

# VersaFlow Coriolis 200 Sensor for Mass Flow Specifications

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## The Solution for Bulk Mass Flow Measurement

The VersaFlow Coriolis 200 has been developed to meet the demanding transfer requirements of the oil and gas industry. It is well suited to bulk measurement in many applications.

A high level of performance makes the VersaFlow Coriolis 200 suitable for the bulk measurement of petroleum and oil as well as products like syrup, molasses and raw chemicals. Combined with the power of the TWC9000, the VersaFlow Coriolis 200 will provide accurate measurement of mass, volume, density and concentration.

## Features

- Innovative twin measuring tube design
- High flow rate capacity
- Easily drained and easy to clean
- Optional heating jacket
- High accuracy for custody transfer
- Optimized flow divider for minimum pressure drop
- Modular electronics concept: electronics and sensor are easy to replace
- Large tube size for bulk measurement

## Industries

- Oil & Gas
- Chemical
- Paper & Pulp
- Food & Beverage
- Pharmaceutical
- Fresh water
- Waste water



Figure 1 – VersaFlow Coriolis 200 sensor for mass flow

1. Comprehensive diagnostic capabilities
2. Available with a range of process connections
3. Outer casing in stainless steel 304L or 316L
4. Common electronics across the range of sensors with redundant storage of calibration and sensor data
5. Modular electronics with all output options.

## Applications

- Bulk loading/unloading
- Custody transfer for volume and mass
- High Volume
- Pipeline measurement applications

## Features and Options



### Features

VersaFlow Coriolis 200 provides the best solution for a variety of applications where bulk measurement is required

- Flow rates up to 2,300,000 kg/h
- Integrated electronics
- Best in class for zero stability



### Connection Options

The VersaFlow Coriolis 200 range of meters are available with both hygienic and flange connections.

- Standard flanges with ratings up to 1500 lbs.
- Hygienic connections (S100 only) for bulk measurement in the food/beverage industry



### Heating Jacket & Purge Port

VersaFlow Coriolis 200 is available with both heating jacket and purge port options.

- Heating jacket option for use with temperature dependant products.
- Prevents solidification of process product.
- Purge port option for protection in the event of measuring tube failure.
- Allows hazardous chemicals to be drained away safely
- Can also be used for the early detection of measuring tube failure where highly toxic chemicals are being measured.

## Versions



### Compact

VersaFlow Coriolis 200 compact provides high accuracy with easy installation.

- Pre-programmed TWC9000 for “plug &play” installation.
- available with certified TWC9000 housing for use in hazardous areas.
- Stainless Steel option for TWC9000 housing for use in aggressive environments



### Remote

VersaFlow Coriolis 200 remote version for use with either the TWC9000 F, TWC9000 W or TWC9000 R converter.

- Suited to applications where data collection needs to be centralized.
- Allows the TWC9000 converter to be installed in a safe area.
- 300m maximum distance between meter and converter.
- Stainless steel option for junction box housing for use in aggressive environments.



### TWC010

VersaFlow Coriolis 200 is also available with the TWC010 MODBUS communications option.

- Stand alone meter - operates without the TWC9000 converter.
- Provides industry standard MODBUS communication.
- Easy integration with MODBUS skids.

## Outer Cylinder



### Please Note

Honeywell strongly recommends that the burst disk option is ordered where the meter is being used to measure:

- high pressure gases
- gases kept as liquids at high pressure and/or where there is a risk of tube failure because of:
  - the use corrosive and/or erosive process
  - pressure and/or temperature shocking
  - seismic or other shock loading

If in doubt please contact Honeywell Field Solutions.

Please note that meters ordered with flange rating of 100 barg or above, will automatically be supplied with a burst disk in the outer cylinder.

## Technical data

### Operating Data

Size	S100	S150	S250
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### Flow Rates

	Maximum (kg/h)	420,000	900,000	2,300,000
	Maximum (lbs/min)	14,698	33,804	84,510
<b>Custody Transfer (Mass)</b>	Minimum (kg/h)	11,000	25,000	60,000
	Minimum (lbs/min)	404	919	2205
	Maximum (kg/h)	220,000	500,000	1,200,000
	Maximum (lbs/min)	8084	18,372	44,092
<b>Custody Transfer (Volume-Operating Density 1000kg/m<sup>3</sup>)</b>	Minimum (m <sup>3</sup> /h)	11	25	60
	Minimum (bbl/day)	1660	3774	9057
	Maximum (m <sup>3</sup> /h)	220	500	1200
	Maximum (bbl/day)	33,210	75,478	181,150

<b>Measuring System</b>	
Measuring principle	Coriolis mass flow
Application range	Mass flow and density measurement of fluids, gases and solids
Measured values	Mass, density, temperature
Calculated values	Volume, referred density, concentration, velocity
<b>Design</b>	
Basic	System consists of a measuring sensor and a converter to process the output signal
Features	Fully welded maintenance free sensor with dual-straight measuring tube
<b>Variants</b>	
Compact version	Integral converter
Remote version	Available with field, wall or 19" rack mount versions of the converter
Modbus version	Sensor with integral electronics providing Modbus output for connection to a PLC

### Accuracy

<b>Mass</b>	
Liquid	±0.1% of actual measured flow rate + zero stability
Gas	±0.5% of actual measured flow rate + zero stability
Repeatability	Better than 0.05% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
<b>Zero stability</b>	
S100	< 7 kg/h
S150	< 18 kg/h
S250	< 50 kg/h

<b>Reference conditions</b>	
Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig
<b>Effect on sensor zero point caused by a shift in process temperature</b>	
Stainless Steel	0.0004% per 1°C / 0.000022% per 1°F
<b>Effect on sensor zero point caused by a shift in process pressure</b>	
Stainless Steel	0.0002% of the max flow rate per 1 barrel. / 0.0000014% of the max flow rate per 1 psig
<b>Density</b>	
Measuring range	400...3000 kg/m <sup>3</sup> / 25...187 lbs/ft <sup>3</sup>
Accuracy	±2 kg/m <sup>3</sup> / ±0.13 lbs/ft <sup>3</sup> (stainless steel DN15: ±5 kg/m <sup>3</sup> / ±0.33 lbs/ft <sup>3</sup> )
On site calibration	±0.5 kg/m <sup>3</sup> / ±0.033 lbs/ft <sup>3</sup>
<b>Temperature</b>	
Accuracy	±1°C / ±1.8°F

<b>Ambient temperature</b>		
Compact version with Aluminium converter	-40...+60°C / -40...+140°F	
	Extended temperature range: 65°C / 149°F for some I/O options. For more information contact manufacturer.	
Compact version with Stainless Steel converter	-40...+55°C / -40...+130°F	
Remote versions	-40...+65°C / -40...+149°F	
<b>Process temperature</b>		
Flanged connection	-45...+130°C / -49...+266°F	
Hygienic connection (S100 only)	-20...+130°C / -4...+266°F	
<b>Nominal pressure at 20°C / 68°F</b>		
Measuring tube	Duplex UNS S31803	Super Duplex UNS S32750
FM	-1...140 barg / -14.5...2030 psig	-1...140 barg / -14.5...2030 psig
CRN / ASME B31.3	-1...100 barg / -14.5...1450 psig	-1...130 barg / -14.5...1885 psig
<b>Outer cylinder</b>		
Non CRN approved	Typical burst pressure > 100 barg / 1450 psig at 20°C / 68°F	
<b>Effect on sensor zero point caused by a shift in process temperature</b>		
Stainless Steel	0.0004% per 1°C / 0.000022% per 1°F	
<b>Effect on sensor zero point caused by a shift in process pressure</b>		
Stainless Steel	0.0002% of the max flow rate per 1 barrel. / 0.0000014% of the max flow rate per 1 psig	

<b>Fluid properties</b>	
Permissible physical condition	Liquids, gases, slurries

Permissible gas content (volume)	Contact manufacturer for information.
Permissible solid content (volume)	Contact manufacturer for information.
Protection category (acc. to EN 60529)	IP 67, NEMA 4X
<b>Installation conditions</b>	
Inlet runs	None required
Outlet runs	None required

### Materials

Measuring tube	Stainless Steel UNS S31803 (1.4462)
	Optional UNS S32750 (1.4410)
Spigot	Stainless Steel UNS J92205 (1.4470)
	Optional UNS J93404 (1.4469)
Flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
	Optional Stainless Steel UNS S31803 (1.4462) (NACE approved)
	Optional UNS S32750 (1.4410) (NACE approved)
Outer cylinder	Stainless Steel AISI 304 / 304L (1.4301 / 1.4307) dual certified
	Optional Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
	Optional Stainless Steel UNS S31803 (1.4462) <sup>(1)</sup>
<b>Heating jacket version</b>	
Heating jacket	Stainless Steel 316L (1.4404)
	Note: the outer cylinder is in contact with the heating medium
<b>All versions</b>	
Sensor electronics housing	Stainless Steel 316L (1.4409). Optional Stainless Steel (1.4469)
Junction box (remote version)	Die cast Aluminium (polyurethane coating)

### Process Connections

<b>Flange</b>	
DIN	DN100...300 / PN16...160
ASME	4...12" / ASME 150...1500
JIS	100A / 10...20K
<b>Hygienic (S100 only)</b>	
Tri-clover	4"
Tri-clamp DIN 32676	DN100
Tri-clamp ISO 2852	4"
DIN 11864-2 Form A	DN100
Male thread DIN 11851	DN100
Male thread SMS	4"
Male thread IDF / ISS	4"
Male thread RJT	4"

<sup>(1)</sup> Where this option is ordered, the electronics stem material is UNS J92205 (1.4470)

### Electrical Connections

Electrical connections	For full details, including: power supply, power consumption etc., see technical data for the relevant converter.
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I/O	For full details of I/O options, including data streams and protocols, see technical data for the relevant converter.
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## Approvals

<b>Mechanical</b>	
Electromagnetic compatibility (EMC) acc. to CE	Namur NE 21/5.95
	2004/108/EC (EMC)
	2006/95/EC (Low Voltage Directive)
Factory Mutual / CSA	Class I, Div 1 groups A, B, C, D
	Class II, Div 1 groups E, F, G
	Class III, Div 1 hazardous areas
	Class I, Div 2 groups A, B, C, D
	Class II, Div 2 groups F, G
	Class III, Div 2 hazardous areas
ANSI / CSA (Dual Seal)	12.27.901-2003
Hygienic	3A 28-03
	ASME BPE
Custody Transfer (pending)	MID 2004/22/EC MI-005
<b>ATEX (acc. 94/9/EC)</b>	
<b>Coriolis 200 with TWC9000C non Ex i Signal outputs</b>	
Ex d connection compartment	II 2 G Ex d [ib] IIC T6...T1
	II 2 D Ex tD A21 IP6x T160°C
Ex e connection compartment	II 2 G Ex de [ib] IIC T6...T1
	II 2 D Ex tD A21 IP6x T160°C
<b>Coriolis 200 with TWC9000C Ex i signal outputs</b>	
Ex d connection compartment	II 2(1) G Ex d [ia/ib] IIC T6...T1
	II 2(1) D Ex tD [iaD] A21 IP6x T160°C
Ex e connection compartment	II 2(1) G Ex de [ia/ib] IIC T6...T1
	II 2(1) D Ex tD [iaD] A21 IP6x T160°C
<b>Coriolis 200 with TWC010</b>	II 2 G Ex ib IIC T6...T1
	II 2 D Ex ibD 21 T165 °C



**ATEX (acc. 94/9/EC) temperature limits**

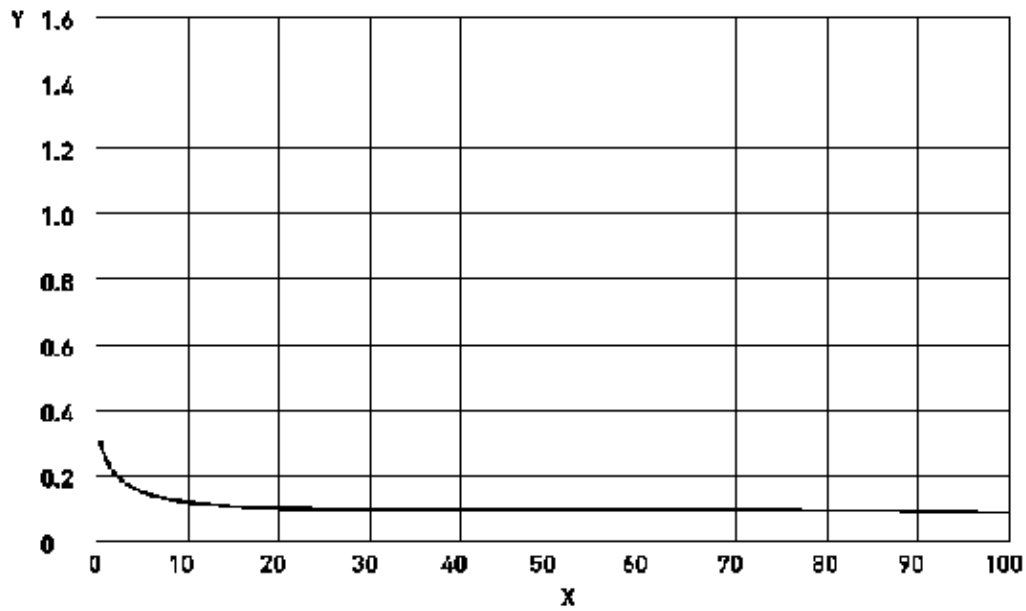
	Ambient temp. Tamb °C	Max. medium temp. Tm °C	Temp. class	Max. surface temp. °C
Coriolis 200 with TWC010 with or without heating jacket / insulation	40	65	T6	T80
		75	T5	T95
		110	T4	T130
		130	T3-T1	T150
	65	75	T5	T95
		110	T4	T130
130		T3-T1	T150	
Coriolis 200 with TWC9000C Aluminium converter housing - with or without heating jacket / insulation	40	50	T6	T80
		65	T5	T95
		100	T4	T130
		130	T3-T1	T160
	50	65	T5	T95
		100	T4-T1	T130
	60	60	T4-T1	T90
	65 (1)	65	T5	T95
Coriolis 200 with TWC9000C Stainless Steel converter housing - with or without heating jacket / insulation	40	50	T6	T80
		65	T5	T95
		100	T4	T130
		120	T3-T1	T150
	50	65	T5	T95
		75	T4-T1	T130
	55	55	T5-T1	T85

(1) depending on I/O option. Please call for more information.

**Maximum End Loadings**

		S100	S150	S250
<b>Flanges</b>				
20°C	40 barg	150kN	650kN	550kN
	100 barg	100kN	120kN	60kN
	150 barg			
130°C	32 barg	150kN	280kN	400kN
	80 barg	60kN	50kN	50kN
	115 barg			
<b>Hygienic (all connections)</b>				
130°C	10 barg	5kN	-	-

**Measuring Accuracy**



X flow rate [%]  
Y measuring error [%]

**Measuring Error**

The measuring error is obtained from the combined effects of accuracy and zero stability.

**Reference Conditions**

Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig

**Dimensions and Weights**

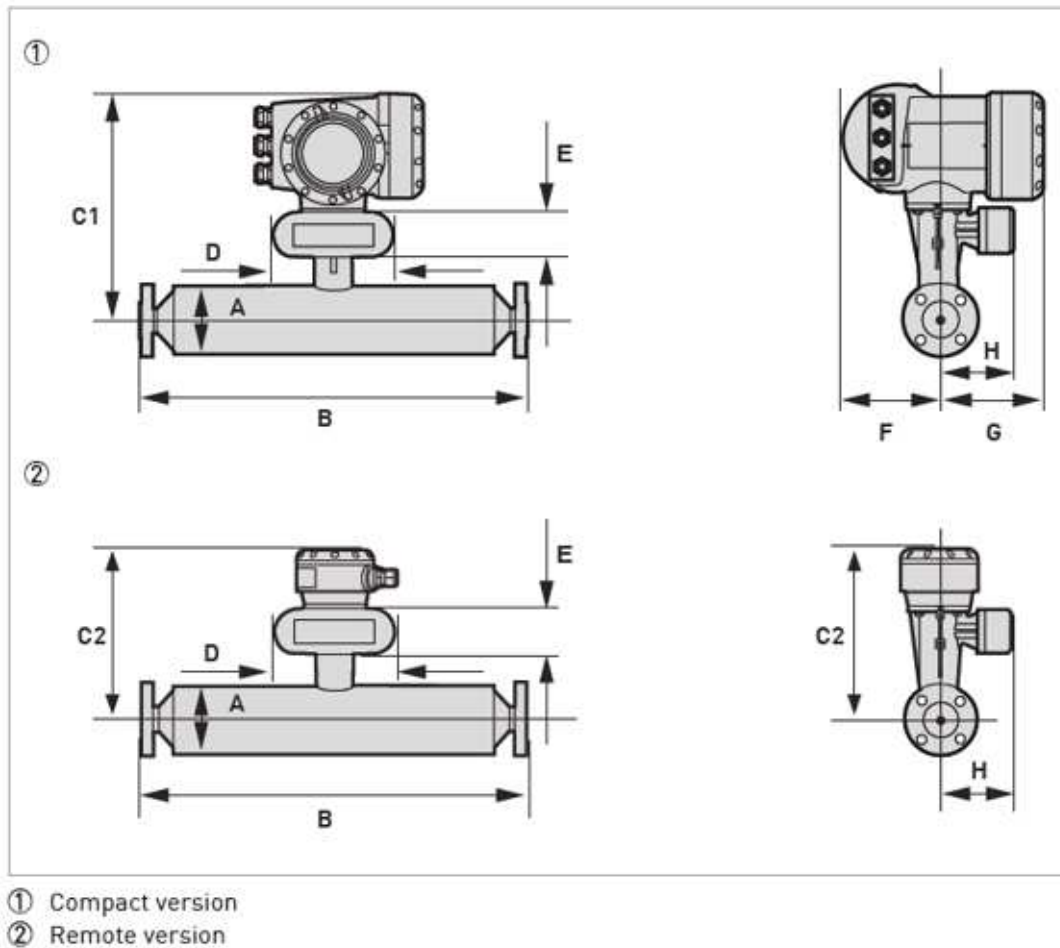
**Weights**

Weights (Kg)	S100	S150	S250
Compact with aluminum converter	84.8	211.5	444.5
Compact with stainless steel converter	90.1	216.8	449.8
Remote with aluminum junction box	80.8	207.5	440.5
Remote with stainless steel junction box	81.7	208.4	441.4

Weights (lbs)	S100	S150	S250
Compact with aluminum converter	187	466	980
Compact with stainless steel converter	198	478	991
Remote with aluminum junction box	178	457	971
Remote with stainless steel junction box	180	459	973

## Dimensions (mm)

### Flanged Versions



### Measuring Tube in Stainless Steel

	Dimensions mm (inches)		
	S100	S150	S250
A	219 ±5 (8.6 ±0.2)	323 ±5 (12.7 ±0.2)	406 ±5 (16 ±0.2)
C1 (compact)	370 ±5 (14.6 ±0.2)	422 ±5 (16.6 ±0.2)	463 ±5 (18.2 ±0.2)
C2 (remote)	293 ±5 (11.5 ±0.2)	345 ±5 (13.6 ±0.2)	386 ±5 (15.2 ±0.2)
D	160 (6.3)		
E	60 (2.4)		
F	123.5 (4.9)		
G	137 (5.4)		
H	98.5 (3.9)		

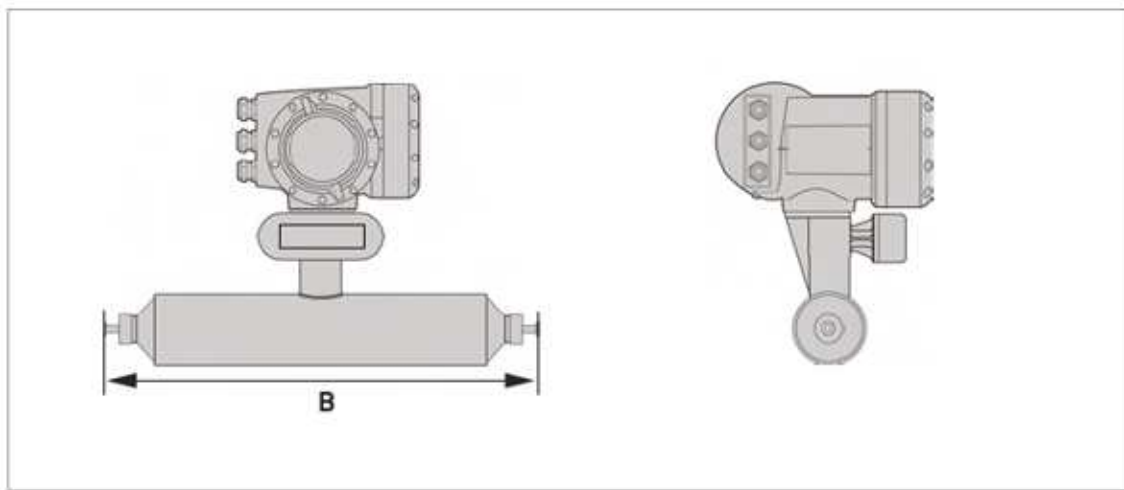
**Flanged Connections**

	Dimension B mm (inches)		
	S100	S150	S250
<b>PN40</b>			
DN100	1310 (51.6)		
DN150	1330 (52.6)	1621 (64)	
DN200		1647 (65.5)	
DN250			2030 (80.7)
DN300			2050 (82.3)
<b>PN63</b>			
DN100	1336 (53.2)		
DN150	1370 (55.5)	1661 (67)	
DN200		1691 (65)	
DN250			2070 (84.8)
DN300			2100 (81.5)
<b>PN100</b>			
DN100	1360 (53.9)		
DN150	1410 (55.5)	1701 (66.6)	
DN200		1731 (68.3)	
DN250			1977 (83.5)
DN300			2160 (85.9)
<b>ASME 150</b>			
4"	1334 (52.5)		
6"	1358 (53.4)	1649 (65)	
8"		1675 (66)	
10"			2024 (80.4)
12"			2050 (81.5)
<b>ASME 300</b>			
4"	1352 (53.2)		
6"	1378 (54.2)	1669 (65.8)	
8"		1695 (66.8)	
10"			2056 (81.7)
12"			2082 (82.7)
<b>ASME 600</b>			
4"	1398 (54.9)		
6"	1428 (56.1)	1719 (67.8)	
8"		1428 (69)	
10"			2138 (85)
12"			2146 (85.2)
<b>ASME 900</b>			
4"	1422 (55.2)		
6"	1474 (57.9)	1765 (69.5)	
8"		1474 (71.2)	
10"			2202 (87.5)
12"			2234 (88.7)
<b>JIS 10K</b>			
100A	1332 (52.5)		
<b>JIS 20K</b>			
100A	1332 (52.5)		

**Hygienic Versions**

**Hygienic Connections: All Welded Versions**

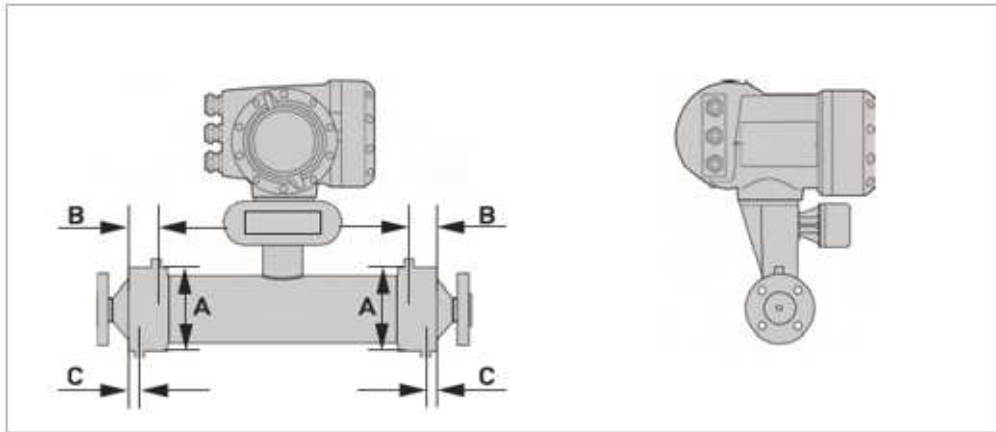
	Dimension B mm (inches)		
	S100	S150	S250
<b>Tri-clover</b>			
4"	1223 (48)		
<b>Tri-clamp DIN 32676</b>			
DN100	1236 (48.7)		
<b>Tri-clamp ISO 2852</b>			
4"	1223 (48)		
<b>DIN 11864-2 Form A</b>			
DN100	1296 (51)		



**Hygienic Connections: Adapter Versions (male thread)**

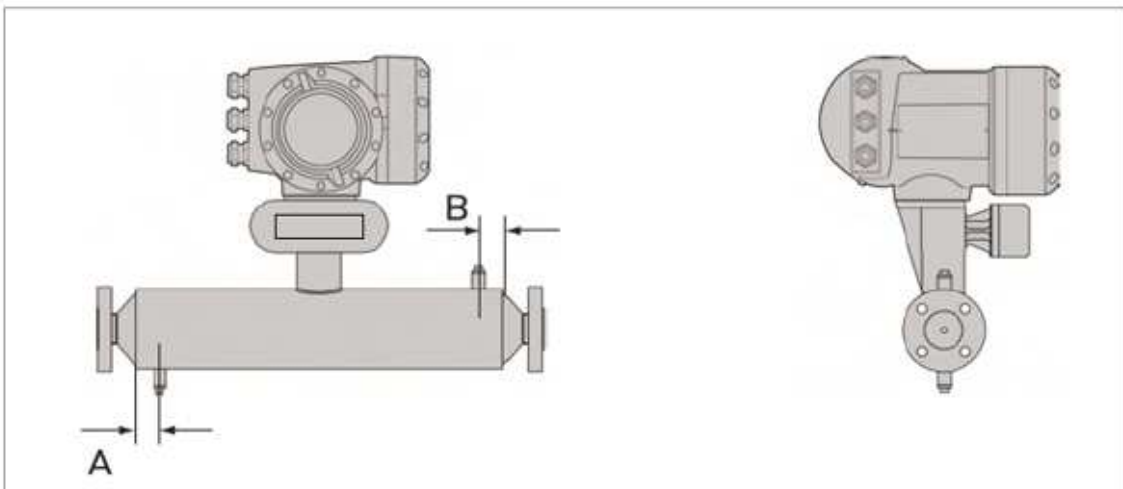
	Dimension B mm (inches)		
	S100	S150	S250
<b>Male thread DIN 11851</b>			
DN100	1288 (50.1)		
<b>Male thread SMS</b>			
4"	1236 (48.7)		
<b>Male thread IDF/ISS</b>			
4"	1223 (48)		
<b>Male thread RJT</b>			
4"	1234 (48.6)		

**Heating Jacket Version**



	Dimensions mm (inches)		
	S100	S150	S250
Heating connection size	25 mm (ERMETO) 1" (NPTF)		
A	254 ±2.5 (10 ±0.1)	355 ±2.5 (14 ±0.1)	444 ±2.5 (17.5 ±0.06)
B	178 ±2.0 (7 ±0.08)	228 ±2.0 (9 ±0.08)	208 ±2.0 (8.2 ±0.08)
C	28 ±2.0 (1.1 ±0.08)	28 ±2.0 (1.1 ±0.08)	6.5 ±2.0 (0.25 ±0.08)

**Purge Port Option**



	Dimensions mm (inches)		
	S100	S150	S250
A	70 ±1.0 (2.75 ±0.04)	100 ±1.0 (4.0 ±0.04)	
B	70 ±1.0 (2.75 ±0.04)	100 ±1.0 (4.0 ±0.04)	

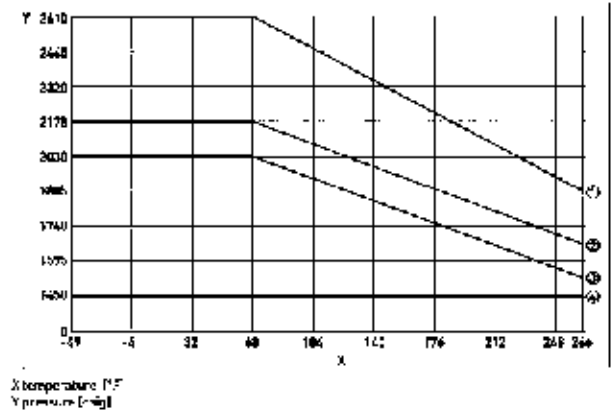
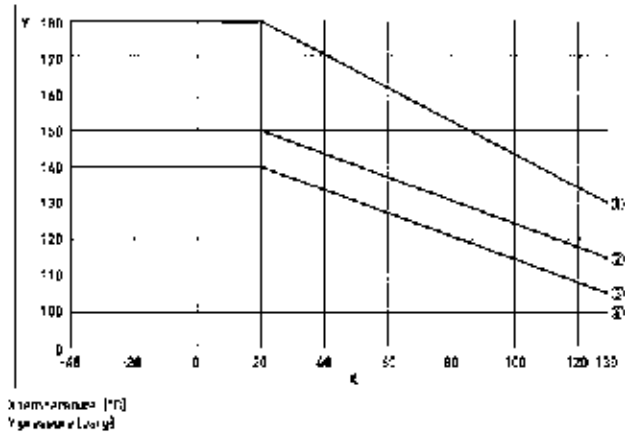
**Guidelines for Maximum Operating Pressure**

**Notes:**

- Ensure that the meter is used within its operating limits
- All hygienic process connections have a maximum operating rating of 10 barg at 130°C/ 145°C at 266°F

**Pressure / temperature de-rating, all meter sizes in metric (flanged connections as per EN 1092-1:2007)**

**Pressure / temperature de-rating, all meter sizes, in imperial (flanged connections as per ASME B16.5)**



1. Measuring tube [UNS S32750] PED certification
2. Measuring tube [UNS S31803] PED certification
3. Measuring tube [UNS S31803/S32750] FM certification
4. Measuring tube [UNS S31803] CRN certification

**Linear de-rating of PED certified secondary containment**

Outer cylinder material	-45°C	20°C	130°C
304 /L or 316 /L	40 barg	40 barg	32 barg
UNS S31803	150 barg	150 barg	100 barg

Outer cylinder material	-49°F	68°F	266°F
304 /L or 316 /L	580 psig	580 psig	464 psig
UNS S31803	2175 psig	2175 psig	1450 psig

**Flanges**

- DIN flange ratings are based on EN 1092-1 2007 table G.1 material group 14EO.
- ASME flange ratings are based on ASME B16.5 2003 table 2 material group 2.2
- JIS flange ratings are based on JIS 2220: 2001 table 1 division 1 material group 022a

**Notes**

- The maximum operating pressure will be either the flange rating or the measuring tube rating. **WHICHEVER IS THE LOWER!**
- The manufacturer recommends that the seals are replaced at regular intervals. This will maintain the hygienic integrity of the connection.