

# Coriolis Mass Flowmeter

## UMC.2B converter:

- Converter with an EEx de [ia] IIC/IIB T6-T3 approval
- Communication capabilities via HART and Profibus PA
- Several self-monitoring functions in hardware and software
- User-friendly operator guidance with new software functions
- Separate operator terminal, for mounting inside or outside the converter to ensure optimum accessibility

## TM transmitter:

- Series for mass rates of flow between 0.08 kg/h to 700 t/h
- Extendible transmitter in modular construction
- Unsurpassed material choice for wetted parts
- Numerous variants and special modules

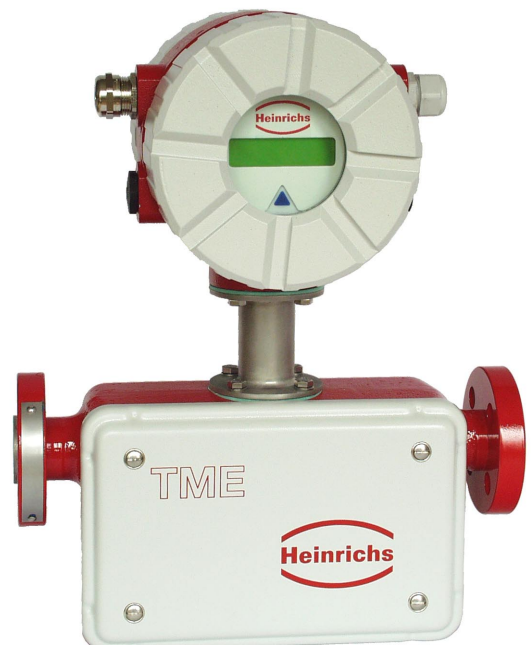
## TME transmitter:

- Series for mass rates of flow from 2 kg/h to 60 t/h
- Optimized for most standard applications

## Measuring principle

The symmetrically arranged Omega measuring tubes 1 and 2 are vibrated against each other in the X and Y axis. For this reason, the limbs RS 1 and RS 2 of the measuring tube 1 and the limbs RS 1 and RS 2 of the measuring tube 2 oscillate on a circular segment in case of zero flow. If a liquid Q flows through the measuring tube, whereby the liquid flow is distributed to the two measuring tubes by the flow separator, the particles in the measuring tube limb RS 1 are accelerated from a smaller to a larger segment speed. In the process the mass of accelerated particles produce an inertial force  $F_c$ , the so-called Coriolis force, which acts opposite to the direction of the rotational movement. Conversely, the particles, which

move on the X or Y axis in the limb RS 2, are forced from the larger to the smaller segment speed, thus they are decelerated and exert an inertial force in direction of the rotational movement. This force, which acts on the two limbs RS 1 and RS 2 with the same mass but with opposite directions, is referred to as Coriolis force. Thus, RS 1 remains behind the uninfluenced vibrating movement whereas RS 2 passes on ahead. The Omega measuring tubes are deformed. The Coriolis force is directly proportional to the product of mass and speed of the medium and the angular velocity of the Omega measuring tube. The following applies:  $F_c = - 2 m [\omega \times v]$ .



## Measuring ranges

The measuring range depends on the transmitter (TM or TME).

TM with single measuring tube

DN	PN	MB (kg/h)	$\Delta p$ (bar)	NP ( $\pm$ kg/h)
10	40	0.8	0.08	0.0008
		8	1.97	
10	40	2	0.03	0.002
		20	1.18	
10	40	8	0.03	0.008
		80	2.64	
10	40	15	0.01	0.015
		150	1.20	

TM with double measuring tube (Omega shape)

DN	PN	MB (kg/h)	$\Delta p$ (bar)	NP ( $\pm$ kg/h)
10	40	20	0.04	0.02
		200	4.1	
10	40	35	0.02	0.035
		350	1.63	
15	40	120	0.02	0.12
		1 200	1.34	
25	40	300	0.01	0.3
		3 000	0.50	
25	40	600	0.01	0.6
		6 000	1.05	
50	40	2 000	0.02	2
		20 000	1.83	
80	40	4 000	0.01	4
		40 000	1.31	

TM with double measuring tube (#Leerlauf shape)

DN	PN	MB (kg/h)	$\Delta p$ (bar)	NP ( $\pm$ kg/h)
100	16	20 000	0.08	0.0008
		80 000	1.97	
125	16	30 000	0.03	0.002
		10 0 000	1.18	
150	16	30000	0.03	0.008
		300000	2.64	
200	16	70000	0.01	0.015
		400000	1.20	
250	16	350000	0.01	0.015
		700000	1.20	

TME with double measuring tube (Omega shape)

DN	PN	MB (kg/h)	$\Delta p$ (bar)	NP ( $\pm$ kg/h)
10	40	20	0.04	0.02
		200	3.9	
10	40	35	0.02	0.035
		350	1.63	
15	40	120	0.02	0.12
		1 200	1.46	
15	40	200	0.02	0.2
		2 000	1.69	
25	40	300	0.01	0.3
		3 000	0.61	
25	40	600	0.02	0.6
		6 000	1.19	
50	40	2 000	0.03	2
		20 000	2.4	
80	40	4 000	0.02	4
		40 000	1.47	
80	40	6 000	0.01	6
		60 000	1.21	

## Tecnicl data

Measuring tolerance:	$\pm 0.2\%$ of measure value $\pm$ NP
Process temperature range:	TM: -40 to +260°C TME: -40 to +180°C
Process pressure range:	PN 10 to PN 40, depending on the transmitter and the flanges; higher nominal pressures on request
Ambient temperature:	- 20 to + 50°C
Degree of protection:	UMC.2B: IP 68 TM: IP 65 DIN 40050 (standard), Option: IP 68 DIN 40 050 explosion-proof transmitter housing TME: IP 65 DIN 40050
Process connection:	TM: Flanges in accordance with DIN 2501, ANSI, BST, etc.; cable glands in accordance with DIN 11851; Special versions TME: flanges in accordance with DIN 2501 PN 40
Power supply:	24 V AC +10% to -15 % 50/60 Hz 230 V AC +10% to -15 % 50/60 Hz 24 V DC +20% to -15 %
Outputs:	Analog outputs: 2 x 0/4-20 mA electrically isolated (EEx "i" or EEx "e") Pulse/frequency output 1 x active/passive Status/frequency 1 x passive
Lining materias:	TM: High-grade steel 1.4571, Hastelloy C4, Tantalum, others on request TME: Stainless steel 1.4571, Hastelloy C4,
Safety class:	UMC.2B converter: DMT 00 ATEX E 050 X II (1) 2G EEx de [ia] IIC / IIB T3 – T6 EEx d [ia] IIC / IIB T3 – T6  TM/TME transmitter: DMT 01 ATEX E 149 X II 2G EEx ia IIC T6 – T2
CE Mark:	EMC directives 89/336/EWG, EN 50081 Parts 1 and 2 EN 50082 Parts 1 and 2 NAMUR guideline NE21 Directive 94/9/EC
Legend:	MB measuring range upper value at Qmax $\Delta p$ pressure loss at Qmax, water T= 20° C NP zero error

Subject to changes without notice

21.03.02

PI 412.1e

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