



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 12.0043X

Issue No: 3

Certificate history:

[Issue No. 3 \(2017-07-17\)](#)

[Issue No. 2 \(2016-06-22\)](#)

[Issue No. 1 \(2015-09-09\)](#)

[Issue No. 0 \(2012-08-21\)](#)

Status: **Current**

Page 1 of 5

Date of Issue: **2017-07-17**

Applicant: **KROHNE Ltd.**

Rutherford Drive, Park Farm Industrial Estate, Wellingborough, Northants, NN8 6AE, UK
United Kingdom

Equipment: **Measuring converter MFC400F VE*****

Optional accessory:

Type of Protection: **Flameproof Enclosure, Increased Safety, Intrinsic Safety, Ignition protection by enclosure "t"**

Marking:

Ex db [ja Ga] IIC T6 Gb Ex db eb [ja Ga] IIC T6 Gb Ex db [ja] IIC T6 Gb

Ex db eb [ja] IIC T6 Gb Ex tb [ja Da] IIIC T75°C Db Ex tb IIIC T75°C Db

*Approved for issue on behalf of the IECEx
Certification Body:*

Dr.-Ing. F. Lienesch

Position:

Head of Department "Explosion Protection in Sensor Technology and
Instrumentation"

*Signature:
(for printed version)*

Date:

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





IECEX Certificate of Conformity

Certificate No: IECEx PTB 12.0043X Issue No: 3
Date of Issue: 2017-07-17 Page 2 of 5
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. (KMTS)
No. 555 Min Shen Road, Songjiang Industrial 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 60079-1 : 2014-06 Edition:7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
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
IEC 60079-31 : 2013 Edition:2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
IEC 60079-7 : 2015 Edition:5.0	Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

*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/ExTR17.0031/00](#)

Quality Assessment Report:

[DE/TUN/QAR10.0003/04](#) [NL/DEK/QAR12.0071/03](#)



IECEX Certificate of Conformity

Certificate No: IECEx PTB 12.0043X

Issue No: 3

Date of Issue: 2017-07-17

Page 3 of 5

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The measuring converter, type MFC400F VE*** is used as part of a mass flow measuring system to determine and display the mass flow rate of flammable and non-flammable liquids. The equipment consists of the separately certified components, electronic assembly, type MFC400, measuring converter housing, type MH300, cable gland, type LC-MASS-Ex as well as a mounting bracket with remote junction box. The measuring converter, type MFC400F VE*** is designed as associated apparatus and may be installed in the hazardous area.

SPECIFIC CONDITIONS OF USE: YES as shown below:

Special conditions for safe use

1. The measuring converter, type MFC400F VE... shall be included in the equipotential bonding system of the hazardous area.
2. Opening the enclosure inside the hazardous area is only permissible in a de-energized state and with keeping a subsequent waiting time (warning label !)

This waiting time is: 35 minutes for temperature class T6

and 10 minutes for temperature class T5

No waiting time is required for temperature classes T4 ... T1.

3. Only certified cable glands may be applied as cable entries. Non-used openings shall be sealed by means of certified blind plugs.
4. The connecting cables shall be installed as fixed wiring and in such a way that they are sufficiently protected against damage.
5. For relationship between maximum permissible ambient temperature, maximum medium temperature, maximum surface temperature and temperature class for the individual type series, reference is made to tables given in the operating instructions manual.



IECEX Certificate of Conformity

Certificate No: IECEx PTB 12.0043X

Issue No: 3

Date of Issue: 2017-07-17

Page 4 of 5

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

1. In addition to flammable and non-flammable liquids also gases are specified in the description as measuring medium.
2. Introduction of a new LC bush between sensor unit and converter enclosure as an additional option.
3. Revision of electrical data, correction of the connection specifications, specification of data for converter variants VE53 and VE54, remove driver circuit A data.
4. Introduction of a clarifying note respecting the interconnection of the measuring converter, type MFC400F and associated OPTIMASS x000F sensors.
5. Update of the state of standards (IEC 60079-7:2015, 5th Edition)
6. Addition of special condition No. 5
7. Revision of the operating instructions manual



IECEX Certificate of Conformity

Certificate No: IECEX PTB 12.0043X

Issue No: 3

Date of Issue: 2017-07-17

Page 5 of 5

Additional information:

For thermal and electrical specifications reference is made to the annex

Annex:

[Annex to IECEX PTB 12.0043X_issue_3.pdf](#)



Applicant: KROHNE Ltd.
Electrical apparatus: Measuring converter, type MFC400F VE***

The measuring converter, type MFC400F VE*** is used as part of a mass flow measuring system to determine and display the mass flow rate of flammable and non-flammable liquids and gases. The equipment consists of the separately certified components, electronic assembly, type MFC400, measuring converter housing, type MH300, cable gland, type LC-MASS-Ex or type LC Bush as well as a mounting bracket with junction box. The housing of the converter is available in the materials aluminum and stainless steel. The measuring converter, type MFC400F VE*** is designed as associated apparatus and may be installed in the hazardous area.

The permissible range of the ambient temperature depends on the design of the housing as follows:

Aluminum converter housing: $T_{amb} = -40\text{ °C} \dots +65\text{ °C}$
Stainless steel converter housing: $T_{amb} = -40\text{ °C} \dots +60\text{ °C}$
Painted versions: $T_{amb} = -40\text{ °C} \dots +40\text{ °C}$

Electrical data:

Measuring converter, type MFC400F VE53...

Auxiliary power (non-intrinsically safe)

depending on version
Terminals, PCB power supply
(L/L+)
(N/L-)
(PE)

$U_N = 12 \dots 24\text{ V DC}, +30\% / -10\%$ (for short periods -25 %),
12 W
internal fuse $I_N \leq 2\text{ A}$
 $U_m = 253\text{ V}$
for connection to protective extra low voltage
with safe isolation (PELV)

or

$U_N = 24\text{ V AC/DC}, 22\text{ VA}/12\text{ W}$
24 V AC, +10 % / -15 %, 50/60 Hz
24 V DC, +30 % / -25 %
internal fuse $I_N \leq 2\text{ A}$
 $U_m = 253\text{ V}$
for connection to protective extra low voltage
with safe isolation (PELV)

or

$U_N = 100 \dots 230\text{ V AC}, +10\% / -15\%$, 50/60 Hz, 22 VA
internal fuse $I_N \leq 1.6\text{ A}$



Input/output circuits (non-intrinsically safe)

Nominal voltage: $U_N \leq 32 \text{ V DC}$
 $U_m = 253 \text{ V}$

Printed circuit board:

Basic IO

(Terminals B, B- C, C-)	Status output, passive	$I_{\max} = 100 \text{ mA}$
	Status output, passive or control input	$I_{\max} = 100 \text{ mA}$ $U_{\max} = 32 \text{ V}$
A, A-, A+ D, D-)	Pulse output, passive	$I_{\max} = 100 \text{ mA}$
	Current output, active/passive	HART

Modular IO

(Terminals C, C- D, D-)	Current output, active/passive	HART
	Status/pulse output, active	$I_{\max} = 20 \text{ mA}$
	Status/pulse output, passive	$I_{\max} = 100 \text{ mA}$

Modular Carrier + IO Module

(Terminals A, A- or B, B-)	depending on module (max. 2 modules)	
	Current output, active/passive	0(4) – 20 mA
	Status/pulse output, active	$I_{\max} = 20 \text{ mA}$
	Status/pulse output, passive	$I_{\max} = 100 \text{ mA}$
	Control input active/passive	$U_{\max} = 32 \text{ V}$
	Control input, active/passive	0(4) – 20 mA, $U_{\max} = 32 \text{ V}$

Fieldbus IO

(Terminals C, C-, D, D-)	according to function	
	Profibus-PA, passive	
	Foundation Fieldbus, passive	
	Nominal voltage 9 V...32 V	

Profibus DP IO

(Terminals B, B-, C, C-, D, D-)	Profibus-DP, active, 12 Mbit/s Termination
---------------------------------	---

Modbus IO

(Terminals C, C-, D, D-)	RS 485 Modbus, active
--------------------------	-----------------------



Input/output circuits (intrinsically safe)

(depending on PCB and IO-function)

Printed circuit board:

Exi-IO

Current output, passive
HART communication
(Terminals C, C-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

or

Current output, active
HART communication
(Terminals C, C-)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 21 \text{ V}$
 $I_o = 90 \text{ mA}$
 $P_o = 0.5 \text{ W}$
linear characteristic

C_o	90 nF	110 nF
L_o	2.0 mH	0.5 mH

and

Puls/Status output
Control input, passive
(Terminals D, D-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low



Exi-Option

Current output, passive
(Terminals A, A-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

or

Current output, active
(Terminals A, A-)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 21 \text{ V}$
 $I_o = 90 \text{ mA}$
 $P_o = 0.5 \text{ W}$
linear characteristic

C_o	90 nF	110 nF
L_o	2.0 mH	0.5 mH

and

Puls/Status output
Control input, passive
(Terminals B, B-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

Exi-Option 2

Current input, passive
(Terminals C, C-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low



or

Current input, active
(Terminals A, A-, B, B-)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 24.1 \text{ V}$
 $I_o = 99 \text{ mA}$
 $P_o = 0.6 \text{ W}$
linear characteristic
 $C_o = 75 \text{ nF}$
 $L_o = 0.5 \text{ mH}$

and

Puls/Status output
Control input, passive
(Terminals D, D-)

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

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

Fieldbus IO

Profibus-PA or
Foundation Fieldbus
passive
(Terminals C, C-, D, D-)

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

Maximum values:

$U_i = 24 \text{ V}$
 $I_i = 380 \text{ mA}$
 $P_i = 5.32 \text{ W}$
 $C_i = 5 \text{ nF}$
 $L_i = 10 \text{ }\mu\text{H}$

FISCO-field device according to EN 60079-27

Intrinsically safe measuring circuits

Driver circuit
(Terminals, DR+, DR-)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 1325 \text{ mA}$
 $P_o = 530 \text{ mW}$
 $C_o = 500 \text{ nF}$
 $L_o = 36 \text{ }\mu\text{H}$
 $L_o = 0$ when connected infallibly



and

Sensor circuit

(Terminals, SA+, SA-, SB+, SB-)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 13 \text{ mA}$
 $P_o = 39 \text{ mW}$
 $C_o = 90 \text{ nF}$
 $L_o = 100 \text{ mH}$
linear characteristic

and

RTD / DMS-circuit

(Terminals, T1, T2, T3, T4)

type of protection Intrinsic Safety Ex ia IIC
or Ex ib IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 9 \text{ mA}$
 $P_o = 27 \text{ mW}$
 $C_o = 310 \text{ nF}$
 $L_o = 1 \text{ mH}$
linear characteristic

The intrinsically safe circuits are safely electrically isolated from all non-intrinsically safe circuits up to a peak value of the nominal voltage of 375 V.

Measuring converter, type MFC400F VE54...

Auxiliary power (non-intrinsically safe)

Depending version

Terminals, PCB power supply

(L/L+)

(N/L-)

(PE)

$U_N = 12...24 \text{ V DC, } +30 \% / -10 \%, 12 \text{ W}$

$U_m = 253 \text{ V}$

for connection to protective extra low voltage
with safe isolation (PELV)

or

$U_N = 24 \text{ V DC, } +30 \% / -25 \%$

$24 \text{ V AC, } +10 \% / -15 \%, 50/60 \text{ Hz}$

$U_m = 253 \text{ V}$

for connection to protective extra low voltage
with safe isolation (PELV)

or

$U_N = 100...230 \text{ V AC, } +10 \% / -15 \%, 50/60 \text{ Hz,}$
 22 VA



Input/output circuits (non-intrinsically safe)

(Depending on I/O board configuration)

Printed circuit board:

SIL I/O

Terminals
(C, C-, D, D)

Current output, active/passive HART
 $I < 22 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$
 Pulse-, frequency- or status output or control input,
 passive
 $I < 100 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$

Fieldbus IO

Terminals
(C, C-, D, D)

Profibus-PA or Foundation Fieldbus
 $I = 10,5 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$

Modbus IO

Terminals
(C, C-, D, D)

RS 485

Profibus DP

Terminals
(B, B-, C, C-, D, D)

Profibus-DP, max. 12 MBaud

Carrier + max. 2 I/O-Modules

Terminals
(A, A- or B, B-)

Current output, active/passive $I < 22 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$
 Current input, active/passive $I < 22 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$
 Pulse-, frequency- or status output, passive
 $I < 100 \text{ mA}$, $U_{\text{ext}} < 32 \text{ V DC}$
 Control input, active/passive $U_{\text{ext}} < 32 \text{ V}$

Input/output circuits (intrinsically safe)

(Depending on I/O board configuration)

Printed circuit board:

Exi-SIL I/O, active

Current output, active
 HART Kommunikation
 (Terminals C, C-)

type of protection Intrinsic Safety Ex ia IIC

Maximum values:

$U_o = 21 \text{ V}$
 $I_o = 90 \text{ mA}$
 $P_o = 0.5 \text{ W}$

linear characteristic

C_o	90 nF	110 nF
L_o	2.0 mH	0.5 mH



Pulse-, frequency- or status
output, passive
(Terminals D, D-)

type of protection Intrinsic Safety Ex ia IIC

only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 100 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

Exi-SIL I/O, passive

Current output, passive,
HART communication
(Terminals C, C-)

type of protection Intrinsic Safety Ex ia IIC

only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 130 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

Pulse-, frequency- or status
output, passive
(Terminals D, D-)

type of protection Intrinsic Safety Ex ia IIC

only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 30 \text{ V}$
 $I_i = 130 \text{ mA}$
 $P_i = 1.0 \text{ W}$
 $C_i = 10 \text{ nF}$
 L_i negligibly low

Fieldbus I/O

Profibus-PA or
Foundation Fieldbus
(Terminals C, C-, D, D-)

type of protection Intrinsic Safety Ex ia IIC
FISCO Field Device

only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 24 \text{ V}$
 $I_i = 380 \text{ mA}$
 $P_i = 5.32 \text{ W}$
 $C_i = 5 \text{ nF}$
 L_i negligibly low



Exi-Option, active

Current output, active
(Terminals A, A-)

type of protection Intrinsic Safety Ex ia IIC

Maximum values:

$$\begin{aligned}U_o &= 21 \text{ V} \\I_o &= 90 \text{ mA} \\P_o &= 0.5 \text{ W}\end{aligned}$$

linear characteristic

C_o	90 nF	110 nF
L_o	2.0 mH	0.5 mH

Pulse-, frequency- or status output
or control input, passive
(Terminals B, B-)

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

Maximum values:

$$\begin{aligned}U_i &= 30 \text{ V} \\I_i &= 130 \text{ mA} \\P_i &= 1.0 \text{ W} \\C_i &= 10 \text{ nF} \\L_i &\text{ negligibly low}\end{aligned}$$

Exi-Option, passive

Current output, passive
Terminals (A, A-)

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

Maximum values:

$$\begin{aligned}U_i &= 30 \text{ V} \\I_i &= 130 \text{ mA} \\P_i &= 1.0 \text{ W} \\C_i &= 10 \text{ nF} \\L_i &\text{ negligibly low}\end{aligned}$$

Pulse-, frequency- or status output
or control input, passive
(Terminals B, B-)

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

Maximum values:

$$\begin{aligned}U_i &= 30 \text{ V} \\I_i &= 130 \text{ mA} \\P_i &= 1.0 \text{ W} \\C_i &= 10 \text{ nF} \\L_i &\text{ negligibly low}\end{aligned}$$



Sensor circuits

Driver circuit

(Terminals, DR+, DR-)

type of protection Intrinsic Safety Ex ia IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 1325 \text{ mA}$
 $P_o = 530 \text{ mW}$
 $C_o = 1000 \text{ nF}$
 $L_o = 36 \text{ }\mu\text{H}$

Sensor circuit

(Terminals, SA+, SA-, SB+, SB-)

type of protection Intrinsic Safety Ex ia IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 13 \text{ mA}$
 $P_o = 39 \text{ mW}$
 $C_o = 90 \text{ nF}$
 $L_o = 100 \text{ mH}$
linear characteristic

RTD / DMS circuit

(Terminals, T1, T2, T3, T4)

type of protection Intrinsic Safety Ex ia IIC

Maximum values:

$U_o = 11.8 \text{ V}$
 $I_o = 10.5 \text{ mA}$
 $P_o = 31 \text{ mW}$
 $C_o = 340 \text{ nF}$
 $L_o = 100 \text{ mH}$
linear characteristic

The intrinsically safe circuits are safely electrically isolated from all non-intrinsically safe circuits up to a peak value of the nominal voltage of 375 V.

Note:

The interconnection of the measuring converter, type MFC400F and the separately certified Mass Flow Sensors, type series OPTIMASS 1000F VE***, 2000F VE***, 3000F VE***, 6000F VE***, 7000F VE*** (IECEX PTB 12.0041 X) can be considered intrinsically safe without additional evaluation if the following parameters of the connecting cable are not exceeded:

Maximum length: 20 m
Maximum total capacitance: 90 nF
Maximum total inductance: 36 μH



Specific conditions of use

1. The measuring converter, type MFC400F VE*** shall be included in the equipotential bonding system of the hazardous area.
2. Opening the enclosure inside the hazardous area is only permissible in a de-energized state and with keeping a subsequent waiting time (warning label !)
This waiting time is: 35 minutes for temperature class T6
and 10 minutes for temperature class T5
No waiting time is required for temperature classes T4 ... T1.
3. Only certified cable glands may be applied as cable entries. Non-used openings shall be sealed by means of certified blind plugs.
4. The connecting cables shall be installed as fixed wiring and in such a way that they are sufficiently protected against damage.
5. For relationship between maximum permissible ambient temperature, maximum medium temperature, maximum surface temperature and temperature class for the individual type series, reference is made to tables given in the operating instructions manual.