



(1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 06 ATEX 2038 X



(4) Equipment: Measuring transducer, type MFC300F

(5) Manufacturer: KROHNE Ltd.

(6) Address: Rutherford Drive, Park Farm South Ind. Est.
Wellingborough, Northants NN8 6AE, Great Britain

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

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, 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 the confidential report PTB Ex 06-26153 .

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

IEC 60079-0:2004 Ed.4

IEC 60079-1:2003 Ed.5

EN 60079-7:2003

EN 50020:2002

IEC 61241-1:2005 Ed.1

IEC 61241-11:2005 Ed.1

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. 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 2 (1) G Ex de [ia/ib] IIC T6


or

 II 2 (1) G Ex d [ia/ib] IIC T6

 II 2 G Ex de [ib] IIC T6

or

 II 2 G Ex d [ib] IIC T6

 II 2 D Ex tD [ibD] A21 IP6x T80 °C

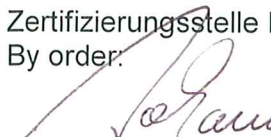
or

 II 2 (1) D Ex tD [iaD/ibD] A21 IP6x T80°C

Zertifizierungsstelle Explosionsschutz

Braunschweig, September 21, 2006

By order:


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

(15) Description of equipment

The measuring transducer, type MFC300F is used for the determination and display of the mass flow rate of flammable and non-flammable liquids and gases. It consists of the separately certified electronic assembly which is mounted into an enclosure certified for type of protection Flameproof Enclosure "d". The measuring transducer is designed as associated apparatus and may be installed in the hazardous area. All connections to the sensor unit comply with type of protection Intrinsic Safety.

The permissible range of the ambient temperature depends on the material of the enclosure as follows.

Aluminium enclosure: -40 °C ... +60 °C

Stainless steel enclosure: -40 °C ... +55 °C

Electrical data

Auxiliary power (non-intrinsically safe)

depending on variant
(terminals L (L+), N (L-))

$U_N = 12...24$ V DC, +30 % / -10 % (short-time -25 %),
approx. 12 W

internal fusing $I_N \leq 2$ A

$U_m = 253$ V

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

or

$U_N = 24$ V AC/DC, +10 % / -15 %, 50/60 Hz,
approx. 22 VA/12 W

24 V DC, +30 % / -25 %

internal fusing $I_N \leq 2$ A

$U_m = 253$ V

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

or

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

internal fusing $I_N \leq 1,6$ A

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In/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	C, C-	status output, passive	$I_{max} = 100 \text{ mA}$
	B, B-	status output, passive or control input	$I_{max} = 100 \text{ mA}$ $U_{max} = 32 \text{ V}$
	D, D-	pulse output, passive	$I_{max} = 100 \text{ mA}$
	A, A-, A+)	current output, active/passive	HART

Modular IO

(terminals	C, C-	current output, active/passive	HART
	D, D-)	status/pulse output, active	$I_{max} = 20 \text{ mA}$
		status/pulse output, passive	$I_{max} = 100 \text{ mA}$

Modular Carrier + IO Module

(terminals	B, B-, A, A-)	depending on module	
		current output, active/passive	HART
		status/pulse output, active/passive	$I_{max} = 20 \text{ mA}$
		control input, active/passive	$U_{max} = 32 \text{ V}$

Fieldbus IO

(terminals	D, D-, C, C-)	depending on function
		Profibus-PA, passive
		Foundation Fieldbus, passive

Profibus DP IO

(terminals	D, D-, C, C-, B, B-)	Profibus-DP, active, 12 Mbit/s Termination
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Modbus IO

(terminals	D, D-, C, C-)	RS 485 Modbus, active
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In/Output circuits (intrinsically safe)
(depending on p.c.b. and I/O-function)

Printed circuit board:

Exi-IO

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

type of protection Intrinsic Safety EEx ia IIC
 or EEx 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 EEx ia IIC
 or EEx 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, passive
(terminals D, D-)

type of protection Intrinsic Safety EEx ia IIC
 or EEx 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 EEx ia IIC
or EEx 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 EEx ia IIC
or EEx 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 EEx ia IIC
or EEx 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
Foundation Fieldbus
passive
(terminals D, D-, C, C-)

type of protection Intrinsic Safety EEx ia IIC
or EEx ib IIC/IIB
only for connection to a certified intrinsically safe circuit
Maximum values:

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

FISCO field device according to IEC 60079-27

Supply circuit (terminals +, -)

type of protection Intrinsic Safety EEx ib IIC

Maximum values:

$$\begin{aligned}U_o &= 16.5 \text{ V} \\I_o &= 305 \text{ mA} \\P_o &= 1.25 \text{ W} \\&\text{linear characteristic} \\C_o &= 230 \text{ nF} \\L_o &= 320 \text{ }\mu\text{H}\end{aligned}$$

Data circuit (terminals A, B)

type of protection Intrinsic Safety EEx ib IIC

Maximum values:

$$\begin{aligned}U_o &= 6 \text{ V} \\I_o &= 33 \text{ mA} \\P_o &= 120 \text{ mW} \\&\text{trapezoidal characteristic} \\C_o &= 1.9 \text{ }\mu\text{F} \\L_o &= 2 \text{ mH}\end{aligned}$$

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.

(16) Test report PTB Ex 06-26153

(17) Special conditions for safe use

1. The measuring transducer, type MFC300F 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
The waiting time may be omitted 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.

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz

By order:



Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, September 21, 2006







1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

(Translation)

Equipment: Measuring transducer, type MFC300F

Marking:  II 2 (1) G Ex de [ia/ib] IIC T6 or  II 2 (1) G Ex d [ia/ib] IIC T6
 II 2 G Ex de [ib] IIC T6 or  II 2 G Ex d [ib] IIC T6
 II 2 D Ex tD [ibD] A21 IP6x T80 °C or
 II 2 (1) D Ex tD [iaD/ibD] A21 IP6x T80 °C

Manufacturer: KROHNE Ltd.

Address: Rutherford Drive, Park Farm South Ind. Est.
Wellingborough, Northants NN8 6AE, Great Britain

Description of supplements and modifications

In the future the measuring transducer, type MFC300F may also be manufactured and operated according to the test documents listed in the test report. The modifications comprise the extension of the permissible ambient temperature to 65 °C for specific variants with aluminium enclosure, the extension of the p.c.b's "Modular Carrier + IO Module" and "Exi-Option 2" by an additional current input and the introduction of a T6-option for the operation with the measuring sensor of type OPTIMASS 1000.

Thus the temperature specifications and the electrical data change as follows:

The permissible range of the ambient temperature depends on the material of the enclosure as follows.

Aluminium enclosure: -40 °C ... +65 °C for all variants listed in the table given in the operating instructions

-40 °C ... +60 °C for non-listed variants

Stainless steel enclosure: -40 °C ... +55 °C

Electrical data

Printed circuit board:

Modular Carrier + IO Module
(terminals B, B-, A, A-)

depending on module
current output, active/passive 0(4) – 20 mA
status/puls output, active $I_{\max} = 20 \text{ mA}$
status/puls output, passive $I_{\max} = 100 \text{ mA}$
control input, active/passive $U_{\max} = 32 \text{ V}$
current input, active/passive 0(4) – 20 mA, $U_{\max} = 32 \text{ V}$

Profibus DP IO
(terminals D, D-, C, C-, B, B-)

depending on function
Profibus RS 485, active, up to 12 Mbit/s

Exi-Option 2

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 input, active
(terminals A, A-)

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, 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

Mesuring transducer, type FC300 F T6

Supply circuit
(terminals +, -)

type of protection Intrinsic Safety EEx ib IIC
Maximum values:

$U_o = 16.5 \text{ V}$
 $I_o = 262 \text{ mA}$
 $P_o = 1.07 \text{ W}$
linear characteristic
 $C_o = 240 \text{ nF}$
 $L_o = 450 \text{ }\mu\text{H}$

Data circuit
(terminals A, B)

type of protection Intrinsic Safety EEx ib IIC
Maximum values:

$U_o = 6 \text{ V}$
 $I_o = 33 \text{ mA}$
 $P_o = 120 \text{ mW}$
trapezoidal characteristic
 $C_o = 1.9 \text{ }\mu\text{F}$
 $L_o = 2 \text{ mH}$

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.

All further specifications and electrical data of the EC-type examination certificate as well as the "Special Conditions" apply without changes also to this 1st supplement.

Applied standards

EN 60079-0:2006	EN 60079-1:2004	EN 60079-7:2007	EN 60079-11:2007
EN 61241-0:2006	EN 61241-1:2004	EN 61241-11:2006	

Test report: PTB Ex 08-28028

Zertifizierungsstelle Explosionschutz
By order:

Braunschweig, June 9, 2008

Dr.-Ing. U. Johannsmeyer
Direktor und Professor



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2. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

(Translation)

Equipment: Measuring transducer, type MFC300F and type MFC300F T6

Marking:  II 2 (1) G Ex de [ia/ib] IIC T6 or  II 2 (1) G Ex d [ia/ib] IIC T6
 II 2 G Ex de [ib] IIC T6 or  II 2 G Ex d [ib] IIC T6
 II 2 D Ex tD [ibD] A21 IP6x T80 °C or
 II 2 (1) D Ex tD [iaD/ibD] A21 IP6x T80 °C

Manufacturer: KROHNE Ltd.

Address: Rutherford Drive, Park Farm South Ind. Est.
Wellingborough, Northants NN8 6AE, Great Britain


Description of supplements and modifications

In the future the measuring transducer, type MFC300F and type MFC300F T6 may also be manufactured and operated according to the test documents listed in the test report. The modifications concern the specifications on the type label regarding the connection of the new sensor types OPTIMASS 4000, 8000k and OPTIGAS 4000, the adaption to the current state of the standards and, therefore, the marking for the application in hazardous areas due to combustible dusts as well as the introduction of a design with lacquered enclosure. Therefore, the range of the permissible ambient temperature changes as follows:

The range of the permissible ambient temperature for the variant with optionally lacquered enclosure (aluminium or stainless steel) reads:

$$T_{\text{amb}}: -40 \text{ °C} \dots +40 \text{ °C}$$

The marking for the application in hazardous areas due to combustible dusts changes as follows:

 II 2 D Ex ib t IIIC Txx °C Db or  II 2 (1) D Ex ib t [ia Da] IIIC Txx °C Db

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

2. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

All further specifications, the electrical data and the "Special Conditions" of the EC-type examination certificate as well as the 1st supplement apply without changes also to this 2nd supplement.

Applied standards

EN 60079-0:2009

EN 60079-1:2007

EN 60079-7:2007

EN 60079-11:2007

EN 61241-1:2004

EN 61241-11:2006

Assessment and test report: PTB Ex 10-20138

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Braunschweig, October 21, 2010


Dr.-Ing. U. Gerlach
Oberregierungsrat









3. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

(Translation)

Equipment: Measuring transducer, type MFC300F and type MFC300F T6

Marking:  II 2 (1) G Ex de [ia/ib] IIC T6 or  II 2 (1) G Ex d [ia/ib] IIC T6
 II 2 G Ex de [ib] IIC T6 or  II 2 G Ex d [ib] IIC T6
 II 2 D Ex tD [ibD] A21 IP6x T80 °C or
 II 2 (1) D Ex tD [iaD/ibD] A21 IP6x T80 °C







Manufacturer: KROHNE Ltd.

Address: Rutherford Drive, Park Farm South Ind. Est.
Wellingborough, Northants NN8 6AE, United Kingdom

Description of supplements and modifications

In the future the measuring transducer, type MFC300F and type MFC300F T6 may also be manufactured and operated according to the test documents listed in the test report. The modifications concern the design of the cover of the sensor terminal box, the adaption to the current state of the standards and hence the marking of the equipment for the application in hazardous areas due to combustible dusts. Furthermore, all markings will be specified in future with EPL.

Therefore, the future markings read:

 II 2 (1) G Ex de [ia/ib] IIC T6 Gb or  II 2 (1) G Ex d [ia/ib] IIC T6 Gb
 II 2 G Ex de [ib] IIC T6 Gb or  II 2 G Ex d [ib] IIC T6 Gb
 II 2 D Ex ib tb IIIC Txx °C Db or  II 2 (1) D Ex ib tb [ia Da] IIIC Txx °C Db

All further specifications, the electrical data and the "Special Conditions" of the EC-type examination certificate as well as the 1st and 2nd supplement apply without changes also to this 3rd supplement.

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 06 ATEX 2038 X

Applied standards

EN 60079-0:2012

EN 60079-1:2007

EN 60079-7:2007

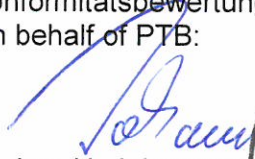
EN 60079-11:2012

EN 60079-31:2014

Test report: PTB Ex 14-24166

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, November 4, 2014


Dr.-Ing. U. Johannsmeyer
Direktor und Professor

