 6230) / **-15 ... +150 °C**
- **AE** PEEK/FFKM (Kalrez 6375) / **-20 ... +150 °C**
- **AG** PEEK/FFKM (Perlast G75B) / **-15 ... +150 °C**
- **AJ** PEEK/FFKM (Perlast G74S) / **-15 ... +150 °C**
- **AL** PEEK/EPDM (COG AP302) / **-40 ... +150 °C**

VEGAPULS 6X with integrated antenna system (threaded connection) or with lens antenna for process temperatures up to max. +250 °C

PS6X(*).2*WC*AD/AF/AH/AK*******

PS6X(*).2*WT*AD/AF/AH/AK*******

Aluminium housing, version A, H, 3, D, S, 4, 9

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +39 °C
T5	-xx ... +95 °C	-40 ... +54 °C
T4	-xx ... +130 °C	-40 ... +69 °C
T3	-xx ... +195 °C	-40 ... +63 °C
T2 ... T1	-xx ... +250 °C	-40 ... +55 °C

Stainless steel housing (precision casting), version V, 5, W

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +38 °C
T5	-xx ... +95 °C	-40 ... +53 °C
T4	-xx ... +130 °C	-40 ... +65 °C
T3	-xx ... +195 °C	-40 ... +56 °C
T2 ... T1	-xx ... +250 °C	-40 ... +45 °C

Stainless steel housing (electropolished), version 8

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T6	-xx ... +80 °C	-40 ... +33 °C
T5	-xx ... +95 °C	-40 ... +48 °C

T-class	Permissible process temperature range at the antenna in Zone 0 (EPL Ga) or in Division 1	Permissible ambient temperature range on the electronics in zone 0 (EPL Ga) or in Division 1
T4	-xx ... +130 °C	-40 ... +59 °C
T3	-xx ... +195 °C	-40 ... +49 °C
T2 ... T1	-xx ... +250 °C	-40 ... +34 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AD** PEEK/FFKM (Kalrez 6230) / -15 ... +250 °C
- **AF** PEEK/FFKM (Kalrez 6375) / -20 ... +250 °C
- **AH** PEEK/FFKM (Perlast G75B) / -15 ... +250 °C
- **AK** PEEK/FFKM (Perlast G74S) / -15 ... +250 °C

9.3 Thermal data - Dust

EPL Da instrument - Complete device (antenna and housing) installed in Zone 20 (surrounded by 200 mm dust) or in Division 1:

Max. permissible ambient/process temperature:	+67 °C
Surface temperature:	Ambient/Process temperature +35 K
Max. surface temperature:	+102 °C

Limitation of the lower process temperature by sealing material. Details can be found in chapter " 2 Type code specification" digits „hi" of PS6X(*) .a-b-c-de-f-g-hi-j-k-l-m-no-p-q-r-s-t-u.

EPL Db instrument - Complete device (antenna and housing) installed in Zone 21 (without dust layer) or in Division 2:

Max. permissible ambient/process temperature:	+76 °C
Surface temperature:	Ambient/Process temperature +35 K
Max. surface temperature:	+111 °C

Limitation of the lower process temperature by sealing material. Details can be found in chapter " 2 Type code specification" digits „hi" of PS6X(*) .a-b-c-de-f-g-hi-j-k-l-m-no-p-q-r-s-t-u.

EPL Da/Db instrument - Housing installed in Zone 21 without dust layer, antenna installed in Zone 20:

VEGAPULS 6X with plastic horn antenna for process temperature up to max. +80 °C

PS6X(*).2*WB*AT/AU/AV*******

Housing (electronics)	Permissible process temperature range on the antenna in zone 20 or in Division 1	Permissible ambient temperature range in Zone 21 or in Division 2 on the electronics housing	Surface temperature of the electronics housing	Max. surface temperature
Aluminium A, D, H, S	-40 ... +76 °C	-40 ... +76 °C	Ambient temperature +35 K	+111 °C
Stainless steel V, W	-40 ... +76 °C	-40 ... +76 °C	Ambient temperature +35 K	+111 °C

VEGAPULS 6X with flange with plastic plating or with integrated antenna system (threaded connection) for process temperature up to max. +150 °C

PS6X(*).2*WF*AW/AY/A2*******

PS6X(*).2*WT*AA/AC/AE/AG/AJ/AL*******

Housing (electronics)	Permissible process temperature range on the antenna in zone 20 or in Division 1	Permissible ambient temperature range in Zone 21 or in Division 2 on the electronics housing	Surface temperature of the electronics housing	Max. surface temperature
Aluminium A, D, H, S	-xx ... +130 °C	-40 ... +57 °C	Ambient temperature +35 K	+132 °C
	-xx ... +150 °C	-40 ... +48 °C	Ambient temperature +35 K	+152 °C
Stainless steel V, W	-xx ... +130 °C	-40 ... +47 °C	Ambient temperature +35 K	+132 °C
	-xx ... +150 °C	-40 ... +34 °C	Ambient temperature +35 K	+152 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AA** PEEK/FKM (SHS FPM 70C3-GLT) / **-40 ... +150 °C**
- **AC** PEEK/FFKM (Kalrez 6230) / **-15 ... +150 °C**
- **AE** PEEK/FFKM (Kalrez 6375) / **-20 ... +150 °C**
- **AG** PEEK/FFKM (Perlast G75B) / **-15 ... +150 °C**
- **AJ** PEEK/FFKM (Perlast G74S) / **-15 ... +150 °C**
- **AL** PEEK/EPDM (A+P 70.10-02) / **-55 ... +150 °C**
- For xx = AW, AY, A2 -40 °C as lower limit value applies

VEGAPULS 6X with flange with plastic plating or with integrated antenna system (threaded connection) or with lens antenna for process temperature up to max. +195 °C

PS6X(*).2*WF*AX/AZ/A3/A4/A5*******

PS6X(*).2*WT*AB*******

PS6X(*).2*WC*AB*******

Housing (electronics)	Permissible process temperature range on the antenna in zone 20 or in Division 1	Permissible ambient temperature range in Zone 21 or in Division 2 on the electronics housing	Surface temperature of the electronics housing	Max. surface temperature
Aluminium A, D, H, S	-40 ... +130 °C	-40 ... +72 °C	Ambient temperature +35 K	+132 °C
	-40 ... +195 °C	-40 ... +62 °C	Ambient temperature +35 K	+197 °C
Stainless steel V, W	-40 ... +130 °C	-40 ... +66 °C	Ambient temperature +35 K	+132 °C
	-40 ... +195 °C	-40 ... +49 °C	Ambient temperature +35 K	+197 °C

VEGAPULS 6X with lens antenna for process temperature up to max. +150 °C

PS6X(*).2*W**C*AA/AC/AE/AG/AJ/AL*****

Housing (electronics)	Permissible process temperature range on the antenna in zone 20 or in Division 1	Permissible ambient temperature range in Zone 21 or in Division 2 on the electronics housing	Surface temperature of the electronics housing	Max. surface temperature
Aluminium A, D, H, S	-xx ... +130 °C	-40 ... +65 °C	Ambient temperature +35 K	+132 °C
	-xx ... +150 °C	-40 ... +58 °C	Ambient temperature +35 K	+152 °C
Stainless steel V, W	-xx ... +130 °C	-40 ... +57 °C	Ambient temperature +35 K	+132 °C
	-xx ... +150 °C	-40 ... +48 °C	Ambient temperature +35 K	+152 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AA** PEEK/FKM (SHS FPM 70C3-GLT) / -40 ... +150 °C
- **AC** PEEK/FFKM (Kalrez 6230) / -15 ... +150 °C
- **AE** PEEK/FFKM (Kalrez 6375) / -20 ... +150 °C
- **AG** PEEK/FFKM (Perlast G75B) / -15 ... +150 °C
- **AJ** PEEK/FFKM (Perlast G74S) / -15 ... +150 °C
- **AL** PEEK/EPDM (A+P 70.10-02) / -40 ... +150 °C

VEGAPULS 6X with integrated antenna system (threaded connection) or with lens antenna for process temperature up to max. +250 °C

PS6X(*).2*W**C*AD/AF/AH/AK*****

PS6X(*).2*W**T*AD/AF/AH/AK*****

Housing (electronics)	Permissible process temperature range on the antenna in zone 20 or in Division 1	Permissible ambient temperature range in Zone 21 or in Division 2 on the electronics housing	Surface temperature of the electronics housing	Max. surface temperature
Aluminium A, D, H, S	-xx ... +130 °C	-40 ... +69 °C	Ambient temperature +35 K	+132 °C
	-xx ... +195 °C	-40 ... +63 °C	Ambient temperature +35 K	+197 °C
	-xx ... +250 °C	-40 ... +55 °C	Ambient temperature +35 K	+252 °C
Stainless steel V, W	-xx ... +130 °C	-40 ... +65 °C	Ambient temperature +35 K	+132 °C
	-xx ... +150 °C	-40 ... +56 °C	Ambient temperature +35 K	+197 °C
	-xx ... +250 °C	-40 ... +45 °C	Ambient temperature +35 K	+252 °C

xx °C lower temperature in the process, limited by the sealing type with xx:

- **AD** PEEK/FFKM (Kalrez 6230) / -15 ... +250 °C
- **AF** PEEK/FFKM (Kalrez 6375) / -20 ... +250 °C
- **AH** PEEK/FFKM (Perlast G75B) / -15 ... +250 °C
- **AK** PEEK/FFKM (Perlast G74S) / -15 ... +250 °C

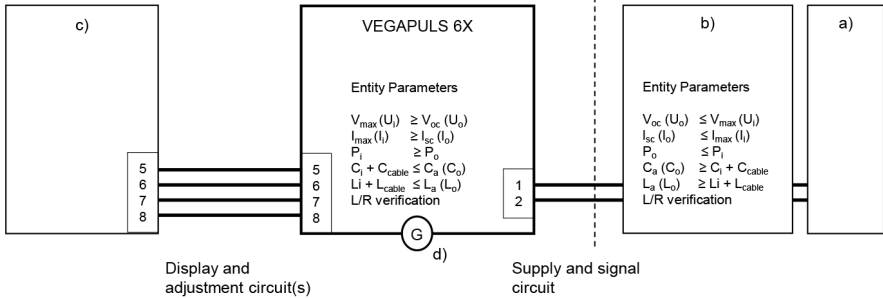
10 Installation Control Drawing

Intrinsically Safe for

Class I, Division 1, Groups A, B, C, D
Class II, Division 1, Groups E, F and G
Class III or
Class I, Zone 0, Group IIC
Class I, Zone 1, Group IIC

Unclassified / Ordinary Location or

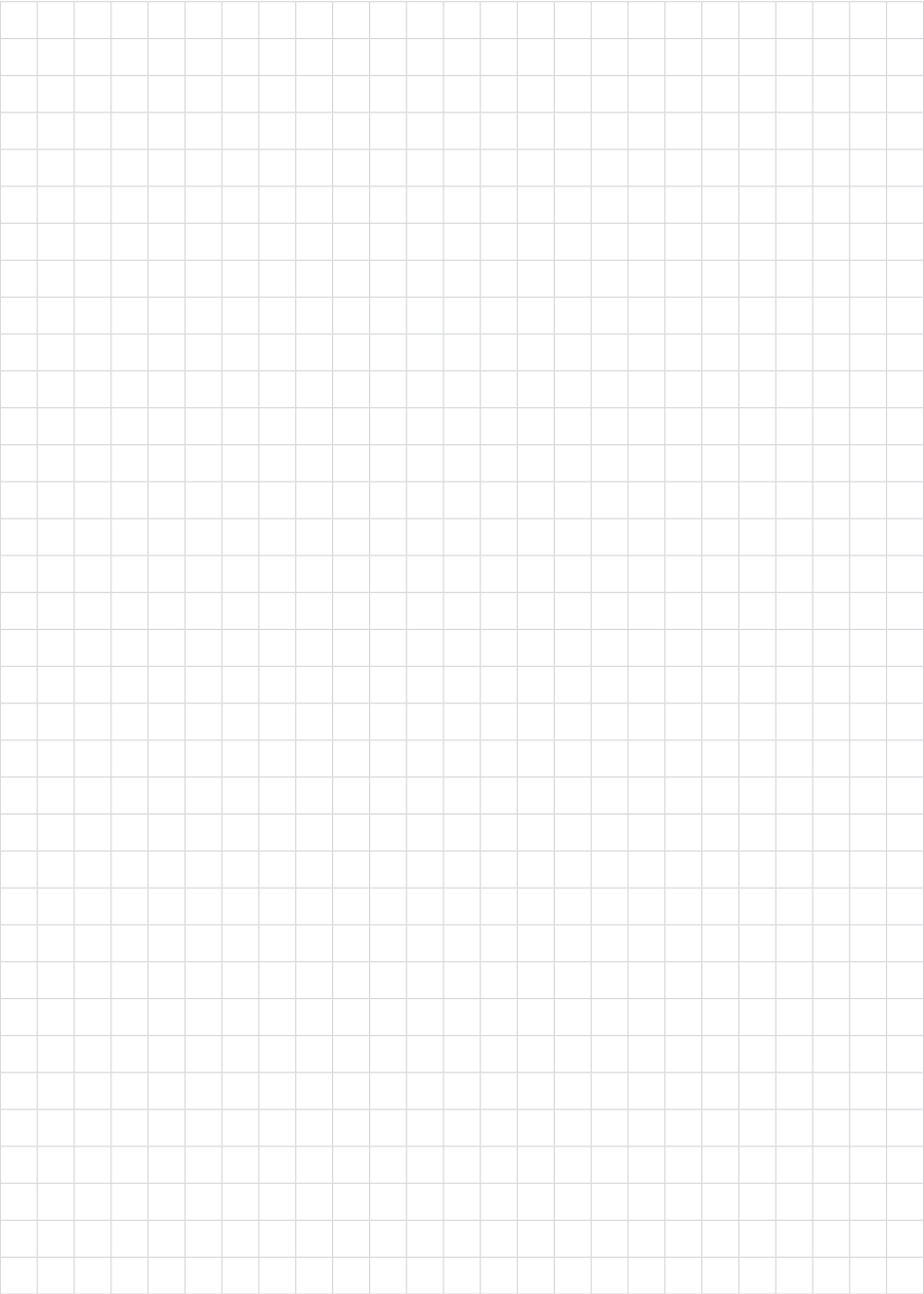
Class I, Division 2, Groups A, B, C, D or
Class I, Zone 2, Group IIC

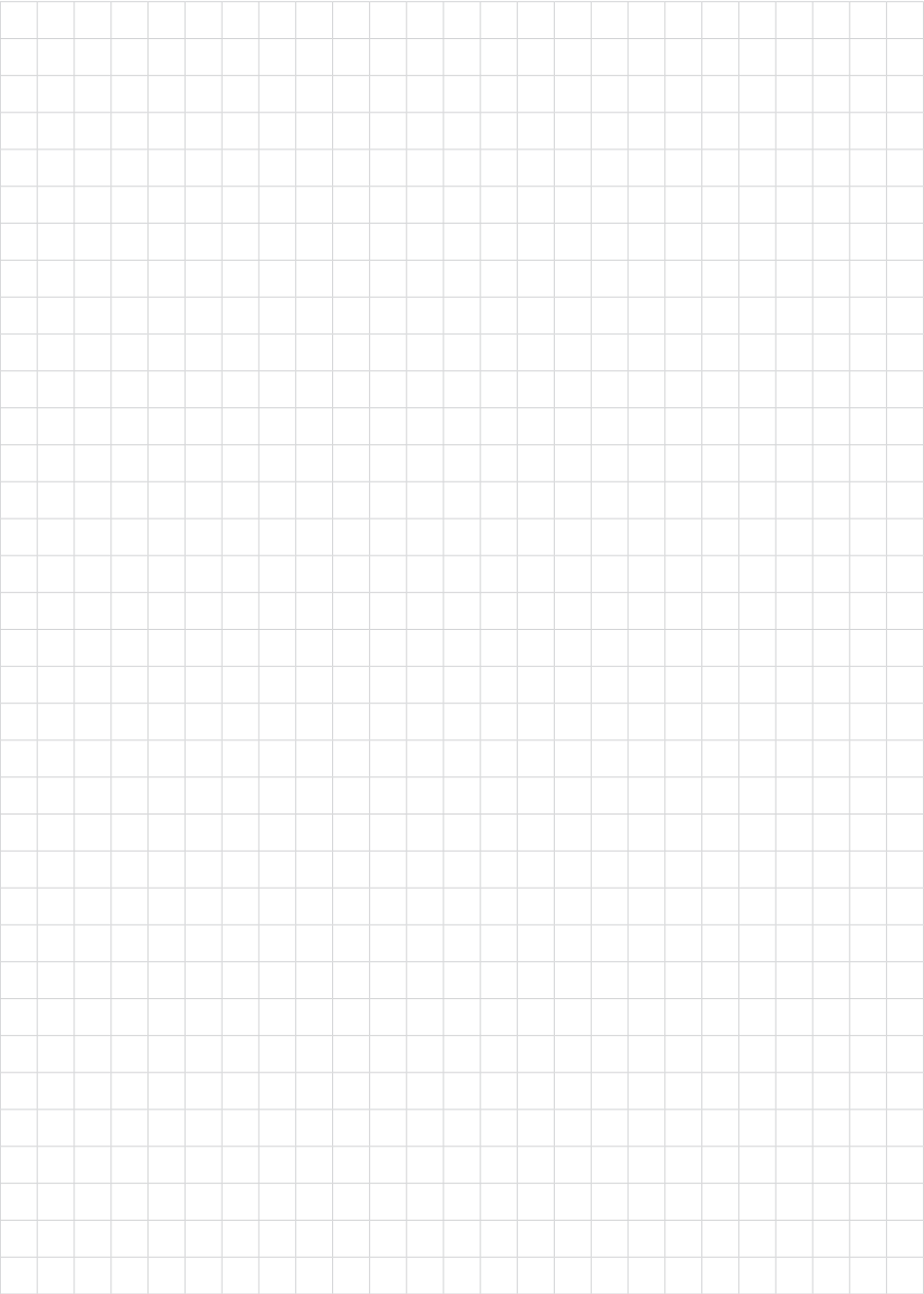


- a) Control Room ($U_m \leq 250 \text{ V}$)
b) Associated Apparatus
c) VEGA DISPLAY e.g. VEGADIS
d) Ground Connection

NOTES:

- The Entity Concept allows the interconnection of suitable approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
 - U_o or V_{oc} or $V_i \leq U_i$ or $V_{\max}$
 - I_o or I_{sc} or $I_i \leq I_i$ or $I_{\max}$
 - $P_o \leq P_i$
 - C_o or $C_o \geq C_i + C_{cable}$
 - L_o or $L_o \geq L_i + L_{cable}$
- Control equipment connected to the Associated Apparatus shall not use or generate more than $250 \text{ V}_{\text{rms}}$ or V_{dc} .
- Installation should be in accordance with ANSI/ISA-RP12.06.01 "Intrinsic Safety Wiring Methods for Hazardous (Classified) Locations Instrumentation" and the Canadian Electrical Code
- The configuration of associated Apparatus shall be approved under Entity Concept.
- Associated Apparatus manufacturer's installation control drawing shall be followed when installing this equipment.
- The VEGAPULS 6X are approved for Class I, Zone 0 and Division 1 applications.
If connecting [Ex ib]/[AEx ib] Associated Apparatus to the VEGAPULS 6X, the above system is only suitable for Class 1, Zone 1, or Division 2 hazardous (classified) locations, and is not suitable for Class I, Zone 0, or Division 1 hazardous (classified) locations.
- When cable parameters are unknown, the following may be used: Capacitance = 200 pF/m (60 pF/ft); Inductance = $0.66 \text{ } \mu\text{H/m}$ ($0.20 \text{ } \mu\text{H/ft}$)
- Resistance between intrinsically safe ground and earth ground must be less than one Ohm.
- No revision to drawing without prior Agency Approval.
- Warning: Substitution of components may impair suitability for intrinsic safety and hazardous locations.





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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