

Translation

(1) EC-type Examination Certificate

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC
- (3) No. of EC-type Examination Certificate: **BVS 11 ATEX E 033 X**
- (4) Equipment: **Coriolis Flow Meter type C-Flow KCE80** / KCM**** and type Tricor TCE80** / TCM******
- (5) Manufacturer: **KEM Küppers Elektromechanik GmbH**
- (6) Address: **85757 Karlsfeld, Germany**
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this type examination certificate.
- (8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council 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 test and assessment report BVS PP 11.2282 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:

EN 60079-0:2009 **General requirements**
EN 60079-1:2007 **Flameproof enclosure 'd'**
EN 60079-11:2007 **Intrinsic safety 'i'**

- (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 appendix to this certificate.
- (11) This EC-type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to 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 2G Ex d [ia] IIC T4 Gb	(Transmitter housing
	II 2G Ex d [ia] IIB T4 Gb	with reference to model)
	II (2)G [Ex ia Gb] IIC	(alternate Transmitter housing
	II (2)G [Ex ia Gb] IIB	with reference to model)
	II 2G Ex ia IIC T4 Gb	(Transducer housing
	II 2G Ex ia IIB T4 Gb	with reference to model)

DEKRA EXAM GmbH
Bochum, dated 21.12.2011

Signed: Simanski

Certification body

Signed: Dr. Eickhoff

Special services unit

- (13) Appendix to
- (14) **EC-type Examination Certificate**
BVS 11 ATEX E 033 X
- (15) 15.1 Subject and type

Coriolis Flow Meter type C-Flow KCE80** / KCM**** or
type Tricor TCE80** / TCM**** comprising:
- Transmitter Unit type KCE80**-**-Ex or type TCE80**-**-Ex**,
respectively:

- one of the following Transducer Units:
- type KCM0300-**-**-**-Ex,
- KCM0600-**-**-**-Ex,
- KCM1500-**-**-**-Ex,
- KCM3000-**-**-**-Ex,
- KCM7900-**-**-**-Ex,
- KCM28K-**-**-**-Ex,
- KCM65K-**-**-**-Ex,
- type TCM0300-**-**-**-Ex-**,
- TCM0600-**-**-**-Ex-**,
- TCM1500-**-**-**-Ex-**,
- TCM3000-**-**-**-Ex-**,
- TCM7900-**-**-**-Ex-**,
- TCM28K-**-**-**-Ex-**,
- TCM65K-**-**-**-Ex-**,

Transmitter Unit C-Flow type series KCE80-**-Ex**

- KCE800n-a-b-c-Ex Reduced driver power electronics designed for Transducer type KCM0300-**-**-**-Ex to type KCM7900-**-**-**-Ex
- KCE801n-a-b-c-Ex Enhanced driver power electronics designed for Transducer type KCM28k-**-**-**-Ex to type KCM65k-**-**-**-Ex
- KCE802n-a-b-c-Ex Enhanced driver power electronics providing adjustable amplification factor designed for Transducer type KCM28k-**-**-**-Ex to type KCM65k-**-**-**-Ex
- n = 0... 9 Hardware- and Software-options not affecting Ex-relevant parameters
- a = WE Wall-mountable flameproof enclosure; screwed cable gland
- SE Panel-mountable housing designed for installation in the safe area
- b = (not used) Standard (RS485, DC 24 V power supply)
- H HART interface provided additionally
- M Power supply AC 100 V – 240 V instead of DC 24 V
- ? Further combinations not affecting Ex-relevant parameters
- c = * Length (in meters) of interconnection cable to Transducer Unit C-Flow type series KCM****-**-**-**-Ex (version KCE80**-WE-**-Ex only)

Transducer Unit C-Flow type series KCM**-**-**-**-Ex**

Type	Flow rate
KCM0300-a-bc-d-e-f-g-Ex	≤ 300 kg/h
KCM0600-a-bc-d-e-f-g-Ex	≤ 600 kg/h
KCM1500-a-bc-d-e-f-g-Ex	≤ 1.500 kg/h
KCM3000-a-bc-d-e-f-g-Ex	≤ 3.000 kg/h
KCM7900-a-bc-d-e-f-g-Ex	≤ 7.900 kg/h
KCM28k-a-bc-d-e-f-g-Ex	≤ 20.000 kg/h
KCM65k-a-bc-d-e-f-g-Ex	≤ 40.000 kg/h

a to f: mechanical details, g: electrical connection

a =	0	Separated electronics / separated transducer
	1	Separated electronics (separated transducer; revision for KCM0300-**-**-**-Ex)
	EF	Compact version; mechanical unit with KCE80**-**-**-Ex
	EFH	EF providing HART interface additionally
	ECM	EF providing AC 100 V – 240 V power supply
	EMH	EM providing HART interface additionally
	E*(H)	various hardware- and software-options not affecting Ex-relevant parameters
b =	HD	High pressure version SS316TI, standard housing
c =	B	With rupture disk
d =	**	Type of process connection (details: see manual)
e =	**	Size and shape of process connection (details: see manual)
f =	**	Pressure range (details: see manual)
g =	2	Terminal box (if a = 0 or 1)

Notes, referring to position a:

- Position 'a' = '0' or '1'; separated transducer; IS connection to transmitter
- Position 'a' = 'EF / EFH / EM / EMH / E*(H)'; compact version; mechanical unit with KCE80**-**-**-Ex

The compact version is marked with KCM****-a-bc-d-e-f-g-Ex only. Separate marking of the flameproof housing with KCE80**-**-**-Ex waived.

Transmitter Unit Tricor type series type TCE80-**-****-Ex-**; type code:**

TCE800n-a-bcde-Ex-xx	Reduced driver power electronics designed for Transducer type TCM0300-**-****-****-Ex-** to type TCM7900-**-****-****-Ex-**	
TCE801n-a-bcde-Ex-xx	Enhanced driver power electronics designed for Transducer type TCM28k-**-****-****-Ex-** to TCM65k-**-****-****-Ex-**	
TCE802n-a-bcde-Ex-xx	Enhanced driver power electronics providing adjustable amplification factor designed for Transducer type TCM28k-**-****-****-Ex-** to TCM65k-**-****-****-Ex-**	
n =	0... 9	Hardware- and Software-options not affecting Ex-relevant parameters
a =	E	Wall-mountable flameproof enclosure; screwed cable gland
	L	Panel-mountable housing designed for installation in the safe area
b =	*	Interface (details see manual)
c =	B	Power supply DC 24 V and AC 100 V... 240 V
	D	Power supply DC 24 V
	M	Power supply AC 100 V ... 240 V
d =	*	Hardware- and Software-options not affecting Ex-relevant parameters
e =	*	Cable length with reference to model TCE80**-E-****-Ex-**
xx =	00 – 99	Special versions, due to application; not affecting Ex-relevant parameters

Transducer Unit Tricor type series TCM****-**-****-****-Ex-**

Type	Flow rate
TCM0300-ab-cdef-ghik-Ex-xx	≤ 300 kg/h
TCM0600-ab-cdef-ghik-Ex-xx	≤ 600 kg/h
TCM1500-ab-cdef-ghik-Ex-xx	≤ 1.500 kg/h
TCM3000-ab-cdef-ghik-Ex-xx	≤ 3.000 kg/h
TCM7900-ab-cdef-ghik-Ex-xx	≤ 7.900 kg/h
TCM28k-ab-cdef-ghik-Ex-xx	≤ 28.000 kg/h
TCM65k-ab-cdef-ghik-Ex-xx	≤ 65.000 kg/h

a to f: mechanical details, g to k: electrical parameters

ab =	**	Size and shape of process connection (details: see manual)
c =	*	Temperature range
d =	*	Pressure range (details: see manual)
e =	*	Accuracy (details: see manual)
f =	*	Mounting length (details: see manual)
g =	A	Terminal box (for IS connection to transmitter)
	E	Compact version (details: see manual)
h =	*	Non-IS interface (details: see manual)
	Z	Not provided
i =	D	Power supply DC 24 V; non-IS
	M	Power supply AC 100 V... 240 V; non-IS
	Z	Not provided
k =	*	Hardware- and Software-options not affecting Ex-relevant parameters
xx =	00 – 99	Special versions, due to application; not affecting Ex-relevant parameters

Notes, referring to position g, h, i:

- separate transducer: only 'A' possible at position 'g'; (position 'h' and 'i': power supply and interface not provided; marked therefore with Z)
- compact version: only E possible at position 'g', position 'h' and 'i' all listed options available.

The compact version is marked with TCM****-**-****-E****-Ex-** only. Separate marking of the flameproof housing with TCE80**-E-****-Ex-**.

15.2 Description

The Coriolis Flow Meter type C-Flow KCE8** / KCM**** or type Tricor TCE8** / TCM**** respectively, comprises either:

- a flameproof transmitter housing and an IS-transducer, directly flanged (compact version), or separately mounted;
- or,
- a transmitter housing made of plastics material (panel mountable housing) intended for installation in the safe area combined with separately mounted IS transducer.

The measuring electronic assemblies type KCE800n / TCE800n, Typ KCE801n / TCE801n or Typ KCE802n / TCE802n inside the flameproof transmitter housing or inside the panel mountable housing provide IS power supply of the transducer and data transfer between the multi-wire IS transducer circuit to non-IS signal circuits and are designed as current limiting and safety shunt assembly modules.

The measuring electronic assemblies type *CE800n and *CE801n or *CE802n provide different IS driver-coil power, KCE80*n and TCE80*n are identical.

Transmitter Housing (models type KCE80**-WE-*-Ex / type TCE80**-E-****-Ex-**):

The transmitter housing consists of a flameproof enclosure closed with threaded covers. The enclosure provides two separated compartments of different size, used as flameproof terminal compartment, or as flameproof electronics compartment, respectively. The terminal compartment contains a terminal board, an LCD-display and buttons, located below the inspection glass of the threaded cover. Cable entries certified for this purpose are used to lead the non-IS circuits into the terminal compartment. The electronics compartment contains the printed circuit boards of the measuring electronic assemblies type KCE800n / TCE800n, type KCE801n / TCE801n or type KCE802n / TCE802n, respectively. For mounting purposes of an associated IS-transducer, the enclosure is fitted with an adapter or terminal box. The IS-transducer may be combined directly with the flameproof enclosure or installed separately. The intrinsically safe multicore transducer circuit is led out of the electronics compartment into the adapter or the terminal box by means of an ATEX approved threaded conductor bushing.

Compliance of the flameproof transmitter housing with EN 60079-1:2007 in context with EN 60079-0:2009 is verified in EC type Examination Certificate FTZU 08 ATEX 0182U including supplements No. 1 and No. 2 thereto.

Panel mountable housing (models type KCE80**-SE-*-Ex / type TCE80**-L-****-Ex-**):

The panel mountable housing comprises a plastics enclosure of cubical size, containing the printed circuit boards of the measuring electronic assemblies type KCE800n / TCE800n, type KCE801n / TCE801n or type KCE802n / TCE802n, respectively. Display and keyboard assemblies are integral part of the front side. Terminals for the non-IS circuits and a 9-pole Sub-D connector for the multicore IS transducer circuit are located on the rear side of the enclosure.

Transducer type KCM****-*.***-*.***-Ex / type TCM****-*.***-*.***-Ex-**.

the transducers comprise a metallic enclosure containing a Coriolis Measuring Chamber or a tubular measuring unit and electronic components (driver- / sensor coils and temperature sensor) designed for interconnection to an multicore IS circuit. The enclosure of the tubular measuring unit may be filled with inert gas, used as a corrosion protection manner. The inert gas is not used for any ex-relevant purposes. The transducers differ with regard to size and shape, measuring range and pressure range of media to be measured.

15.3 Parameters

15.3.1 Panel mountable housing

15.3.1.1 Non-IS circuits

Parameters / circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC) or optionally Power supply (DC)	230 V	AC 264 V	91 (N), 90 (L), 52 (PE)
Relay-SPDT-contact	24 V	AC 264 V	50 (+24 V), 51 (GND), 52 (PE)
RS485 interface	30 V	AC 264 V	40, 41, 42
Foundation Fieldbus	3.3 V	DC 30 V	22 (+), 21 (-), 20 (GND)
Analogue output(4-20 mA)	24 V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Digital-input	24 V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Digital output	24 V	AC 264 V	7 (CTL IN), 8 (GND)
	24 V	AC 264 V	5 (F-OUT), 6 (CTL OUT)

15.3.1.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U_o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I_o	382 mA	219 mA	17 mA	45 mA
Power P_o	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection	9-pol-Sub D connector			
Probe type	*CM28K-x) ¹ *CM65K-x) ¹	*CM0300-x) ¹ *CM0600-x) ¹ *CM1500-x) ¹ *CM3000-x) ¹ *CM7900-x) ¹	(all models)	
Type of protection	Ex ia IIB	Ex ia IIC	Ex ia IIC / IIB	
Remark:) ¹ "*" replaced by 'K' or 'T'; "x" see full-scale type code			

15.3.2 Flameproof enclosure

15.3.2.1 Non-IS circuits

Parameter / Circuit	Voltage U_n	Voltage U_m	Terminals
Power supply (AC)) ¹ exclusive-or	230 V	AC 264 V	91 (N), 90 (L), 52 (PE)
Power supply (DC)) ¹	24 V	AC 264 V	50 (+24 V), 51 (GND), 52 PE)
RS485 interface	3.3V	DC 30 V	22 (+), 21 (-), 20 (GND)
Foundation Fieldbus	24V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Analogue output (4-20 mA)	24V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Digital-input	24V	AC 264 V	7 (CTL IN), 8 (GND)
Digital output	24V	AC 264 V	5 (F-OUT), 6 (CTL OUT)
Remark:	Relay-SPDT-contact not provided) ¹ according to model		

15.3.2.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U_o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I_o	382 mA	219 mA	17 mA	45 mA
Power P_o	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	LEMO FAG.2B.308 (TCM****-**-****-E***-Ex-**, compact)) ² cable with open leads (KCE80**-WE-**-Ex, wall mountable housing) cable with open leads TCE80**-E-****-Ex-**, wall mountable housing) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-**-Ex, compact)) ²			
Probe type	*CM28K-x) ¹ *CM65K-x) ¹	*CM0300-x) ¹ *CM0600-x) ¹ *CM1500-x) ¹ *CM3000-x) ¹ *CM7900-x) ¹	(all models)	
Type of protection	Ex ia IIB	Ex ia IIC	Ex ia IIC / IIB	
Remarks:) ¹ "*" replaced by 'K' or 'T'; "x" see full-scale type code) ² compact version: Transmitter and Transducer Unit form a mechanical unit marked with KCM / TCM			

15.3.3 Intrinsically safe transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U_i	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I_i	382 mA	219 mA	17 mA	45 mA
Power P_i	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	crewed terminals (KCM****-0-**-**-2-Ex, external) screwed terminals (KCM****-1-**-**-2-Ex, external) screwed terminals (TCM****-**-**-AZZ*-Ex, external) LEMO HEG.2B.308 (TCM****-**-**-E***-Ex, compact) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-Ex, compact)			
Probe type	*CM28K-x) ¹ *CM65K-x) ¹	*CM0300-x) ¹ *CM0600-x) ¹ *CM1500-x) ¹ *CM3000-x) ¹ *CM7900-x) ¹	(all models)	
Type of protection	Ex ia IIB	Ex ia IIC	Ex ia IIC / IIB	
Remark:) ¹ "*" replaced by 'K' or 'T'; "x" see full-scale type code			

15.3.4 For the Coriolis C-Flow Meter type C-Flow KCE80** / KCM**** or type Tricor TCE80** / TCM****, respectively, the following ambient temperature range applies:

Model	Type	Ambient temperature range	Medium- temperature range	Temperature class
Panel mountable housing	KCE80x-SE-x-Ex TCE80x-L-x-Ex-x	$0\text{ °C} \leq T_a \leq 60\text{ °C}$	not applicable	not applicable
Flameproof enclosure	KCE80x-WE-x-Ex TCE80x-E-x-Ex-x	$-20\text{ °C} \leq T_a \leq 70\text{ °C}$	not applicable	T4
Transducer compact version	KCMx-a-x-x-Ex TCMx-x-x-Cx-Ex-x	$-20\text{ °C} \leq T_a \leq 70\text{ °C}$	$-40\text{ °C} \leq T \leq 70\text{ °C}$	T4
external transducer	KCMx*-0-x-Ex	$-20\text{ °C} \leq T_a \leq 70\text{ °C}$	$-100\text{ °C} \leq T \leq 70\text{ °C}$	T4
	KCMx-1-x-Ex		$-100\text{ °C} \leq T \leq 135\text{ °C}$	T3
	TCMx-x-x-Ax-Ex-x		$-100\text{ °C} \leq T \leq 210\text{ °C}$	T2
Remark:	"x" see full-scale type code "a" = EF / EFH / EM / EMH / E*(H)			



(16) Test and Assessment Report
BVS PP 11.2282 EG as of 21.12.2011

(17) Special conditions for safe use

- 17.1 Transmitter Unit type KCE80**-WE-*-*Ex / type TCE80**-E-****-Ex-** and Compact Version type KCM****-'EF/EFH/EM/EMH/E*(H)-**-*-*-*Ex / type TCM****-**-****-E***-Ex-**
None
- 17.2 Transmitter Unit type KCE80**-SE-*-*Ex / type TCE80**-L-****-Ex-**
- 17.2.1 The Transmitter Units shall be installed in the safe area only.
- 17.2.2 The installation of Transmitter Units shall be carried out in such a way that the clearances of bare conductive parts of intrinsically safe circuits to grounded metal parts of the enclosure are at least 3 mm, and bare conductive parts of non-intrinsically safe circuits of other apparatus are located in a distance of at least 50 mm away from terminals for external intrinsically safe circuits, or are separated from them by a partition wall according to clause 6.2.1 of EN 60079-11:2007.
- 17.3 External Transducer Units type KCM****-0-**-***-Ex / type KCM****-1-**-***-Ex / type TCM****-**-****-AZZ*-Ex-**
None

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 21.12.2011
BVS-Scha/Sch A 20100640

Certification body

Special services unit