Technical Information

Honeywell

VersaFlow Coriolis 100 Mass Flow Sensor Specifications

34-VF-03-09 May 2011

The Universal Solution for the Process Industry

VERSAFLOW is the only sensor for mass flow in its class with secondary pressure containment as standard. VERSAFLOW reliably measures mass flow of liquids and gases, concentration and density of liquids.

Highlights

- Innovative twin measuring tube
- Easily drained and easy to clean
- Insensitive of installation and external factors
- Long working life
- Optimized flow divider for minimum pressure loss
- High accuracy with best price-performance ratio
- Modular electronics concept: electronics and sensor easy to replace
- Data redundancy: accurate plug & play replacement of electronics

Industries

- Wastewater
- Chemical
- Food & Beverage
- Paper & Pulp
- Petrochemistry
- Pharmaceutical
- Water

Figure 1 – VersaFlow Mass Flow Sensor

Applications

- Suitable for all standard applications up to 130°C / 266°F
- With hygienic type process connections for food and pharmaceutical applications

Mass Flowmeter Product Family

All meters consist of a sensor and a converter, which may be mounted integral to the sensor, or remotely, either with a field mount kit, a wall mount housing or a 19" rack mount module.

A sensor mount converter (TWC 010) with a Modbus® output only is also possible for OEM manufacturers or where the user does not require a converter with analogue outputs.

Converter: Common hardware for All Converters Makes Spares Holding Simpler

1. TWC 9000 C: Compact or integrally mounted on sensor
2. TWC 9000 F: Field mount up to 300 m / 1000 ft from sensor
3. TWC 9000 W: Wall mount for non-hazardous areas
4. TWC 9000 R: 19" Rack mount module for control room installation
5. TWC 010: Sensor electronics with Modbus output

Sensor: Sensors for Any Applications

1. VersaFlow Coriolis 100: The general purpose solution for the process industry
2. VersaFlow Coriolis 1000:The optimum solution for chemical, food & beverage and pharmaceutical industry
3. VersaFlow Coriolis 200: Large diameter meter suitable for custody transfer measurement

Technical Data

Operating Data

Size	S15	S25	S40	S50

Flow Rate

Maximum flow rate [kg/h]	6500	27000	80000	170000
Maximum flow rate [lbs/min]	240	990	2935	6235

Accuracy

Accuracy, liquid	±0.15% of actual measured flow rate
Accuracy, gas	±0.50% of actual measured flow rate
Repeatability	Better than 0.05% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
Zero stability	±0.01% of nominal flow rate with respective sensor size

Reference Conditions

Product	Water
Temperature	20°C/68°F
Operating pressure	1 $bar_{rel.}$ / 14.5 psig

Density

Measuring range	400...2500 kg/m^3 / 25...155 lbs/ft^3
Accuracy	±2 kg/m^3 / ±0.13 lbs/ft^3 (S15: ±5 kg/m^3 / ±0.33 lbs/ft^3)
Accuracy (on-site calibration)	±0.5 kg/m^3 / ±0.033 lbs/ft^3

Temperature

Measuring range	-40...+130°C / -40...+266°F
Accuracy	±1°C / ±1.8°F

Materials

Measuring tube	Stainless steel UNS S31803 (1.4462)
Spigot	Stainless steel 316 / 316L (CF3M / 1.4409) dual certified
Flanges	Stainless steel 316 / 316L (1.4401 / 1.4404) dual certified
Outer cylinder (secondary pressure containment)	Stainless steel 304 / 304L (1.4301 /1.4307) dual certified (Optional Stainless Steel 316 / 316L (1.4401 / 1.4404) dual certified)
Junction Box – remote version	Die cast Aluminum (polyurethane coating) Optional Stainless Steel 316L (1.4401)
Heating jacket version	
Heating jacket	Stainless Steel 316L (1.4404) (The outer cylinder is in contact with the heating medium)

Nominal Pressure at 20°C or 68°F

Measuring Tube	-1…100 bar g/ -14.5 …1450 psig
Outer Cylinder	
Non PED/CRN Approved	Typical burst pressure > 100 barg. / 1450 psig
PED/CRN Approved secondary containment	-1...63 barg. / -14.5...910 psig
PED approved secondary containment	-1...100 barg. / -14.5...1450 psig

Approvals and Certifications

Mechanical:	
Electromagnetic compatibility (EMC) acc. to CE	Namur NE 21/5.95 89/336/EEC (EMC) 72/73/EEC (Low Voltage Directive)
Protection category (acc. to EN 60529)	IP 67; NEMA 4X
European Pressure Equipment Directive	PED 97-23 EC (acc. to AD 2000 Regelwerk)
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

ATEX (acc. 94/9/EC)	
Coriolis 100/TWC9000C non Ex i Signal outputs without heating jacket / insulation	
Ex d connection compartment	II 2 G Ex d [ib] IIC T4....T1
	Optional: II 2 G Ex d [ib] IIC T6....T1
	II 2 D Ex tD A21 IP6x T185°C
	Optional: II 2 D Ex tD A21 IP6x T160°C
Ex e connection compartment	II 2 G Ex de [ib] IIC T4....T1
	Optional: II 2 G Ex de [ib] IIC T6....T1
	II 2 D Ex tD A21 IP6x T185°C
	Optional: II 2 D Ex tD A21 IP6x T160°C
Coriolis 100/TWC9000C non Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	II 2 G Ex d [ib] IIC T4....T1
	Optional: II 2 G Ex d [ib] IIC T6....T1
	II 2 D Ex tD A21 IP6x T195°C
	Optional: II 2 D Ex tD A21 IP6x T165°C

Ex e connection compartment	II 2 G Ex de [ib] IIC T4....T1
	Optional: II 2 G Ex de [ib] IIC T6....T1
	II 2 D Ex tD A21 IP6x T195°C
	Optional: II 2 D Ex tD A21 IP6x T165°C
Coriolis 100/TWC9000C Ex i signal outputs without heating jacket / insulation	
Ex d connection compartment	II 2(1) G Ex d [ia/ib] IIC T4....T1
	Optional: II 2(1) G Ex d [ia/ib] IIC T6....T1
	II 2(1) D Ex tD [iaD] A21 IP6x T185°C
	Optional: II 2(1) D Ex tD [iaD] A21 IP6x T160°C
Ex e connection compartment	II 2(1) G Ex de [ia/ib] IIC T4....T1
	Optional: II 2(1) G Ex de [ia/ib] IIC T6....T1
	II 2(1) D Ex tD [iaD] A21 IP6x T185°C
	Optional: II 2(1) D Ex tD [iaD] A21 IP6x T160°C
Coriolis 100/TWC9000C Ex i signal outputs with heating jacket / insulation	
Ex d connection compartment	II 2(1) G Ex d [ia/ib] IIC T4....T1
	Optional: II 2(1) G Ex d [ia/ib] IIC T6....T1
	II 2(1) D Ex tD [iaD] A21 IP6x T195°C
	Optional: II 2(1) D Ex tD [iaD] A21 IP6x T165°C
Ex e connection compartment	II 2(1) G Ex de [ia/ib] IIC T4....T1
	Optional: II 2(1) G Ex de [ia/ib] IIC T6....T1
	II 2(1) D Ex tD [iaD] A21 IP6x T195°C
	Optional: II 2(1) D Ex tD [iaD] A21 IP6x T165°C
Coriolis 100/TWC010 without heating/ insulation	II 2 G Ex ib IIC T4…T1
	Optional: II 2 G Ex ib IIC T6…T1
	II 2 D Ex ibD 21 T175 °C
	Optional: II 2 D Ex ibD 21 T165 °C
Coriolis 100/TWC010 with heating/ insulation	II 2 G Ex ib IIC T4…T1
	Optional: II 2 G Ex ib IIC T6…T1
	II 2 D Ex ibD 21 T175 °C
	Optional: II 2 D Ex ibD 21 T165 °C

Approvals and Certifications continued

ATEX (acc. 94/9/EC) temperature limits (standard)	Ambient temp. Tamb °C	Max. medium temp. Tm °C	Temp. class	Max. surface temp. °C
Coriolis 100/TWC9000 or TWC010 - with or without heating jacket / insulation	65	89	T4	T130
		130	T3 - T1	T175
Coriolis 100/TWC9000 - aluminium converter housing - no heating jacket / insulation	50	70	T4	T130
		130	T3 - T1	T185
	60	60 T	4 - T1	T125
	65 (1)	65	T4 - T1	T130
Coriolis 100/TWC9000 - aluminium converter housing - heating jacket / insulation	40	65	T4	T130
		130	T3 - T1	T195
	50	65	T4	T130
		100	T3 - T1	T165
	60	60	T4 - T1	T125
	65 (1)	65	T4 - T1	T130
Coriolis 100/TWC9000 - SS converter housing - no heating jacket / insulation	50	70	T4	T130
		130	T3 - T1	T185
	55	55	T4 - T1	T120
Coriolis 100/TWC9000 - SS converter housing - heating jacket / insulation	40	65	T4	T130
		120	T3 - T1	T185
	50	65	T4	T130
		75	T3 - T1	T140
	55	55	T4 - T1	T120
Coriolis 100/TWC9000/TWC010 T6 - with or without heating jacket / insulation	40	45	T6	T180
		60	T5	T95
		95	T4	T130
		130	T3-T1	T165
Coriolis 100/TWC9000/T6 - aluminium converter housing - no heating jacket / insulation	40	45	T6	T80
		60	T5	T95
		100	T4	T130
		130	T3-T1	T155
	50	60	T5	T95
		100	T4	T130
		130	T3-T1	T160
	60	60 T	4-T1	T95
	65(1)	65	T4-T1	T100

[1] Depending on I/O option. Please call for more information.

ATEX (acc. 94/9/EC) temperature limits (standard)	Ambient temp. Tamb °C	Max. medium temp. Tm °C	Temp. class	Max. surface temp. °C
Coriolis 100/TWC9000/T6 - Stainless Steel converter housing - no heating jacket / insulation	40	45	T6	T80
		60	T5	T95
		100	T4	T130
		130	T3-T1	T155
	50	60	T5	T95
		100	T4	T130
		130	T3-T1	T160
	55	55	T4-T1	T95
Coriolis 100/TWC9000 T6 - Stainless Steel converter housing - heating jacket / insulation	40	45	T6	T80
		60	T5	T95
		95	T4	T130
		120	T3-T1	T155
	50	60	T5	T95
		75	T4-T1	T110
	55	55	T4-T1	T130
NEPSI (with TWC9000C/F, TWC 010)	Exdeib(ia)II C T1...T6, Exdib(ia)II C T1...T6			

Temperature

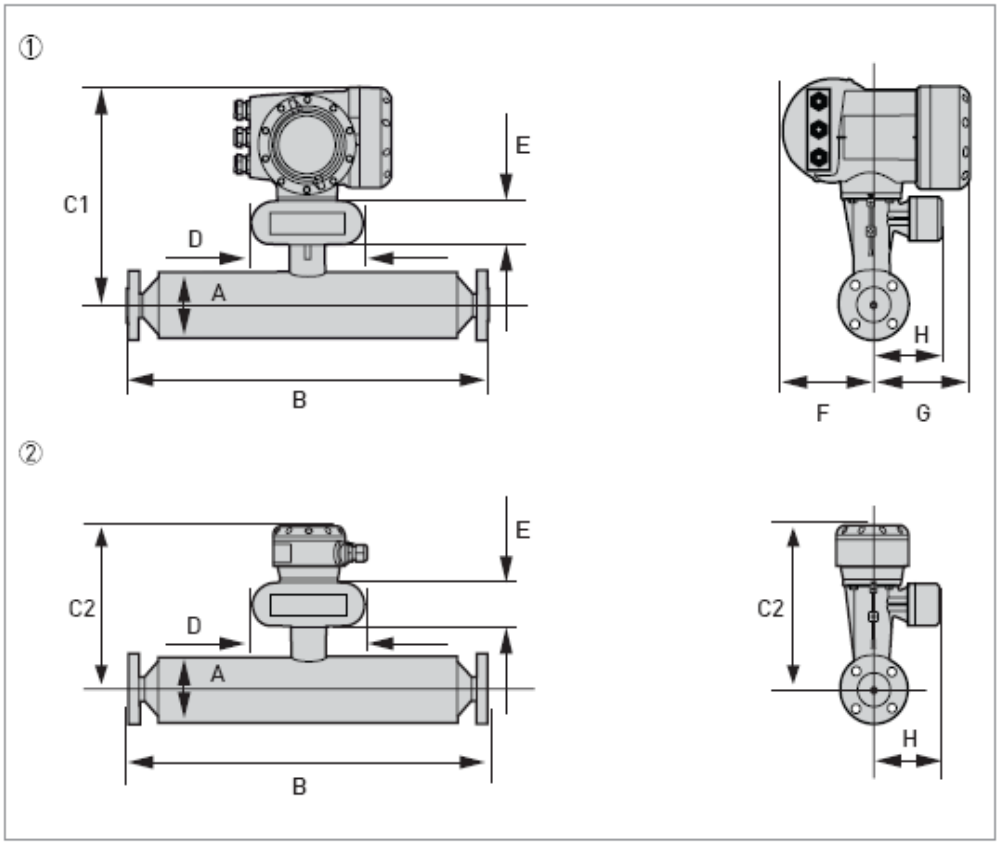
Process temperature - flanged connections	-40...+130°C / -40...+266°F
Process temperature - hygienic connections	-20...+130°C / -4...+266°F
Ambient temperature - compact version	40...+60°C / -40...+140°F for Aluminum converter (Extended temperature range: +65°C / +149°F for some I/O options. For more information contact manufacturer.) -40...+55°C / -40…+130°F for Stainless Steel converter
Ambient temperature - remote version	-40...+65°C / -40...+149°F

Process Effects on the Sensor

Temperature	0.001% per 1°C / 0.00055% per 1°F
Pressure	0.00012% of the max flow rate per 1 bar_{rel} / 0.0000083% of the max flow rate per 1 psig

Dimensions and Weights

Flanged Versions



① Compact version
② Remote version

Meter Weights (all flanges)

Weight – kg (lbs)

	S15	S25	S40	S50
Aluminium (compact)	13.5 (30)	16.5 (36.3)	29.5 (65)	57.5 (127)
Stainless Steel (compact)	18.8 (41)	21.8 (48)	34.8 (77)	62.8 (138
Aluminium (remote)	11.5 (25)	14.5 (32)	25.5 (56)	51.5 (113)
Stainless Steel (remote)	12.4 (27)	15.4 (33.8)	26.4 (58)	52.4 (115)

Measuring Tube Stainless Steel

Dimensions – mm (inches)

	S15	S25	S40	S50
A	101.6 (4)	114.3 (4.5)	168.3 (6.6)	219.1 (8.6)
C1 (compact)	311 (12.2)	317 (12.5)	344 (13.5)	370 (14.6)
C2 (remote)	231 (9)	237 (9.3)	264 (10.4)	290 (11.4)
D	160 (6.3)			
E	60 (2.4)			
F	123.5 (2.4)			
G	137 (5.4)			
H	98.5 (3.9)			

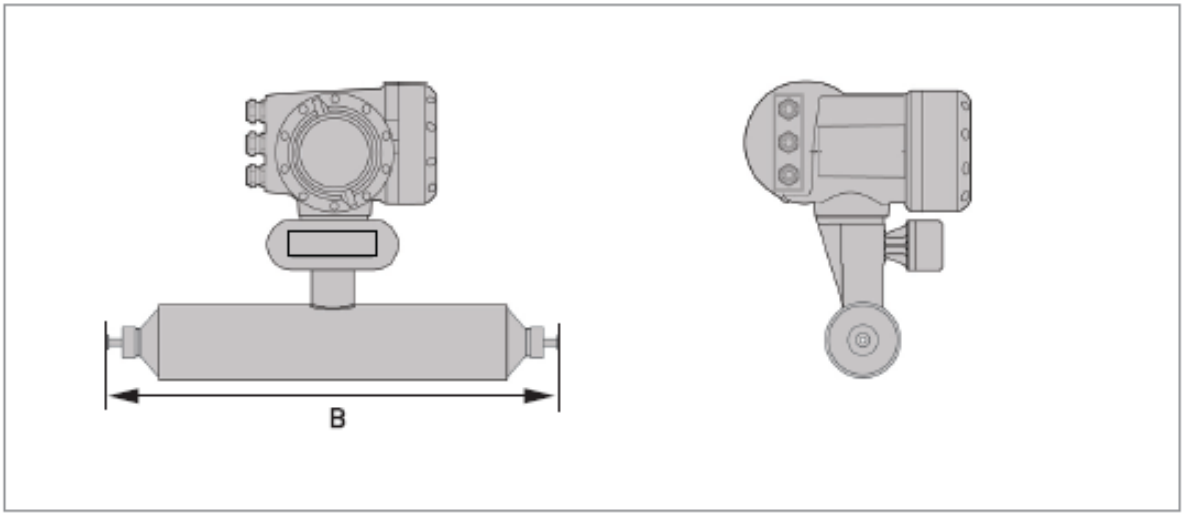
Flange Connections

	Dimension B [mm]			
	S15	**S25**	**S40**	**S50**
PN40				
DN15	498	-	-	-
DN25	503	531	-	-
DN40	513	541	706	-
DN50	-	547	712	862
DN80	-	-	832	882
DN100	-	-	-	896
PN63				
DN50	-	-	740	890
DN80	-	-	-	910
PN100				
DN15	513	-	-	-
DN25	538	567	-	-
DN40	-	575	740	-
DN50	-	-	752	902
DN80	-	-	-	922
ASME 150				
½¨	518	-	-	-
¾¨	528	-	-	-
1¨	534	563	-	-
1½¨	-	575	740	-
2¨	-	579	744 894	
3¨	-	-	756	906
4¨	-	-	-	920
ASME 300				
½¨	528	-	-	-
¾¨	538	-	-	-
1¨	546	575	-	-
1½¨	-	589	754	
2¨	-	-	756	906
3¨	-	-	-	926
ASME 600				
½¨	541	-	-	-
¾¨	550	-	-	-
1¨	558	589	-	-
1½¨	-	603	770	-
2¨	-	-	774	926
3¨	-	-	-	944
JIS 10K				
50A	-	-	712	862
80A	-	-	-	882
JIS 20K				
15A	498	-	-	-
25A	503	531	-	-
40A	-	541	706	-
50A	-	-	712	862
80A	-	-	-	882

	Dimension B [inches]			
	S15	**S25**	**S40**	**S50**
PN40				
DN15	19.6	-	-	-
DN25	19.8	21	-	-
DN40	20.2	21.3	27.8	-
DN50	-	21.5	28	33.9
DN80	-	-	28.8	34.7
DN100	-	-	-	35.3
PN63				
DN50	-	-	29	35
DN80	-	-	-	35.8
PN100				
DN15	20.2	-	-	-
DN25	21.2	22.3	-	-
DN40	-	22.6	29	-
DN50	-	-	29.6	35.5
DN80	-	-	-	36.3

ASME 150				
½¨	20.4	-	-	-
¾¨	20.8	-	-	-
1¨	21	22.2	-	-
1½¨	-	22.5	29.1	
2¨	-	22.8	29.3	35.2
3¨	-	-	29.8	35.7
4¨	-	-	-	36.2
ASME 300				
½¨	20.8	-	-	-
¾¨	21.2	-	-	-
1¨	21.5	22.6	-	-
1½¨	-	23.2	29.7	
2¨	-	-	29.8	35.7
3¨	-	-	-	36.4
ASME 600				
½¨	21.3	-	-	-
¾¨	21.6	-	-	-
1¨	22	23.2	-	-
1½¨	-	23.7	30.3	-
2¨	-	-	30.5	36.4
3¨	-	-	-	37.2
JIS 10K				
50A	-	-	28	33.9
80A	-	-	-	34.7
JIS 20K				
15A	19.6	-	-	-
25A	19.8	20.9	-	-
40A	-	21.3	27.8	-
50A	-	-	28	33.9
80A	-	-	-	34.7

Hygienic versions



Hygienic Connections: All Welded Versions

Dimension B (mm)

	S15	S25	S40	S50
Tri-clover				
1"	487			
1½"		534		
2"			691	
3"				832

Dimension B (mm)

	S15	S25	S40	S50
Tri-clamp DIN 32676				
DN10				
DN15				
DN25	468			
DN40		515		
DN50			677	
DN80				836

Dimension B (mm)

	S15	S25	S40	S50
Tri-clamp ISO 2852				
1"	473			
1½"		502		
2"			667	
3"				817

Dimension B (mm)

	S15	S25	S40	S50
DIN 11864-2 form A				
DN25	505			
DN40		562		
DN50			724	
DN80				896

Dimension B (inches)

	S15	S25	S40	S50
Tri-clover				
1"	19.2			
1½"		21		
2"			27.2	
3"				32.7

Dimension B (inches)

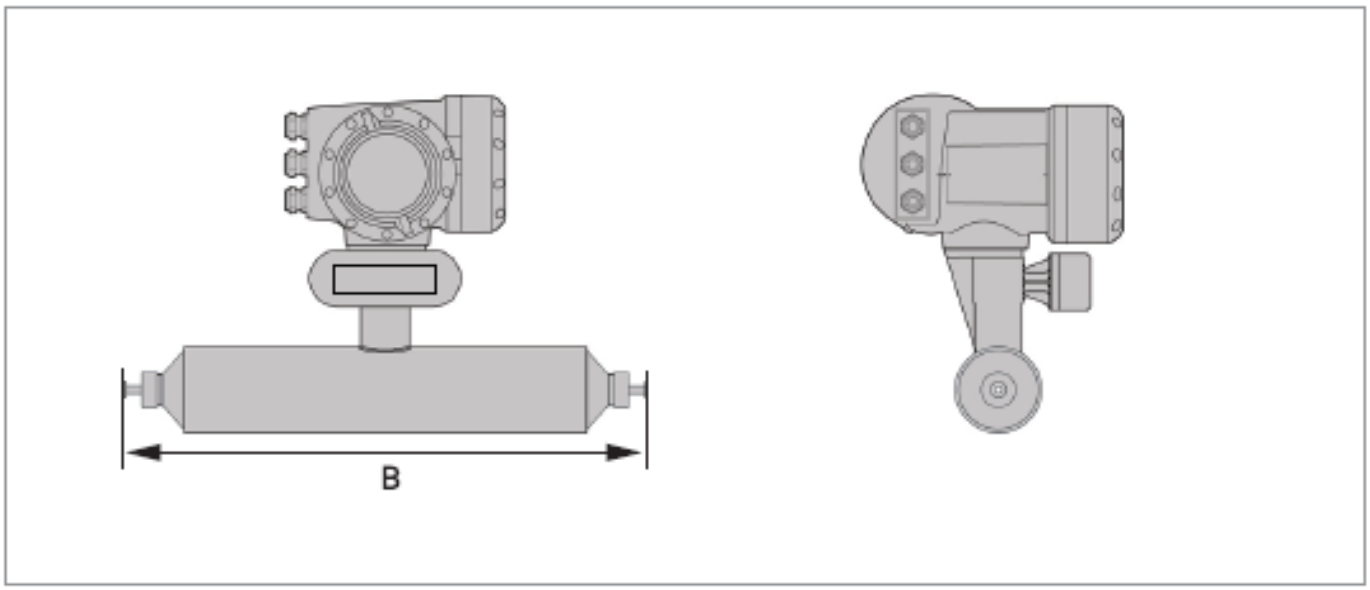
	S15	S25	S40	S50
Tri-clamp DIN 32676				
DN10				
DN15				
DN25	18.4			
DN40		20.3		
DN50			26.6	
DN80				32.9

Dimension B (inches)

	S15	S25	S40	S50
Tri-clamp ISO 2852				
1"	18.6			
1½"		19.8		
2"			26.3	
3"				32.2

Dimension B (inches)

	S15	S25	S40	S50
DIN 11864-2 form A				
DN25	19.9			
DN40		22.2		
DN50			28.5	
DN80				35.3



Hygienic Connections: Adapter Versions (male thread)

Dimension B (mm)

	S15	S25	S40	S50
Male thread DIN 11851				
DN25	483			
DN40		538		
DN50			704	
DN80				870

Dimension B (mm)

	S15	S25	S40	S50
Male thread SMS				
1"	474			
1½"		537		
2"			694	
3"				837

Dimension B (mm)

	S15	S25	S40	S50
Male thread IDF/ISS				
1"	487			
1½"		534		
2"			691	
3"				832

Dimension B (mm)

	S15	S25	S40	S50
Male thread RJT				
1"	498			
1½"		545		
2"			702	
3"				843

Dimension B (inches)

	S15	S25	S40	S50
Male thread DIN 11851				
DN25	19			
DN40		21.2		
DN50			27.7	
DN80				34.2

Dimension B (inches)

	S15	S25	S40	S50
Male thread SMS				
1"	18.7			
1½"		21.1		
2"			27.3	
3"				32.9

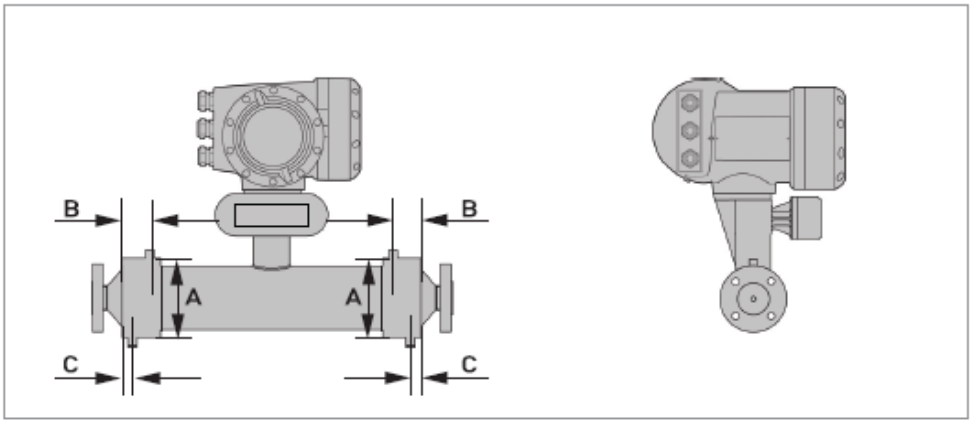
Dimension B (inches)

	S15	S25	S40	S50
Male thread IDF/ISS				
1"	19.2			
1½"		21		
2"			27.2	
3"				32.7

Dimension B (inches)

	S15	S25	S40	S50
Male thread RJT				
1"	19.6			
1½"		21.4		
2"			27.6	
3"				33.2

Heating Jacket Version



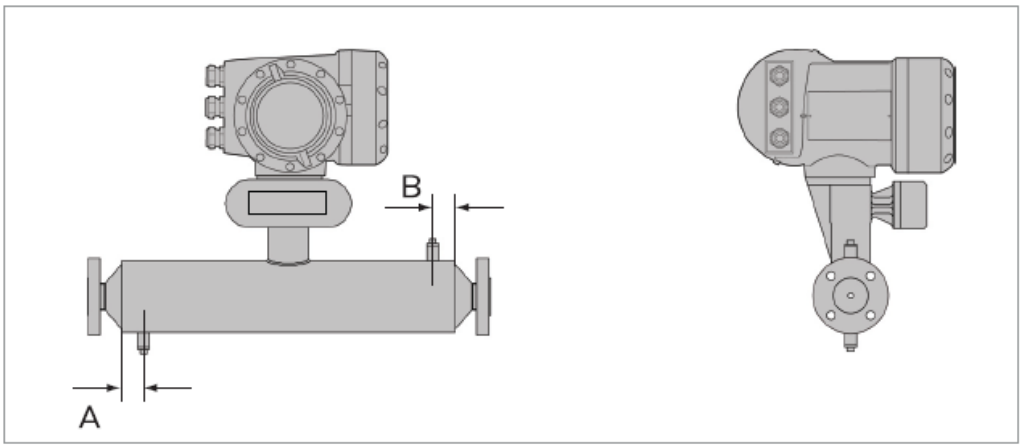
Dimensions – (mm)

	S15	S25	S40	S50
Heating Conn Size	12 mm (ERMETO)			25
A	115 ±1	142 ±1	206 ±1	254 ±1
B	51	55	90	105
C	20			26

Dimensions – (inches)

	S15	S25	S40	S50
Heating Conn Size	½" (NPTF)			1
A	4.5 ±0.04	5.6 ±0.04	8.1 ±0.04	10 ±0.04
B	2.0	2.2	3.5 4.1	
C	0.8			1.0

Purge Port Option



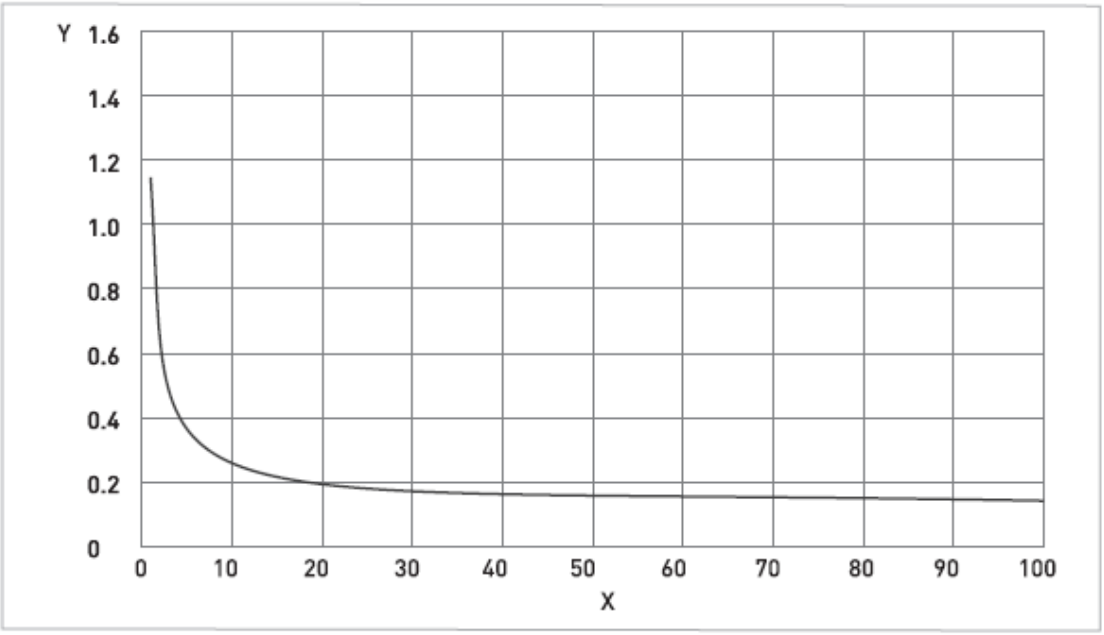
Dimensions – (mm)

	S15	S25	S40	S50
A	30 ±1.0		65 ±1.0	
B	30 ±1.0		65 ±1.0	

Dimensions – (inches)

	S15	S25	S40	S50
A	1.2 ±0.04		2.5 ±0.04	
B	1.2 ±0.04		2.5 ±0.04	

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

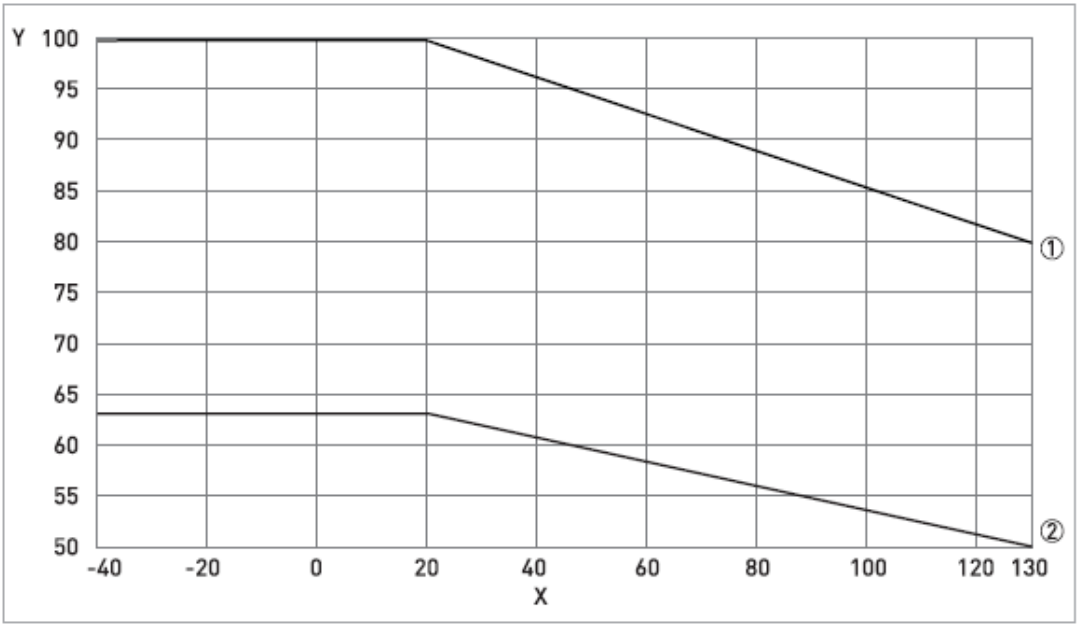
Operating pressure: 1 barg / 14.5 psig

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 psig at 266°F

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



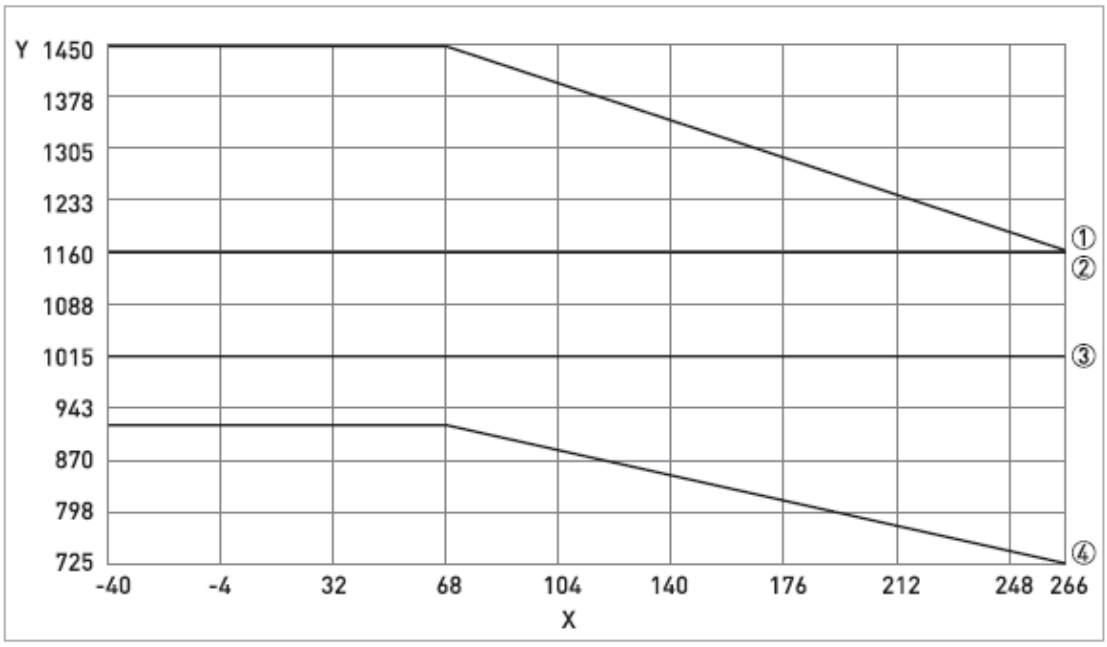
X temperature [°C]

Y pressure [barg]

1 Measuring tubes and 100barg 316L secondary containment (PED)

2 63 barg 304L / 316 secondary containment (PED)

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



X temperature [°F]
Y pressure [psig]

1 Measuring tubes S15 / S25 (CRN)
2 Measuring tubes S40 (CRN)
3 Measuring tubes S50 (CRN)
4 Secondary containment 304L / 316L (CRN)

Flanges

- DIN flange ratings are based on EN 1092-1 2007 table G.4.1 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.