IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx PTB 11.0012X issue No.:1

Status: **Current**

Date of Issue: **2014-10-24** Page 1 of 5

Certificate history:
Issue No. 1 (2014-10-24)
Issue No. 0 (2011-2-25)

Applicant: **KROHNE Limited**
Rutherford Drive, Park Farm South Industrial Estate
Wellingborough, Northants NN8 6AE
United Kingdom

Electrical Apparatus: **Mass Flow Sensor, type OPTIMASS x0x0x and OPTIGAS x0x0x**
Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking: Ex ib IIC T6...T1 Ga/Gb
Ex ib IIIC T*** °C Db

Approved for issue on behalf of the IECEx Certification Body: Dr. Ing. U. Johannsmeyer

Position: Head of department "Explosion Protection in Sensor Technology and Instrumentation"

Signature:
(for printed version)

Date: 2014-11-11

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

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Manufacturer: **KROHNE Limited**
Rutherford Drive, Park Farm South Industrial Estate
Wellingborough, Northants NN8 6AE
United Kingdom

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-26 : 2006 Edition: 2	Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
DE/PTB/ExTR14.0056/00

Quality Assessment Report:

DE/TUN/QAR10.0003/02

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Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The mass flow sensors of type series OPTIMASS 1000, 1000-T6, 1010C, 1010C-T6, 2000, 2010C, 3000, 3010C, 4000, 4010C, 7000, 7010C, 8000, 8010C, 8000k, 8010kC, 9000 and 9010C as well as type series OPTIGAS 4000, 4010C, 5000 and 5010C are used as part of a flow measuring system to determine the mass flow rate of flammable and non-flammable liquids and gases. The mass flow sensors are equipped with the separately certified on-site electronics Frontend & Backplane-FE as well as the p.c.b. Junction Box and they are operated via the measuring transducer, type MFC300F which is also certified separately.

CONDITIONS OF CERTIFICATION: YES as shown below:

Special conditions for safe use

1. The measuring sensors of type series OPTIMASS 1010C, 1010C-T6, 2010C, 3010C, 4010C, 7010C, 8010C, 8010kC and 9010C as well as OPTIGAS 4010C and 5010C shall be included in the equipotential bonding system of the hazardous area.
2. For relationship between maximum permissible ambient temperature, maximum medium temperature, maximum surface temperature and temperature class for the individual types of sensors, reference is made to the tables given in the operating instructions or the tables given the annex respectively.

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Certificate No.: IECEx PTB 11.0012X

Date of Issue: **2014-10-24** Issue No.: **1**

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

1.) OPTIMASS 2000/2010C - Reduced driver coil resistance from 40Ω to 15Ω & remove internal protection diodes.

2a.) OPTIGAS 4000/4010C - Remove current limiting resistor R1, remove Junction Box & replace with blanking plate, & fit smaller PCB inside stem. 2b.) Reduction of permissible medium temperatures

3.) Adaption to the current state of the standards

IECEx Certificate of Conformity

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Additional information:

For additional information reference is made to the annex

Annex: Annex to IECEx PTB 11.0012X-01.pdf

Applicant: KROHNE Limited

Electrical Apparatus: Coriolis Mass Flow Sensor
OPTIMASS x0x0x and OPTIGAS x0x0x

Description of equipment

The mass flow sensors of type series OPTIMASS 1000, 1000-T6, 1010C, 1010C-T6, 2000, 2010C, 3000, 3010C, 4000, 4010C, 7000, 7010C, 8000, 8010C, 8000k, 8010kC, 9000 and 9010C as well as type series OPTIGAS 4000, 4010C, 5000 and 5010C are used as part of a flow measuring system to determine the mass flow rate of flammable and non-flammable liquids and gases. The mass flow sensors are equipped with the separately certified on-site electronics Frontend & Backplane-FE as well as the p.c.b. Junction Box *) and they are operated via the measuring transducer, type MFC300F which is also certified separately.

*) *The junction box is no longer used for sensors of type series OPTIGAS 4000 / 4010C*

For relationship between maximum permissible ambient temperature, maximum medium temperature, maximum surface temperature and temperature class for the individual types of sensors, reference is made to the following tables.

OPTIMASS 1000 / 1010C

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
65 °C	T4	89 °C	T130°C
	T3 – T1	130 °C (*)	T175°C

(*) heat-resistant connecting cable ≥ 80 °C required

OPTIMASS 1000 / 1010C with T6-option

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
40 °C	T6	45 °C	T80°C
	T5	60 °C	T95°C
	T4	95 °C (*)	T130°C
	T3 – T1	130 °C (*)	T165°C
50 °C	T5	60 °C	T95°C
	T4	95 °C (*)	T130°C
	T3 – T1	130 °C (*)	T165°C
65 °C	T4	95 °C (*)	T130°C
	T3 – T1	130 °C (*)	T165°C

(*) heat-resistant connecting cable ≥ 80 °C required

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OPTIMASS 2000 / 2010C

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
40 °C	T6	60 °C	T80°C
	T5	75 °C	T95°C
	T4	110 °C	T130°C
	T3 – T1	130 °C	T150°C
65 °C	T5	75 °C	T95°C
	T4	110 °C (*)	T130°C
	T3 – T1	130 °C (*)	T150°C

(*) heat-resistant connecting cable ≥ 80 °C required

OPTIMASS 3000 / 3010C und 7000 / 7010C, non-insulated designs

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
40 °C	T6	70 °C	T80°C
	T5	90 °C	T95°C
	T4	130 °C (*)	T130°C
	T3 – T1	150 °C (*)	T150°C
50 °C	T6	70 °C	T80°C
	T5	85 °C	T95°C
	T4	130 °C (*)	T130°C
	T3 – T1	150 °C (*)	T150°C
65 °C	T5	85 °C	T95°C
	T4	125 °C (*)	T130°C
	T3 – T1	150 °C (*)	T150°C

(*) heat-resistant connecting cable ≥ 80 °C required

OPTIMASS / OPTIGAS 4000 / 4010C without heating jacket / insulation

permissible range of the ambient temperature T_{amb}	temperature class	permissible range of the medium temperature T_M	max. surface temperature
– 40°C ... + 65 °C	T4	-40 °C ... +60 °C	T130°C
	T3	-40 °C ... +125 °C *)	T195°C
	T2 – T1	-40 °C ... +140 °C *)	T210°C

*) heat-resistant connecting cable ≥ 80 °C required

OPTIMASS 3000 / 3010C und 7000 / 7010C, insulated / heated designs

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
40 °C	T6	65 °C	T80°C
	T5	80 °C	T95°C
	T4	115 °C (*)	T130°C
	T3 – T1	150 °C (*)	T165°C
65 °C	T5	80 °C	T95°C
	T4	115 °C (*)	T130°C
	T3 – T1	150 °C (*)	T165°C

(*) heat-resistant connecting cable ≥ 90 °C required

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OPTIMASS 8000 / 8010C

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
65 °C	T4	80 °C	T130°C
	T3	145 °C	T195°C
	T2 – T1	230 °C (*)	T280°C

(*) heat-resistant connecting cable ≥ 80 °C required

OPTIMASS 8000k / 8010kC with or without heating jacket / insulation
Cyrogenic applications

permissible range of the ambient temperature T_{amb}	temperature class	permissible range of the medium temperature T_M	max. surface temperature
– 20°C ... + 65 °C	T4 – T1	– 195°C ... + 80 °C	T130°C

OPTIMASS 9000 / 9010C

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M	max. surface temperature
65 °C	T4	95 °C	T130°C
	T3	160 °C	T195°C
	T2	255 °C (*)	T290°C
	T1	350 °C (*)	T385°C

(*) heat-resistant connecting cable ≥ 80 °C required

OPTIGAS 5000 / 5010C

ambient temperature, up to T_{amb}	temperature class	max. medium temperature, up to T_M
65 °C	T4	70 °C
	T4	80 °C (*)
	T3 – T1	95 °C (*)

(*) heat-resistant connecting cable ≥ 80/90 °C required

The maximum permissible ambient and medium temperatures for type series OPTIMASS 1000, 1000 T6, 1010C, 1010C T6, 2000, 2010C, 3000, 3010C, 4000, 4010C, 7000, 7010C, 8000k, 8010kC, as well as OPTIGAS 4000 and 4010C of lacquered designs are:

T_{amb} = 40 °C T_{medium} = 110 °C

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Electrical data

Supply circuit
terminals +, -
(on p.c.b. Sensor Junction Box)

type of protection Intrinsic Safety Ex ib IIC
only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 16.5 V
Ii = 340 mA
P_i = 1.3 W
C_i = 35 nF
L_i = 10 µH

Data circuit
terminals A, B
(on p.c.b. Sensor Junction Box)

type of protection Intrinsic Safety Ex ib IIC
only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 11.8 V
Ii = 40 mA
P_i = 120 mW
C_i = 35 nF
L_i = 10 µH

The supply circuit and the data circuit are electrically interconnected.

Special conditions for safe use

1. The measuring sensors of type series OPTIMASS 1010C, 1010C-T6, 2010C, 3010C, 4010C, 7010C, 8010C, 8010kC and 9010C as well as OPTIGAS 4010C and 5010C shall be included in the equipotential bonding system of the hazardous area.

2. For relationship between maximum permissible ambient temperature, maximum medium temperature, maximum surface temperature and temperature class for the individual types of sensors, reference is made to the tables given in the operating instructions or the tables given above respectively.

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