Certificate

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# 1 Type Examination Certificate

2 Equipment and protective systems intended for use in potentially explosive atmospheres – Directive 94/9/EC

3 Type Examination Certificate Number: **KIWA 15ATEX0040 X** **Issue: 1**

4 Equipment: **Vortex Flow Meter Series OPTISWIRL 4200 ... Ex**

5 Manufacturer: **KROHNE Messtechnik GmbH**

6 Address: **Ludwig-Krohne-Straße 5, 47058 Duisburg Germany**

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Kiwa Nederland B.V. certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report number NL/KIWA/ExTR15.0018/00.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0 : 2012 + A11** **EN 60079-11 : 2012** **EN 60079-15 : 2010**

10 If the equipment is subject to specific conditions of use, specified in the schedule to this certificate, the sign "X" shall be placed after the certificate number on the equipment marking. As an alternative to the "X" marking, an advisory marking may appear on the equipment.

11 This Type Examination Certificate relates only to the design, examination and tests of the specified equipment. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

12 The marking of the equipment shall include the following:

II 3 G Ex nA ic IIC T6...T2 Gc (Optiswirl 4200 C)
II 3 G Ex nA [ic] IIC T6 Gc (VFC 200 F)
II 3 G Ex ic IIC T6...T2 Gc (Optiswirl 4000 F)

**Kiwa Nederland B.V.** **Issue date:** **First issue:**

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13 **SCHEDULE**

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15.1 **Description**

Vortex Flow Meters model OPTISWIRL 4200 C .. Ex (compact versions with integral sensor) and model OPTISWIRL 4200 F .. Ex (versions with separate sensor assembly) are used to convert the measurement signal of a vortex sensor into an electrical signal. The different I/O options are described in 15.2, electrical data.

Flow Meters OPTISWIRL 4200 C .. Ex consist of a signal converter and an integral sensor.
Flow Meters OPTISWIRL 4200 F .. Ex consist of a signal converter model VFC 200 F ..020 Ex and a separate sensor assembly model OPTISWIRL 4000 F.
The integral sensor and the separate sensor assemblies are available in different sizes (DN15 - DN300).

The Flow Meter can be provided with an indicator for local read-out and control.

The temperature class in relation to the maximum ambient temperature, the maximum process temperature and the sensor size, also depending on the mounting position of the transmitter or terminal enclosure with respect to the sensor, is listed in the following tables:

OPTISWIRL 4200 C .. Ex and OPTISWIRL 4000 F with transmitter enclosure respectively terminal enclosure on top of the sensor:

| Temperature class | T6 | | T5 | | T4 | | T3 | | | T2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T ambient [°C] | 60 | 65 | 60 | 65 | 60 | 65 | 40 | 60 | 65 | 40 | 60 | 65 |
| Sensor size | Maximum process temperature [°C] | | | | | | | | | | | |
| DN15-DN25 | 80 | 65 | 100 | 100 | 135 | 135 *) | 200 | 200 *) | 165 *) | 240 | 200 *) | 165 *) |
| DN40-DN 50 | 80 | 65 | 100 | 100 | 135 | 135 *) | 200 | 175 *) | 150 *) | 240 | 175 *) | 150 *) |
| DN60-DN100 | 80 | 65 | 100 | 100 *) | 135 *) | 130 *) | 200 | 150 *) | 130 *) | 235 *) | 150 *) | 130 *) |
| DN100-DN300 | 75 | 65 | 100 | 100 | 135 | 135 *) | 200 | 185 *) | 155 *) | 240 | 185 *) | 155 *) |

*): Heat resistant cables and cable glands suitable for at least 80 °C shall be used.

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OPTISWIRL 4200 C .. Ex and OPTISWIRL 4000 F with transmitter enclosure respectively terminal enclosure at the side of or underneath the sensor:

| Temperature class | T6 | | T5 | | T4 | | T3 | | | T2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tamb [°C] | 60 | 65 | 60 | 65 | 60 | 65 | 40 | 60 | 65 | 40 | 60 | 65 |
| Sensor size | Maximum process temperature [°C] | | | | | | | | | | | |
| DN15-DN25 | 85 | 65 | 100 | 100 | 135 | 135 | 200 | 200 | 200 *) | 240 | 240 | 240 *) |
| DN40-DN 50 | 80 | 65 | 100 | 100 | 135 | 135 | 200 | 200 | 200 *) | 240 | 240 | 240 *) |
| DN60-DN100 | 85 | 65 | 100 | 100 | 135 | 135 *) | 200 | 200 *) | 200 *) | 240 | 240 *) | 240 *) |
| DN100-DN300 | 80 | 65 | 100 | 100 | 135 | 135 | 200 | 200 | 200 *) | 240 | 240 | 240 *) |

*): Heat resistant cables and cable glands suitable for at least 80 °C shall be used.

OPTISWIRL 4200 C .. Ex and OPTISWIRL 4000 F with painted transmitter enclosure respectively painted terminal enclosure on top of the painted sensor:

| Temperature class | T6 | | T5 | | T4 | | T3 | | | T2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tamb [°C] | 60 | 65 | 60 | 65 | 60 | 65 | 40 | 60 | 65 | 40 | 60 | 65 |
| Sensor size | Maximum process temperature [°C] | | | | | | | | | | | |
| DN15-DN25 | 70 | 65 | 100 | 95 *) | 120 *) | 115 *) | 120 | 120 *) | 115 *) | 120 | 120 *) | 115 *) |
| DN40-DN 50 | 70 | 65 | 100 | 95 *) | 115 *) | 105 *) | 120 | 115 *) | 105 *) | 120 | 115 *) | 105 *) |
| DN60-DN100 | 70 | 65 | 100 *) | 90 *) | 105 *) | 95 *) | 120 | 105 *) | 95 *) | 120 | 105 *) | 95 *) |
| DN100-DN300 | 65 | 65 | 95 | 90 *) | 120 *) | 110 *) | 120 | 120 *) | 110 *) | 120 | 120 *) | 110 *) |

*): Heat resistant cables and cable glands suitable for at least 80 °C shall be used.

OPTISWIRL 4200 C .. Ex and OPTISWIRL 4000 F with painted transmitter enclosure respectively painted terminal enclosure at the side of or underneath the painted sensor:

| Temperature class | T6 | | T5 | | T4 | | T3 | | | T2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tamb [°C] | 60 | 65 | 60 | 65 | 60 | 65 | 40 | 60 | 65 | 40 | 60 | 65 |
| Sensor size | Maximum process temperature [°C] | | | | | | | | | | | |
| DN15-DN25 | 65 | 65 | 95 | 90 | 120 | 120 *) | 120 | 120 | 120 *) | 120 | 120 | 120 *) |
| DN40-DN 50 | 65 | 65 | 85 | 80 | 120 *) | 120 *) | 120 | 120 *) | 120 *) | 120 | 120 *) | 120 *) |
| DN60-DN100 | 65 | 65 | 95 | 90 *) | 120 *) | 120 *) | 120 | 120 *) | 120 *) | 120 | 120 *) | 120 *) |
| DN100-DN300 | 65 | 65 | 85 | 85 | 120 | 120 *) | 120 | 120 | 120 *) | 120 | 120 | 120 *) |

*): Heat resistant cables and cable glands suitable for at least 80 °C shall be used.

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The minimum ambient temperature is -40 °C; the minimum process temperature is -40 °C.

The degree of protection of the signal converter enclosure is IP66/IP67 in accordance with EN 60529.

15.2 **Electrical data**

OPTISWIRL 4200 C .. Ex and VFC 200 F ..020 Ex

Supply/output circuit, current 4 - 20 mA with HART communication (terminals C1 and C2):
$U_n$ = 12 - 32 V;
$I_n$ = 4 - 20 mA.

Binary output, open collector, pnp-output (terminals M1 and M2, M4):
$U_n$ = 8 - 32 V;
$I_n \leq$ 100 mA;
or NAMUR (terminals M3 and M2, M4):
$U_n$ = 8 V;
$I_n \leq$ 1 or $\geq$ 3 mA.

Input circuit, current 0 - 20 mA (terminals I1 and I2):
$U_n$ = 9 - 32 V;
$I_n$ = 0 - 20 mA.

OPTISWIRL 4200 C FF Ex, OPTISWIRL 4200 C PA Ex,
VFC 200 F FF020 Ex and VFC 200 F PA020 Ex

Fieldbus circuit, Fieldbus Foundation respectively Profibus PA (terminals D/D- and C/C-):
$U_n$ = 9 - 32 V;
$I_n$ = 20 mA.

OPTISWIRL 4200 C .. Ex

Sensor circuit (internal circuit):
in type of protection intrinsic safety Ex ic IIC

OPTISWIRL VFC 200 F ..020 Ex

Sensor circuit (terminals 1 to 7 (colour coded)):
in type of protection intrinsic safety Ex ic IIC, with following maximum values:
$U_o$ = 6,65 V; $I_o$ = 1107 mA; $P_o$ = 650 mW; $C_o$ = 2,5 µF; $L_o$ = 73 µH.
The sensor circuit is connected to earth.

OPTISWIRL 4000 F

Sensor circuit (terminals 1 to 7 (colour coded)):
in type of protection intrinsic safety Ex ic IIC, only for connection to Signal converter VFC 200 F ..020-Ex, with following maximum values:
$U_i$ = 7 V; $I_i$ = 1107 mA; $P_i$ = 650 mW; $C_i$ and $L_i$ are negligibly small.

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15.3 **Instructions**

The instructions provided with the equipment shall be followed in detail to assure safe operation.

16 **Test Report**

No. NL/KIWA/ExTR15.0018/00.

17 **Specific conditions of use**

- If installed in an explosive atmosphere of group IIC, electrostatic discharge of enclosure and sensor parts with a lacquer thickness > 200 µm shall be prevented by suitable measures;
- For thermal and electrical data, refer to section 15.

18 **Essential Health and Safety Requirements**

All relevant Essential Health and Safety Requirements are covered by the standards listed at section 9.

19 **Test documentation**

As listed in Test Report No. NL/KIWA/ExTR15.0018/00.