



# ACM Mass Coriolis Mass Flow Meter



## Application and Features

- For fluids (e.g. PU components, paints) and gases of high density
- Suitable for slurries and particle filled fluids
- 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 tubes

### Special features:

- Pmax: 5,600 PSI
- Short response time
- DKD calibration

## Principle

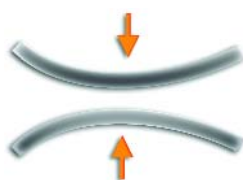
Two parallel tubes are rotated at their resonant frequency by coils. Any mass flow passing through the tubes will generate coriolis forces which appear whenever a mass moves radially in a rotating system. The forces have opposed effects on the in- and outlet side, and slightly deform the pipes. The excursion 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 the pipes changes with the density of the medium. This effect is used to determine the density.

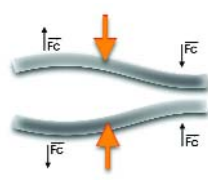
The extent of deformation of the pipes depends on temperature. Therefore the temperature is measured for compensation purposes.

### Cycle of excursion (simplified)

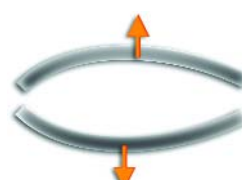
Rotation and deformation of two parallel looped pipes by the coriolis force  $F_c$ .



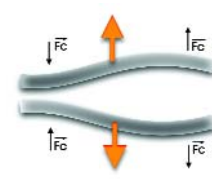
Movement to the inside  
no flow



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

## ACM Flow Meter

Type	Internal dia	Meas. range, kg/h	kg/min
ACM 0300	4 mm	4.5 up to 300	0.075 up to 5
ACM 0600	4 mm	9.0 up to 600	0.15 up to 10
ACM 1500	8 mm	25 up to 1,500	0.40 up to 25
ACM 3000	8 mm	50 up to 3,000	0.90 up to 50
ACM 6000	12 mm	60 up to 6,000	1 up to 100
ACM 20K	18 mm	200 up to 20,000	3.3 up to 334
ACM 40K	28 mm	400 up to 40,000	11 up to 667
ACM 60K	34 mm	600 up to 60,000	16.6 up to 1,000

### Technical Data - ACM 0300 to ACM 3000

medium temperature:	up to +125°C
connections:	<ul style="list-style-type: none"> <li>female threads G1/2"</li> <li>adapters for flanges, diary or tri-clamp connectors</li> </ul>
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"> <li>9-pin flange plug</li> <li>compact version with integral transmitter</li> </ul>
max cable length:	30 metres between tranducer and transmitter
Ex-protection:	EX II 2G EEx ib IIC T2–T4
weight:	ACM 300 and 600: 4.1 kg ACM 1500 and 3000: 8.8 kg



### Technical Data - ACM 6000 to ACM 60K

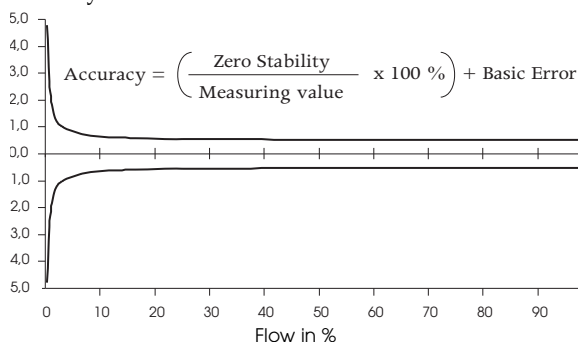
End connections:	flanges acc. EN 1092, ANSI B16.5, DIN2512
Nominal pressure:	PN 40, ANSI 150 / 300 lbs
Process temperature:	-40°C to +180°C (-40°F to +356°F)
Ambient temperature:	-40°C to +60°C (-40°F to +140°F)
Ingress protection:	IP 65 (EN60529) (NEMA 4X)
Materials	Flow tubes, splitter flanges: 1.4404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



## Accuracy

Type	ACM 300	ACM 600	ACM 1500	ACM 3000	ACM 6000	ACM 20K	ACM 40K	ACM 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

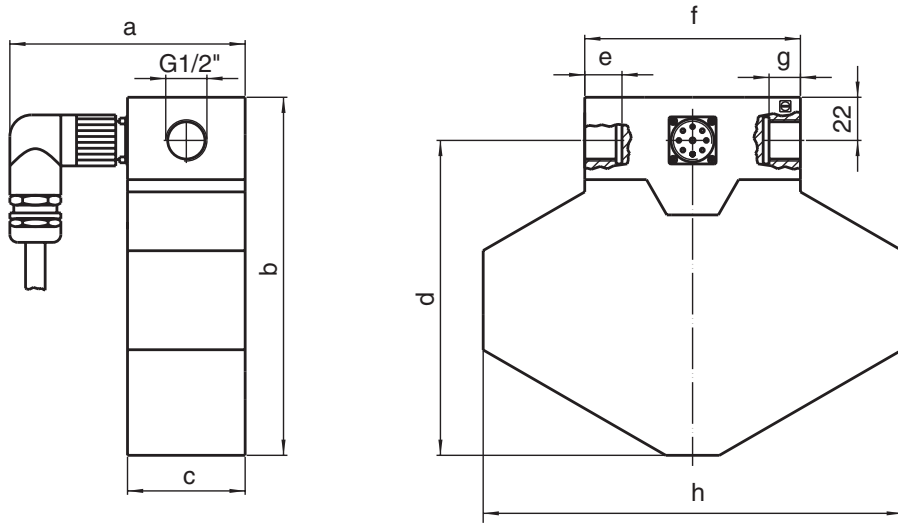
### Accuracy in %



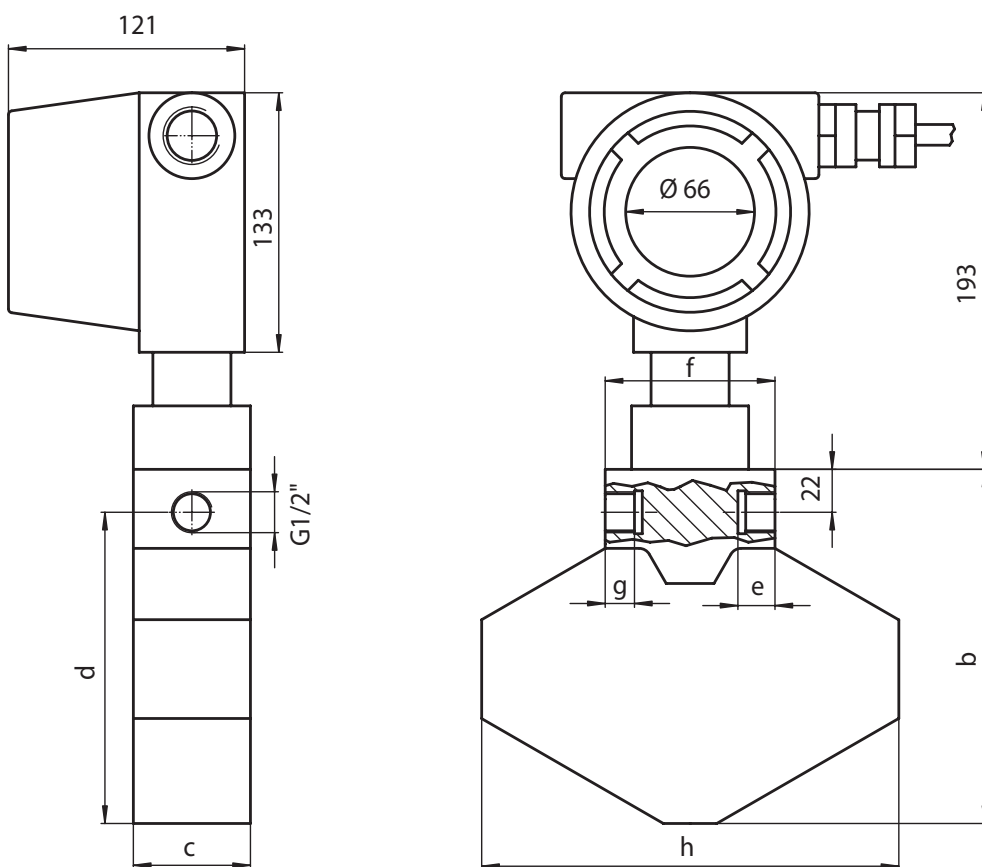
The diagram shows typical values. Individual values may be taken from the calibration records supplied with each meter.

Dimensional drawings (mm) ACM 0300 to ACM 3000

standard housing

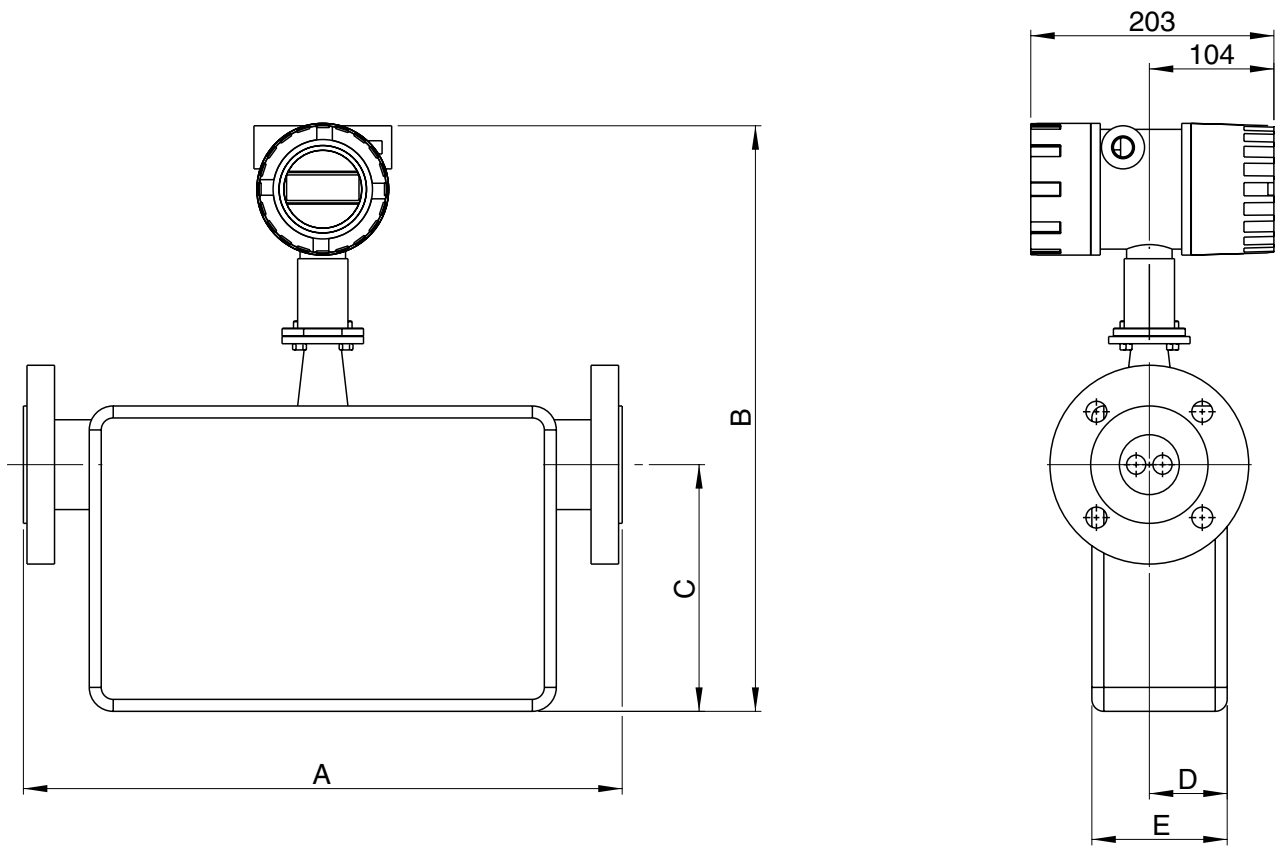


compact housing



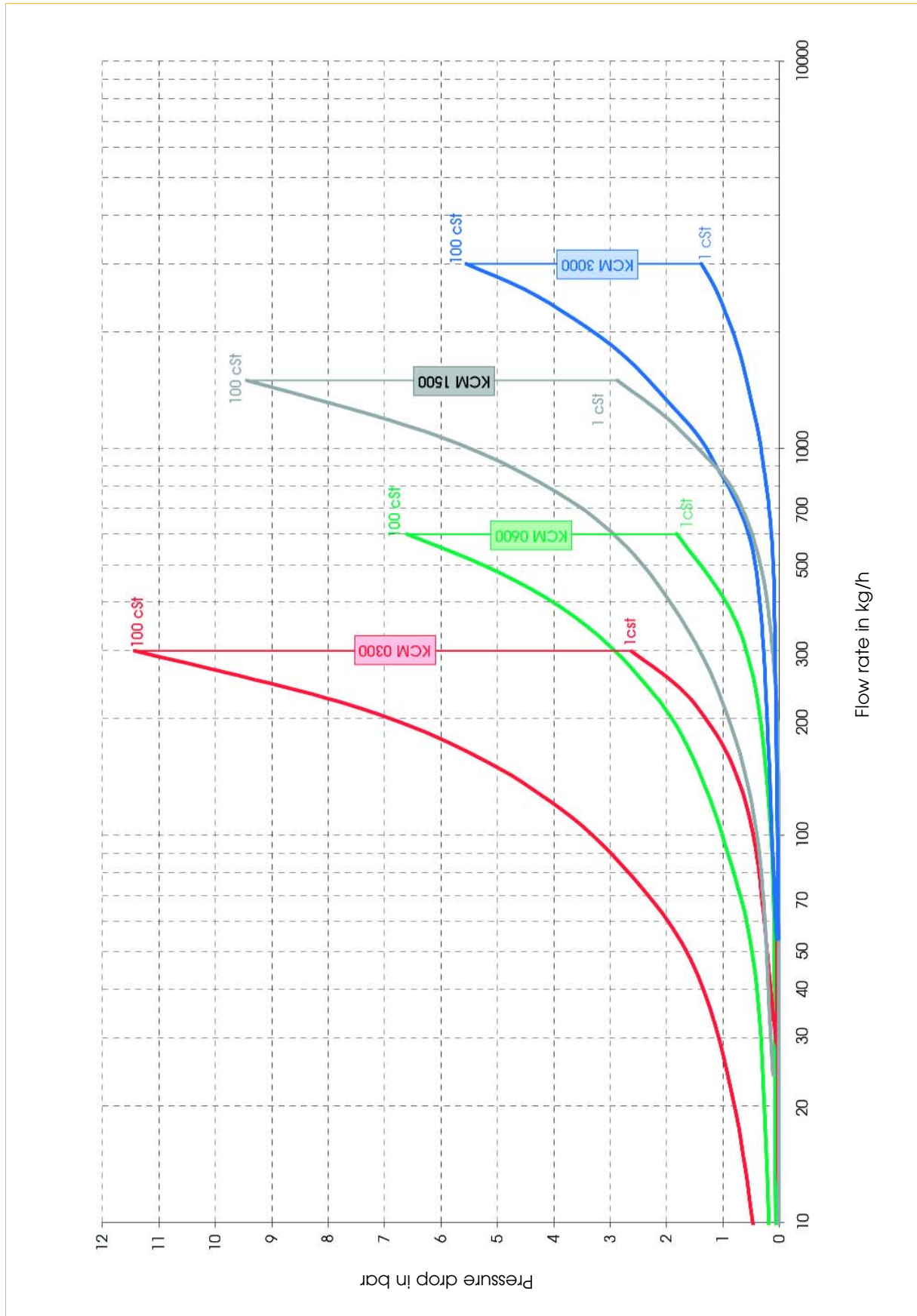
Type	a	b	c	d	e	f	g	h
ACM 0300	120	182	60	160	19	110	15	214
ACM 0600	120	182	60	160	19	87	15	214
ACM 1500	119	280	60	258	21	140	18	350
ACM 3000	119	280	60	258	21	140	18	350

Dimensional drawings (mm) ACM 6000 to ACM 60K




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

### Pressure drop



## ACE 1000 Transmitter

### General

Housing (WG):	plastic for wall mounting with transparent cover 200 x 215 x 168 (B 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 (B x H x D) without cover 196 x 99 x 241 (B x H x D) with cover panel board cut out: 186 x 92 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
<b>Analogue Outputs</b>	
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 $\Omega$ scaled output of flow rate or job total, density or temperature

## ACE 1000 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

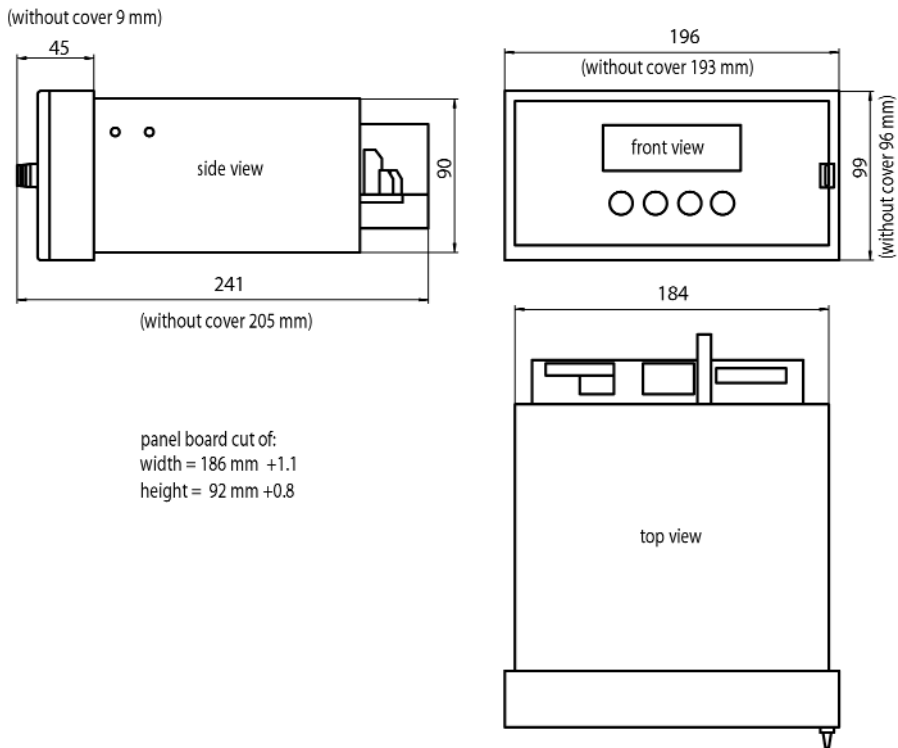
### Switch Inputs (2 off)

- passive "on"  $> 4 \text{ V}$ , "off"  $< 1 \text{ V}$
- Use:
- 1x for job total reset
  - 1x for offset

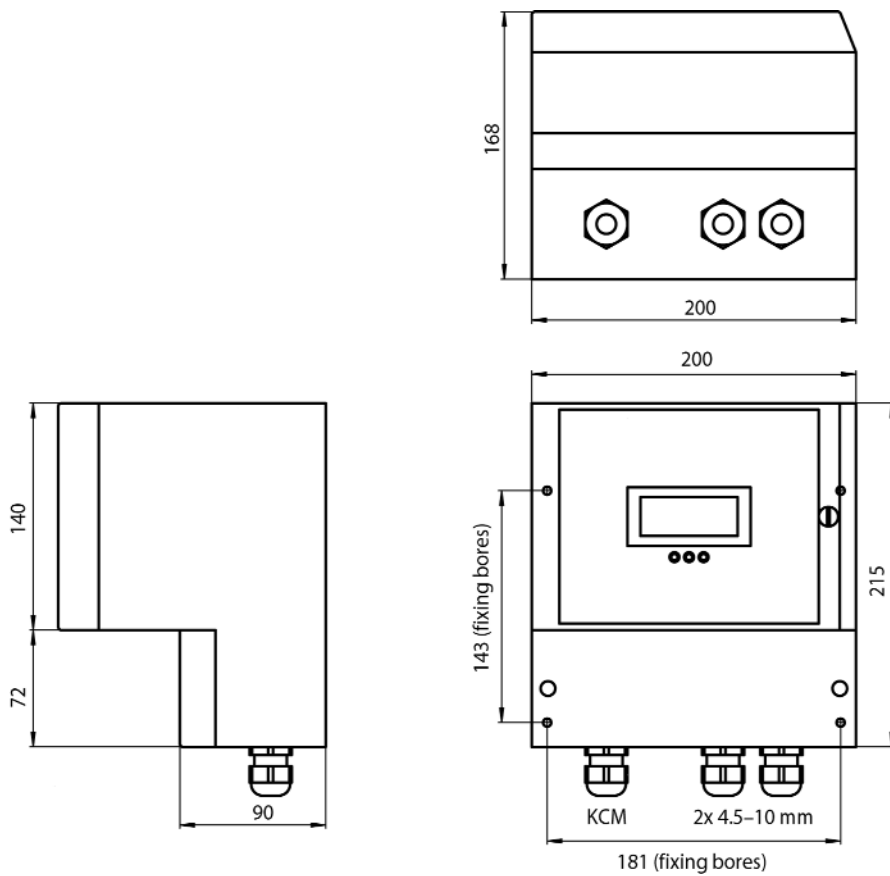


**Dimensional drawings (mm)**


*panel-mounted housing (192 x 96 mm)*



*housing for wall-mounting*



## ACM Flow Meter Identification


Type ACM *****	$U_i = 10.6 \text{ V}$
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 ACM \*\*-Ex must only be operated with the associated evaluation electronics transmitter ACE \*\*-Ex.

## ACE Transmitter Identification

Type ACE *****	$U_o = 10.6 \text{ V}$
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 ACE\*\*\* must not be operated within hazardous areas.  
ACM\*\*-Ex and ACE\*\*\* must be connected with the ready-to-wire cable ( $L=0.45 \text{ mH/km}$ ,  $C = 160 \text{ nF/km}$ ). 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

Subject to change without notice.