

Coriolis Mass Flow Meter

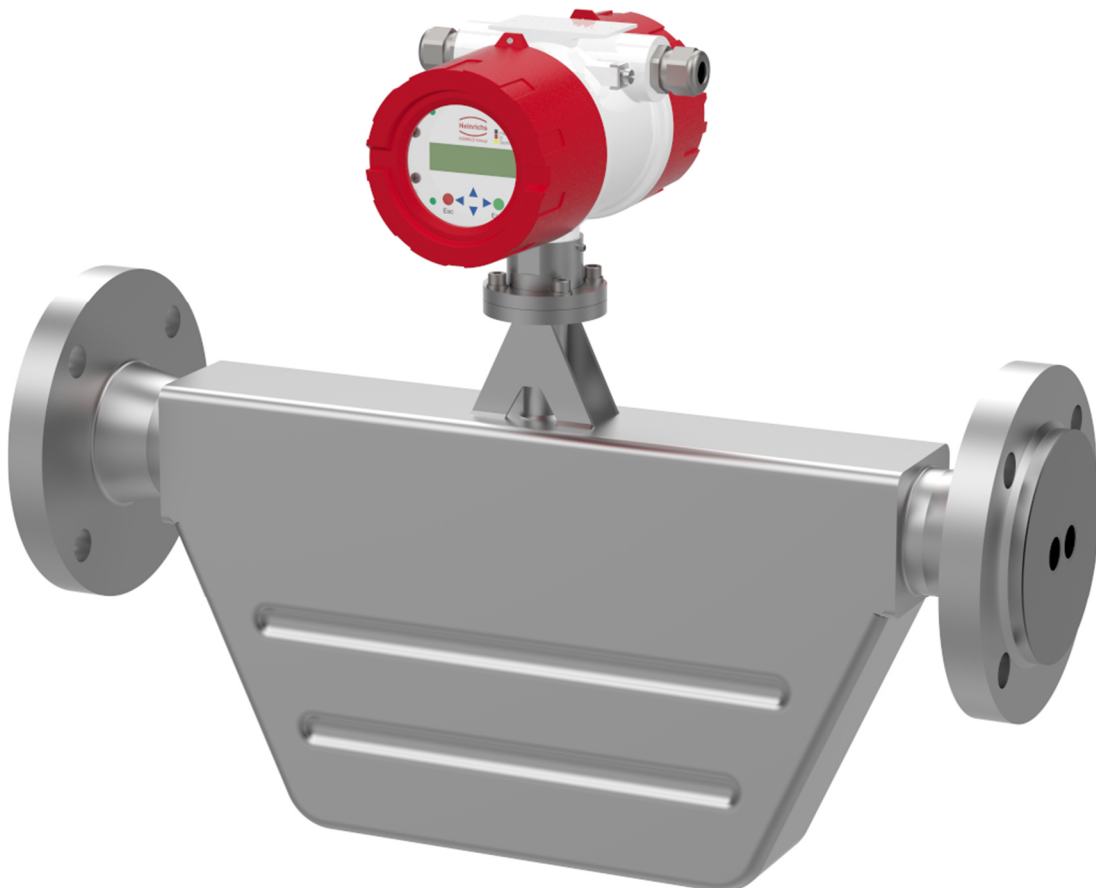
A proven solution for aggressive media
and demanding industrial applications

TMU-T

Technical information

Tantalum

- Extreme compact design
- Measuring ranges from 60 kg/h to 80 000 kg/h
- Immune to external vibration
- Immune to pipeline induced stresses
- Wetted parts made of Tantalum
- Sensor housing: 1.4301 (304L), fully welded
- Optional sensor heating



Function

The TMU Coriolis flow Sensors utilize the Coriolis principle for the direct measurement of mass flow.

The sensor possesses two parallel-arranged tubes, which are continuously force-vibrated at their resonance frequency. When a fluid or gas passes through the tubes, the mass flow momentum in conjunction with the Coriolis effect invokes a change in the tubes deflection, causing the inlet and outlet legs of the tubes to twist out of phase.

Coupled with a UMC transmitter, the phase shift is captured and evaluated. The derived linear output is proportional to the mass-flow.

The TMU Coriolis Mass Flow Sensors are designed for measuring the mass flow, density and calculated volume flow of almost all liquid and gaseous media

TMU-T offers many advantages for use in demanding industrial applications. These devices are designed to measure the mass flow of liquids and gases in a variety of industrial processes, especially those involving highly

corrosive materials. This is possible by the usage of tantalum as wetted material.

The chemical resistance and robustness of tantalum ensures long-term performance and durability in industrial applications with high requirements.

The use of TMU-T in demanding industrial applications is advantageous due to its high accuracy and ability to remain stable over long periods of time.

The meters are designed to handle a wide range of flow rates, providing flexibility for various applications. They are used in industries such as oil and gas, petrochemical and chemical industries, where accurate measurement for mass flow is required to maintain process efficiency and product quality.

The TMU Series also has a proven track record for use in precise dosing systems as well as in loading and unloading applications.

Technical Details

Sensor system: TMU (2. generation)

Coriolis dual-pipe tubes
TMU-T008 to TMU-T050

Accuracy

Liquid: 0,1 % of actual flowrate
± ZP stability

Gas: 0,5 % of actual flowrate
± ZP stability

Wetted parts:

- Tantalum

Process connection:

- Flanges: DIN / ASME

Sensor housing:

Material: 1.4301 Stainless Steel
Optional: 2x drain nozzle NPT(f)
Trace heating

Operating conditions:

Ambient temperature: -40 °C...+80 °C
-40 °F...+176 °F

Process temperature: -40 °C...+180 °C
-40 °F...+356 °F

Process pressure: depending on sensor size

Protection class: IP67 (EN 60529) / NEMA 6

Certificates and Approvals

ATEX/IECEX: II 1/2G Ex ia IIC T2...T6 Ga/Gb

cCSAus: Class I, Zone 0, Div.1 and Div.2
Group A, B, C, D
AEx ia IIC T5-T2 Ga

NEPSI: Ex ia IIC T2...T6 Ga/Gb
Class I, Zone 0

Available Transmitters UMC4 / UMC4-RM

Transmitter mounting:

- Field housing
local mounted or remote mounted via junction box (½"NPT (f), M20x1,5) or connector (Harting Han® R23).
IP67 (EN60529) / NEMA6
- Rack-mount design (RM)
remote, via screw terminals
IP20 (to be mounted in min. IP54 ATEX certified protective cabinet)

Power supply:

- 19...36 V_{DC} / 24 V_{AC} (+5%...-20%), 50/60 Hz
- 90...265 V_{AC}, 50/60 Hz

Outputs:

Each output circuit is galvanically isolated from each other as well as to ground.

Analogue: 1x 4...20 mA, passive, with HART®
1x 4...20 mA, passive
mass flow, volume flow, density, temperature

Binary: passive via optocoupler
Pulse duration: 50 ms
adjustable range: 0,1...2000 ms

Status: passive via optocoupler
Forward-/Reverse flow, MIN/MAX flow rate, MIN/MAX density, MIN/MAX temperature, alarm, second pulse output (phase shifted to pulse 1 by 90°).

Certificates and Approvals UMC4 / UMC4-RM



Field housing:

ATEX / IECEx: II (1)2G Ex d [ia Ga] IIC T4-T3 Gb
NEPSI: Ex db [ia Ga] IIC T4/T3 Gb

Terminal compartment: Ex d

Type of protection signal output:

- Ex [ia Ga] intrinsically safe
- Non-intrinsically safe



Rack-mount design (RM):

ATEX / IECEx: II (1)3G Ex ec [ia Ga] IIC T6...T3 Gc

(Transmitter to be mounted in min. IP54 ATEX certified protective cabinet)

Type of protection signal output:

- Ex [ia Ga] intrinsically safe
- Non-intrinsically safe

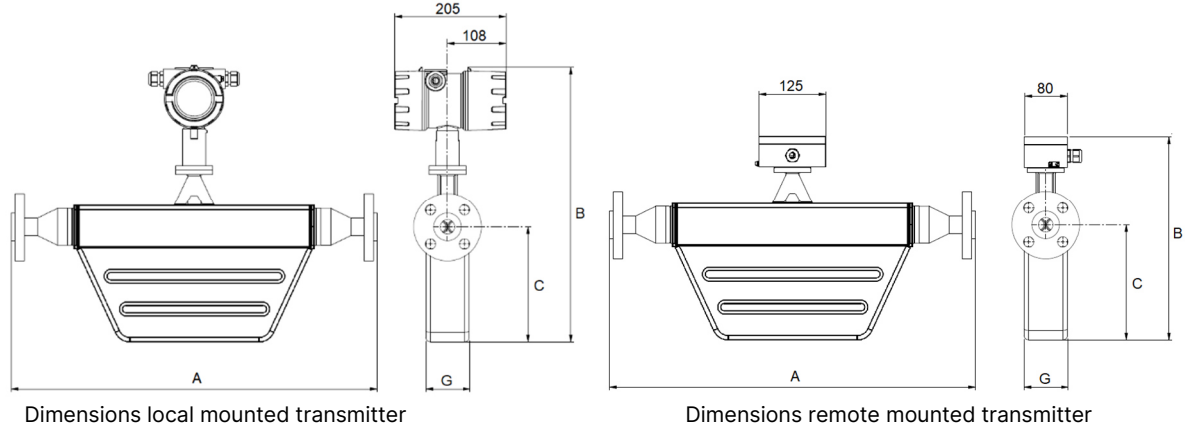
Process pressure range

Depending on the device size, specific flange connections with pressure rating class 150 / 300 and PN16 / 40 are available. Due to the special material tantalum, only the stated process connections are possible. Requests for changes to the process connection cannot be accepted.

Standard – Measuring ranges

Type	Measuring ranges max.		Zero point stability (of end value)	
	kg/h	[lbs/min]	kg/h	[lbs/min]
TMU-T008	600	[22,0]	0,06	[0,002]
TMU-T010	2.500	[91,9]	0,25	[0,009]
TMU-T012	9.000	[330,7]	0,9	[0,033]
TMU-T015	12.000	[440,9]	1,2	[0,044]
TMU-T020	24.000	[881,8]	2,4	[0,088]
TMU-T025	30.000	[1.102,3]	3,0	[0,11]
TMU-T050	80.000	[2.939,4]	8,0	[0,294]

Dimensions



Modell	Local mounted transmitter		Remote mounted transmitter		C mm [inch]	G mm [inch]				
	-40°C ... 100°C [-40°F ... 212°F]		-40°C ... 150°C [-40°F ... 302°F]				-40°C ... 100°C [-40°F ... 212°F]		-40°C ... 180°C [-40°F ... 356°F]	
	mm [inch]	mm [inch]	mm [inch]	mm [inch]			mm [inch]	mm [inch]		
TMU-T008	318 [12,52]	418 [16,46]	233 [9,17]	333 [13,11]	82 [3,23]	35 [1,38]				
TMU-T010	338 [13,31]	438 [17,24]	245 [9,65]	345 [13,58]	100 [3,94]	40 [1,57]				
TMU-T012	410 [16,14]	510 [20,08]	315 [12,40]	415 [16,34]	160 [6,3]	60 [2,36]				
TMU-T015	408 [16,06]	508 [20,00]	315 [12,40]	415 [16,34]	160 [6,3]	60 [2,36]				
TMU-T020	470 [18,5]	570 [22,44]	375 [14,76]	475 [18,7]	210 [8,27]	80 [3,15]				
TMU-T025	470 [18,5]	570 [22,44]	375 [14,76]	475 [18,7]	210 [8,27]	80 [3,15]				
TMU-T050	628 [24,72]	728 [28,66]	535 [21,06]	635 [20,00]	312 [12,28]	136 [5,35]				

Installation length - dimension „A“ see Modelcode on page 5

Heated sensors

Sensors equipped with heating plates can have different dimensions depending on the mounted heating plate and the associated connection. Max. permitted pressure for heating plate 6 bar, max. permitted temperature of 200°C independent of the process connection of the heating plate.

Necessary data for the sizing of the TMU

Medium: _____

	Nominal	Minimum	Maximum	Unit
Flow rate:	_____	_____	_____	_____
Process pressure:	_____	_____	_____	_____
<input type="checkbox"/> abs. / <input type="checkbox"/> gauge:	_____	_____	_____	_____
Process temperature:	_____	_____	_____	_____
Density: (at process conditions)	_____	_____	_____	_____
Viscosity: (at process conditions)	_____	_____	_____	_____

Modelcode

Example: TMU-T008-305I-A00-A0-10-0-H

Modelcode		Description	
TMU			
- Wetted parts			
T	Tantal		
Sensor size and process connection			
008	60...600 kg/h		
- Process connection:		Installation length:	
305I	DN15 PN40 Form B2 DIN EN 1092-1	280 mm	
202F	¾" Class 150 SM3 ASME B16.5-2003	280 mm	
222F	¾" Class 300 SM3 ASME B16.5-2003	280 mm	
010	250...2500 kg/h		
- Process connection:		Installation length:	
305I	DN15 PN40 Form B2 DIN EN 1092-1	340 mm	
202F	¾" Class 150 SM3 ASME B16.5-2003	340 mm	
222F	¾" Class 300 SM3 ASME B16.5-2003	340 mm	
012	900...9000 kg/h		
- Process connection:		Installation length:	
309I	DN25 PN40 Form B2 DIN EN 1092-1	420 mm	
203F	1" Class 150 SM3 ASME B16.5-2003	420 mm	
223F	1" Class 300 SM3 ASME B16.5-2003	420 mm	
015	1200...12000 kg/h		
- Process connection:		Installation length:	
309I	DN25 PN40 Form B2 DIN EN 1092-1	420 mm	
203F	1" Class 150 SM3 ASME B16.5-2003	420 mm	
223F	1" Class 300 SM3 ASME B16.5-2003	420 mm	
020	2400...24000 kg/h		
- Process connection:		Installation length:	
321I	DN50 PN40 Form B2 DIN EN 1092-1	540 mm	
206F	2" Class 150 SM3 ASME B16.5-2003	540 mm	
226F	2" Class 300 SM3 ASME B16.5-2003	540 mm	
025	3000...30000 kg/h		
- Process connection:		Installation length:	
331B	DN80 PN40 Form B2 DIN EN 1092-1	600 mm	
208F	3" Class 150 SM3 ASME B16.5-2003	600 mm	
228F	3" Class 300 SM3 ASME B16.5-2003	600 mm	
050	8000...80000 kg/h		
- Process connection:		Installation length:	
335I	DN100 PN16 Form B2 DIN EN 1092-1	800 mm	
210F	4" Class 150 SM3 ASME B16.5-2003	800 mm	
- Containment option			
A	Stainless steel		
C	Stainless steel containment with 2x drain connection ½" NPT (f). Mounted at the top. Incl. purge fitting		
X	Special, customer specified		
Heating / Cooling			
O	ohne		
A	Heating plate		1)
X	Special, customer specified		
Connection for heating / cooling			
O	without		
A	Ermeto EO12		
B	Swagelok 12mm		
C	DN15 PN40 Form B1 DIN EN 1092-1		
D	½" Class 150 RF ASME B16.5-2003		
E	½" NPT (f)		
F	DN25 PN40 Form B1 DIN EN 1092-1		
G	1" Class 150 RF ASME B16.5-2003		
H	1" NPT (f)		
X	Special, customer specified		
- Transmitter mounting			
A	Integral mounted transmitter	Process temperature	Sensor cable connection
B	Integral mounted transmitter	-20...100°C (-4...212°F)	- IP67
C	Integral mounted transmitter	-20...150°C (-4...302°F)	- IP67
D	Remote mounted transmitter	-40...100°C (-40...212°F)	Terminal box via ½" NPT (f) IP67
E	Remote mounted transmitter	-40...180°C (-40...356°F)	Terminal box via ½" NPT (f) IP67
F	Remote mounted transmitter	-40...100°C (-40...212°F)	Terminal box via M20x1,5 IP67
G	Remote mounted transmitter	-40...180°C (-40...356°F)	Terminal box via M20x1,5 IP67
J	Remote mounted transmitter	-40...60°C (-40...140°F)	Plug-in connector (Harting Han® R 23) IP67
K	Remote mounted transmitter	-40...100°C (-40...212°F)	Plug-in connector (Harting Han® R 23) IP67
L	Remote mounted transmitter	-40...180°C (-40...356°F)	Plug-in connector (Harting Han® R 23) IP67
S	Remote mounted transmitter	-40...100°C (-40...212°F)	Terminal box (PE) via M20x1,5 IP65/IP66
T	Remote mounted transmitter	-40...180°C (-40...356°F)	Terminal box (PE) via M20x1,5 IP65/IP66
X	Special, customer specified		

Approvals	
0	without
B	NEPSI Ex ia IIC T6...T2 Ga/Gb 2)
D	CSA Class I Zone 0/Div1+2 Ex ia IIC T5...T2 Ga/Gb / Group A,B,C,D 2)
K	KCS (Korea) Ex ia IIC T6...T2 Ga/Gb 2)
L	ATEX / IECEx II 1/2G Ex ia IIC T2...T6 Ga/Gb 2)
Calibration flow	
1	Standard, 3-point
2	5-point
X	Special, customer specified
Calibration density	
0	without
1	Standard, 3-point 3)
2	5-point 3)
X	Special, customer specified
Supplementary equipment	
0	ohne
X	Special, customer specified
Design	
H	Heinrichs

Notes:

- 1) Max. permitted pressure 6 Bar independent of the process connection of the heating plate.
- 2) Only in combination with approved transmitter.
Order cable glands separately.
- 3) Not for device size 008