

# Micro Motion™ TA-Series Flow and Density Meters



## Best fit for application

- Remote transmitters available to match installation mounting requirements
- All wetted materials constructed from tantalum to handle corrosive applications such as acids

## Exceptional reliability and safety

- Low operating frequency for robust measurement
- Reliable sensor design minimizes down time and process interruption costs

## Micro Motion TA-Series flow meters

Tantalum (TA) meters deliver superb measurement with exceptional flow and density performance as well as outstanding reliability in corrosive service environments.

### Optimal flow and density fit for corrosive process control applications

- High performance rugged measurement in a compact design
- Low frequency, high sensitivity fit-and-forget meter provides robust measurements even under demanding process conditions
- Multiple line sizes provide an ideal platform for batching, distribution, allocation and intra-plant measurement applications

### Industry-leading capabilities that unleash your process potential

- Available exclusively with the Model 5700 transmitter, with a wide range of input and output options, and an intuitive interface
- State of the art, ISO/IEC 17025 compliant calibration stands achieving  $\pm 0.014\%$  uncertainty drive exceptional measurement accuracy
- True multi-variable technology measures necessary flow and density process variables simultaneously

### Smart Meter Verification™: advanced diagnostics for your entire system

- Ordered as standard with the option to license flow range detection and other advanced meter health diagnostics
- Runs comprehensive tests that can be scheduled, run locally, or from the control room to provide confidence in your meter functionality and performance
- Verifies that your meter performs as well as the day it was installed, giving you assurance in less than 90 seconds
- Saves significant expenditure by reducing labor and extending or eliminating calibration intervals without interrupting the process

### Access information when you need it with asset tags

Newly shipped devices include a unique QR code asset tag that enables you to access serialized information directly from the device. With this capability, you can:

- Access device drawings, diagrams, technical documentation, and troubleshooting information in your MyEmerson account
- Improve mean time to repair and maintain efficiency
- Ensure confidence that you have located the correct device
- Eliminate the time-consuming process of locating and transcribing nameplates to view asset information

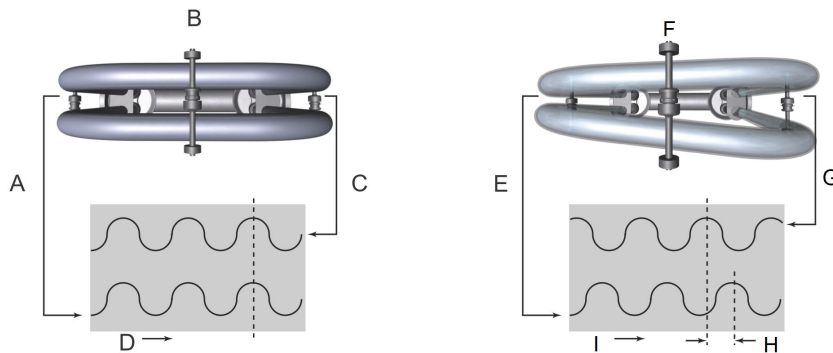
## Measurement principles

As a practical application of the Coriolis effect, the Coriolis mass flow meter operating principle involves inducing a vibration of the flow tube through which the fluid passes. The vibration, though it is not completely circular, provides the rotating reference frame which gives rise to the Coriolis effect. While specific methods vary according to the design of the flow meter, sensors monitor and analyze changes in frequency, phase shift, and amplitude of the vibrating flow tubes. The changes observed represent the mass flow rate and density of the fluid.

### Mass and volume flow measurement

The measuring tubes are forced to oscillate producing a sine wave. At zero flow, the two tubes vibrate in phase with each other. When flow is introduced, the Coriolis forces cause the tubes to twist resulting in a phase shift. The time difference between the waves is measured and is directly proportional to the mass flow rate. Volume flow rate is calculated from mass flow rate and the density measurement.

Watch this video to learn more about how a Coriolis flow meter measures mass flow and density (click the link and select **View Videos**): <https://www.emerson.com/en-us/automation/measurement-instrumentation/flow-measurement/coriolis-flow-meters>.



- A. Inlet pickoff displacement
- B. No flow
- C. Outlet pickoff displacement
- D. Time
- E. Inlet pickoff displacement
- F. With flow
- G. Outlet pickoff displacement
- H. Time difference
- I. Time

## Density measurement

The measuring tubes are vibrated at their natural frequency. A change in the mass of the fluid contained inside the tubes causes a corresponding change to the tube natural frequency. The frequency change of the tube is used to calculate density.

## Temperature measurement

Temperature is a measured variable that is available as an output. The temperature is also used internal to the sensor to compensate for temperature influences on Young's Modulus of Elasticity.

## Meter characteristics

- Measurement accuracy is a function of fluid mass flow rate independent of operating temperature, pressure, or composition. However, pressure drop through the sensor is dependent upon operating temperature, pressure, and fluid composition.
- Specifications and capabilities vary by model and certain models may have fewer available options. For detailed information regarding performance and capabilities, either contact customer service or visit [www.emerson.com/flowmeasurement](http://www.emerson.com/flowmeasurement).

## Performance specifications

### Reference operating conditions

For determining the performance capabilities of our meters, the following conditions were used as a basis:

- Water at 68 °F (20.0 °C) to 77 °F (25.0 °C) and 14.5 psig (1.0 barg) to 29 psig (2.0 barg)
- Accuracy based on industry leading accredited calibration stands according to ISO 17025/IEC 17025
- All models have a density range up to 2,000 kg/m<sup>3</sup> (2 g/cm<sup>3</sup>)

### Accuracy and repeatability

#### Accuracy and repeatability on liquids and slurries

Performance specification	All models
Mass and volume flow accuracy	±0.10% ± (zero stability/flow rate) × 100%
Mass and volume flow repeatability	±0.05%+[½ (zero stability / flow rate) × 100] % of rate
Density accuracy	±1 kg/m <sup>3</sup> (±0.001 g/cm <sup>3</sup> )
Density repeatability	±0.5 kg/m <sup>3</sup> (±0.0005 g/cm <sup>3</sup> )
Temperature accuracy	±1.5 °C ±0.5% of reading
Temperature repeatability	1.5 °C

### Warranty

#### Warranty options on all TA-Series models

The warranty period is generally initiated from the day of shipment. For warranty details, see the *Terms and Conditions* included with the standard product quote.

Base model	Included as standard	Included with start-up service	Available for purchase
TA010T-TA300T	18 months	36 months	> 36 months (customizable length)

### Liquid flow rates

#### Nominal flow rate

Micro Motion has adopted the term nominal flow rate, which is the flow rate at which water at reference conditions causes approximately 14.5 psig (1.0 barg) of pressure drop across the meter.

**Mass flow rates for all models**

Model	Nominal Line Size	Nominal flow rate		Maximum flow rate	
		lb/min	kg/h	lb/min	kg/h
TA010T	0.10 in (DN6)	11.9	325	12.9	350
TA025T	0.25 in (DN8)	41.5	1130	44.1	1200
TA050T	0.50 in (DN15)	110.2 <sup>(1)</sup>	3000 <sup>(1)</sup>	110.2	3000
TA075T	0.75 in (DN20)	191.1	5200	220.5	6000
TA100T	1 in (DN25)	503.4	13700	611.4	18000
TA200T	2 in (DN50)	1102.3	30000	1102.3	30000
TA300T	3 in (DN80)	2,939.5	80,000	2,939.5	80,000

(1) Stated TA050T nominal flow rate generates a pressure drop of 8.3 psig (0.57 barg).

**Volume flow rates for all models**

Model	Nominal flow rate			Maximum flow rate		
	gal/min	barrels/h	l/h	gal/min	barrels/h	l/h
TA010T	1.4	2	325	1.5	2.1	350
TA025T	5	6.8	1130	5.3	7.2	1200
TA050T	13.2 <sup>(1)</sup>	18 <sup>(1)</sup>	3000 <sup>(1)</sup>	13.2	18	3000
TA075T	22.9	31.2	5200	26.5	36	6000
TA100T	60.4	82.2	13700	79.4	108	18000
TA200T	132.3	180	30000	132.3	180	30000
TA300T	352.2	503.1	80,000	352.2	503.1	80,000

(1) Stated TA050T nominal flow rate generates a pressure drop of 8.3 psig (0.57 barg).

## Zero stability for all models

Zero stability is used when the flow rate approaches the low end of the flow range where the meter accuracy begins to deviate from the stated accuracy rating, as depicted in the turndown section. When operating at flow rates where meter accuracy begins to deviate from the stated accuracy rating, accuracy is governed by the formula: Accuracy = (zero stability / flow rate) x 100%. Repeatability is similarly affected by low flow conditions.

Model	Zero stability
TA010T	0.001 lb/min 0.035 kg/h
TA025T	0.004 lb/min 0.12 kg/h
TA050T	0.011 lb/min 0.3 kg/h
TA075T	0.022 lb/min 0.6 kg/h

Model	Zero stability
TA100T	0.066 lb/min 1.8 kg/h
TA200T	0.110 lb/min 3 kg/h
TA300T	0.239 lb/min 6.5 kg/h

## Process pressure ratings

Sensor maximum working pressure reflects the highest possible pressure rating for a given sensor. Process connection type, environment, and process fluid temperatures may reduce the maximum rating. For common sensor and fitting combinations, see the *Micro Motion ELITE Coriolis Flow and Density Meters Technical Data Sheet* at [www.emerson.com/flowmeasurement](http://www.emerson.com/flowmeasurement).

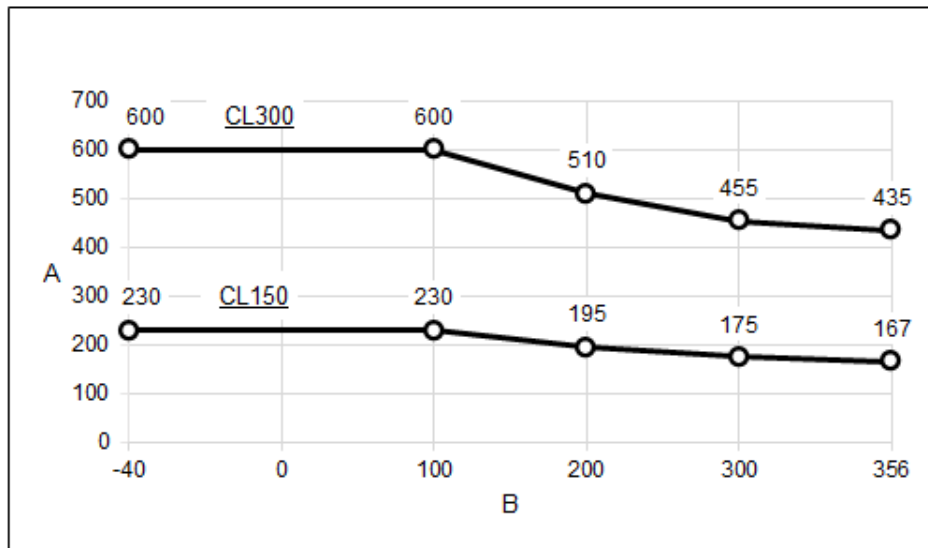
Model	Pressure
TA010T	1,377 psig (95 barg)
TA025T	1,160 psig (80 barg)
TA050T	870 psig (60 barg)
TA075T	1,450 psig (100 barg)
TA100T	913 psig (63 barg)
TA200T	681 psig (47 barg)
TA300T	870 psig (60 barg)

## Temperature and pressure de-ratings

### Note

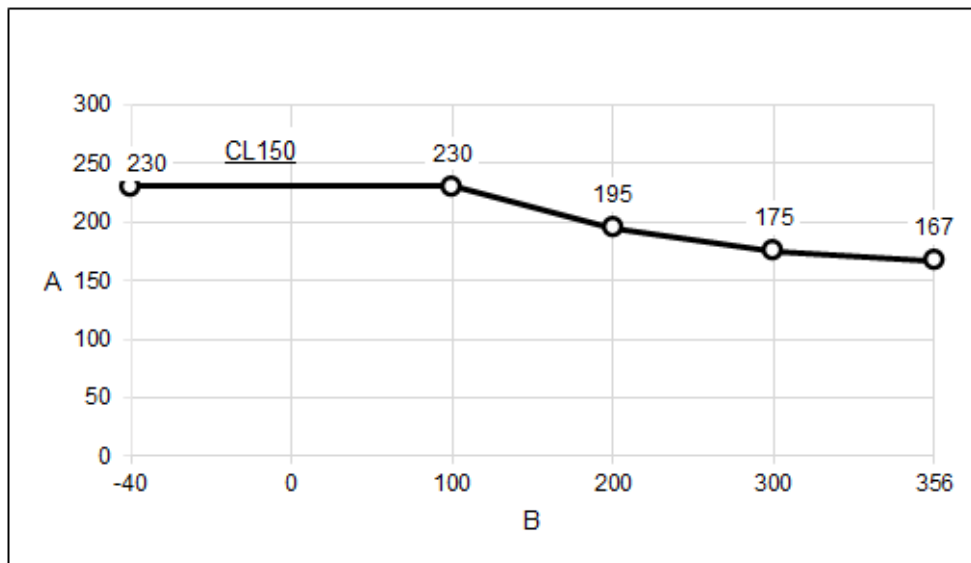
- The ratings in this section apply to the combined sensor and process connection to ensure that the meter does not exceed the limits of either component.
- The temperature and pressure de-ratings graphs do not represent all possible model and fitting combinations. For combinations not listed here, contact a sales representative or the factory.

TA010T-TA100T-ASME B16.5 EN1.4404



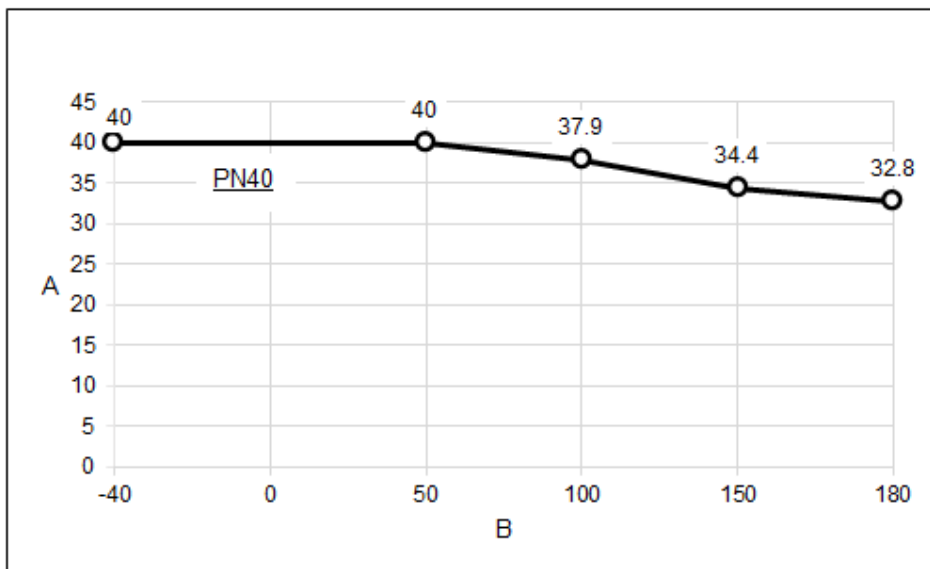
- A. Pressure (psi)
- B. Temperature (°F)

TA200T - TA300T ASME B16.5 EN1.4404



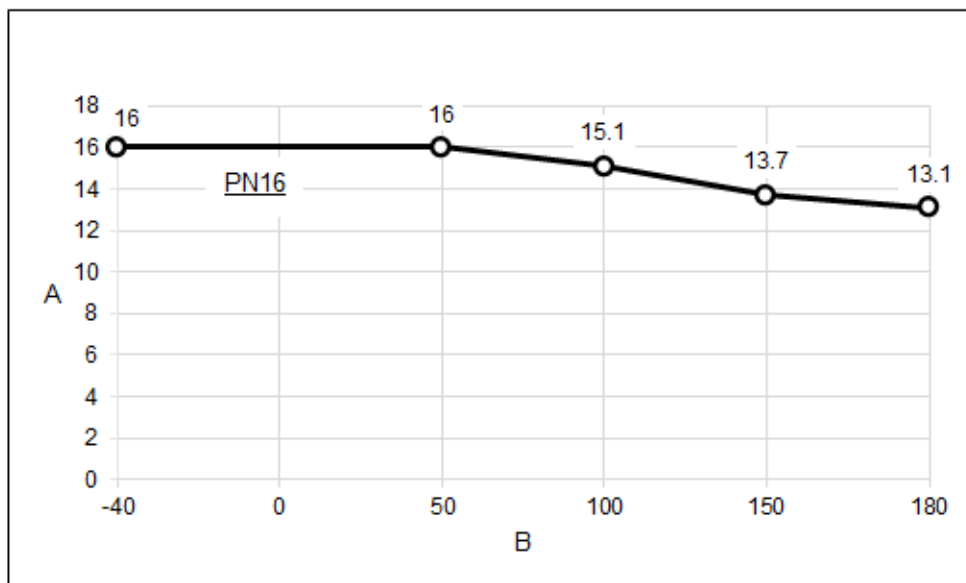
- A. Pressure (psi)
- B. Temperature (°F)

TA010T-TA200T EN 1092-1 EN1.4404



- A. Pressure (Bar)
- B. Temperature (°C)

TA300T EN 1092-1 EN1.4404



- A. Pressure (Bar)
- B. Temperature (°C)



## Operating conditions: Environmental

### Temperature limits

Temperature type	Min	Max
Process temperature	-40 °F (-40.0 °C)	356 °F (180.0 °C)
Ambient temperature	-40 °F (-40.0 °C)	176 °F (80.0 °C)

Use the extended mount junction box (electronic interface code H) for process temperatures above 176 °F (80.0 °C).

## Operating conditions: Process

### Process temperature effect

- For mass flow measurement, process temperature effect is defined as the change in sensor flow accuracy due to process temperature change away from the calibration temperature. Temperature effect can be corrected by zeroing at the process conditions.
- For density measurement, process temperature effect is defined as the change in sensor density accuracy due to process temperature change away from the calibration density. See the *Micro Motion TA-Series Flow and Density Meters Installation Guide* for proper setup and configuration.

Model code	Mass flow rate (% of maximum rate) per °C	Density per °C
TA010T - TA300T	±0.00175	±0.1 kg/m <sup>3</sup> (±0.0001 g/cm <sup>3</sup> )

### Process Pressure Effect

#### Process pressure effect

Process pressure effect is defined as the change in sensor flow and density accuracy due to process pressure change away from the calibration pressure. This effect can be corrected by dynamic pressure input or a fixed meter factor. For proper setup and configuration, see the *Micro Motion TA-Series Flow and Density Meters Installation Guide*.


#### Pressure effect for liquid flow rate, gas flow rate, or density

The following table shows the process pressure effect using TA-Series sensors.

Model	Density	
	g/cm <sup>3</sup> per psi	kg/m <sup>3</sup> per bar
TA010T	0.00001	0.145
TA025T	-0.00001	-0.145
TA050T	-0.00008	-1.160
TA075T	-0.000004	-0.058
TA100T	-0.00007	-1.015
TA200T	-0.0002	-2.901
TA300T	-0.0001	-1.450

## Hazardous area classifications

### Approvals and certifications

Type	Approval or certification (typical)	
CSA and CSA C-US	Ambient temperature: -40 °F (-40.0 °C) to 176 °F (80.0 °C) Class 1, Div 1, Groups A, B, C, and D Class I, Div. 2, Groups A, B, C, and D	
ATEX		II 1/2G Ex ib IIC T6...T3 Ga/Gb
IECEX	Ex ib IIC T6...T3 Ga/Gb	
EMC effects	Complies with EMC directive 2014/30/EU per EN 61326 Industrial	
	Complies with NAMUR NE-21 (08-01-2017)	

#### Note

When a meter is ordered with hazardous area approvals, detailed information is shipped along with the product.

### Industry standards

Type	Standard
Industry standards and commercial approvals	<ul style="list-style-type: none"> <li>■ Pressure Equipment Directive (PED)</li> <li>■ Canadian Registration Number (CRN)<sup>(1)</sup></li> <li>■ SIL2 and SIL3 safety certifications</li> </ul>

(1) CRN approval for the TA300T model is in process, but pending.

## Connectivity

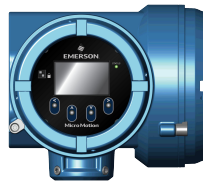
TA-Series sensors are highly customizable to provide a configuration that is tailor-fit to specific applications.

For help determining which Micro Motion products are right for your application, see the *Micro Motion Technical Overview and Specification Summary* and other resources at [www.emerson.com/flowmeasurement](http://www.emerson.com/flowmeasurement).

## Communication and diagnostic information

### Transmitter interface

- The tantalum sensor has the following communication options with the 5700 transmitter: configurable I/O with up to five configurable channels, with options for 2-wire, EtherNet and wireless
- Remote mount 9-wire version of the 5700 transmitter
- Application software designed specific for your process — batching, concentration, and Advanced Phase Measurement



### Diagnostic data

- Smart Meter Verification — checks the health and integrity of the meter's tubes, electronics, and calibration without interrupting the process
- Zero verification — quickly diagnoses the meter to determine if re-zeroing is recommended, and if process conditions are stable and optimal for zeroing
- Multiphase detection — proactively identifies multiphase process conditions and severity
- Time-stamped digital audit trails and reports for optimized agency compliance




## Communication protocols

Typical I/O connectivity options include:

- 4-20 mA
- HART/Bell 202
- EtherNet/IP/Ethernet
- Modbus TCP/Ethernet
- PROFINET/Ethernet
- Modbus/USP
- Modbus/RS-485, Hart/RS-485
- FOUNDATION fieldbus
- Intrinsically safe outputs

## Transmitter compatibility and primary attributes

For a complete list of all transmitter configurations and options, see the transmitter product data sheets and other resources available at [www.emerson.com/flowmeasurement](http://www.emerson.com/flowmeasurement).

Transmitter and Models	Power	Diagnostics	Local operator interface	Certification and approvals
Remote 5700 Transmitter 	<ul style="list-style-type: none"> <li>■ AC</li> <li>■ DC</li> </ul>	<ul style="list-style-type: none"> <li>■ SMV basic (included)</li> <li>■ SMV Pro</li> <li>■ Real time clock</li> <li>■ Onboard data historian</li> </ul>	Graphical display	<ul style="list-style-type: none"> <li>■ SIS certified</li> <li>■ Custody transfer</li> </ul>

Transmitter and Models	Power	Diagnostics	Local operator interface	Certification and approvals
Models: TA010T - TA300T				

## Physical specifications

### Materials of construction

General corrosion guidelines do not account for cyclical stress, and therefore should not be relied upon when choosing a wetted material for a Micro Motion meter. Refer to the *Micro Motion Corrosion Guide* for material compatibility information.

For the Model 5700 transmitter specifications, see the *Micro Motion 5700 Product Data Sheet*.

#### Wetted part materials

All wetted materials are pure tantalum.

Model	Sensor weight
TA010T	11.0 lb (5 kg)
TA025T	26.5 lb (12 kg)
TA050T	33.1 lb (15 kg)
TA075T	33.1 lb (15 kg)
TA100T	52.9 lb (24 kg)
TA200T	88.2 lb (40 kg)
TA300T	123 lb (56 kg)

#### Note

Weight specifications are based upon the ASME B16.5 CL150 flange and do not include electronics.

#### Non-wetted part materials

Component	Enclosure rating	304L stainless steel	Polyurethane-painted aluminum	316L-stainless steel
Sensor housing	—	✓		
Junction box housing	NEMA 4X (IP66)		✓	
Model 5700 transmitter housing	NEMA 4X (IP66)		✓	✓

## Flanges

Sensor type	Flange types
TA010T - TA100T	<ul style="list-style-type: none"> <li>■ ASME B16.5 SM3 (up to CL300)</li> <li>■ EN 1092-1 Form B2 (up to PN40)</li> </ul>

Sensor type	Flange types
TA200T	<ul style="list-style-type: none"> <li>■ ASME B16.5 SM3 (up to CL150)</li> <li>■ EN 1092-1 Form B2 (up to PN40)</li> </ul>
TA300T	<ul style="list-style-type: none"> <li>■ ASME B16.5 SM3 (up to CL150)</li> <li>■ EN 1092-1 Form B2 (up to PN16)</li> </ul>

**Note**

For flange compatibility, please refer to the Online Store Sizing and Selection Tool at [www.emerson.com/flowmeasurement](http://www.emerson.com/flowmeasurement).

## Detailed specifications

### Flow tube information

Model	Number of tubes	Tube inside diameter	Tube length
TA010T	2	0.12 in (3 mm)	28.2 in (716 mm)
TA025T	2	0.20 in (5 mm)	30.1 in (765 mm)
TA050T	2	0.35 in (9 mm)	37.9 in (963 mm)
TA075T	2	0.39 in (10 mm)	38.7 in (983 mm)
TA100T	2	0.63 in (16 mm)	47.9 in (1,217 mm)
TA200T	2	0.87 in (22 mm)	42.9 in (1,090 mm)
TA300T	2	1.34 in (34 mm)	45.6 in (1,158 mm)

### ASME B16.5 specification flange compatibility

Model	0.75 in (19.0 mm)	1 in (25 mm)	2 in (51 mm)	3 in (76 mm)	4 in (102 mm)
TA010T	•				
TA025T	•				
TA050T		•			
TA075T		•			
TA100T			•		
TA200T				•	
TA300T					•

### EN1092-1 specification flange compatibility

Model	DN15	DN25	DN50	DN80	DN100
TA010T	•				
TA025T	•				
TA050T		•			
TA075T		•			
TA100T			•		

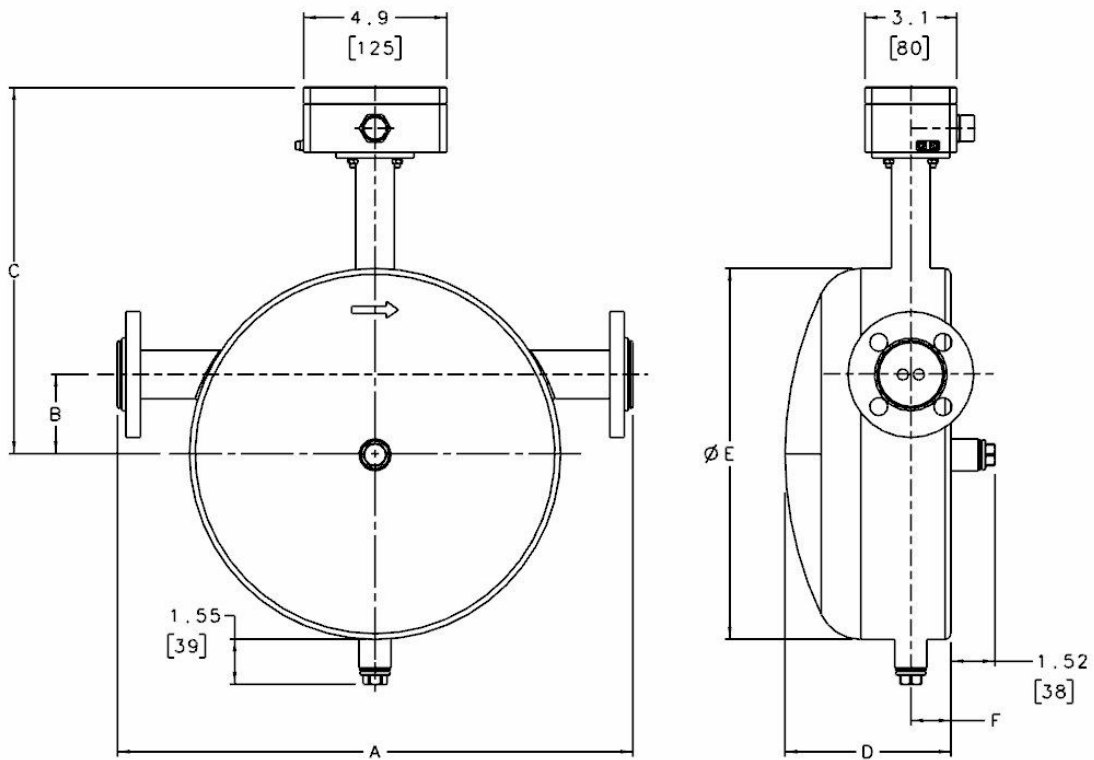
Model	DN15	DN25	DN50	DN80	DN100
TA200T				•	
TA300T					•

## Dimensions

These dimensional drawings are intended to provide a basic guideline for sizing and planning. They are representative of a sensor fitted with a junction box meant for a remote mount transmitter.

All dimensions in tables are ±0.12 in (±3.0 mm)

### Example dimensions for models TA010T to TA200T with a standard welded body

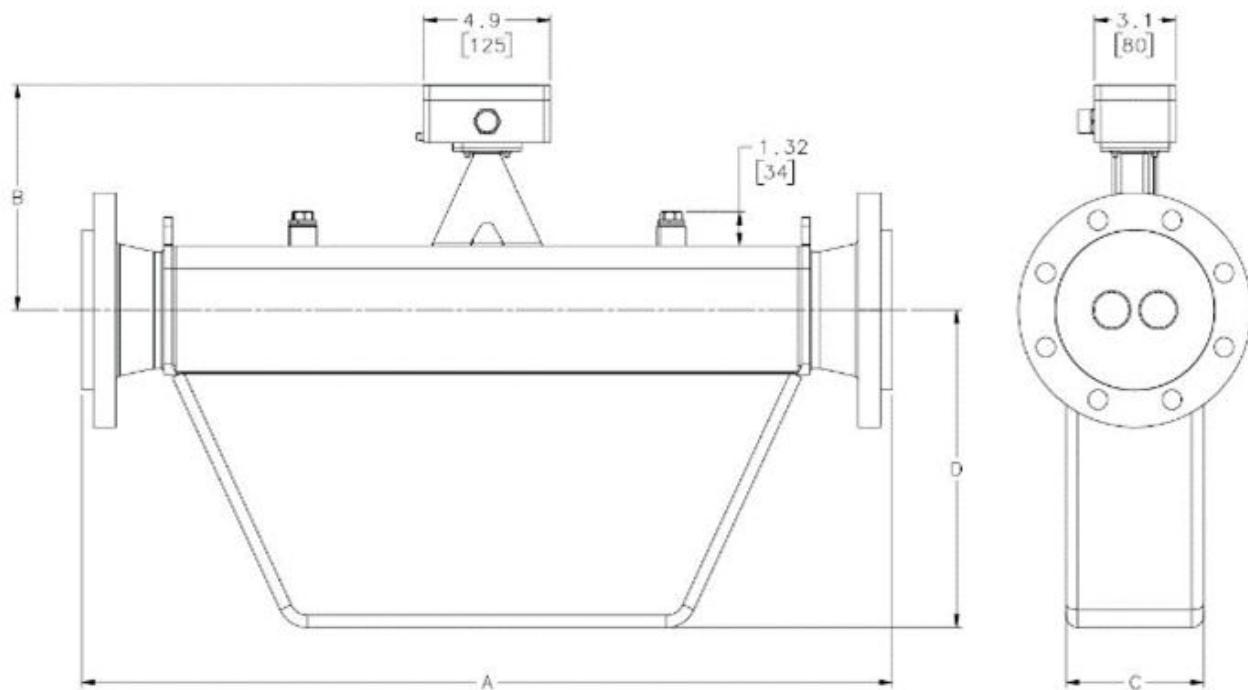


- Junction box dimensions are in inches (mm).
- Representative of a sensor model fitted with DN100 PN16 flange CL150 ASME B16.5.

Model	Dim A	Dim B	Dim C		Dim D	Dim E	Dim F
			Standard junction box	Extended mount option			
TA010T	13.8 in (350 mm)	0.8 in (20 mm)	9.8 in (249 mm)	13.8 in (351 mm)	3.7 in (95 mm)	8.16 in (219 mm)	1.1 in (28 mm)
TA025T	15.7 in (400 mm)	0.8 in (20 mm)	9.8 in (249 mm)	13.8 in (351 mm)	3.7 in (95 mm)	8.16 in (219 mm)	1.1 in (28 mm)

Model	Dim A	Dim B	Dim C		Dim D	Dim E	Dim F
			Standard junction box	Extended mount option			
TA050T	17.7 in (450 mm)	2.7 in (69 mm)	9.9 in (251 mm)	13.9 in (352 mm)	5.7 in (145 mm)	12.8 in (324 mm)	1.4 in 35 mm
TA075T	17.7 in (450 mm)	2.8 in (70mm)	9.9 in (251mm)	13.9 in (352 mm)	5.7 in (145 mm)	12.8 in (324 mm)	1.4 in 35 mm
TA100T	25.6 in (650 mm)	3.0 in (75 mm)	11.3 in (287 mm)	15.3 in (389 mm)	9.1 in (230 mm)	16.0 in (406 mm)	3.1 in (80 mm)
TA200T	29.5 in (750 mm)	3.0 in (75 mm)	13.3 in (338 mm)	17.3 in (440 mm)	13.0 in (330 mm)	20.0 in (508 mm)	4.7 in (120 mm)

**Example dimensions for model TA300T**



- All dimensions in tables are ±0.12 in (±3.0 mm).
- Representative of a sensor model fitted with CL150 ASME B16.5 flange.

Model	Dim A	Dim B		Dim C	Dim D
		Standard junction box	Extended mount option		
TA300T	31.49 in (799.8 mm)	8.70 in (221.0 mm)	12.72 in (323.1 mm)	5.35 in (135.9 mm)	12.27 in (311.7 mm)

## Ordering information

This section lists the available options and ordering codes for the TA-Series product family.

### Base model

#### Code descriptions

Model	Size and material
TA010T	0.079 in (2.0 mm) (DN2), tantalum
TA025T	0.25 in (6 mm) (DN6), tantalum
TA050T	0.59 in (15.0 mm) (DN15), tantalum
TA075T	0.79 in (20.1 mm) (DN20), tantalum
TA100T	1 in (25 mm) (DN25), tantalum
TA200T	2 in (51 mm) (DN50), tantalum
TA300T	3 in (76 mm) (DN80), tantalum

### Process connections

#### Models TA010T and TA025T

Code	Description					
D15	DN15	PN40	EN 1092-1	EN1.4404	Socket weld flange	Form B1
D17	0.75 in (19.0 mm)	CL150	ASME B16.5-2003	EN1.4404	Socket weld flange	SM3
D18	0.75 in (19.0 mm)	CL300	ASME B16.5-2003	EN1.4404	Socket weld flange	SM3

#### Models TA050T and TA075T

Code	Description					
D25	DN25	PN40	EN 1092-1	EN1.4404	Socket weld flange	Form B1
D27	1 in (25 mm)	CL150	ASME B16.5-2003	EN1.4404	Socket weld flange	SM3
D28	1 in (25 mm)	CL300	ASME B16.5-2003	EN1.4404	Socket weld flange	SM3



**Model TA100T**

Code	Description					
D50	DN50	PN40	EN 1092-1	EN1.4404	Socket weld flange	Form B1
D52	2 in (51 mm)	CL150	ASME B16.5	EN1.4404	Socket weld flange	SM3
D53	2 in (51 mm)	CL300	ASME B16.5	EN1.4404	Socket weld flange	SM3

**Model TA200T**

Code	Description					
D80	DN80	PN40	EN 1092-1	EN1.4404	Socket weld flange	Form B1
D82	3 in (76 mm)	CL150	ASME B16.5	EN1.4404	Socket weld flange	SM3

**Model TA300T**

Code	Description					
D90	DN100	PN16	EN 1092-1	EN.1.4404	Socket weld flange	Form B2
D92	4 in (102 mm)	CL150	ASME B16.5	EN.1.4404	Socket weld flange	SM3

## Case options

**Case options for all models**

Code	Case option
N	Standard case (300-Series stainless steel)
P	Standard case (300-Series stainless steel) with purge fittings (0.5 in (13 mm) NPT female)
G	Standard case (300-Series stainless steel) with purge fittings (G1/2 female)

## Electronics interface (available on all models)

Code	Electronics interface	Temperature service rating
R	9-wire polyurethane-painted aluminum box	-40 °F (-40.0 °C) to 212 °F (100.0 °C)
H	9-wire extended mount polyurethane-painted aluminum box	-40 °F (-40.0 °C) to 356 °F (180.0 °C)

## Conduit connections (available on all models)

Code	Description
A	No gland
H	Brass nickel cable gland
J	Stainless steel cable gland

## Approvals (available on all models)

Code	Description
M	Micro Motion Standard (no approval, without CE/EAC markings)
N	Micro Motion Standard / PED compliant (with CE/EAC markings)
A	CSA (US and Canada): Class I, Division 1, Groups C, and D
Z	ATEX - Equipment Category 2 (Zone 1)
I	IECEX Zone 1

## Future option 1

Code	Future option 1
Z	Future option

## Future option 2

Code	Future option 2
Z	Future option

## Calibration (available on all models)

Code	Calibration option
Z	0.10% mass flow and 1 kg/m <sup>3</sup> (0.001 g/cm <sup>3</sup> ) density calibration

## Measurement application software (all models)

Code	Measurement application software option
Z	No measurement application software

## Factory options

Code	Factory option
Z	Standard product

## Certificate, tests, calibrations and services (all optional)

Code	Material quality examination tests and certificates
MC	Material Inspection Certificate 3.1 (Supplier Lot Traceability per EN 10204) Available on all models

Code	Pressure testing
HT	Hydrostatic Test Certificate 3.1 Available on all models

Code	Dye penetrant examination
D1	Dye Penetrant Test Package 3.1 (sensor only; Liquid Dye Penetration NDE Qualification) Available on all models except TA010T

Code	Positive material testing
PM	Positive Material Test Certificate 3.1 (without carbon content) Available on all models

Code	Sensor completion options
SP	Special packaging Available on all models

For more information: [www.emerson.com](http://www.emerson.com)

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