



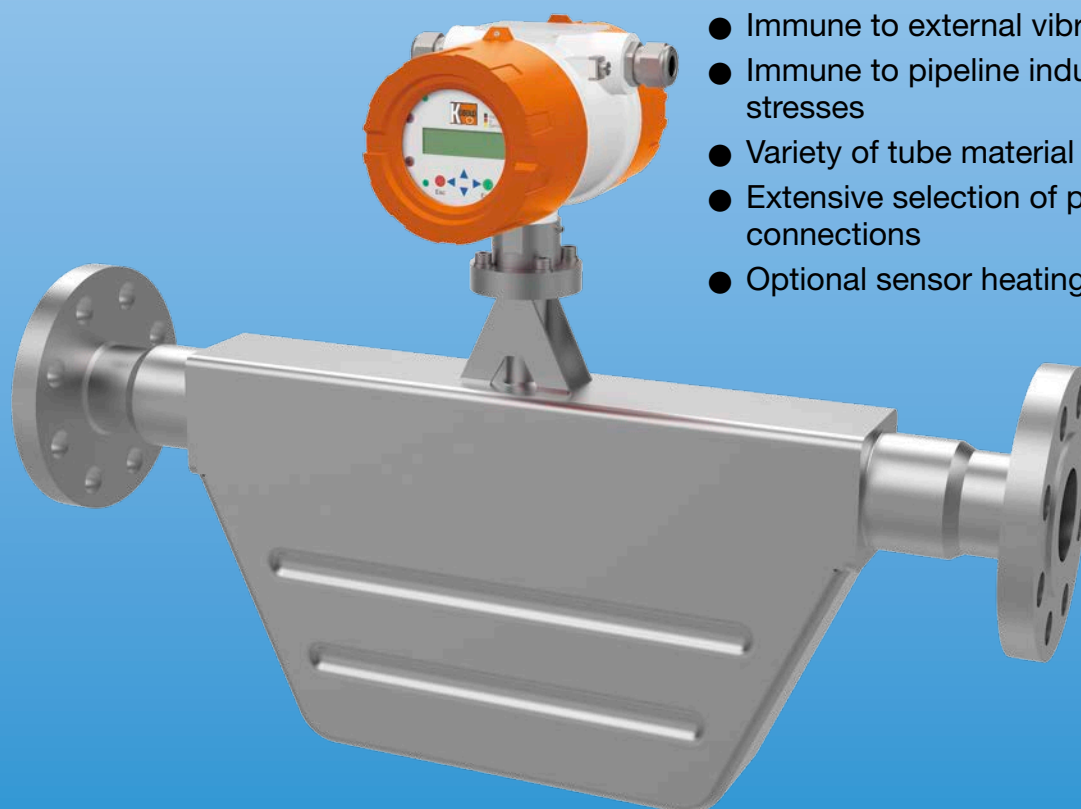
Coriolis Mass Flow Meter

Standard device for all applications



measuring
•
monitoring
•
analysing

TMU



- Extreme compact lightweight design
- Measuring ranges from 60 kg/h to 80 000 kg/h
- Immune to external vibrations.
- Immune to pipeline induced stresses
- Variety of tube material available
- Extensive selection of process connections
- Optional sensor heating

CS



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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.

Available as a standard configuration with a variety of process connections, the TMU sensors are optimised for the use in innumerable applications common to chemical, petrochemical, oil and gas, food and pharmaceutical industries.

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 nd Generation)
Coriolis dual-pipe tubes	TMU-X008 to TMU-X050 (X denotes tube material)
Accuracy	
Liquid:	0.1 % of actual flowrate ± ZP stability
Gas:	0.5 % of actual flowrate ± ZP stability
Wetted parts:	316TI/1.4571 316L/1.4404 Hastelloy® C-22 Tantalum Others on request
Process connection:	Flanges: DIN / ASME / JIS Thread: G / NPT Others on request
Sensor containment:	1.4301 Stainless Steel
Ambient temperature:	-40 ... +80 °C -40 ... +176 °F
Process temperature:	-50 ... +220 °C/260 °C* -58 ... +428 °F/500 °F* *(260 °C / 500 °F max. 1 h)
Process pressure:	Dependant on sensor size
Ingress protection:	IP67 (EN 60529) / NEMA 6

Certificates and Approvals

ATEX/IECEX/UKEX:	II 1/2G Ex ia IIC T2 ... T6 Ga/Gb
cCSA _{US} :	Class I, Zone 0, Div.1 and Div.2 AEx ia IIC T5-T2 Ga
NEPSI:	Ex ia II C T2...T6 Ga/Gb
Ships approval:	DNV / ABS



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°)

Certificate and Approvals for 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:

ATEX / IECEx: II (1)3G Ex ec [ia Ga] IIC T6..T3 Gc
 (to be mounted in min. IP54 ATEX certified protective cabi-
 net)

- Type of protection signal output:
- Ex [ia Ga] intrinsically safe
 - Non-intrinsically safe



Process pressure range

All device sizes are available with standard flanges according to pressure ratings class 150 / 300 and PN40. Depending on the sensor size, other nominal sizes with higher pressure ratings are possible on request.

For further information, please contact our sales department.

Standard - Measuring ranges

Type	Measuring range max.	Nominal ($\Delta p = 1 \text{ bar}$)	Zero point stability (of range)
	kg/h [lbs/min]	kg/h [lbs/min]	kg/h [lbs/min]
TMU-x008	600 [22,0]	330 [12,1]	0,06 [0,002]
TMU-x010	2500 [91,9]	1150 [42,3]	0,25 [0,01]
TMU-x015	12000 [440,9]	5250 [192,9]	1,2 [0,04]
TMU-x025	30000 [1102,3]	20000 [734,9]	3 [0,1]
TMU-x040	60000 [2204,6]	55000 [2020,9]*	6 [0,2]
TMU-x050	80000 [2939,4]	74000 [2719,0]	8 [0,3]

* $\Delta p = 0,87 \text{ bar}$

Measuring ranges for approvals

Type	ABS ¹⁾ [kg/h]	DNV ¹⁾ [kg/h]
TMU-x008	N/A	0...600
TMU-x010	N/A	0...2500
TMU-x015	600...12000 ²⁾⁴⁾	0...12000
TMU-x025	1500...30000 ²⁾⁴⁾	0...30000
TMU-x040	3000...60000 ²⁾⁴⁾	0...60000
TMU-x050	4000...80000 ³⁾⁴⁾	0...80000

¹⁾ Must be used with approved transmitter (UMC3) for system approval.

²⁾ Measuring accuracy $\pm 0.1 \% \pm ZP$

³⁾ Measuring accuracy $\pm 0.15 \% \pm ZP$

⁴⁾ Repeatability $\pm 0.05 \% \pm \frac{1}{2}ZP$

Necessary data for the sizing of the meter

Medium:

Nominal	Minimum	Maximum	Unit
_____	_____	_____	_____

Flow rate:

_____	_____	_____	_____
-------	-------	-------	-------

Process pressure

abs. / gauge.

_____	_____	_____	_____
-------	-------	-------	-------

Process temperature:

_____	_____	_____	_____
-------	-------	-------	-------

Density:

(at process condition)

_____	_____	_____	_____
-------	-------	-------	-------

Viscosity:

(at process condition)

_____	_____	_____	_____
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Requirements for the ship approval

For the use of the sensor in combination with the ship approval the following conditions according to DNV Rules: DNVGL RU Ship Pt.4 Ch.6 Sec.1 have to be fulfilled:

- Max. process temperature: 150°C
- Max. process pressure: 16 Bar
- Materials 1.4401 (AISI 316) or 1.4404 (AISI 316L) cannot be used for salt water applications.
- Only in combination with 3.1 Certificate (DIN EN 1024:2004).
- Only in combination with approved remote mounted transmitter

If you have different requirements for a measuring device, please contact our sales department.



Order details Sensor (Example: TMU-S 008 6010 A 0 0 A 0 1 0 0 K)

Type/ Wetted materials	Meter line size	Process connection / Installation length	Containment option	Heating / Cooling
TMU-S = stainless steel 1.4404 / 1.4571 TMU-H = Hastelloy C-22 2.4602	008 = 60 ... 600 kg/h	6010 = ¼" NPT (f) / 320 mm 6030 = ½" NPT (f) / 320 mm 301B = DN10 PN40 Form B1 DINEN 1092-1 / 300 mm 201R = ½" Class 150 RF ASME B16.5-2003 / 300 mm 221R = ½" Class 300 RF ASME B16.5-2003 / 310 mm 241R = ½" Class 600 RF ASME B16.5-2003 / 330 mm	A = Stainless steel X = Special, customer specified	0 = without A = Heating plate X = Special, customer specified
	010 = 250 ... 2500 kg/h	6010 = ¼" NPT (f) / 380 mm 6030 = ½" NPT (f) / 380 mm 301B = DN10 PN 40 Form B1 DINEN 1092-1 / 390 mm 305B = DN15 PN40 Form B1 DINEN 1092-1 / 410 mm 309B = DN25 PN 40 Form B1 DINEN 1092-1 / 410 mm 201R = ½" Class 150 RF ASME B16.5-2003 / 380 mm 221R = ½" Class 300 RF ASME B16.5-2003 / 390 mm 241R = ½" Class 600 RF ASME B16.5-2003 / 390 mm 202R = ¾" Class 150 RF ASME B16.5-2003 / 380 mm 222R = ¾" Class 300 RF ASME B16.5-2003 / 380 mm 242R = ¾" Class 600 RF ASME B16.5-2003 / 390 mm 203R = 1" Class 150 RF ASME B16.5-2003 / 380 mm 223R = 1" Class 300 RF ASME B16.5-2003 / 380 mm 243R = 1" Class 600 RF ASME B16.5-2003 / 400 mm		
	015 = 1200... 12000 kg/h	6030 = ½" NPT (f) / 460 mm 305B = DN15 PN40 Form B1 DINEN 1092-1 / 500 mm 309B = DN25 PN 40 Form B1 DINEN 1092-1 / 500 mm 321B = DN50 PN40 Form B1 DINEN 1092-1 / 500 mm 201R = ½" Class 150 RF ASME B16.5-2003 / 460 mm 221R = ½" Class 300 RF ASME B16.5-2003 / 460 mm 241R = ½" Class 600 RF ASME B16.5-2003 / 460 mm 202R = ¾" Class 150 RF ASME B16.5-2003 / 480 mm 222R = ¾" Class 300 RF ASME B16.5-2003 / 490 mm 242R = ¾" Class 600 RF ASME B16.5-2003 / 500 mm 203R = 1" Class 150 RF ASME B16.5-2003 / 490 mm 223R = 1" Class 300 RF ASME B16.5-2003 / 500 mm 205R = 1 ½" Class 150 RF ASME B16.5-2003 / 600 mm 225R = 1 ½" Class 300 RF ASME B16.5-2003 / 600 mm		



Coriolis Mass Flow Meter Model TMU

Order details Sensor (Example: TMU-S 008 6010 A 0 0 A 0 1 0 0 K) (continued)

Type/ Wetted materials	Meter line size	Process connection / Installation length	Containment option	Heating / Cooling
TMU-S = stainless steel 1.4404 / 1.4571 TMU-H = Hastelloy C-22 2.4602	025 = 3000...30000 kg/h	309B = DN25 PN40 Form B1 DIN EN 1092-1 / 600 mm 317B = DN40 PN40 Form B1 DIN EN 1092-1 / 600 mm 321B = DN50 PN40 Form B1 DIN EN 1092-1 / 600 mm 203R = 1" Class 150 RF ASME B16.5-2003 / 650 mm 223R = 1" Class 300 RF ASME B16.5-2003 / 660 mm 243R = 1" Class 600 RF ASME B16.5-2003 / 675 mm 205R = 1 1/2" Class 150 RF ASME B16.5-2003 / 650 mm 225R = 1 1/2" Class 300 RF ASME B16.5-2003 / 660 mm 245R = 1 1/2" Class 600 RF ASME B16.5-2003 / 675 mm 206R = 2" Class 150 RF ASME B16.5-2003 / 650 mm 226R = 2" Class 300 RF ASME B16.5-2003 / 660 mm 246R = 2" Class 600 RF ASME B16.5-2003 / 675 mm	A = Stainless steel X = Special, customer specified	0 = without A = Heating plate X = Special, customer specified
	040 = 6000...60000 kg/h	317B = DN40 PN40 Form B1 DIN EN 1092-1 / 800 mm 321B = DN50 PN40 Form B1 DIN EN 1092-1 / 800 mm 331B = DN80 PN40 Form B1 DIN EN 1092-1 / 850 mm 205R = 1 1/2" Class 150 RF ASME B16.5-2003 / 900 mm 245R = 1 1/2" Class 600 RF ASME B16.5-2003 / 900 mm 206R = 2" Class 150 RF ASME B16.5-2003 / 900 mm 226R = 2" Class 300 RF ASME B16.5-2003 / 900 mm 228R = 3" Class 300 RF ASME B16.5-2003 / 900 mm		
	050 = 8000...80000 kg/h	317B = DN40 PN40 Form B1 DIN EN 1092-1 / 800 mm 321B = DN50 PN40 Form B1 DIN EN 1092-1 / 800 mm 331B = DN80 PN40 Form B1 DIN EN 1092-1 / 850 mm 335B = DN100 PN16 Form B1 DIN EN 1092-1 / 850 mm 205R = 1 1/2" Class 150 RF ASME B16.5-2003 / 900 mm 245R = 1 1/2" Class 600 RF ASME B16.5-2003 / 900 mm 206R = 2" Class 150 RF ASME B16.5-2003 / 900 mm 226R = 2" Class 300 RF ASME B16.5-2003 / 900 mm 208R = 3" Class 150 RF ASME B16.5-2003 / 900 mm 248R = 3" Class 600 RF ASME B16.5-2003 / 900 mm 210R = 4" Class 150 RF ASME B16.5-2003 / 900 mm 230R = 4" Class 300 RF ASME B16.5-2003 / 900 mm		



Order details Sensor (Example: **TMU-S 008 6010 A 0 0 A 0 1 0 0 K**) (continued)

Connection for heating / cooling	Transmitter mounting / Process temperature / Sensor cable connection	Approvals
0 = 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	A = Integral mounted transmitter, -20...100°C (-4...212°F), IP67 ⁸⁾ B = Integral mounted transmitter, -20...150°C (-4...302°F), IP67 ⁸⁾ C = Remote mounted transmitter, -50...100°C (-58...212°F), Junction box via ½" NPT (f), IP67 D = Remote mounted transmitter, -50...180°C (-58...356°F), Junction box via ½" NPT (f), IP67 E = Remote mounted transmitter, -50...260°C (-58...500°F), Junction box via ½" NPT (f), IP67 F = Remote mounted transmitter, -50...100°C (-58...212°F), Junction box via M20x1,5, IP67 G = Remote mounted transmitter, -50...180°C (-58...356°F), Junction box via M20x1,5, IP67 H = Remote mounted transmitter, -50...260°C (-58...500°F), Junction box via M20x1,5, IP67 K = Remote mounted transmitter, -50...100°C (-58...212°F), Connector (Harting Har® R 23), IP67 L = Remote mounted transmitter, -50...180°C (-58...356°F), Connector (Harting Har® R 23), IP67 M = Remote mounted transmitter, -50...260°C (-58...500°F), Connector (Harting Har® R 23), IP67 N = Remote mounted transmitter, not specified, without junction box ^{3) 4)} X = Special, customer specified	0 = without B = NEPSI Ex ia IIC T6...T2 Ga/Gb ¹⁾ D = CSA Class I Zone 0/Div1+2 AEx ia IIC T5...T2 Ga/Gb / Group A,B,C,D ¹⁾ K = KCS (Korea) Ex ia IIC T6...T2 Ga/Gb ¹⁾ L = ATEX / IECEx / UKEX II 1/2G Ex ia IIC T2...T6 Ga/Gb ¹⁾ S = Ships approval DNV / ABS ^{1) 2) 6) 7)} U = ATEX Component certificate II 1G Ex ia IIC T6...T2 Ga ^{1) 5)} 9 = Multiple approvals B, D, K, L ¹⁾

Calibration flow	Calibration density	Supplementary equipment	Design
1 = Standard, 3-point 2 = 10-point 3 = External lab X = Special, customer specified	0 = without 1 = Standard, 3-point 2 = 5-point ⁹⁾ X = Special, customer specified	0 = without X = Special, customer specified	K = Kobold

¹⁾ Must be used with approved transmitter for system approval. Order cable glands separately.

²⁾ Includes ATEX and IECEx approvals. See "Requirements for the ship approval".

³⁾ Temperature specification is applicable for whole device only.

⁴⁾ Applicable only with approval "U".

⁵⁾ Applicable only with sensor configuration "N"

⁶⁾ Only in combination with 3.1 certificate.

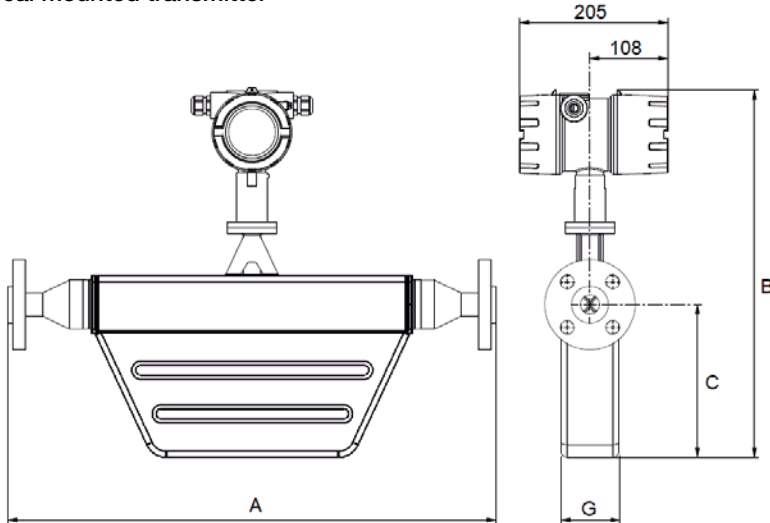
⁷⁾ Only in combination with a remote mounted transmitter. Only for approved process conditions. See documentation.

⁸⁾ Not for ship approval.

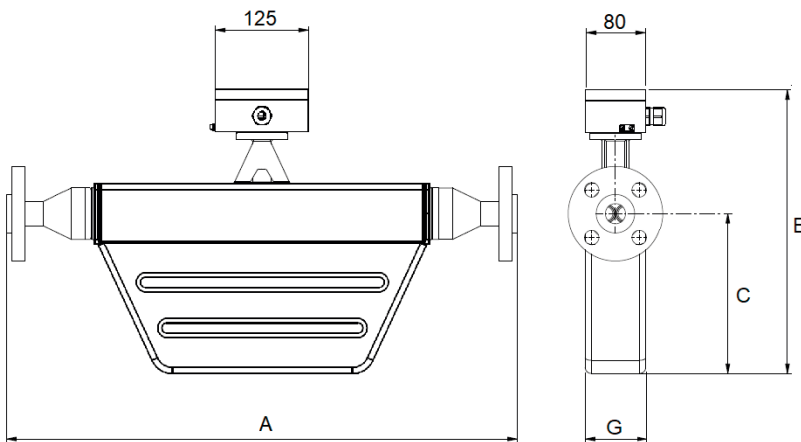
⁹⁾ Not for device line size 008

Dimensions

Local mounted transmitter



Remote mounted transmitter



Type	B					C	D
	Local mounted transmitter		Remote mounted transmitter				
	-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)	-40 °C... 260 °C (-40 °F... 500 °F)		
	mm [inch]	mm [inch]	mm [inch]	mm [inch]	mm [inch]	mm [inch]	
TMU-x008	318 [12.52]	418 [16.46]	233 [9.17]	333 [13.11]	433 [17.04]	82 [3.23]	35 [1.38]
TMU-x010	338 [13.31]	438 [17.24]	245 [9.65]	345 [13.58]	445 [17.52]	100 [3.94]	40 [1.57]
TMU-x015	408 [16.06]	508 [20.00]	315 [12.40]	415 [16.34]	515 [20.28]	160 [6.30]	60 [2.36]
TMU-x025	469 [18.46]	569 [22.40]	376 [14.80]	476 [18.74]	576 [22.68]	211 [8.31]	80 [3.15]
TMU-x040	628 [24.72]	728 [28.66]	535 [21.06]	635 [20.00]	735 [28.94]	312 [12.28]	136 [5.35]
TMU-x050	628 [24.72]	728 [28.66]	535 [21.06]	635 [20.00]	735 [28.94]	312 [12.28]	136 [5.35]

Installation length dimension "A" see "Order details".

Heated sensors

Sensors equipped with heating plates can have different dimensions depending on the mounted heating plate and the associated connection.



Coriolis Mass Flow Meter

Standard device for all applications

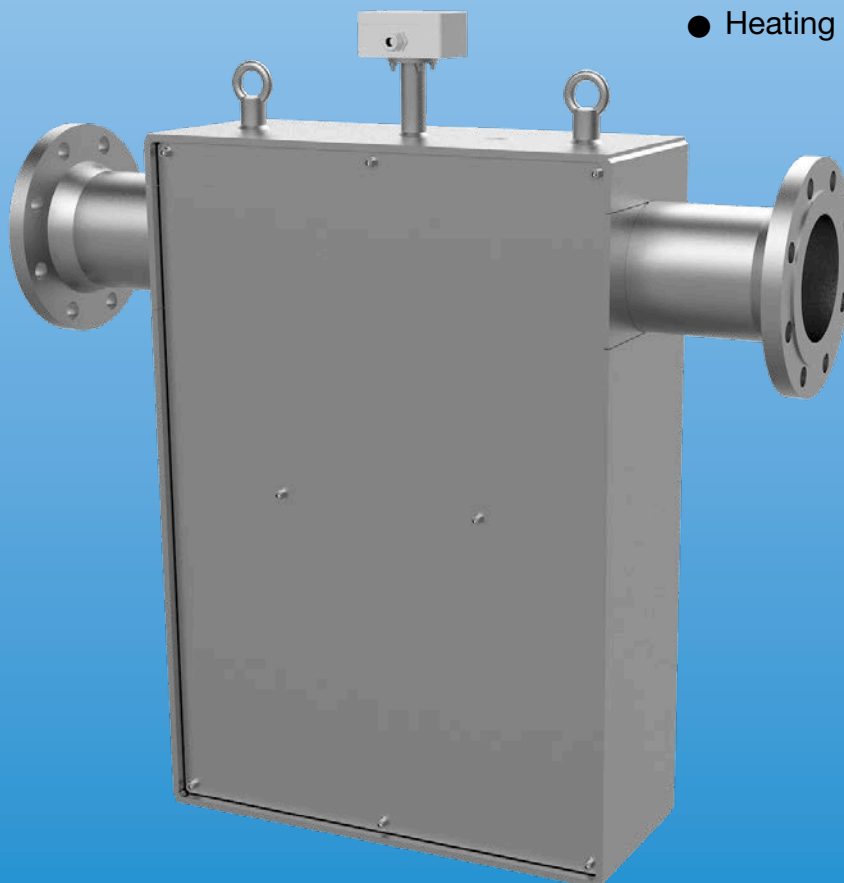


measuring
•
monitoring
•
analysing

TMU - HIGH FLOW



- High flow rates up to 2200 t/h
- Process connections up to DN400 / 16"
- Pressure resistant up to 40 bar
- Heating system (optional)



SS



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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.

Available as a standard configuration with a variety of process connections, the TMU sensors are optimised for the use in innumerable applications common to chemical, petrochemical, oil and gas, food and pharmaceutical industries.

TMU High Flow Coriolis Mass Flow Meter are used where high flow values in piping systems up to 400 mm / 32 inch and up to 2,200 t/h have to be measured safely and accurate.

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

Coriolis dual-pipe tubes
TMU-X080 ... TMU-X300
(X denotes tube material)

Accuracy

Liquid: 0.15 % of actual flowrate
± ZP stability

Gas: 0.5 % of actual flowrate
± ZP Stability

Wetted parts: 316TI/1.4571
316L/1.4404
Hastelloy C-22
Others on request

Process connection: Flanges: DIN / ASME / JIS
Others on request

Sensor containment: 1.4301 Stainless steel

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

Process temperature: -50 °C ...+220 °C/260 °C*
-58 °F...+428 °F/500 °F*
*(260 °C / 500 °F max. 1h)

Process pressure: Dependant on sensor size.

Ingress protection: IP65 (EN 60529)

Certificates and Approvals

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

cCSA_{US}: Class I, Zone 0, Div.1 and Div.2
AEx ia IIC T5-T2 Ga

NEPSI: Ex ia II C T2...T6 Ga/Gb

Ships approval: DNV / ABS



Available Transmitters UMC4 / UMC4-RM

Transmitter mounting: Field housing
 local mounted or remote mounted
 via junction box (1/2"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°).

Certificate and Approvals for 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

- Type of protection: 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
 (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

All device sizes are available with standard flanges according to pressure ratings class 150 / 300 and PN40. Depending on the sensor size, other nominal sizes with higher pressure ratings are possible on request.

For further information, please contact our sales department.

Standard – Measuring ranges

Type	Measuring range max.	Nominal ($\Delta p = 1 \text{ bar}$)	Zero point stability (of range)
	kg/h [lbs/min]	kg/h [lbs/min]	kg/h [lbs/min]
TMU-x080 ¹⁾	120000 [4409.2]	118000 [4335.7]	12 [0.4]
TMU-x100 ²⁾	200000 [7348.6]	200000 [7348.6]	20 [0.7]
TMU-x150 ²⁾	460000 [16901.8]	460000 [16901.8]	46 [1.7]
TMU-x200 ³⁾	700000 [25720.2]	700000 [25720.2]	70 [2.6]
TMU-x250	1500000 [55114.6]	1350000 [49603.2]	150 [5.5]
TMU-x300	2200000 [80834.8]	1900000 [69811.9]	220 [8.1]

¹⁾ $\Delta p = 0.95 \text{ bar}$

²⁾ $\Delta p = 0.93 \text{ bar}$

³⁾ $\Delta p = 0.66 \text{ bar}$

Measuring ranges for approvals

Type	ABS ^{1) 2)} [kg/h]	DNV ³⁾ [kg/h]
TMU-x080	6000...120000	0...120000
TMU-x100	10000...200000	0...200000
TMU-x150	23000...460000	0...460000
TMU-x200	35000...700000	0...700000
TMU-x250	N / V	N / V
TMU-x300	N / V	N / V

¹⁾ Must be used with approved transmitter (UMC3) for system approval.

²⁾ Measuring accuracy $\pm 0.15 \% \pm \text{NP}$ Repeatability $\pm 0.05 \% \pm \frac{1}{2} \text{NP}$

³⁾ Must be used with approved transmitter (UMC4) for system approval.

Necessary data for the sizing of the meter

Medium:

Nominal	Minimum	Maximum	Unit
---------	---------	---------	------

Flow rate:

_____	_____	_____	_____
-------	-------	-------	-------

Process pressure

abs. / gauge

_____	_____	_____	_____
-------	-------	-------	-------

Process temperature:

_____	_____	_____	_____
-------	-------	-------	-------

Density:

(at process condition)

_____	_____	_____	_____
-------	-------	-------	-------

Viscosity:

(at process condition)

_____	_____	_____	_____
-------	-------	-------	-------

Requirements for the ship approval

For the use of the sensor in combination with the ship approval the following conditions according to DNV Rules: DNVGL RU Ship Pt.4 Ch.6 Sec.1 have to be fulfilled:

- Max. process temperature: 150°C
- Max. process pressure: 16 bar
- Materials 1.4401 (AISI 316) or 1.4404 (AISI 316L) cannot be used for salt water applications.
- Only in combination with 3.1 Certificate (DIN EN 1024:2004).
- Only in combination with approved remote mounted transmitter.

If you have different requirements for a measuring device, please contact our sales department.



Order Details Sensor (Example: **TMU-S 080 321B A 0 0 A 0 1 0 0 K**)

Type/ Wetted materials	Meter line size	Process connection / Installation length	Containment option	Heating / Cooling
TMU-S = Stainless steel 1.4404 / 1.4571 TMU-H = Hastelloy C-22 2.4602	080 = 25000...120000 kg/h	321B = DN50 PN40 Form B1 DIN EN 1092-1 / 1150 mm 321D = DN50 PN40 Form D DIN EN 1092-1 / 1150 mm 331B = DN80 PN40 Form B1 DIN EN 1092-1 / 1196 mm 331D = DN80 PN40 Form D DIN EN 1092-1 / 1196 mm 335B = DN100 PN16 Form B1 DIN EN 1092-1 / 1184 mm 335D = DN100 PN16 Form D DIN EN 1092-1 / 1184 mm 340B = DN125 PN16 Form B1 DIN EN 1092-1 / 925 mm 345B = DN150 PN16 Form B1 DIN EN 1092-1 / a. Anfrage 206R = 2" Class 150 RF ASME B16.5-2003 / 1200 mm 246R = 2" Class 600 RF ASME B16.5-2003 / 1225 mm 208R = 3" Class 150 RF ASME B16.5-2003 / 1218 mm 248R = 3" Class 600 RF ASME B16.5-2003 / 1243 mm 210R = 4" Class 150 RF ASME B16.5-2003 / 1230 mm 230R = 4" Class 300 RF ASME B16.5-2003 / 1250 mm 211R = 5" Class 150 RF ASME B16.5-2003 / 1000 mm 231R = 5" Class 300 RF ASME B16.5-2003 / 1000 mm 212R = 6" Class 150 RF ASME B16.5-2003 / on request 232R = 6" Class 300 RF ASME B16.5-2003 / on request XXXX = Special, customer specified	A = Stainless steel X = Special, customer specified	0 = without B = Heater / cooler X = Special, customer specified
	100 = 30000...200000 kg/h	331B = DN80 PN40 Form B1 DIN EN 1092-1 / 1350 mm 331D = DN80 PN40 Form D DIN EN 1092-1 / 1350 mm 335B = DN100 PN16 Form B1 DIN EN 1092-1 / 1350 mm 335D = DN100 PN16 Form D DIN EN 1092-1 / 1350 mm 345B = DN150 PN16 Form B1 DIN EN 1092-1 / 1090 mm 345D = DN150 PN16 Form D DIN EN 1092-1 / 1090 mm 208R = 3" Class 150 RF ASME B16.5-2003 / 1375 mm 248R = 3" Class 600 RF ASME B16.5-2003 / 1413 mm 210R = 4" Class 150 RF ASME B16.5-2003 / 1400 mm 230R = 4" Class 300 RF ASME B16.5-2003 / 1420 mm 212R = 6" Class 150 RF ASME B16.5-2003 / 1154 mm 232R = 6" Class 300 RF ASME B16.5-2003 / 1173 mm XXXX = Special, customer specified		



Coriolis Mass Flow Meter Model TMU High Flow

Order Details Sensor (Example: TMU-S 080 321B A 0 0 A 0 1 0 0 K) (continued)

Type/ Wetted materials	Meter line size	Process connection / Installation length	Containment option	Heating / Cooling
TMU-S = Stainless steel 1.4404 / 1.4571 TMU-H = Hastelloy C-22 2.4602	150 = 60 000...460 000 kg/h	335B = DN100 PN16 Form B1 DIN EN 1092-1 / 1700 mm 335D = DN100 PN16 Form D DIN EN 1092-1 / 1700 mm 345B = DN150 PN16 Form B1 DIN EN 1092-1 / 1725 mm 345D = DN150 PN16 Form D DIN EN 1092-1 / 1725 mm 350B = DN200 PN16 Form B1 DIN EN 1092-1 / 1448 mm 350D = DN200 PN16 Form D DIN EN 1092-1 / 1448 mm 210R = 4" Class 150 RF ASME B16.5-2003 / 1770 mm 230R = 4" Class 300 RF ASME B16.5-2003 / 1775 mm 212R = 6" Class 150 RF ASME B16.5-2003 / 1796 mm 232R = 6" Class 300 RF ASME B16.5-2003 / 1815 mm 213R = 8" Class 150 RF ASME B16.5-2003 / 1525 mm 233R = 8" Class 300 RF ASME B16.5-2003 / 1545 mm XXXX = Special, customer specified	A = Stainless steel X = Special, customer specified	0 = without B = Heater / cooler X = Special, customer specified
	200 = 150 000...700 000 kg/h	345B = DN150 PN16 Form B1 DIN EN 1092-1 / 2175 mm 345D = DN150 PN16 Form D DIN EN 1092-1 / 2175 mm 350B = DN200 PN16 Form B1 DIN EN 1092-1 / 2175 mm 350D = DN200 PN16 Form D DIN EN 1092-1 / 2175 mm 356B = DN250 PN16 Form B1 DIN EN 1092-1 / 1850 mm 356D = DN250 PN16 Form D DIN EN 1092-1 / 1850 mm 212R = 6" Class 150 RF ASME B16.5-2003 / 2225 mm 232R = 6" Class 300 RF ASME B16.5-2003 / 2250 mm 213R = 8" Class 150 RF ASME B16.5-2003 / 2270 mm 233R = 8" Class 300 RF ASME B16.5-2003 / 2275 mm 214R = 10" Class 150 RF ASME B16.5-2003 / 1925 mm 234R = 10" Class 300 RF ASME B16.5-2003 / 1957 mm XXXX = Special, customer specified		



Order Details Sensor (Example: **TMU-S 080 321B A 0 0 A 0 1 0 0 K**) (continued)

Type/ Wetted materials	Meter line size	Process connection / Installation length	Containment option	Heating / Cooling
TMU-S = Stainless steel 1.4404 / 1.4571 TMU-H = Hastelloy C-22 2.4602	250 = 300 000 ... 1 500 000 kg/h	350B = DN200 PN16 Form B1 DIN EN 1092-1 / 2275 mm 356B = DN250 PN16 Form B1 DIN EN 1092-1 / 2275 mm 363B = DN300 PN16 Form B1 DIN EN 1092-1 / 1925 mm 213R = 8" Class 150 RF ASME B16.5-2003 / 2350 mm 233R = 8" Class 300 RF ASME B16.5-2003 / 2375 mm 214R = 10" Class 150 RF ASME B16.5-2003 / 2348 mm 234R = 10" Class 300 RF ASME B16.5-2003 / 2375 mm 215R = 12" Class 150 RF ASME B16.5-2003 / 1975 mm 235R = 12" Class 300 RF ASME B16.5-2003 / 2025 mm XXXX = Special, customer specified	A = Stainless steel X = Special, customer specified	0 = without B = Heater / cooler X = Special, customer specified
	300 = 400 000 ... 2 200 000 kg/h	355B = DN250 PN10 Form B1 DIN EN 1092-1 / 2875 mm 362B = DN300 PN10 Form B1 DIN EN 1092-1 / 2875 mm 369B = DN350 PN10 Form B1 DIN EN 1092-1 / 2875 mm 375B = DN400 PN10 Form B1 DIN EN 1092-1 / 2200 mm 214R = 10" Class 150 RF ASME B16.5-2003 / 2950 mm 234R = 10" Class 300 RF ASME B16.5-2003 / 3008 mm 215R = 12" Class 150 RF ASME B16.5-2003 / 3000 mm 235R = 12" Class 300 RF ASME B16.5-2003 / 3030 mm 216R = 14" Class 150 RF ASME B16.5-2003 / 3000 mm 236R = 14" Class 300 RF ASME B16.5-2003 / 3050 mm 217R = 16" Class 150 RF ASME B16.5-2003 / a. Anfrage XXXX = Special, customer specified		



Order Details Sensor (Example: **TMU-S 080 321B A 0 0 A 0 1 0 0 K**) (continued)

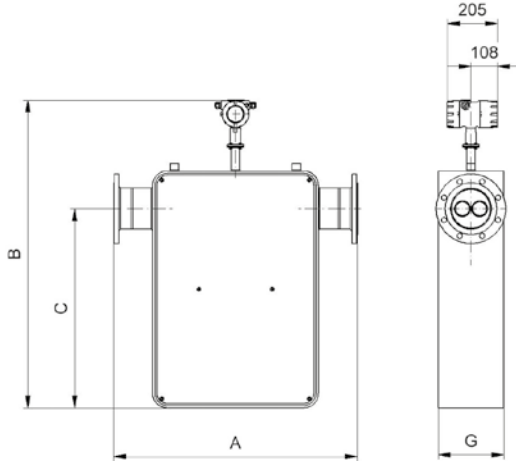
Connection for heating / cooling	Transmitter mounting / Process temperature / Sensor cable connection	Approvals
0 = without A = Ermeto EO12 B = Swagelok® 12mm C = DN15 PN40 Form B1 DIN EN 1092-1 D = ½" Class 150 RF ASME B16.5-2003 E = ½" NPT (f) F = DN25 PN40 Form B1 DIN EN 1092-1 G = 1" Class 150 RF ASME B16.5-2003 H = 1" NPT (f) X = Special, customer specified	A = Integral mounted transmitter, -20... 100 °C (-4...212°F), IP65 ¹⁾ B = Integral mounted transmitter, -20... 150 °C (-4...302°F), IP65 ¹⁾ C = Remote mounted transmitter, -50... 100 °C (-58...212°F), Junction box via ½" NPT (f), IP65 D = Remote mounted transmitter, -50... 180 °C (-58...356°F), Junction box via ½" NPT (f), IP65 E = Remote mounted transmitter, -50... 260 °C (-58...500°F), Junction box via ½" NPT (f), IP65 F = Remote mounted transmitter, -50... 100 °C (-58...212°F), Junction box via M20x1,5, IP65 G = Remote mounted transmitter, -50... 180 °C (-58...356°F), Junction box via M20x1,5, IP65 H = Remote mounted transmitter, -50... 260 °C (-58...500°F), Junction box via M20x1,5, IP65 K = Remote mounted transmitter, -50... 100 °C (-58...212°F), Connector (Harting Han® R 23), IP65 L = Remote mounted transmitter, -50... 180 °C (-58...356°F), Connector (Harting Han® R 23), IP65 M = Remote mounted transmitter, -50... 260 °C (-58...500°F), Connector (Harting Han® R 23), IP65 N = Remote mounted transmitter, not specified, Without junction box ^{2) 3)} X = Special, customer specified	0 = without B = NEPSI Ex ia IIC T6...T2 Ga/Gb ⁴⁾ D = CSA Class I Zone 0/Div1+2 AEx ia IIC T5...T2 Ga/Gb / Group A,B,C,D ⁴⁾ K = KCS (Korea) Ex ia IIC T6...T2 Ga/Gb ⁴⁾ L = ATEX / IECEx / UKEX II 1/2G Ex ia IIC T2...T6 Ga/Gb ⁴⁾ S = Ships approval DNV / ABS ^{4) 5) 6) 7) 9)} U = ATEX Component certificate II 1G Ex ia IIC T6...T2 Ga ^{4) 5)} 9 = Multiple approvals B, D, K, L

Calibration flow	Calibration density	Supplementary equipment	Design
1 = Standard, 3-point 2 = 10-point 3 = External lab X = Special, customer specified	0 = without 1 = Standard, 3-point 2 = 5-point X = Special, customer specified	0 = without X = Special, customer specified	K = Kobold

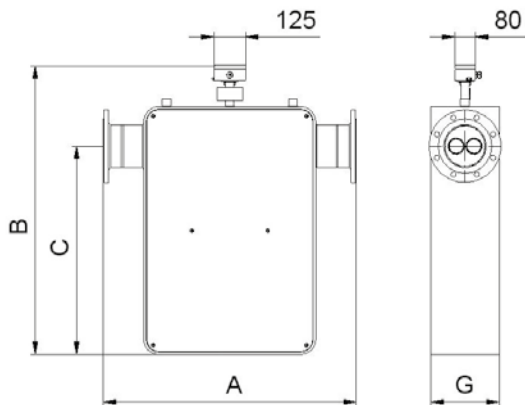
¹⁾ Not for ships approval. Not for OIML R117-1.
²⁾ Temperature specification is applicable for whole device only.
³⁾ applicable only with approval "U".
⁴⁾ Must be used with approved transmitter for system approval.
⁵⁾ Includes ATEX and IECEx approvals. See "Requirements for the ship approval".
⁶⁾ Only in combination with 3.1 certificate.
⁷⁾ Only in combination with a remote mounted transmitter.
⁸⁾ Applicable only with sensor configuration "N".

Dimensions

Local mounted transmitter



Remote mounted transmitter



Type	B					C	D
	Local mounted transmitter		Remote mounted transmitter				
	-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)	-40°C... 260°C (-40°F... 500°F)		
	mm [inch]	mm [inch]	mm [inch]	mm [inch]	mm [inch]	mm [inch]	
TMU-x080	1241 [48.9]	1343 [82.9]	1110 [43.7]	1212 [47.7]	1312 [51.7]	800 [31.5]	250 [9.8]
TMU-x100	1261 [49.6]	1363 [53.7]	1130 [44.5]	1232 [48.5]	1332 [52.4]	1070 [42.1]	270 [10.6]
TMU-x150	1591 [62.6]	1693 [66.7]	1460 [57.5]	1562 [61.5]	1662 [65.4]	1070 [42.1]	380 [15.0]
TMU-x200	1751 [68.9]	1853 [73.0]	1620 [63.8]	1722 [67.8]	1822 [71.7]	1210 [47.6]	400 [15.7]
TMU-x250	1891 [74.4]	1993 [78.5]	1760 [69.3]	1862 [73.3]	1962 [77.2]	1300 [51.2]	550 [21.7]
TMU-x300	1896 [74.6]	1998 [78.7]	1765 [69.5]	1867 [73.5]	1967 [77.4]	1400 [55.1]	510 [20.1]

Installation length dimension "A" see Order details sensor.

Heated sensors

Sensors equipped with heating plates can have different dimensions depending on the mounted heating plate and the associated connection.