



C-Flow Coriolis Mass Flow Meter



Küppers Elektromechanik GmbH

Application and Features

- For fluids (e.g. PU components, paints) and gases of high density
- Suitable for aggressive and contaminated media
- Measurement of mass flow, density, temperature and volume flow
- Excellent purging and sterilization qualities due to a construction free of dead spots
- Up to +125°C medium temperature
- Individual 8-point-calibration including report
- Ex protected as per ATEX and EMC tested
- High rotation frequency and well-balanced measuring pipes

Special features:

- Pmax. 350 bar
- Short response time
- DKD calibration

Principle

Two parallel arranged pipes are rotated at their resonant frequency by coils. Any mass flow passing through the tubes will generate coriolis forces which appear whenever a mass moves radially in a rotating system. The forces have opposed effects on the in- and outlet side, they do slightly deform the pipes. The excursion of the pipes is detected by sensors on the in- and outlet side. The phase shift between the rotational frequencies of both pipes is proportional to the mass flow rate.

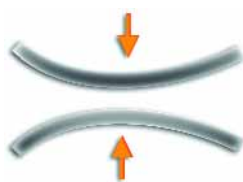
The resonant frequency of both pipes changes in accordance with the density of the medium. This effect is used to determine the density.

The extent of deformation of the pipes depends on temperature. Therefore the temperature is measured for compensation purposes.

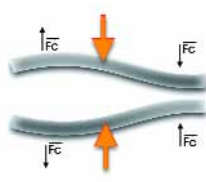
Using only one sensor primary values as mass flow, density and temperature can be measured. Conversions allow for calculation of further values like flow volume and concentration.

Cycle of excursion (simplified)

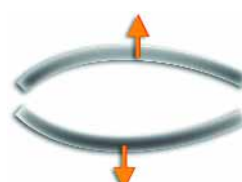
Rotation and deformation of two parallel looped pipes by the coriolis force F_c .



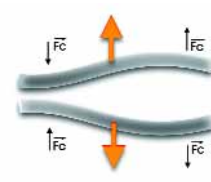
Movement to the inside
no flow



Movement to the inside and
 F_c direction with flow



Movement to the outside
no flow



Movement to the outside and
 F_c direction with flow

KCM Transducer

Type	Internal dia	Meas. range, kg/h	kg/min
KCM 0300	4 mm	4.5 up to 300	0.075 up to 5
KCM 0600	4 mm	9.0 up to 600	0.15 up to 10
KCM 1500	8 mm	25 up to 1,500	0.40 up to 25
KCM 3000	8 mm	50 up to 3,000	0.90 up to 50
KCM 6000	12 mm	60 up to 6,000	1 up to 100
KCM 20K	18 mm	200 up to 20,000	3.3 up to 334
KCM 40K	28 mm	400 up to 40,000	6.7 up to 667
KCM 60K	34 mm	600 up to 60,000	10 up to 1,000

Technical Data - KCM 0300 to KCM 3000

medium temperature:	up to +125°C
connections:	<ul style="list-style-type: none"> • female threads G1/2" • adapters for flanges, diary or tri-clamp connectors
operating pressure:	max. 350 bar
material:	stainless steel as per DIN 1.4571 (AISI 316 Ti)
ingress protecton:	IP 67
electrical connection:	<ul style="list-style-type: none"> • 9-pin flange plug • compact version with integral transmitter
max cable length:	30 metres between transducer and transmitter
Ex-protection:	EX II 2G EEx ib IIC T2–T4
weight:	KCM 300 and 600: 4.1 kg KCM 1500 and 3000: 8.8 kg



Technical Data - KCM 6000 to KCM 60K

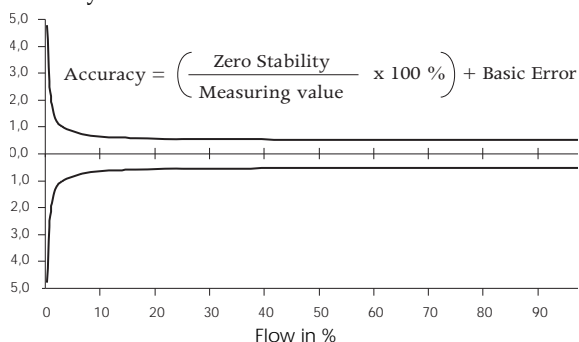
End connections:	flanges acc. EN 1092, ANSI B16.5, DIN2512
Nominal pressure:	PN 40, ANSI 150 / 300 lbs
Process temperature:	-40°C to +180°C (-40°F to +356°F)
Ambient temperature:	-40°C to +60°C (-40°F to +140°F)
Ingress protection:	IP 65 (EN60529) (NEMA 4X)
Materials	Flow tubes, splitter flanges: 1.4404 (316 L)/1.4571 (316 Ti) Housing: cast iron



Accuracy

Type	KCM 300	KCM 600	KCM 1500	KCM 3000	KCM 6000	KCM 20K	KCM 40K	KCM 60K
No. of measuring tubes (arrangement)	2 (serial)	2 (parallel)	2 (serial)	2 (parallel)	2 (parallel)	2 (parallel)	2 (parallel)	2 (parallel)
Basic error (referring to instant. flow)	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Zero stability	0.05 kg/h	0.12 kg/h	0.3 kg/h	0.5 kg/h	0.6 kg/h	2.0 kg/h	4 kg/h	6 kg/h

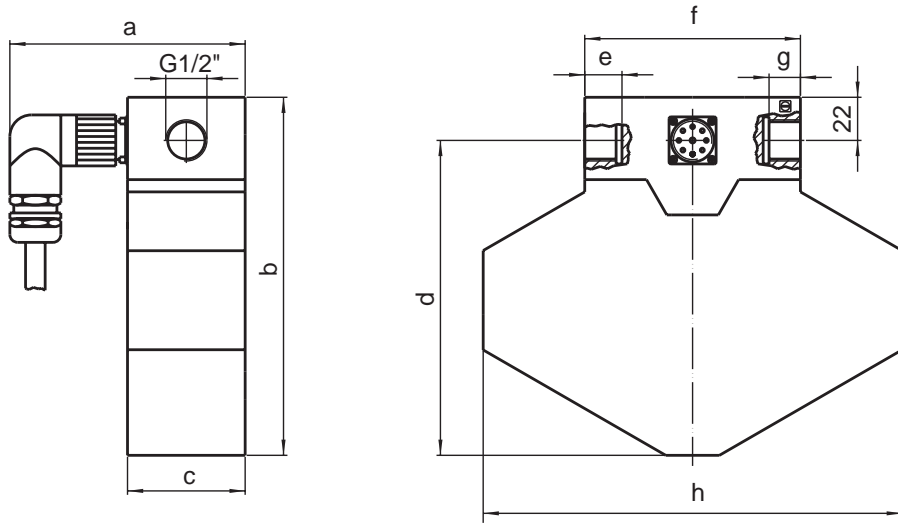
Accuracy in %



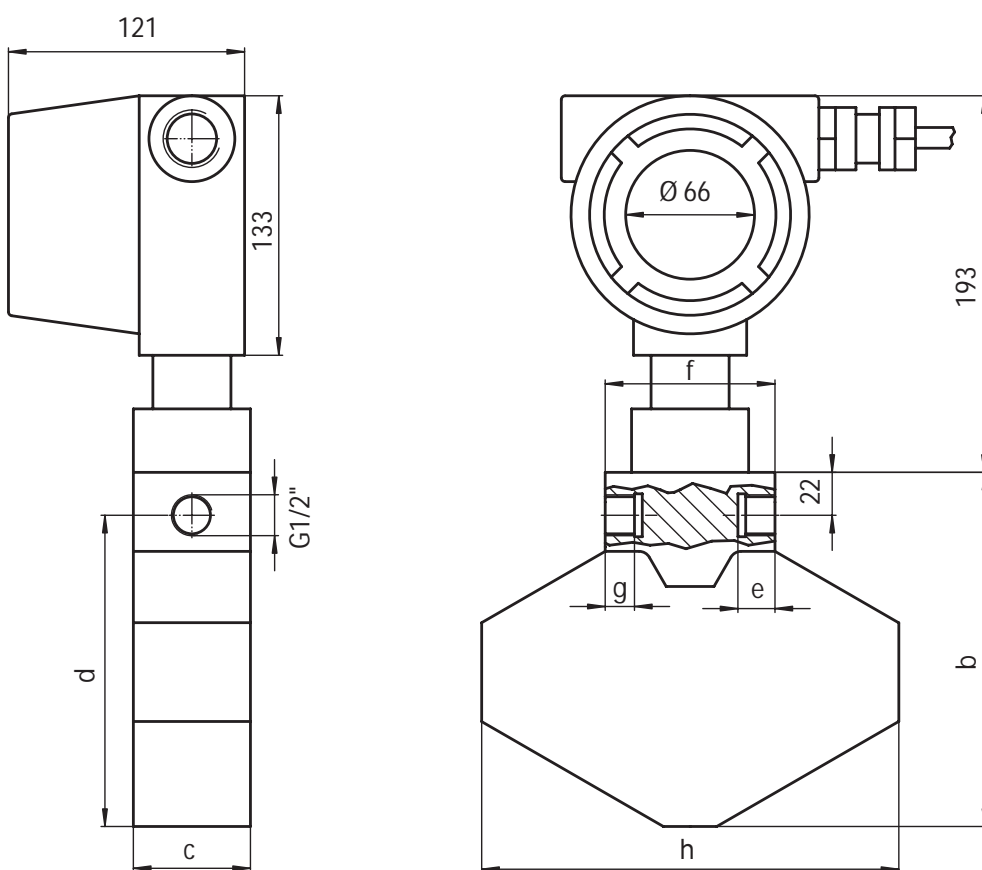
The diagram shows typical values. Individual values may be taken from the calibration records supplied with each meter.

Dimensional drawings (mm) KCM 0300 to KCM 3000

standard housing

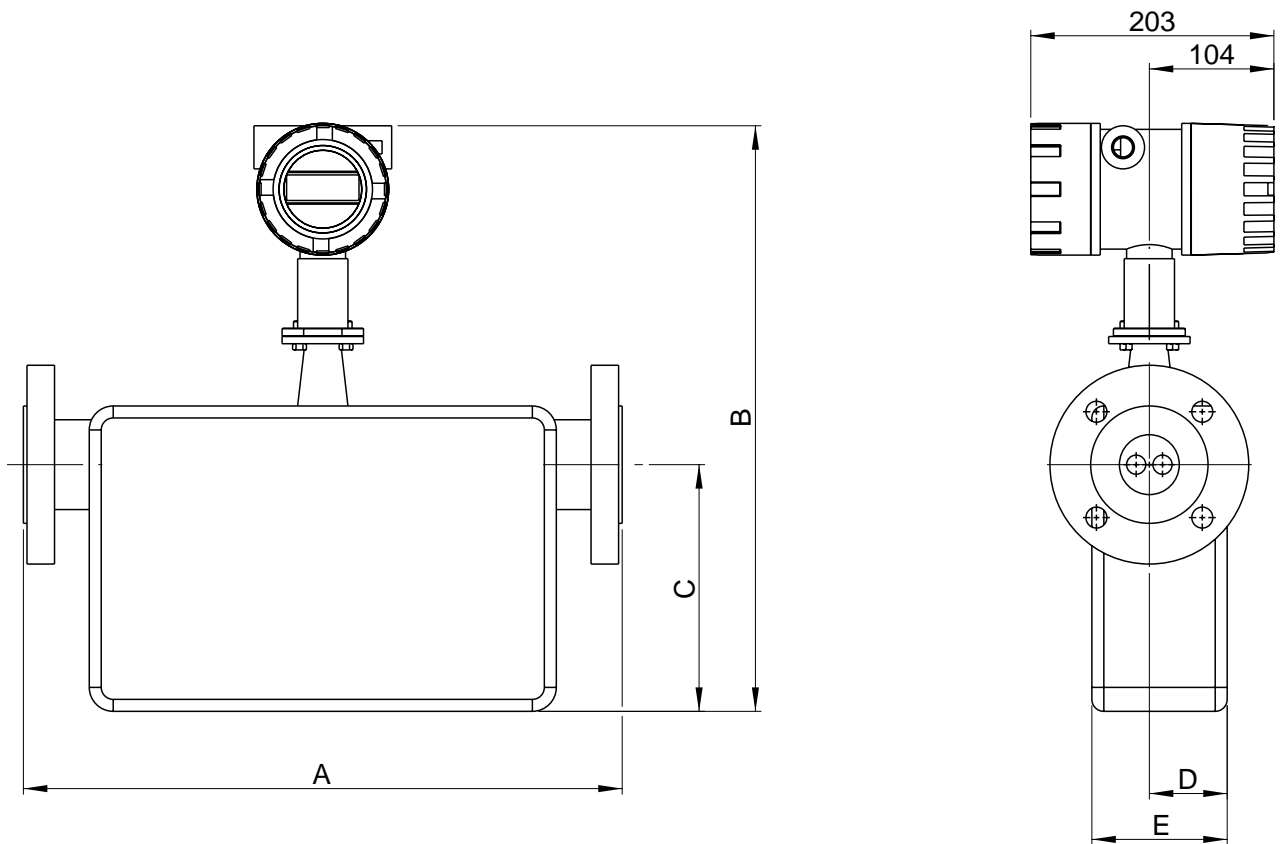


compact housing



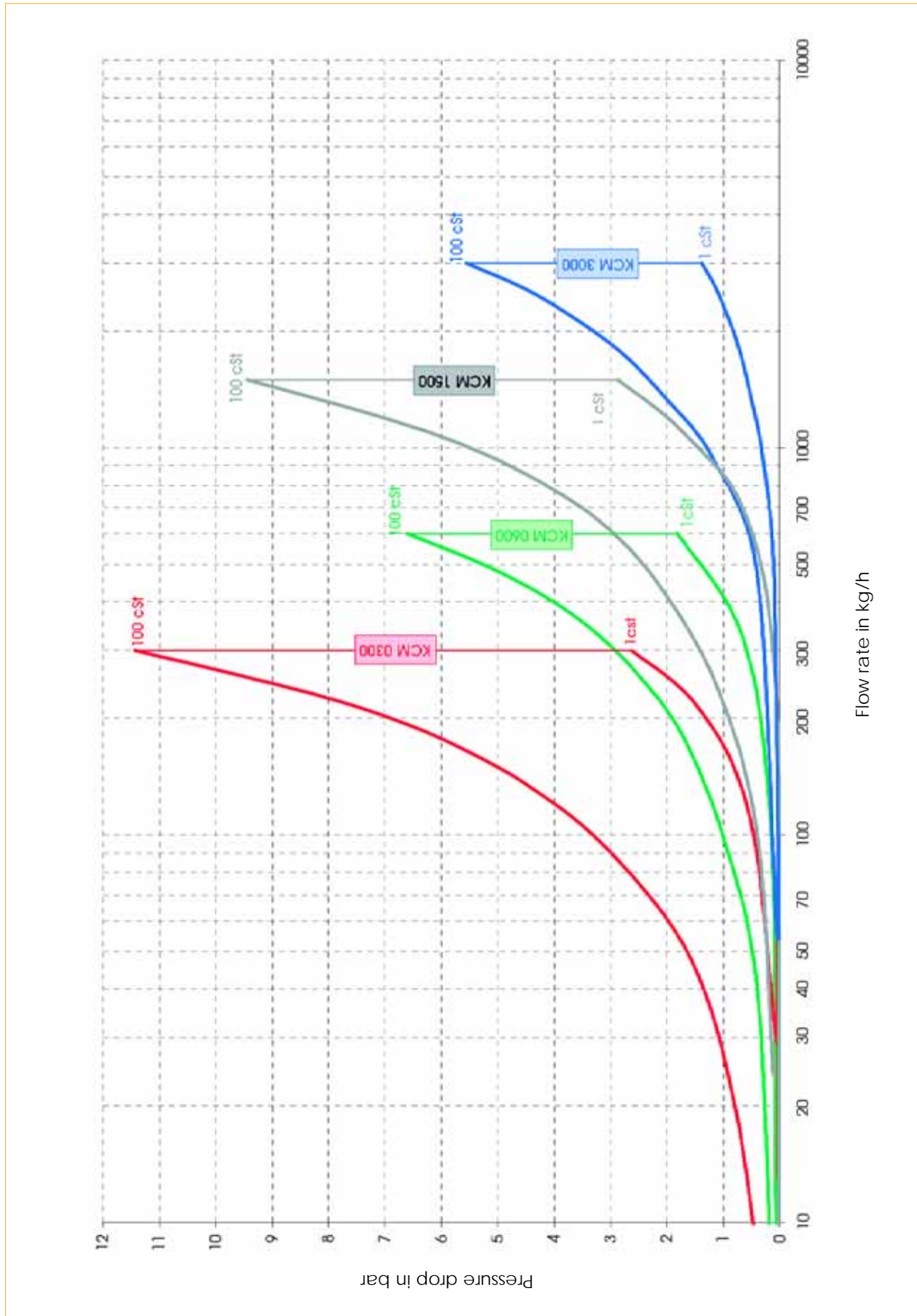
Type	a	b	c	d	e	f	g	h
KCM 0300	120	182	60	160	19	110	15	214
KCM 0600	120	182	60	160	19	87	15	214
KCM 1500	119	280	60	258	21	140	18	350
KCM 3000	119	280	60	258	21	140	18	350

Dimensional drawings (mm) KCM 6000 to KCM 60K




Type	a	b	c	f	g	flange ends
KCM 6000	400	450	173	65	113	DN 25 PN 40, ANSI 1" 150/300 lb
KCM 20K	500	491	206	65	113	DN 50 PN 40, ANSI 2" 150/300 lb
KCM 40K	600	577	290	77	137	DN 80 PN 40, ANSI 3" 150/300 lb
KCM 60K	600	577	290	77	137	DN 80 PN 40, ANSI 3" 150/300 lb

Pressure drop



KCE 4000 Transmitter

General

Housing (WG):	plastic for wall mounting with transparent cover 200 x 215 x 168 mm (W x H x D) without cable glands weight: approx. 1.5 kg protection class: IP 54/DIN EN 60529
Housing (SG):	plastic for panel mounting as per DIN 43700/IEC 61554 optionally with transparent cover 192 x 96 x 205 mm (W x H x D) without cover 196 x 99 x 241 mm (W x H x D) with cover panel board cut out: 186 x 92 mm weight: approx. 1 kg protection class: IP 42 (IP 52 with cover)
Programming:	via front keyboard
Display:	illuminated two-line alpha numerical LCD display for measuring values and parameter setting, 2x 20 characters, character size 2.4 x 4.7 mm
Interface:	RS 485 (in preparation)
Temperature:	storage and transport: -25 up to +75°C operation: 0 up to +50°C
EMC:	according to EN 50 081-2 and EN 50 082-2
Supply voltage:	24 V/DC, 15%
Power consumption:	max. 2 W
Ex-Protection:	 II (2) G [EEx ib] IIC
Analogue Outputs	
Voltage output:	2 off 0-5 V resolution: 12 bit linearity: $\pm 0.05\%$ of final value temperature drift: 0.05 % per 10 K load: > 10 k scaled output of flow rate
Current output:	1 off 0/4-20 mA, active, galvanically free resolution: 12 bit linearity: $\pm 0.05\%$ of final value temperature drift: 0.05% per 10 K load: < 800 Ω scaled output of flow rate or job total, density or temperature

KCE 4000 Transmitter

Pulse Output

Frequency range: 8-5,000 Hz

Output signal: adjustable via jumpers

- open collector: $U_{CE} < 30 \text{ V}$, $I_{CE} < 50 \text{ mA}$
- push pull: $I_{max} 20 \text{ mA}$
output of flow rate

Switch Outputs (2 off)

Output signal: adjustable via jumpers:

- open collector: $U_{CE} < 30 \text{ V}$, $I_{CE} < 50 \text{ mA}$
- push pull: $I_{max} 20 \text{ mA}$

Use:

- limit 1 for job total, fault or flow rate
- limit 2 for job total, cycle or flow rate

Switch Inputs (2 off)

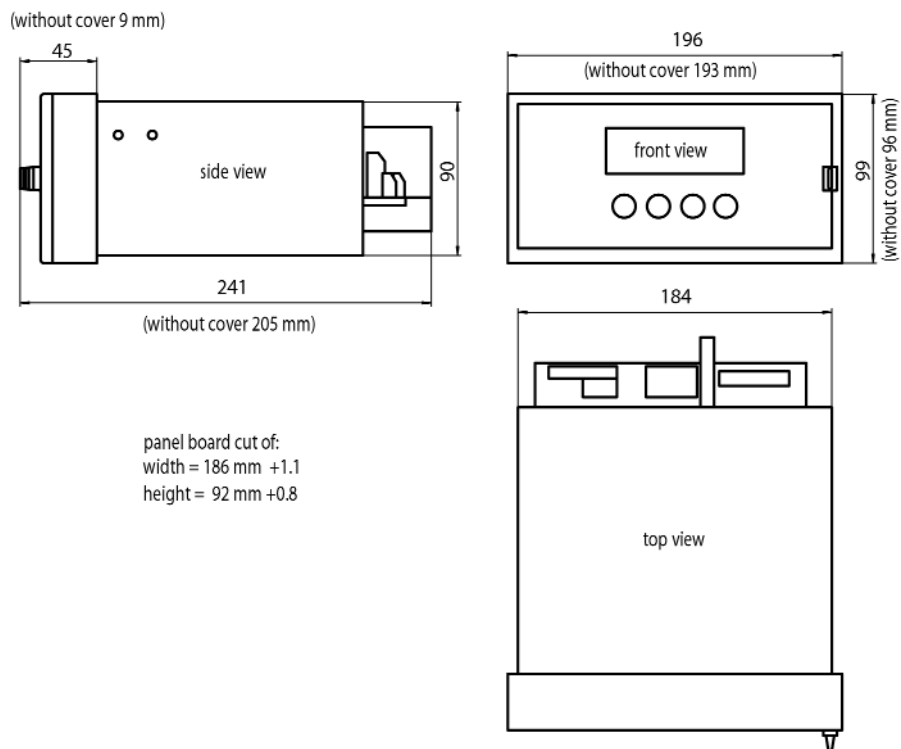
passive "on" $> 4 \text{ V}$, "off" $< 1 \text{ V}$

Use:

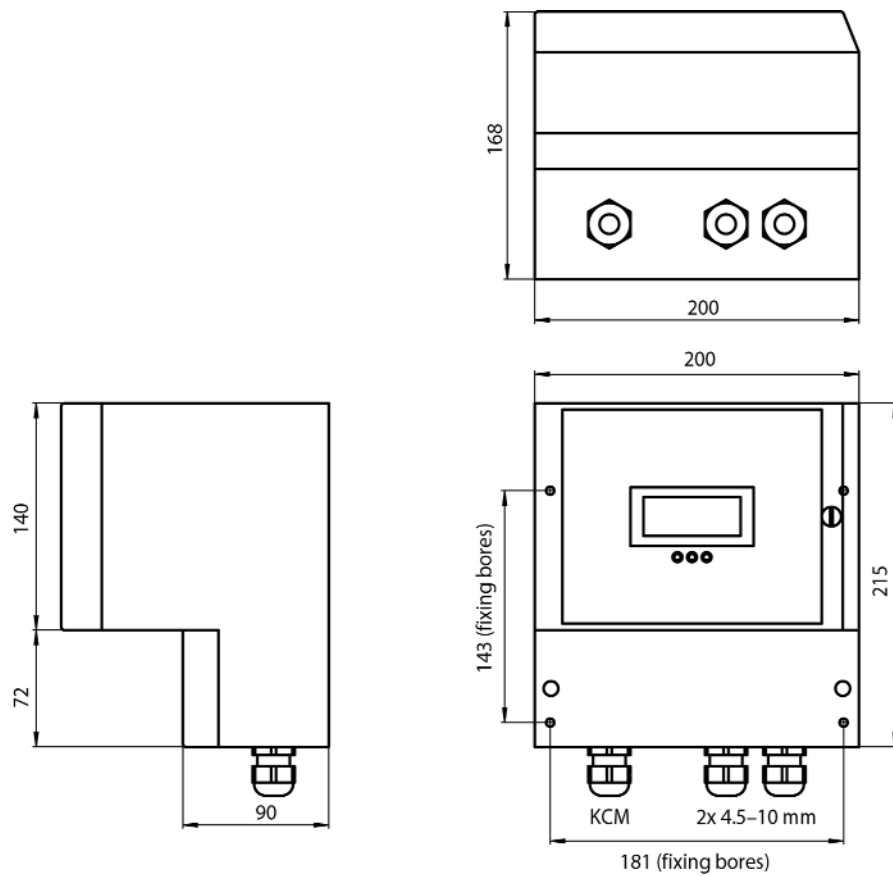
- 1x for job total reset
- 1x for offset

Dimensional drawings (mm)

panel-mounted housing (192 x 96 mm)




housing for wall-mounting



Marking of the Transducer KCM



Küppers Elektromechanik GmbH
Flow Meters - www.kem-kueppers.com
Liebigstr.2 - D-85757 Karlsfeld -
Phone +49 (0) 8131/593910

Type KCM *****	$U_i = 10.6 \text{ V}$
S/N *****	$I_i = 80 \text{ mA}$
 II 2G EEx ib IIC T2-T4	$P_i = 0.22 \text{ W}$
Tamb. -30 up to +50°C	$L_i = 3 \text{ mH}$
Tmed.max. +125°C	

The year of manufacture and date of final test is documented by a test sticker.


Important Note

The transducer KCM **-Ex must only be operated with the associated evaluation electronics transmitter KCE **-Ex.

Marking of the Transmitter KCE



Küppers Elektromechanik GmbH
Flow Meters - www.kem-kueppers.com
Liebigstr.2 - D-85757 Karlsfeld -
Phone +49 (0) 8131/593910

Type KCE *****	$U_o = 10.6 \text{ V}$
S/N *****	$I_o = 80 \text{ mA}$
 II 2G [EEx ib] IIC	$P_o = 0.22 \text{ W}$
Tamb. 0 up to +50°C	$L_o = 4 \text{ mH}$
$U_b +24\text{V/DC} \pm 15\%$	$C_o = 2.3 \mu\text{F}$
	$U_m = 253 \text{ V/50 Hz}$

The year of manufacture and date of final test is documented by a test sticker.

Important Note

The transmitter KCE*** must not be operated within hazardous areas.
KCM**-Ex and KCE*** must be connected with the ready-to-wire cable by KEM ($L=0.45 \text{ mH/km}$, $C = 160 \text{ nF/km}$). The max. cable length has to be below 75 metres and max. inductivities and capacities for the respective zone have to be considered.

Housings available



Panel-mounted housing



Compact version

Compact version for higher flow rates



Housing for wall-mounting

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Internet
www.kem-kueppers.com



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