Safety instructions
VEGAPULS 69

Dust ignitionproof and Protection by Enclosure
4 … 20 mA/HART - two-wire
4 … 20 mA/HART - four-wire
Profibus PA
Foundation Fieldbus
Modbus

Document ID: 51032

Contents

Supplementary documentation:

- Operating Instructions VEGAPULS 69
- Quick setup guide VEGAPULS 69
- Certificate of Conformity CSA 15CA70025164 (Document ID: 51033)

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1 Area of applicability

These safety instructions apply to the radar sensors VEGAPULS 69 of type series:

- VEGAPULS PS69(*).CR****H/B/I/P/F/U******(*)(*)
- VEGAPULS PS69(*).CR****HZ*****(*)(*)
- VEGAPULS PS69(*).VR****H/B/I/P/F/U****(*)(*)
- VEGAPULS PS69(*).VR****HZ*****(*)(*)

with the electronics versions

- H - 4 … 20 mA/HART - two-wire
- B - 4 … 20 mA/HART- four-wire
- I - 4 … 20 mA/HART - four-wire
- P - Profibus PA
- F - Foundation Fieldbus
- U - Modbus

According to Certificate of Conformity CSA 15CA70025164 (certificate number on the type label) and for all instruments with safety instruction 51032.

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

- Class II, Division 1, Groups E, F and G, T*°C; Class III
- Ex ta IIIC T* °C Da
- Ex ta/tb IIIC T* °C Da/Db
- Ex ta/tc IIIC T* °C Da/Dc
- Ex tb IIIC T* °C Db
- Zone 20 AEx ta IIIC T* °C Da
- Zone 20/21 AEx ta/tb IIIC T* °C Da/Db
- Zone 20/22 AEx ta/tc IIIC T* °C Da/Dc
- Zone 21 AEx tb IIIC T* °C Db

T* see "Thermal Data"

2 Different ignition protection types

The VEGAPULS PS69.*R can only be used in explosive dust atmospheres.

3 Important specification in the type code

VEGAPULS PS69(*).abcdefghijklm(*)(*)

Position		Feature	Description
a	Scope	C	CSA / Canada
		V	Combination (ATEX, IECEx, FM, CSA)
b	Approval	R	Class II, Division 1, Groups E, F and G, T*°C; Class III Ex ta IIIC T*°C Da Ex ta/tb IIIC T*°C Da/Db Ex ta/tc IIIC T*°C Da/Dc Ex tb IIIC T*°C Db Zone 20 AEx ta IIIC T*°C Da Zone 20/21 AEx ta/tb IIIC T*°C Da/Db Zone 20/22 AEx ta/tc IIIC T*°C Da/Dc Zone 21 AEx tb IIIC T*°C Db

Position		Feature	Description
c	Version / Material	B	Plastic horn antenna / PP
		C	Metal-jacketed lens antenna with rinsing connection / PEEK
		U	Thread with integrated horn antenna / PEEK
de	Process fitting / Material	**	Clamp, DN or ASME industry type flange with pressure ratings and any type which compley with an international or national standard.
f	Seal / Process temperature	A	FKM (SHS FPM 70C3 GLT) and PEEK / -40 … +130 °C
		B	FKM (SHS FPM 70C3 GLT) and PEEK / -40 … +200 °C
		C	PP / -40 … +80 °C
		D	FKM (SHS FPM 70C3 GLT) and PP / -40 … +80 °C
		E	EPDM (COG AP310) and PP / -40 … +80 °C
		F	EPDM (COG AP302) and PEEK (FDA) / -40 … +130 °C
g	Electronics	H	Two-wire, 4 … 20 mA/HART, U = 12 … 35 V DC
		B	Four-wire, 4 … 20 mA/HART, U = 90 … 250 V AC; 50/60 Hz
		I	Four-wire, 4 … 20 mA/HART, U = 9.6 … 48 V DC; 20 … 42 V AC; 50/60 Hz
		P	Two-wire Profibus PA
		F	Two-wire Foundation Fieldbus
		U	Four-wire Modbus (converter in second chamber)
h	Supplementary electronics	X	without
		Z	Additional current output 4 … 20 mA
i	Housing	A	Aluminium / IP 66/IP 68 (0.2 bar)
		H	Special colour Aluminium / IP 66/IP 68 (0.2 bar)
		D	Aluminium double chamber / IP 66/IP 68 (0.2 bar)
		S	Special colour Aluminium double chamber / IP 66/IP 68 (0.2 bar)
		V	Stainless steel (precision casting) 316L / IP 66/IP 68 (0.2 bar)
		W	Stainless steel double chamber / IP 66/IP 68 (0.2 bar)
j	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
k	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

Position		Feature	Description
l	Additional equipment	X	without
		R	Reflux valve for rinsing air connection
		V	Purging air connection with reflux valve
m	Certificates	X	No
		M	Yes

4 General information

The radar sensors VEGAPULS PS69 are used to detect the distance between product surface and sensor by means of high frequency electromagnetic waves in the GHz range. The electronics uses the running time of the signals reflected by the product surface to calculate the distance to the product surface.

The VEGAPULS PS69 consist of an electronics housing, a process connection element and a sensor or an antenna.

The display and adjustment module can be mounted optionally.

The VEGAPULS 69 are suitable for use in areas with combustible, dust generating bulk solids.

5 Application area

EPL Da instrument
The electronics housing and the antennas with the mechanical fixing element are installed in explosion-endangered areas of zone 20 requiring EPL Da instruments.

EPL Da/Db or EPL Da/Dc instrument
The electronics housing is installed in hazardous areas of zone 21 or 22 requiring EPL Db or EPL Dc instruments. The process connection element is installed in the separating wall, which separates areas requiring EPL Db, EPL Dc or EPL Da instruments. The antenna system with the mechanical fixing element is installed in hazardous areas of zone 20 requiring EPL Da instruments.

EPL Db instrument
The electronics housing and the antenna system with the mechanical fixing element are installed in explosion-endangered areas of zone 21 requiring instruments of EPL Db.

VEGA Instrument	EPL Dc	EPL Db	EPL Da/Db	EPL Da
Ex Zone 22 				

VEGA Instrument	EPL Dc	EPL Db	EPL Da/Db	EPL Da
Ex Zone 21 				
Ex Zone 20 				

DIVISION
The VEGAPULS 69 are suitable for applications requiring Division 1 or Division 2 instruments.

6 Specific conditions of use

The following overview is listing the specific conditions of use.

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

Impact and friction sparks
The VEGAPULS PS69 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.

Swivelling holder
The VEGAPULS PS69 in the versions with swivelling holder must be installed in such a way that when used as separating wall instrument, the protection rating IP 67 is maintained.

Non-grounded, metallic parts
Resistance between aluminium housing to metal measurement loop labels is > 10^9 Ohm.

The capacitance of the metal measurement loop label was measured with 15 pF.

See chapter "*Electrostatic charging (ESD)*" for precaution.

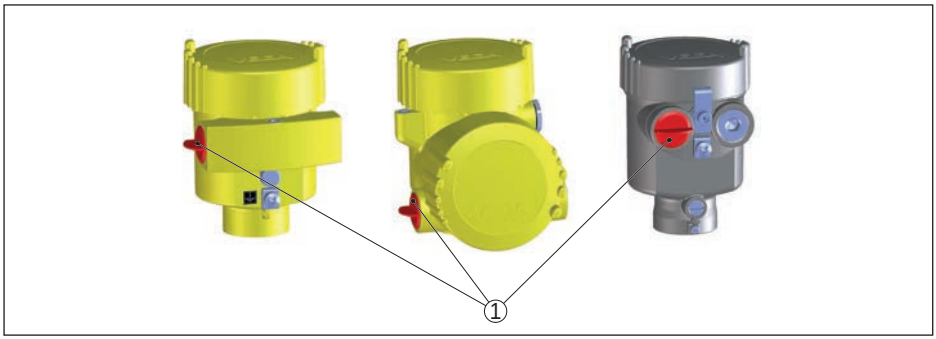
7 Important information for mounting and maintenance

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

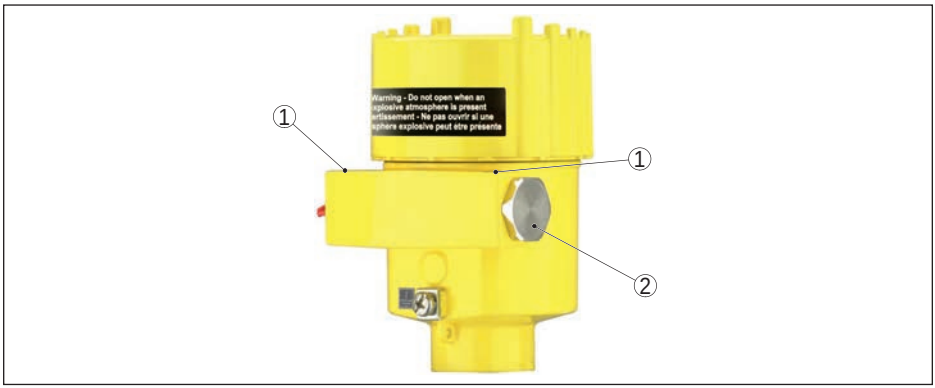
- The staff must be qualified according the respective tasks
- The staff must be trained in explosion protection
- The staff must be familiar with the respectively valid regulations
- Make sure when working on the instrument (mounting, installation, maintenance) that there is no explosive atmosphere 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 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

Cable and wire entries

- 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, conduit 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. conduit sealing facilities must be suitable for the application conditions (e.g. temperature range) of the application
- With surface temperatures > 60 °C, the cables must be suitable for the extended temperature range
- The connection cable of VEGAPULS PS69 has to be wired fix and in such a way that damages can be excluded.



1 Red threaded or dust protection cap



1 *Label: Type and size of the thread ½-14 NPT or M20 x 1.5*
2 *Screw plug*

1 *Label: Type and size of the thread ½-14 NPT or M20 x 1.5*
2 *Screw plug*

Mounting

Keep in mind for instrument mounting

- Mechanical damage on the instrument must be avoided
- Mechanical friction must be avoided
- Vessel installations and probable flow must be taken into account
- Process connections separating two areas of different Ex-zones must comply to valid regulations and standards
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label
- Protect the lid against unauthorized opening by unscrewing the locking screw up to the stop. With double chamber housing, you have to protect both lids.
- 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

8 Safe operating mode

General operating conditions

- 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.
- 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 VEGAPULS PS69
- 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

9 Potential equalization/Grounding

- Integrate the instruments into the local potential equalisation, e.g. via the internal or external earth terminal
- If grounding of the cable screening is necessary, this must be carried out acc. to the valid standards and regulations

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
- 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

11 Electrical data

VEGAPULS PS69 used in explosive dust atmospheres

VEGAPULS PS69(*).*R****H/P/F/B/I/U******(*)(*), PS69(*).*R****HZ*****(*)(*) installed in Zone 20

Supply and signal circuit: VEGAPULS PS69(*).*R****H******(*)(*) Terminal 1[+], 2[-] in electronics compartment of the single chamber housing or Terminal 1[+], 2[-] in terminal compartment of the double chamber housing	U = 12 … 35 V DC P_{max} < 2 W
The max. power of the voltage supply of PS69(*).*R****H******(*)(*) installed in Zone 20 must not exceed 2 W.	
VEGAPULS PS69(*).*R****HZ*****(*)(*) Power supply and signal circuit 1: terminals 1[+], 2[-] Power supply and signal circuit 2: terminals 7[+], 8[-] Terminal 1, 2, 7, 8 in terminal compartment of the double chamber housing	U = 12 … 35 V DC P_{max} < 2 W U = 12 … 35 V DC P_{max} < 2 W
The max. power of the voltage supply of VEGAPULS PS69(*).*R****HZ*****(*)(*) installed in Zone 20 must not exceed 2 x 2 W.	
Supply and signal circuit: VEGAPULS PS69(*).*R****P/F******(*)(*) Terminal 1[+], 2[-] in electronics compartment of the single chamber housing or Terminal 1[+], 2[-] in terminal compartment of the double chamber housing	U = 9 … 32 V DC P_{max} < 2 W
The max. power of the voltage supply of VEGAPULS PS69(*).*R****P/F******(*)(*) installed in Zone 20 must not exceed 2 W.	
VEGAPULS PS69(*).*R****B******(*)(*) Supply circuit: terminals 1[+], 2[-] Signal circuit: Terminals 5[+], 7[-], 4 … 20 mA with superimposed HART signal Passive signal circuit: terminals 6[+], 7[-], 4 … 20 mA with superimposed HART signal Terminal 1, 2, 5, 6, 7 in connection compartment	U = 90 … 250 V AC, 50/60 Hz
VEGAPULS PS69(*).*R****I******(*)(*) Supply circuit: terminals 1[+], 2[-] Signal circuit: Terminals 5[+], 7[-], 4 … 20 mA with superimposed HART signal Passive signal circuit: terminals 6[+], 7[-], 4 … 20 mA with superimposed HART signal Terminal 1, 2, 5, 6, 7 in connection compartment	U = 20 … 42 V AC, 50/60 Hz or U = 9.6 … 48 V DC

VEGAPULS PS69(*).*R****U******(*)(*) Supply circuit: terminals 1[+], 2[-] Supply circuit: terminals 3[D0], 4[D1] Terminals 5[IS GND] USB connection Terminals 1, 2, 3, 4, 5, USB in connection compartment	U = 8 … 30 V DC P_{max} < 2 W U_{max} 5 V with Modbus signal (telegram) Function when installing according to CSA (Canadian Standards Association) U_{max} 5 V mit USB signal (USB protocol)
The max. power of the voltage supply of VEGAPULS PS69(*).*R****U******(*)(*) installed in Zone 20 must not exceed 2 W.	

VEGAPULS PS69(*).*R**H/P/F/B/I/U******(*)(*), PS69(*).*R****HZ*****(*)(*) installed in Zone 20/21, 20/22, 21, Division 1 or Division 2**

The VEGAPULS PS69(*).*R****H/P/F/U******(*)(*) must be supplied by a Class 2 or Limited Energy Source in accordance with CSA 61010-1-12 or ISA 61010-1, Third Edition.

Supply and signal circuit: VEGAPULS PS69(*).*R****H******(*)(*) Terminal 1[+], 2[-] in electronics compartment of the single chamber housing or Terminal 1[+], 2[-] in terminal compartment of the double chamber housing	U = 12 … 35 V DC
VEGAPULS PS69(*).*R****HZ*****(*)(*) Power supply and signal circuit 1: terminals 1[+], 2[-] Power supply and signal circuit 2: terminals 7[+], 8[-] Terminal 1, 2, 7, 8 in terminal compartment of the double chamber housing	 U = 12 … 35 V DC U = 12 … 35 V DC
Supply and signal circuit: VEGAPULS PS69(*).*R****P/F******(*)(*) Terminal 1[+], 2[-] in electronics compartment of the single chamber housing or Terminal 1[+], 2[-] in terminal compartment of the double chamber housing	U = 9 … 32 V DC
VEGAPULS PS69(*).*R****B******(*)(*) Supply circuit: terminals 1[+], 2[-] Signal circuit: Terminals 5[+], 7[-], 4 … 20 mA with superimposed HART signal Passive signal circuit: terminals 6[+], 7[-], 4 … 20 mA with superimposed HART signal Terminal 1, 2, 5, 6, 7 in connection compartment	U = 90 … 250 V AC, 50/60 Hz

VEGAPULS PS69(*).*R****I******(*)(*) Supply circuit: terminals 1[+], 2[-] Signal circuit: Terminals 5[+], 7[-], 4 … 20 mA with superimposed HART signal Passive signal circuit: terminals 6[+], 7[-], 4 … 20 mA with superimposed HART signal Terminal 1, 2, 5, 6, 7 in connection compartment	U = 20 … 42 V AC, 50/60 Hz or U = 9.6 … 48 V DC
VEGAPULS PS69(*).R****U******(*)(*) Supply circuit: terminals 1[+], 2[-] Supply circuit: terminals 3[D0], 4[D1] Terminals 5[IS GND] USB connection Terminals 1, 2, 3, 4, 5, USB in connection compartment	U = 8 … 30 V DC U_{max} 5 V with Modbus signal (telegram) Function when installing according to CSA (Canadian Standards Association) U_{max} 5 V mit USB signal (USB protocol)

Display and adjustment circuit

VEGAPULS PS69(*).*R****H/P/F******(*)(*) Terminals 5, 6, 7 in electronics compartment of the single chamber housing or Terminals 5, 6, 7 in terminal compartment of the double chamber housing	Only for connection to the associated display unit VEGADIS 61/81.
VEGAPULS PS69(*).*R****H/P/F/B/I/U******(*)(*) Indication and adjustment circuit: (spring contacts)	For connection to the display and adjustment module PLICSCOM.

12 Thermal data

Permissible ambient temperature on the electronics housing: -40 … +60 °C

Permissible process temperature on the antenna/sensor

VEGAPULS PS69(*).*R***X*******(*)(*)	X:	A	FKM (SHS FPM 70C3 GLT) and PEEK / -40 … +130 °C with short temperature adapter
		B	FKM (SHS FPM 70C3 GLT) and PEEK / -40 … +200 °C with long temperature adapter
		C	PP / -40 … +80 °C
		D	FKM (SHS FPM 70C3 GLT) and PP / -40 … +80 °C
		E	EPDM (COG AP310) and PP / -40 … +80 °C
		F	EPDM (COG AP302) and PEEK (FDA) / -40 … +130 °C with short temperature adapter

Max. surface temperature on the electronic housing

Installation in Zone 20:

VEGAPULS	**Surface temperature electronic housing**
PS69(*).*R****H******(*)(*), P_{max} < 2 W	Ambient temperature +86 K
PS69(*).*R****B/I******(*)(*)	limited to +102 °C by the thermal link

51032-EN-180806

VEGAPULS	Surface temperature electronic housing
PS69(*).*R****P/F******(*)(*), P_{max} < 2 W	Ambient temperature +86 K
PS69(*).*R****U******(*)(*), P_{max} < 2 W	Ambient temperature +86 K
PS69(*).*R****HZ*****(*)(*), P_{max} < 2 W	Ambient temperature +86 K

Installation in Zone 20/21, 20/22, 21, Division 1 or Division 2:

VEGAPULS	Surface temperature electronic housing
PS69(*).*R****H******(*)(*)	Ambient temperature +36 K
PS69(*).*R****B/I******(*)(*)	limited to +102 °C by the thermal link
PS69(*).*R****P/F******(*)(*)	Ambient temperature +36 K
PS69(*).*R****U******(*)(*)	Ambient temperature +36 K
PS69(*).*R****HZ*****(*)(*)	Ambient temperature +36 K

Max. surface temperature on the sensor/antenna: Process temperature +2 K
The max. surface temperature of the instrument with which the hazardous dust atmosphere can come into contact, **is the higher** of the two specified surface temperatures on the electronics housing or the sensor/antenna.

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