Safety instructions

VEGAPULS 61, 62, 63, 65, 66, 68, SR68

Non-incendive
Two-wire 4 … 20 mA/HART
Four-wire 4 … 20 mA/HART
Profibus PA
Foundation Fieldbus
Modbus
HW ≥ 2.0.0 - SW ≥ 4.0.0

Document ID: 39088

Contents

Supplementary documentation:

- Operating Instructions VEGAPULS 61, 62, 63, 65, 66, 68, SR68
- Quick setup guide VEGAPULS 61, 62, 63, 65, 66, 68, SR68
- Certificate of Conformity CSA 1507580 (Document ID: 61884)

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1 Area of applicability

These safety instructions apply to the radar sensors:

- VEGAPULS PS61(*).KX***H/D/P/K/F/L/B/G/I/M/7/8****
- VEGAPULS PS62(*).KX****H/D/P/K/F/L/B/G/I/M/7/8****
- VEGAPULS PS63(*).KX***H/D/P/K/F/L/B/G/I/M/7/8****
- VEGAPULS PS65(*).KX***H/P/F/B/I/7 ****
- VEGAPULS PS66(*).KX****H/P/F/B/I/7****
- VEGAPULS PS68(*).KX****H/P/F/B/I/7****
- VEGAPULS PSSR68(*).KX****H/P/F/B/I/7****

With the electronics versions:

- H - Two-wire 4 … 20 mA/HART
- D - Two-wire 4 … 20 mA/HART with increased sensitivity
- P - Two-wire Profibus PA
- K - Two-wire Profibus PA with increased sensitivity
- F - Two-wire Foundation Fieldbus
- L - Two-wire Foundation Fieldbus with increased sensitivity
- B - Four-wire 4 … 20 mA/HART; 90 … 253 V AC, 50/60 Hz
- G - Four-wire 4 … 20 mA/HART with increased sensitivity; 90 … 253 V AC, 50/60 Hz
- I - Four-wire 4 … 20 mA/HART; 9.6 … 48 V DC, 20 … 42 V AC
- M - Four-wire 4 … 20 mA/HART with increased sensitivity; 9.6 … 48 V DC, 20 … 42 V AC
- 7 - Four-wire Modbus
- 8 - Four-wire Modbus with increased sensitivity

According to Certificate of Conformity CSA 1507580 (certificate number on the type label) and for all instruments with safety instruction 39088.

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

- Class I, DIV 2, Groups A, B, C, D

2 Important specification in the type code

VEGAPULS PS 61/62/63/65/66/68/SR68(*).abcd(e)fghij

Position		Feature	Description
a	Scope	K	CSA / Canada
b	Approval	X	Class I, DIV 2, Groups A, B, C, D
c	Version / Material	*	One-digit alphanumeric variable for metal antenna, standpipe with different metal materials and diameters
d	Process fitting / Material	**	One or two-digit alphanumerical code for gas-tight threaded connections, pipe connections and industrial flanges acc. to ASME, BS, DIN, EN, GOST, HG/T, JIS, other international, national or industrial standards, regulations or standards with pressure specifications
(e)	Seal / Process temperature	*	One-digit alphanumeric variable for different seal materials, suitable for the application including the process temperature to be taken into account (Only for VEGAPULS 62, 66, 68, SR68)

Position		Feature	Description
f	Electronics	H	Two-wire 4 … 20 mA/HART
		D	Two-wire 4 … 20 mA/HART with increased sensitivity
		P	Two-wire Profibus PA
		K	Two-wire Profibus PA with increased sensitivity
		F	Two-wire Foundation Fieldbus
		L	Two-wire Foundation Fieldbus with increased sensitivity
		B	Four-wire 4 … 20 mA/HART; 90 … 253 V AC, 50/60 Hz
		G	Four-wire 4 … 20 mA/HART with increased sensitivity; 90 … 253 V AC, 50/60 Hz
		I	Four-wire 4 … 20 mA/HART; 9.6 … 48 V DC, 20 … 42 V AC
		M	Four-wire 4 … 20 mA/HART with increased sensitivity; 9.6 … 48 V DC, 20 … 42 V AC
		7	Four-wire Modbus
		8	Four-wire Modus with increased sensitivity
i	Housing / Protection	D	Aluminium double chamber / IP 66/IP 68 (0.2 bar)
		S	Special colour Aluminium double chamber / IP 66/IP 68 (0.2 bar)
		W	Stainless steel double chamber / IP 66/IP 68 (0.2 bar)
h	Cabel entry	M	M20 x 1.5
		N	1½ NPT
		*	One-digit alphanumerical code for further suitable fittings, cable entries and closing screws.
i	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
j	Additional equipment	X	without
		*	with equipment

In the following, all above mentioned versions are called VEGAPULS 6*. 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 VEGAPULS 6* in ignition protection type non-incendive (NI) are used for detection of the distance between product surface and sensor by means of high frequency, electromagnetic waves in the GHz range.

The electronics uses the running time of the signals reflected by the product surface to calculate the distance to the product surface.

The VEGAPULS 6* consist of an electronics housing, a process connection element and a sensor or an antenna.

The VEGAPULS 6* are suitable for applications in hazardous atmospheres of all combustible materials of Class I Groups A, B, C, D, Class II Groups F, G and Class III.

The VEGAPULS 6* are suitable for applications requiring Division 2 instruments.

4 Application area

Division 2 instrument
The VEGAPULS 6* with the mechanical fixing element are installed in hazardous areas of division 2.

5 Specific conditions of use

The following overview is listing the specific conditions of use.

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

Ambient temperature
The ambient temperature range can be limited.

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

Impact and friction sparks
The VEGAPULS 6* 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.

6 Additional instructions for safe operation

- The 3/8" NPT threaded port of the Dual-Chamber housing shall not be used as a field wiring conduit entry and has to be closed at all times with a suitable plug.
- 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.
- The VEGAPULS 6* must be installed in such a way that sensor (antenna) does not touch the vessel wall. Especially the inner tank structure, the flow conditions in the tank and the antenna length must be taken into account.

Connection conditions
- Unused openings must be covered. 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.
- The connection cable of VEGAPULS 6* has to be wired fix and in such a way that damages can be excluded
- If the temperature at the inlet components exceeds 60 °C, temperature-resistant connection cables must be used
- The VEGAPULS 6* must be integrated in the local potential equalization of the hazardous areas (contact resistor ≤ 1 MΩ)
- Use the instrument only in media against which the wetted parts are sufficiently resistant
- If necessary, a suitable overvoltage arrester can be connected in front of the VEGAPULS 6*

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 CEC or NEC
- 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 approval certificate and the valid regulations and standards
- Modifications on the instrument can influence the explosion protection and hence the safety
- Modifications must only be carried out by employees authorized by VEGA company

Mounting

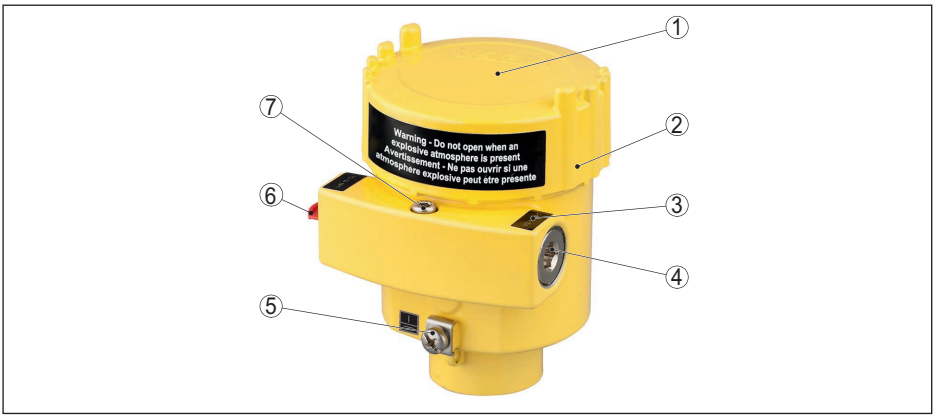
Keep in mind for instrument mounting

- Mechanical damage on the instrument must be avoided
- Mechanical friction must be avoided
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label
- 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

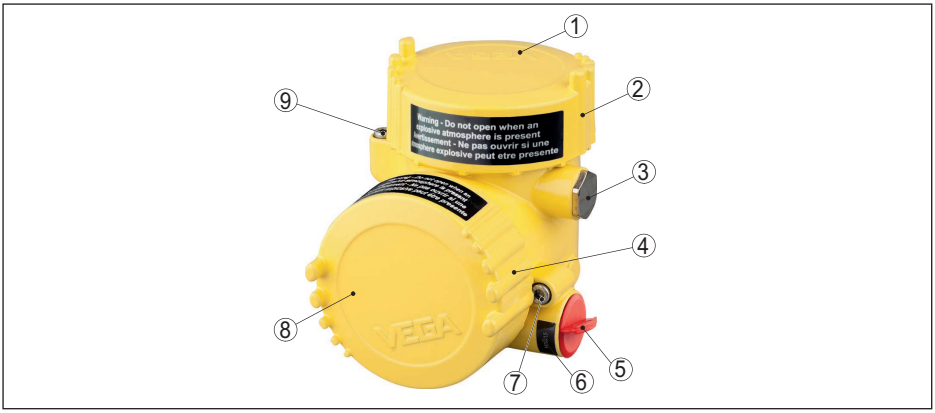
AVERTISSEMENT -- NE PAS OUVRIR SI UNE ATMOSPHÈRE EXPLOSIVE PEUT ÊTRE PRÉSENTE

Single chamber housing



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

Double chamber housing



1 *Lid, optionally with inspection window*
2 *Electronics compartment*
3 *Screw plug*
4 *Terminal 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*

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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
- The potential equalization terminal must be secured against loosening
- Correct and clearly marked cable connections

The parts of the VEGAPULS 6* being in contact with flammable media during operation must be included in the periodic overpressure test of the plant.

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

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
- 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 (measurement loop identification label)

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 Versions with antenna extension

The VEGAPULS 6* with antenna extension have to be mounted so that the extension is effectively secured against bending or oscillating as well as contact of the sensor to the vessel wall, under consideration of the vessel installations and flow conditions in the vessel.

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11 Versions with ball valve

With the VEGAPULS 6* in the version with ball valve, make sure that the ball valve is closed before separating the flange connection and that the IP rating IP 67 is maintained when removing the instrument.

12 Impact and friction sparks

The VEGAPULS 6* in Aluminium/Titanium version must be mounted in such a way that sparks from impact and friction between Aluminium/Titanium and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

13 Material resistance

The VEGAPULS 6* must only be used in products against which the wetted materials are sufficiently resistant.

14 Installation with swivelling holder

VEGAPULS 6* in the version with swivelling holder must be installed in such a way that, after the antenna has been aligned (by means of the swivelling holder) and the mounting flange screwed on, protection rating IP 67 is maintained.

15 Versions with rinsing connection

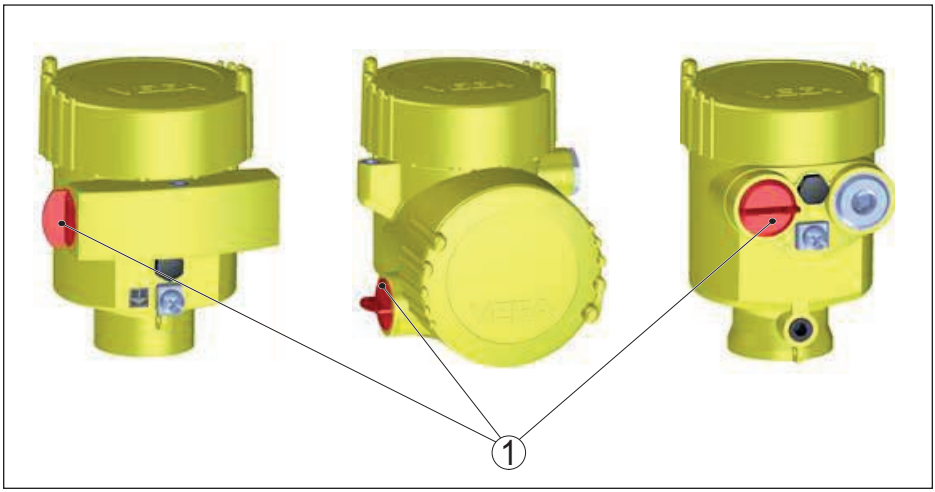
With VEGAPULS 6* in the version with rinsing connection, make sure the protection class IP 67 is ensured on the connection to the reflux valve.

16 Removing and replacing the red threaded/dust cover

When the VEGAPULS 6* are delivered, depending on the version, the red threaded or dust protection caps must be removed before installing the device and the openings must be sealed according to the requirements of the type of protection and the IP protection type specified on the type label.

When using certified i.e. suitable cable glands, sealing plugs or plug connectors, they must be mounted correctly and the respective certificates/documents must be observed.

The sealing plugs included in the delivery by VEGA meet the necessary requirements.



1 Red threaded or dust protection cap

17 Electrical data

The electrical data listed in the following are valid for:

Non-intrinsically safe circuits

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX(*)B/G/I/M***** (electronics 4 … 20 mA/HART - four-wire)**

Supply and signal circuit:	
Terminals 1[+], 2[-] in connection compartment	U = 9,6 … 48 V DC (M/I) U = 20 … 42 V AC (M/I) U = 90 … 250 V AC (G/B) Um = 253 V
Active signal circuit: (terminals 5[+], 7[-] in the connection compartment)	Iout = 4 … 20 mA with superimposed HART signal Um = 60 V
Passive signal circuit: (terminals 6[+], 7[-] in the connection compartment)	Iin = 4 … 20 mA with superimposed HART signal Um = 60 V

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX(*)H/D**** (electronics 4 … 20 mA/HART - two-wire)**

Supply and signal circuit:	
Terminals 1[+], 2[-] in connection compartment	U = 14 … 36 V DC Um = 253 V

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX**(*)P/F/K/L**** (electronics Profibus PA, Foundation Fieldbus)

Supply and signal circuit:	
Terminals 1[+], 2[-] in connection compartment	U = 14 … 32 V DC Um = 253 V

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX**(*)7/8***** (electronics Modbus)

Supply circuit:	
Terminals 1[+], 2[-] in connection compartment	U = 8 … 30 V DC

Modbus signal:	
Terminals 3[D0+], 4[D1-]	U_{max} = 5 V with Modbus signal (telegram)
Terminals 5[IS GND]	Function ground when installing according to CSA (Canadian Standards Association)

USB connection:	
6-pole mini USB socket in connection compartment	U_{max} with USB signal (USB protocol)

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX**(*)B/G/I/M/7/8**** (electronics 4 … 20 mA/HART - four-wire, Modbus)

Display and adjustment circuit:	
Spring contacts in the electronics compartment	Only for connection to the display and adjustment module PLICSCOM or for connection to the external indicating unit VEGADIS 61/81 via the VEGADIS-ADAPT.

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX**(*)H/D/P/K/F/L/7/8**** (electronics 4 … 20 mA/HART - two-wire, Profibus PA, Foundation Fieldbus, Modbus)

Display and adjustment circuit:	
Terminals 5, 6, 7, 8 in electronics compartment	For connection to the external indicating instrument VEGADIS 61/81.

VEGAPULS PS61/62/63/65/66/68/SR68(*).KX**(*)H/D/P/K/F/L**** (electronics 4 … 20 mA/HART - two-wire, Profibus PA, Foundation Fieldbus)

Display and adjustment module:	
Spring contacts in electronics compartmentof the single chamber housing or Spring contacts in electronics compartmentof the double chamber housing	Only for connection to the corresponding display and adjustment module PLICSCOM

The metallic parts of the VEGAPULS PS6*(*)/SR68(*).KX*** are electrically connected to the earth terminals.

18 Thermal data

The permissible operating temperatures without explosion-endangered atmosphere are mentioned in the respective manufacturer instructions, e.g. operating instructions manuals.

The division of the temperature classes of the different VEGAPULS 6* versions is specified in form of tables.

Furthermore it must be observed that the tables for instruments with a permissible process temperature of up to +195 °C with an isolation (heat conductance of 0.05 W/(m*K) with 2 cm thick insulation) were determined. Two layers of insulation material with a thickness of 2 cm each were attached from the tank surface with the mentioned heat conductance.

Instruments for process temperatures of max. +80 °C or +130 °C were not isolated for determination of the tables.

VEGAPULS PS61(*).KX*H/D/B/G/I/M****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +80 °C	-40 … +61 °C
T4, T3, T2, T1	-60 … +80 °C	-40 … +80 °C

VEGAPULS PS61(*).KX*P/F/K/L/7/8****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +80 °C	-40 … +61 °C
T4, T3, T2, T1	-60 … +80 °C	-40 … +80 °C

VEGAPULS PS62(*).KX**H/D/B/G/I/M****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3	-60 … +195 °C	-40 … +80 °C
T2	-60 … +290 °C	-40 … +80 °C
T1	-60 … +440 °C	-40 … +80 °C

-170 °C version - VEGAPULS PS62(*).KX**H/D/B/G/I/M****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-170 … +80 °C	-40 … +46 °C
T5	-170 … +95 °C	-40 … +61 °C
T4	-170 … +130 °C	-40 … +80 °C

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T3	-170 … +195 °C	-40 … +80 °C
T2	-170 … +290 °C	-40 … +80 °C
T1	-170 … +440 °C	-40 … +80 °C

VEGAPULS PS62(*).KX**P/F/K/L/7/8****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3	-60 … +195 °C	-40 … +80 °C
T2	-60 … +290 °C	-40 … +80 °C
T1	-60 … +440 °C	-40 … +80 °C

-170 °C version - VEGAPULS PS62(*).KX**P/F/K/L/7/8****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-170 … +80 °C	-40 … +46 °C
T5	-170 … +95 °C	-40 … +61 °C
T4	-170 … +130 °C	-40 … +80 °C
T3	-170 … +195 °C	-40 … +80 °C
T2	-170 … +290 °C	-40 … +80 °C
T1	-170 … +440 °C	-40 … +80 °C

VEGAPULS PS63(*).KX*H/D/B/G/I/M****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3, T2, T1	-60 … +195 °C	-40 … +80 °C

-170 °C version - VEGAPULS PS63(*).KX*H/D/B/G/I/M****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-170 … +80 °C	-40 … +46 °C
T5	-170 … +95 °C	-40 … +61 °C
T4	-170 … +130 °C	-40 … +80 °C

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T3, T2, T1	-170 … +195 °C	-40 … +80 °C

VEGAPULS PS63(*).KX*P/F/K/L/7/8****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3, T2, T1	-60 … +195 °C	-40 … +80 °C

-170 °C version - VEGAPULS PS63(*).KX*P/F/K/L/7/8****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-170 … +80 °C	-40 … +46 °C
T5	-170 … +95 °C	-40 … +61 °C
T4	-170 … +130 °C	-40 … +80 °C
T3, T2, T1	-170 … +195 °C	-40 … +80 °C

VEGAPULS PS65(*).KX*H/B/I****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3, T2, T1	-60 … +150 °C	-40 … +80 °C

VEGAPULS PS65(*).KX*P/F/7****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3, T2, T1	-60 … +150 °C	-40 … +80 °C

VEGAPULS PS66(*).KX**H/B/I****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3	-60 … +195 °C	-40 … +80 °C
T2	-60 … +290 °C	-40 … +80 °C
T1	-60 … +400 °C	-40 … +80 °C

VEGAPULS PS66(*).KX**P/F/7****

Temperature class	Process Temperature at the sensor in Div 2	Ambient temperature at the electronic in Div 2
T6	-60 … +80 °C	-40 … +46 °C
T5	-60 … +95 °C	-40 … +61 °C
T4	-60 … +130 °C	-40 … +80 °C
T3	-60 … +195 °C	-40 … +80 °C
T2	-60 … +290 °C	-40 … +80 °C
T1	-60 … +400 °C	-40 … +80 °C

VEGAPULS PS68/PSSR68(*).KX**H/B/I****

Temperature class	Process Temperature at the sensor in Div 2		Ambient temperature at the electronic in Div 2
	VEGAPULS 68	VEGAPULS SR 68	
T6	-60 … +80 °C		-40 … +46 °C
T5	-60 … +95 °C		-40 … +61 °C
T4	-60 … +130 °C		-40 … +80 °C
T3	-60 … +195 °C		-40 … +80 °C
T2	-60 … +290 °C	-60 … +250 °C	-40 … +80 °C
T1	-60 … +440 °C	-60 … +250 °C	-40 … +80 °C

VEGAPULS PS68/PSSR68(*).KX**P/F/7****

Temperature class	Process Temperature at the sensor in Div 2		Ambient temperature at the electronic in Div 2
	VEGAPULS 68	VEGAPULS SR 68	
T6	-60 … +80 °C		-40 … +46 °C
T5	-60 … +95 °C		-40 … +61 °C
T4	-60 … +130 °C		-40 … +80 °C
T3	-60 … +195 °C		-40 … +80 °C
T2	-60 … +290 °C	-60 … +250 °C	-40 … +80 °C
T1	-60 … +440 °C	-60 … +250 °C	-40 … +80 °C

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