# CERTIFICATE OF CONFORMITY

1. **HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**

2. **Certificate No:** **FM20CA0003X**

3. **Equipment:**
   **(Type Reference and Name)** **VEGAPULS 21, 31 and VEGAPULS C 21, C 22, C 23, Level Transmitter Radar Sensors**

4. **Name of Listing Company:** **VEGA Grieshaber KG**

5. **Address of Listing Company:** **Am Hohenstein 113**
   **D-77761 Schiltach, Baden-Wuerttemberg**
   **Germany**

6. The examination and test results are recorded in confidential report number:

   PR453628 dated 19th May 2020

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   CAN/CSA-C22.2 No. 94.2-15:2015, CAN/CSA-C22.2 No. 60079-0:2019, CAN/CSA-C22.2 No. 60079-11-14:R2018, CAN/CSA-C22.2 No. 60079-26:2016, CAN/CSA-C22.2 No. 60529:2016, CAN/CSA-C22.2 No. 61010-1-12:R2017

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

**Certificate issued by:**

J.E. Marquedant
VP, Manager – Electrical Systems

19 November 2020
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com



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# SCHEDULE

to Canadian Certificate Of Conformity No: FM20CA0003X

10. **Equipment Ratings:**

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual, hazardous locations, with an ambient temperature rating of -40 ºC to +70 ºC, indoor and outdoor (Type 4X;IP66/IP67) environments.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Zone 20, Group IIIC Da, with intrinsically safe process connections "ia" suitable for use in Zone 20, Group IIIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety Ex ia for use in Zone 20/21, Group IIIC Da/Db, with intrinsically safe process connections "ia" suitable for use in Zone 20 and 21, Group IIIC, in accordance with manufacturer's operation manual, in accordance with manufacturer's operation manual, hazardous locations, with an ambient temperature rating of -40 ºC to +80 ºC, indoor and outdoor (Type 4X/6P, IP66/IP68 (IPX8 @ 3 bar/24 hrs)) environments.

11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is labelled with the following marking(s).

FM20CA0003X
Intrinsic Safe for Cl I, Div 1, Gp ABCD T4; Cl I, Zn 0, 0/1 Ex ia IIC T4 Ga, Ga/Gb
Ta = -40 ºC to +70 ºC
Install per document 62414
Type 4X;IP66/IP67
WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS
AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS

# SCHEDULE

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In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is labelled with the following marking(s).

FM20CA0003X
Intrinsic Safe for Cl I, Div 1, Gp ABCD, Cl II, Div 1, Gp EFG, Cl III T4
Cl I, Zn 0, 0/1 Ex ia IIC T4 Ga, Ga/Gb; Zn 20, 20/21 Ex ia IIIC T134 ºC Da, Da/Db
Ta = -40 ºC to +80 ºC
Install per document 62412
IP66/IP68 (IPX8 @ 3 Bar/24 Hrs, Type 4X/6P
WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS
AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS

12. **Description of Equipment:**

**General –** The VEGAPULS level transmitter radar sensors are designed for industrial and hazardous location applications. Radar sensor types VEGAPULS 21, 31, C 21, C 22, C 23 are for use in explosive atmospheres caused by the presence of combustible gases or dusts, used for monitoring and control of filling levels by means of microwave technology based on the FMCW (frequency modulated continuous wave) measurement principle, which is an indirect method of distance measurement. The devices use high-frequency microwave signals in the GHz range to detect the distance between the sensor and the product surface level.

**Construction –** The electronics, mounted in a plastic enclosure converts the reflected microwave echo, indicating the filling level, into a two-wire 4-20 mA HART signal. Operation and control of the sensor can either be through the wired connection or via smart phone and VEGA Tools-App (Bluetooth). The sensor is either equipped with a fixed cable (VEGAPULS C 21, C 22, C 23) of 5 m, 10 m, 25 m or selectable length with a G1 inch, 1 inch NPT or R1 inch threaded connection or a two-wire terminal (VEGAPULS 21, 31) via a M20x1.5 or 1/2 inch NPT cable entry.

VEGAPULS 21 and 31 have non-metallic enclosures primarily yellow in color. The top part of the enclosure includes a solid yellow or transparent threaded window cover for accessing the wiring area and possibly viewing an optional display present on the final equipment that would use the enclosures. A single 1/2 inch NPT threaded entry or a single M20x1.5 entry with a suitably-rated cable gland is provided on the side of the enclosure for wiring entry and connection. The bottom of the enclosure is gray in color and includes a R 1-1/2 inch, G 1-1/2 inch, or 1-1/2 inch NPT male thread intended for connection to an industrial process. All seams and joints present on the enclosure employ suitable gaskets and O-rings for environmental sealing in order to maintain the ratings for degree of environmental protection Type 4X;IP66/IP67.

VEGAPULS 21 and 31 are electrically identical where type 21 is equipped without a display module and a blind cover and type 31 is equipped with a display module and a windowed cover.

VEGAPULS C 21, C 22 and C 23 have non-metallic enclosures that are gray in color. The top part of the enclosure includes an integral cable and gland as well as an R 1 inch, G 1 inch, or 1 inch NPT male thread for connection to conduit via direct connection via the NPT thread option or via a suitable coupling. The bottom of the enclosure is gray in color, and for the C 21 and C 22 enclosures, includes an R 1-1/2 inch, G 1-1/2 inch, or 1-1/2 inch NPT male thread intended for connection to an industrial process. The enclosures may offer means for wall or ceiling mounting which do not penetrate the enclosure. Gaskets and O-rings are provided for environmental sealing of the integral cable gland and there are no other seams nor joints present on these enclosures.

For more specifics concerning construction and description details of the level transmitter radar sensor, reference the manufacturer's sales literature and specification sheets.

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**Ratings –** The equipment is certified to the following ratings.

The ambient operating temperature range is -40 ºC to +70 ºC or -40 ºC to +80 ºC, depending upon type of protection and model configuration, when properly mounted and installed.

The process temperature range of the media is -40 ºC to +80 ºC, with a maximum working pressure range of -0.1 to 0.3 MPa (-14.5 to 43.5 psig) within a maximum measuring range of 30 m.

The equipment is designated for installation transient overvoltages up to levels of overvoltage category III and environmentally classified as pollution degree 4.

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS 21, 31) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and output circuit (+ (terminals 1), - (terminal 2)): only for connection to a certified intrinsically safe circuit, with the following maximum values:
*V*max (*Ui*) = 30 V; *I*max (*Ii*) = 131 mA; *Pi* = 983 mW; *Ci* ≈ 0 nF; *Li* ≈ 0 µH

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS C 21, C 22, C 23) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and output circuit (+ (Brown wire), - (Blue wire)): only for connection to a certified intrinsically safe circuit, with the following maximum values:
*V*max (*Ui*) = 30 V; *I*max (*Ii*) = 131 mA; *Pi* = 983 mW; *Ci* = 0.18 nF/m; *Li* = 0.65 µH/m

**Model Codes –** The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is designated with the following model code(s).

***VEGAPULS 21, Level Transmitter.***

Reference Control Drawing No. 62414 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or M20x1.5
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

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***VEGAPULS 31, Level Transmitter.***

Reference Control Drawing No. 62414 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or M20x1.5
Electronics: Two-wire 4-20 mA HART with display
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, smartphone communication capabilities, and optional local display interface.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is designated with the following model code(s).

***VEGAPULS C 21, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type process side and wiring side: G1-1/2 and G1, 1-1/2 NPT and 1 NPT or R1-1/2 and R1
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

***VEGAPULS C 22, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or Without
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

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***VEGAPULS C 23, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type wiring side: G1, 1 NPT or R1
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

13. **Specific Conditions of Use:**

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC hazardous locations.
2. Maximum permissible working pressure is 3 bar (43.5 psig).
3. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
4. The maximum permitted ambient temperature of the radar sensor is +70 ºC.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC hazardous locations.
2. For Division 1, Zone 20, and Zone 21 Approvals, the level transmitter radar sensors are suitable for process connections to Class II, Division 1, Groups E, F and G, Class III, Division 1 and Zone 20 and 21, Group IIIC hazardous locations.
3. Maximum permissible custom cable length is limited by the parameters *Co* and *Lo* of the intrinsically safe barrier. Consult the certificate of the intrinsically safe barrier to retrieve the parameters *Co* and *Lo*, where the following must be observed at all time: *Co* ≥ 0.18 nF/m × cable length in meter and *Lo* ≥ 0.65 µH/m × cable length in meter.
4. Maximum permissible working pressure is 3 bar (43.5 psig).
5. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
6. The maximum permitted ambient temperature of the radar sensor is +80 ºC.

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

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to Canadian Certificate Of Conformity No: FM20CA0003X

15. **Schedule Drawings:**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History:**

Details of the supplements to this certificate are described below:

| Date | Description |
|---|---|
| 19th May 2020 | Original Issue. |
| 19th November 2020 | Supplement 1:<br>Report Reference: – RR225169 dated 19th November 2020.<br>Description of the Change:<br>1) Type 4X enclosure rating added to VEGAPULS 21, 31 models. Assessment and testing of Type 4X approved under Project ID PR457765 |



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# CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** **FM20US0007X**

3. **Equipment:**
   **(Type Reference and Name)** **VEGAPULS 21, 31 and VEGAPULS C 21, C 22, C 23, Level Transmitter Radar Sensors**

4. **Name of Listing Company:** **VEGA Grieshaber KG**

5. **Address of Listing Company:** **Am Hohenstein 113**
   **D-77761 Schiltach, Baden-Wuerttemberg**
   **Germany**

6. The examination and test results are recorded in confidential report number:

   PR453628 dated 19th May 2020

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3600:2022, FM Class 3610:2021, FM Class 3810:2021,
   ANSI/IEC 60529:R2011, ANSI/UL 60079-0:2019, ANSI/UL 60079-11:2014,
   ANSI/UL 60079-26:2017, ANSI/UL 61010-1:2018, NEMA 250:2018

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

**Certificate issued by:**

J.E. Marquedant
VP, Manager – Electrical Systems

December 8, 2022
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com



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10. **Equipment Ratings:**

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual, hazardous (classified) locations with an ambient temperature rating of -40 ºC to +70 ºC, indoor and outdoor (Type 4X;IP66/IP67) environments.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Zone 20, Group IIIC Da, with intrinsically safe process connections "ia" suitable for use in Zone 20, Group IIIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Zone 20/21, Group IIIC Da/Db, with intrinsically safe process connections "ia" suitable for use in Zone 20 and 21, Group IIIC, in accordance with manufacturer's operation manual, hazardous (classified) locations with an ambient temperature rating of -40 ºC to +80 ºC, indoor and outdoor (Type 4X/6P, IP66/IP68 (IPX8 @ 3 bar/24 hrs)) environments.

11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is labelled with the following marking(s).

Intrinsic Safe for Cl I, Div 1, Gp ABCD T4; Cl I, Zn 0, 0/1 AEx ia IIC T4 Ga, Ga/Gb
Ta = -40 ºC to +70 ºC
Install per document 62414
Type 4X;IP66/IP67
WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

# SCHEDULE

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In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is labelled with the following marking(s).

Intrinsic Safe for Cl I, Div 1, Gp ABCD, Cl II, Div 1, Gp EFG, Cl III T4
Cl I, Zn 0, 0/1 AEx ia IIC T4 Ga, Ga/Gb; Zn 20, 20/21 AEx ia IIIC T134 ºC Da, Da/Db
Ta = -40 ºC to +80 ºC
Install per document 62412
IP66/IP68 (IPX8 @ 3 Bar/24 Hrs), Type 4X/6P
WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

12. **Description of Equipment:**

**General –** The VEGAPULS level transmitter radar sensors are designed for industrial and hazardous location applications. Radar sensor types VEGAPULS 21, 31, C 21, C 22, C 23 are for use in explosive atmospheres caused by the presence of combustible gases or dusts, used for monitoring and control of filling levels by means of microwave technology based on the FMCW (frequency modulated continuous wave) measurement principle, which is an indirect method of distance measurement. The devices use high-frequency microwave signals in the GHz range to detect the distance between the sensor and the product surface level.

**Construction –** The electronics, mounted in a plastic enclosure converts the reflected microwave echo, indicating the filling level, into a two-wire 4-20 mA HART signal. Operation and control of the sensor can either be through the wired connection or via smart phone and VEGA Tools-App (Bluetooth). The sensor is either equipped with a fixed cable (VEGAPULS C 21, C 22, C 23) of 5 m, 10 m, 25 m or selectable length with a G1 inch, 1 inch NPT or R1 inch threaded connection or a two-wire terminal (VEGAPULS 21, 31) via a M20x1.5 or 1/2 inch NPT cable entry.

VEGAPULS 21 and 31 have non-metallic enclosures primarily yellow in color. The top part of the enclosure includes a solid yellow or transparent threaded window cover for accessing the wiring area and possibly viewing an optional display present on the final equipment that would use the enclosures. A single 1/2 inch NPT threaded entry or a single M20x1.5 entry with a suitably-rated cable gland is provided on the side of the enclosure for wiring entry and connection. The bottom of the enclosure is gray in color and includes a R 1-1/2 inch, G 1-1/2 inch, or 1-1/2 inch NPT male thread intended for connection to an industrial process. All seams and joints present on the enclosure employ suitable gaskets and O-rings for environmental sealing in order to maintain the ratings for degree of environmental protection Type 4X; IP66/IP67.

VEGAPULS 21 and 31 are electrically identical where type 21 is equipped without a display module and a blind cover and type 31 is equipped with a display module and a windowed cover.

VEGAPULS C 21, C 22 and C 23 have non-metallic enclosures that are gray in color. The top part of the enclosure includes an integral cable and gland as well as an R 1 inch, G 1 inch, or 1 inch NPT male thread for connection to conduit via direct connection via the NPT thread option or via a suitable coupling. The bottom of the enclosure is gray in color, and for the C 21 and C 22 enclosures, includes an R 1-1/2 inch, G 1-1/2 inch, or 1-1/2 inch NPT male thread intended for connection to an industrial process. The enclosures may offer means for wall or ceiling mounting which do not penetrate the enclosure. Gaskets and O-rings are provided for environmental sealing of the integral cable gland and there are no other seams nor joints present on these enclosures.

For more specifics concerning construction and description details of the level transmitter radar sensor, reference the manufacturer's sales literature and specification sheets.

# SCHEDULE

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**Ratings –** The equipment is certified to the following ratings.

The ambient operating temperature range is -40 ºC to +70 ºC or -40 ºC to +80 ºC, depending upon type of protection and model configuration, when properly mounted and installed.

The process temperature range of the media is -40 ºC to +80 ºC, with a maximum working pressure range of -0.1 to 0.3 MPa (-14.5 to 43.5 psig) within a maximum measuring range of 30 m.

The equipment is designated for installation transient overvoltages up to levels of overvoltage category III and environmentally classified as pollution degree 4.

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS 21, 31) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and output circuit (+ (terminals 1), - (terminal 2)): only for connection to a certified intrinsically safe circuit, with the following maximum values:
$V$max ($U$i) = 30 V; $I$max ($I$i) = 131 mA; $P$i = 983 mW; $C$i ≈ 0 nF; $L$i ≈ 0 µH

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS C 21, C 22, C 23) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and output circuit (+ (Brown wire), - (Blue wire)): only for connection to a certified intrinsically safe circuit, with the following maximum values:
$V$max ($U$i) = 30 V; $I$max ($I$i) = 131 mA; $P$i = 983 mW; $C$i = 0.18 nF/m; $L$i = 0.65 µH/m

**Model Codes –** The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is designated with the following model code(s).

***VEGAPULS 21, Level Transmitter.***

Reference Control Drawing No. 62414 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or M20x1.5
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

# SCHEDULE

to US Certificate Of Conformity No: FM20US0007X

***VEGAPULS 31, Level Transmitter.***

Reference Control Drawing No. 62414 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or M20x1.5
Electronics: Two-wire 4-20 mA HART with display
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, smartphone communication capabilities, and optional local display interface.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is designated with the following model code(s).

***VEGAPULS C 21, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type process side and wiring side: G1-1/2 and G1, 1-1/2 NPT and 1 NPT or R1-1/2 and R1
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

***VEGAPULS C 22, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type process side: G1-1/2, 1-1/2 NPT or R1-1/2
Thread type wiring side: 1/2 NPT or Without
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

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***VEGAPULS C 23, Level Transmitter.***

Reference Control Drawing No. 62412 for Entity Parameter values

Thread type wiring side: G1, 1 NPT or R1
Cable material (length): PUR (1 m), PUR (5 m), PUR (10 m), PUR (25 m) or PUR (custom length)
Electronics: Two-wire 4-20 mA HART
Maximum working pressure rating (MWPR): 3 bar
Process temperature range: -40 ºC to +80 ºC

FM Approved equipment models also include additional options that are not related to compliance with the applicable standards as listed on the certificate; for example: measurement range, overfill protection, shipboard and/or foodstuff/pharmaceutical certification, and smartphone communication capabilities.

13. **Specific Conditions of Use:**

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 21, 31) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC hazardous (classified) locations.
2. Maximum permissible working pressure is 3 bar (43.5 psig).
3. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
4. The maximum permitted ambient temperature of the radar sensor is +70 ºC.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS C 21, C 22, C 23) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, Division 1, Groups A, B, C and D and Class I, Zone 0, Group IIC hazardous (classified) locations.
2. For Division 1, Zone 20, and Zone 21 Approvals, the level transmitter radar sensors are suitable for process connections to Class II, Division 1, Groups E, F and G, Class III, Division 1 and Zone 20 and 21, Group IIIC hazardous (classified) locations.
3. Maximum permissible custom cable length is limited by the parameters *C*o and *L*o of the intrinsically safe barrier. Consult the certificate of the intrinsically safe barrier to retrieve the parameters *C*o and *L*o, where the following must be observed at all time: *C*o ≥ 0.18 nF/m × cable length in meter and *L*o ≥ 0.65 µH/m × cable length in meter.
4. Maximum permissible working pressure is 3 bar (43.5 psig).
5. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
6. The maximum permitted ambient temperature of the radar sensor is +80 ºC.

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

# SCHEDULE

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15. **Schedule Drawings:**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History:**

Details of the supplements to this certificate are described below:

| Date | Description |
|---|---|
| 19th May 2020 | Original Issue. |
| 19th November 2020 | Supplement 1:<br>Report Reference: – RR225169 dated 19th November 2020.<br>Description of the Change:<br>1) Type 4X enclosure rating added to VEGAPULS 21, 31 models. Assessment and testing of Type 4X approved under Project ID PR457765 |
| 8th December 2022 | Supplement 2:<br>Report Reference: – RR235304 dated 8th December 2022.<br>Description of the Change:<br>1) Documentation updates due to component shortage<br>2) FM3600 updated to latest edition (2022)<br>3) FM3610 and FM3810 updated to latest edition (2021) |