IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

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Certificate No.:	IECEx PTB 12.0041X	Issue No: 3	Certificate history:
Status:	**Current**	Page 1 of 5	Issue No. 3 (2016-06-22) Issue No. 2 (2015-06-02) Issue No. 1 (2014-10-08) Issue No. 0 (2012-08-21)
Date of Issue:	**2016-06-22**		

Applicant: **KROHNE Ltd.**
Rutherford Drive, Park Farm Industrial Estate, Wellingborough, Northants, NN8 6AE, UK.
United Kingdom

Equipment: **Mass Flow Sensors, type series OPTIMASS 1000F VE ... , 2000F VE ... , 3000F VE ... , 6000F VE ... , 7000F, VE ...**

Optional accessory:

Type of Protection: **Intrinsic Safety, Equipment with equipment protection level (EPL) Ga**

Marking:

Ex ia IIC T6…T1 Ga

Ex ia IIIC Txxx^{o}C Da

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. T. Horn

Position: Head of Working Group "Intrinsic Safety"

Signature:
(for printed version)

Date:

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Certificate issued by:

IECEx Certificate of Conformity

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Manufacturer:	**KROHNE Ltd.** Rutherford Drive, Park Farm Industrial Estate, Wellingborough, Northants, NN8 6AE, UK **United Kingdom**	

Additional Manufacturing location(s):

KROHNE Measurement Technology (Shanghai) Co. Ltd. (KTMS)
No.555 Min Shen Road, Songjiang Industral Area
Shanghai 201612
China

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 : 2014-10 Edition:3.0	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/ExTR16.0021/00

Quality Assessment Report:

DE/TUN/QAR10.0003/03 NL/DEK/QAR12.0071/02

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The Mass Flow Sensors of type series OPTIMASS 1000F VE ... , 2000F VE ... , 3000F VE ... , 6000F VE ... , 7000F, VE ... are used as part of a mass flow measuring system to determine the mass flow rate of flammable and non-flammable liquids. The sensor units are operated either as a separately certified compact device where the converter is bolted directly onto the sensor housing or as a remote unit for connection to the separately certified MFC400F, VE ... converter. The remote versions are provided with a Remote Junction Box which includes the terminals for connection to the converter and protection diodes to limit the voltage of the driver circuit. Therefore, an infallible connection between Remote Junction Box and MFC400F, VE ... converter is not required.

CONDITIONS OF CERTIFICATION: YES as shown below:

Special conditions for safe use

1. The Mass Flow Sensors of type series OPTIMASS 1000F VE ... , 2000F VE ... , 3000F VE ... , 6000F VE ... , 7000F, VE ... 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 tables given in the operating instructions manual or the tables given in the annex respectively.

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

The type designation changes to OPTIMASS 1000F, 2000F, 3000F, 6000F, 7000F followed by a so-called VE-code for further product specifications.

The maximum process temperature for the variant OPTIMASS 1000F has been increased from 130 °C to 150 °C.

The tables showing the temperature specifications have been revised and supplemented.

In future the variant OPTIMASS 2000F will also be available as a 4-tube-option. This design is specified in the VE-code (VE90...).

The variant OPTIMASS 6000F will in future also be available with a shorter stem between sensor unit and junction box and with a more powerful driver coil for large line meters.

The circuitry arranged in the junction box for the limitation of the voltage generated from the driver coils in the event of a remote cable break (back EMF) has been revised (now 3-fold redundant).

Furthermore, corrections have been made in the test documents and special condition No. 1 has been updated.

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Additional information:

For thermal and electrical specifications as well as special conditions for safe use, reference is made to the annex.

Annex:

Annex to IECEx PTB 12.0041X_issue_3.pdf

Applicant: KROHNE Ltd.

Electrical Apparatus: Mass Flow Sensors, type series OPTIMASS 1000F VE ..., 2000F, VE ...3000F VE ..., 6000F VE ..., 7000F, VE ...

Description of equipment

The Mass Flow Sensors of type series OPTIMASS 1000F VE ..., 2000F VE ..., 3000F VE ..., 6000F VE ..., 7000F VE ... are used as part of a mass flow measuring system to determine the mass flow rate of flammable and non-flammable liquids. The sensor units are operated either as a separately certified compact device where the converter is bolted directly onto the sensor housing or as a remote unit for connection to the separately certified MFC400F VE ...converter. The remote versions are provided with a Remote Junction Box which includes the terminals for connection to the converter and protection diodes to limit the voltage of the driver circuit. Therefore, an infallible connection between Remote Junction Box and MFC400F, VE ... converter is not required.

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 1000F

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	45	T6-T1	T80°C
	60	T5-T1	T95°C
	95	T4-T1	T130°C
	130	T3-T1	T165°C
	150	T3-T1	T185°C
– 40 ... + 50	60	T5-T1	T95°C
	95	T4-T1	T130°C
	130	T3-T1	T165°C
	150	T3-T1	T185°C
– 40 ... + 65	95	T4-T1	T130°C
	130	T3-T1	T165°C
	150	T3-T1	T185°C

Table 1: OPTIMASS 1000F with Remote Junction Box made of aluminum or stainless steel, with or without heating jacket or insulation
Minimum process temperature: – 50 °C

OPTIMASS 2000F including VE90... (4-tube-option)

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T70°C
	55	T5-T1	T85°C
	90	T4-T1	T120°C
	130	T3-T1	T160°C
– 40 ... + 50	55	T5-T1	T85°C
	90	T4-T1	T120°C
	130	T3-T1	T160°C
– 40 ... + 65	65	T5-T1	T95°C
	90	T4-T1	T120°C
	130	T3-T1	T160°C

Table 2: OPTIMASS 2000F (incl. VE90...) with Remote Junction Box made of aluminum or stainless steel, with or without heating jacket or insulation
Minimum process temperature: – 50 °C

OPTIMASS 3000F

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	65	T6-T1	T80°C
	80	T5-T1	T95°C
	115	T4-T1	T130°C
	150	T3-T1	T165°C
– 40 ... + 50	65	T6-T1	T80°C
	80	T5-T1	T95°C
	115	T4-T1	T130°C
	150	T3-T1	T165°C
– 40 ... + 65	65	T6-T1	T80°C
	80	T5-T1	T95°C
	115	T4-T1	T130°C
	130	T3-T1	T145°C

Table 3: OPTIMASS 3000F with Remote Junction Box made of aluminum or stainless steel, with or without heating jacket AND insulation
Minimum process temperature: – 50 °C

OPTIMASS 6000F

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
– 40 ... + 50	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
– 40 ... + 65	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C

Table 4: OPTIMASS 6000F with Remote Junction Box made of aluminum or stainless steel, with heating jacket AND insulation or without heating jacket and with or without insulation
Minimum process temperature: – 50 °C

OPTIMASS 6000F, cryogenic applications

Permissible range of the ambient temperature T_{amb} [°C]	Permissible range of the medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 25 ... + 65	– 140 ... + 40	T6-T1	T80°C
– 25 ... + 65	– 160 ... + 40	T6-T1	T80°C
– 20 ... + 65	– 180 ... + 40	T6-T1	T80°C
– 20 ... + 65	– 200 ... + 40	T6-T1	T80°C

Table 5: OPTIMASS 6000F with Remote Junction Box made of aluminum or stainless steel, with heating jacket AND insulation or without heating jacket and with or without insulation

Minimum process temperature: < – 50 °C
Minimum medium temperature: – 20 °C or – 25 °C

OPTIMASS 6000F VE...0... (short stem option)

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
– 40 ... + 50	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
– 40 ... + 65	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	135	T3-T1	T175°C

Table 6: OPTIMASS 6000F VE...0... with Remote Junction Box made of aluminum or stainless steel, with heating jacket AND insulation or without heating jacket and with or without insulation

Minimum process temperature: – 50 °C

OPTIMASS 6000F VE...0... (short stem option), cryogenic applications

Permissible range of the ambient temperature T_{amb} [°C]	Permissible range of the medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
+ 10 ... + 65	– 140 ... + 40	T6-T1	T80°C
+ 20 ... + 65	– 160 ... + 40	T6-T1	T80°C
+ 30 ... + 65	– 180 ... + 40	T6-T1	T80°C
+ 40 ... + 65	– 200 ... + 40	T6-T1	T80°C

Table 7: OPTIMASS 6000F VE...0... with Remote Junction Box made of aluminum or stain less steel, with heating jacket AND insulation or without heating jacket and with or without insulation

Minimum process temperature: < – 50 °C

OPTIMASS 6000F VE ...T... (high-temperature applications)

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 55	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 60	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 65	350	T1	T390°C

Table 8: OPTIMASS 6000F VE...T... with Remote Junction Box made of aluminum or stainless steel, with heating jacket AND insulation

Minimum process temperature: – 50 °C

OPTIMASS 6000F VE ...T... (high-temperature applications)

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 50	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 55	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 60	350	T1	T390°C

Table 9: OPTIMASS 6000F VE...T... with Remote Junction Box made of stainless steel, with heating jacket AND insulation

Minimum process temperature: – 50 °C

OPTIMASS 6000F VE ...T... (high-temperature applications)

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 55	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C
– 40 ... + 65	40	T6-T1	T80°C
	55	T5-T1	T95°C
	90	T4-T1	T130°C
	150	T3-T1	T190°C
	230	T2-T1	T270°C
	400	T1	T440°C

Table 10: OPTIMASS 6000F VE...T... with Remote Junction Box made of aluminum or stainless steel, without heating jacket AND with insulation

Minimum process temperature: – 50 °C

OPTIMASS 7000F

Permissible range of the ambient temperature T_{amb} [°C]	Maximum medium temperature T_m [°C]	Temperature class	Maximum surface temperature [°C]
– 40 ... + 40	65	T6-T1	T80°C
	80	T5-T1	T95°C
	100	T4-T1	T115°C
	115	T4-T1	T130°C
	150	T3-T1	T165°C
– 40 ... + 50	80	T5-T1	T95°C
	100	T4-T1	T115°C
	115	T4-T1	T130°C
	150	T3-T1	T165°C
– 40 ... + 65	100	T4-T1	T115°C
	115	T4-T1	T130°C
	130	T3-T1	T145°C

Table 11: OPTIMASS 7000F with Remote Junction Box made of aluminum or stainless steel, with or without heating jacket AND insulation

Minimum process temperature: – 50 °C

Electrical data:

Driver circuit A
(terminals,
Dubox Connector X5-1...X5-6)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC
only for connection to the certified measuring converter, type MFC400F, VE ... ,
IECEx PTB 12.0043X

Maximum values:

U_i = 11.8 V
I_i = 2130 mA
P_i = 920 mW

C_i = 500 nF
L_i = 16 µH
L_i = 0 when connected infallibly

or

Driver circuit B
(terminals,
Dubox Connector X5-9...X5-14)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC
only for connection to the certified measuring converter, type MFC400F, VE ... ,
IECEx PTB 12.0043X

Maximum values:

U_i = 11.8 V
I_i = 1325 mA
P_i = 530 mW

C_i = 500 nF
L_i = 36 µH
L_i = 0 when connected infallibly

and

Sensor circuit
(terminals,
Dubox Connector X3-1…X3-6)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC
only for connection to the certified measuring converter, type MFC400F, VE ... ,
IECEx PTB 12.0043X
Maximum values:
U_i = 11.8 V
I_i = 13 mA
P_i = 39 mW

C_i = 90 nF
L_i = 100 mH

and

RTD / DMS-circuit
(terminals,
Dubox Connector X3 – 7…10)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC
only for connection to the certified measuring converter, type MFC400F, VE ... ,
IECEx PTB 12.0043X
Maximum values:
U_i = 11.8 V
I_i = 9 mA
P_i = 27 mW

C_i = 310 nF
L_i = 1 mH

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Special conditions for safe use

1. The Mass Flow Sensors of type series OPTIMASS 1000F VE ..., 2000F VE ..., 3000F VE ..., 6000F VE ..., 7000F VE ... 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 tables given in the operating instructions manual or the tables given above respectively.