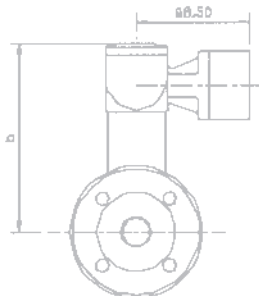


7000 Series OPTIMASS Mass Flowmeters

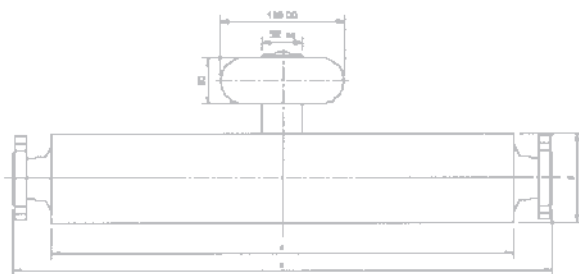
with single straight measuring tube



Titanium

Hastelloy

Stainless Steel



One tube - no limits

- No limits with tube material
- No limits with flow range
- No limits with measured product
- No limits with installation

Variable area flowmeters

Vortex flowmeters

Flow controllers

Electromagnetic flowmeters

Ultrasonic flowmeters

Mass flowmeters

Level measuring instruments

Communications technology

Engineering systems & solutions

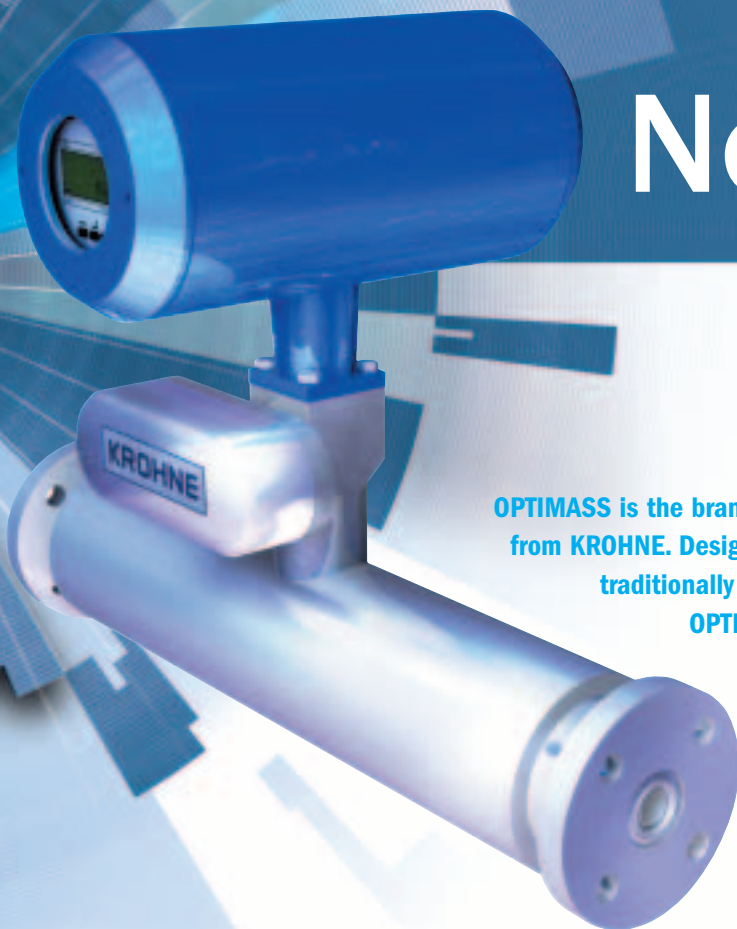
Switches, counters, displays and recorders

Heat metering

Pressure and temperature

One tube

No limits



OPTIMASS is the brand NEW family of Coriolis meters from KROHNE. Designed to overcome the limitations traditionally associated with Coriolis meters, OPTIMASS makes single tube metering realistic in more applications than ever before.

No limits with tube materials

Titanium, Hastelloy or Stainless Steel allow straight tube metering for almost any process.

No limits with flow

From 0.55 to 15,800 lbs/min or 15 to 430,000 kg/h with a full range of meter sizes for low and high flow.

No limits with measured product

High viscosity, particulate matter, inhomogeneous mixtures, normal entrained air, have little effect on the accuracy and quality of the measurement.

No limits with installation

Support on the pipe or the meter, without the need for accurate alignment. And a complete range of process connectors for all existing and future installations.

OPTIMASS

Discover the difference

Titanium Hastelloy Stainless Steel

Front end signal processing

Short analog signal path gives:

- Faster signal evaluation
- Less distortion and loss
- Communication to back end via RS485 allowing remote installation up to 1,000 ft or 300 m
- Sensor calibration data embedded in front end; therefore easy to change back end I/O functionally without the need for complex re-programming

No limits with material

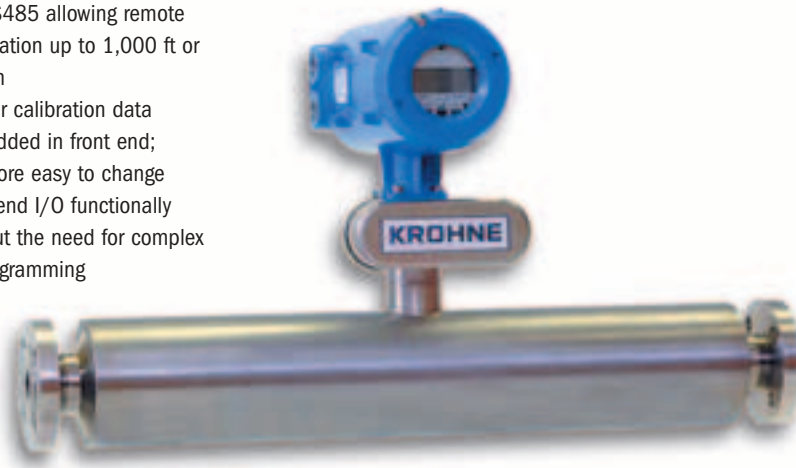
Titanium is the best of all materials, but it can't cover all conceivable applications. That's why we spent years of research to offer 3 different tube materials, Titanium, Hastelloy and Stainless Steel.

Now there's no company able to handle more applications than KROHNE. Test us.

No limits with process connections

OPTIMASS offers a wide range of special process connections in addition to standard flanges.

The unique modular connection design, also gives our production facilities flexibility, which translates to speedier delivery, easy on-site installation and complete adaptability to customers' specifications.



No limits with installation

Mount and measure!

- Supports can be attached to the pipework at any point.
- Reduced limits for inlet and outlet pipe lengths.
- Even possible to attach supports to body for installation in flexible pipework!

No limits with applications

Starting with the best performance available on the market, we improved on all counts, making more applications open to single tube Coriolis meters than ever before.

Ampoule filling	Flow	Tanker loading
Hydrogen gas	Density	Mineral slurry
Natural gas	Temperature	Liquid sodium
Gravimetric feed	Pressure	Supercritical Ethylene
Light alcohols	Viscosity	Molasses

MFS 7000 Titanium T 06 – T 80 Technical data**Performance specifications****Flow in lbs/min (kg/h)**

Nominal flow rate is defined as the flow rate at which water under reference conditions causes approximately 14.5 psi or 1 bar pressure drop across the sensor.

	T06	T10	T15	T25	T40	T50	T80
Nominal flow rate	35 (950)	100 (2,700)	400 (11,250)	1,250 (34,500)	3,350 (91,500)	6,600 (180,000)	15,800 (430,000)
Maximum flow rate	Typically 130 % of the nominal flow rate for the sensor size depending on application.						
Minimum flow rate	Depending on measuring error required.						

Accuracy

Accuracy, liquid	All sizes: $\pm 0.1\%$ of actual measured flow rate
Accuracy, gas	All sizes: $\pm 0.5\%$ of actual measured flow rate
Repeatability	Better than 0.05% plus zero stability Includes the combined effects of repeatability, linearity and hysteresis
Zero Stability	$\pm 0.015\%$ of nominal flow for the sensor size
Reference conditions	Calibrated using water at 70°F or 20°C, operating pressure 14.5 psig or 1 barg.

Density

		g/cc	lbs/ft³	kg/m³
Measuring range	All sizes	0.5 ... 2	30 ... 125	500 ... 2000
Accuracy	All sizes	± 0.002	± 0.13	± 2
Accuracy (on-site calibration)	All sizes	± 0.0005	± 0.033	± 0.5

Temperature

		°F	°C
Measuring range	All sizes	-22 ... +300	-30 ... +150
Accuracy	All sizes	± 1.8	± 1

Functional specifications**Materials**

Measuring tube	Titanium
Flange raised face	Titanium
Flanges	Stainless Steel 316L
Outer cylinder (Secondary containment)	Stainless Steel 304L (optional 316L)
Converter mount and front end electronics housing	Stainless Steel 316L

Pressure ratings

		psig	barg
Measuring tube	All sizes	-14.5 ... 910	-1 ... 63
Outer cylinder	All sizes	-14.5 ... 910	-1 ... 63

Temperature ratings

		°F	°C	
Process	All sizes	-22 ... +300	-30 ... +150	For flanged versions only. Minimum process temperature for sanitary or aseptic connection version is -4°F or -20°C.
Ambient environment	All sizes	-40 ... +130 -40 ... +140	-40 ... +55 -40 ... +60	with compact (integral) converter with remote (field mount) converter

Process effects on sensor

This describes the additional measurement error introduced if the meter is operated away from the conditions at which the customer zero calibration was performed.

Temperature	All sizes	0.0028% of nominal flow rate per 1°F 0.005% of nominal flow rate per 1°C
Pressure	All sizes	0.001% of nominal flow rate per 1psig 0.015% of nominal flow rate per 1bar

MFS 7000 Hastelloy C-22 H 10 – H 80 Technical data**Performance specifications****Flow in lbs/min (kg/h)**

Nominal flow rate is defined as the flow rate at which water under reference conditions causes approximately 14.5 psi or 1 bar pressure drop across the sensor.

	H10	H15	H25	H40	H50	H80
Nominal flow rate	100 (2,700)	400 (11,250)	1,250 (34,500)	3,350 (91,500)	6,600 (180,000)	15,800 (430,000)
Maximum flow rate	Typically 130 % of the nominal flow rate for the sensor size depending on application.					
Minimum flow rate	Depending on measuring error required.					

Accuracy

Accuracy, liquid	All sizes: $\pm 0.1\%$ of actual measured flow rate
Accuracy, gas	All sizes: $\pm 0.5\%$ of actual measured flow rate
Repeatability	Better than 0.05% plus zero stability Includes the combined effects of repeatability, linearity and hysteresis
Zero Stability	$\pm 0.05\%$ of nominal flow for the sensor size
Reference Conditions	Calibrated using water at 70°F or 20°C, operating pressure 14.5 psig or 1 barg.

Density

		g/cc	lbs/ft³	kg/m³
Measuring range	All sizes	0.5 ... 2	30 ... 125	500 ... 2000
Accuracy	All sizes	± 0.002	± 0.13	± 2
Accuracy (on-site calibration)	All sizes	± 0.0005	± 0.033	± 0.5

Temperature

		°F	°C
Measuring range	All sizes	-32 ... +210	0 ... +100
Accuracy	All sizes	± 1.8	± 1

Functional specifications**Materials**

Measuring tube	Hastelloy C-22
Flange raised face	Hastelloy C-22
Flanges	Stainless Steel 316L (optional: HC-22)
Outer cylinder (Secondary containment)	Stainless Steel 304L (optional: 316L)
Converter mount and front end electronics housing	Stainless Steel 316L

Pressure ratings

		psig	barg
Measuring tube	All sizes	-14.5 ... 580	-1 ... 40
Outer cylinder	All sizes	-14.5 ... 910	-1 ... 63

Temperature ratings

Maximum allowed differential temperature between process and ambient is 176°F/80°C unless the sensor outer cylinder is thermally insulated.

		°F	°C	
Process	All sizes	-32 ... +210	0 ... +100	
Ambient environment	All sizes	-40 ... +130	-40 ... +55	with compact (integral) converter
		-40 ... +140	-40 ... +60	with remote (field mount) converter

Process effects on sensor

This describes the additional measurement error introduced if the meter is operated away from the conditions at which the customer zero calibration was performed.

Temperature	All sizes	0.0042% of nominal flow rate per 1°F 0.0075% of nominal flow rate per 1°C
Pressure	All sizes	0.001% of nominal flow rate per 1psig 0.015% of nominal flow rate per 1bar

MFS 7000 Stainless Steel 316L sensor S 10 – S 80 Technical data**Performance specifications****Flow in lbs/min (kg/h)**

Nominal flow rate is defined as the flow rate at which water under reference conditions causes approximately 14.5 psi or 1 bar pressure drop across the sensor.

	S06	S10	S15	S25	S40	S50	S80
Nominal flow rate	35 (950)	100 (2,700)	400 (11,250)	1,250 (34,500)	3,350 (91,500)	6,000 (180,000)	15,800 (430,000)
Maximum flow rate	Typically 130 % of the nominal flow rate for the sensor size depending on application.						
Minimum flow rate	Depending on measuring error required.						

Accuracy

Accuracy, liquid	All sizes: ± 0.1% of actual measured flow rate
Accuracy, gas	All sizes: ± 0.5% of actual measured flow rate
Repeatability	Better than 0.05% plus zero stability Includes the combined effects of repeatability, linearity and hysteresis
Zero Stability	± 0.05% of nominal flow for the sensor size
Reference Conditions	Calibrated using water at 70°F or 20°C, operating pressure 14.5 psig or 1 barg.

Density

		g/cc	lbs/ft³	kg/m³
Measuring range	All sizes	0.5 ... 2	30 ... 125	500 ... 2000
Accuracy	All sizes	± 0.002	± 0.13	± 2
Accuracy (on-site calibration)	All sizes	± 0.0005	± 0.033	± 0.5

Temperature

		°F	°C
Measuring range	All sizes	-32 ... +210	0 ... +100
Accuracy	All sizes	± 1.8	± 1

Functional specifications**Materials**

Measuring tube	Stainless Steel 316L (1.4462)
Flange raised face	Stainless Steel 316L
Flanges	Stainless Steel 316L
Outer cylinder (Secondary containment)	Stainless Steel 304L (optional 316L)
Converter mount and front end electronics housing	Stainless Steel 316L

Pressure ratings

		psig	barg
Measuring tube	All sizes	-14.5 ... 580	-1 ... 40
Outer cylinder	All sizes	-14.5 ... 910	-1 ... 63

Temperature ratings

Maximum allowed differential temperature between process and ambient is 80°C/176°F unless the sensor outer cylinder is thermally insulated.

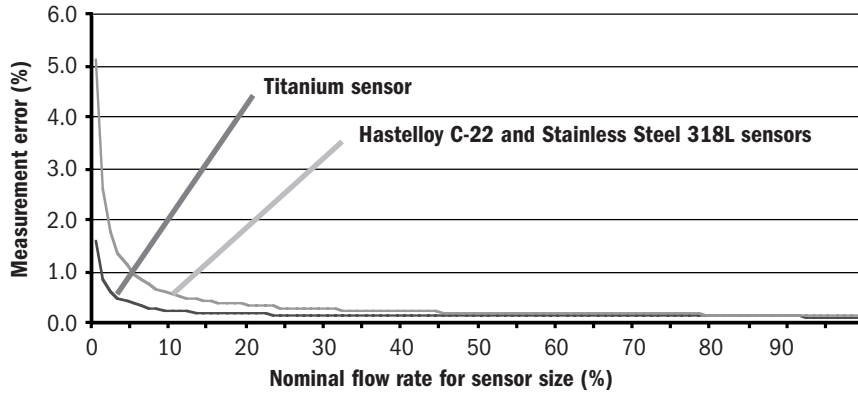
		°F	°C	
Process	All sizes	-32 ... +210	0 ... +100	
Ambient environment	All sizes	-40 ... +130	-40 ... +55	with compact (integral) converter
		-40 ... +140	-40 ... +60	with remote (field mount) converter

Process effects on sensor

This describes the additional measurement error introduced if the meter is operated away from the conditions at which the customer zero calibration was performed.

Temperature	All sizes	0.0042% of nominal flow rate per 1°F 0.0075% of nominal flow rate per 1°C
Pressure	All sizes	0.001% of nominal flow rate per 1psig 0.015% of nominal flow rate per 1bar

Performance specifications



Typical measuring error

This is defined as the measurement error due to the combined effects of accuracy and zero stability, at various points over the nominal flow range of each sensor size.

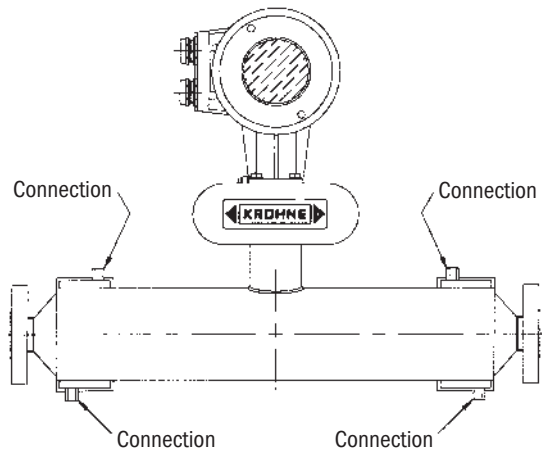
Turndown

Turndown	100:1	20:1	10:1	5:1	2:1	1:1
Typical measuring error % Titanium sensor	1.6	0.4	0.25	0.175	0.13	0.115
Typical measuring error % HC-22 and SS 318L sensors	5.1	1.1	0.60	0.35	0.20	0.15

Mechanical Options

Heating Jacket

An integral heating jacket for liquid or steam to a maximum temperature of 300°F/150°C (Titanium) or 210°F/100°C (Hastelloy and Stainless Steel) measuring tubes.



Purge Ports

An optional pair of purge ports is provided to decontaminate the pressure containment in the event of a tube failure. Heating Jackets and Purge Ports options cannot be combined.

Tube Polishing

The measurement tubes can optionally be polished to < 0.5 µm Ra.

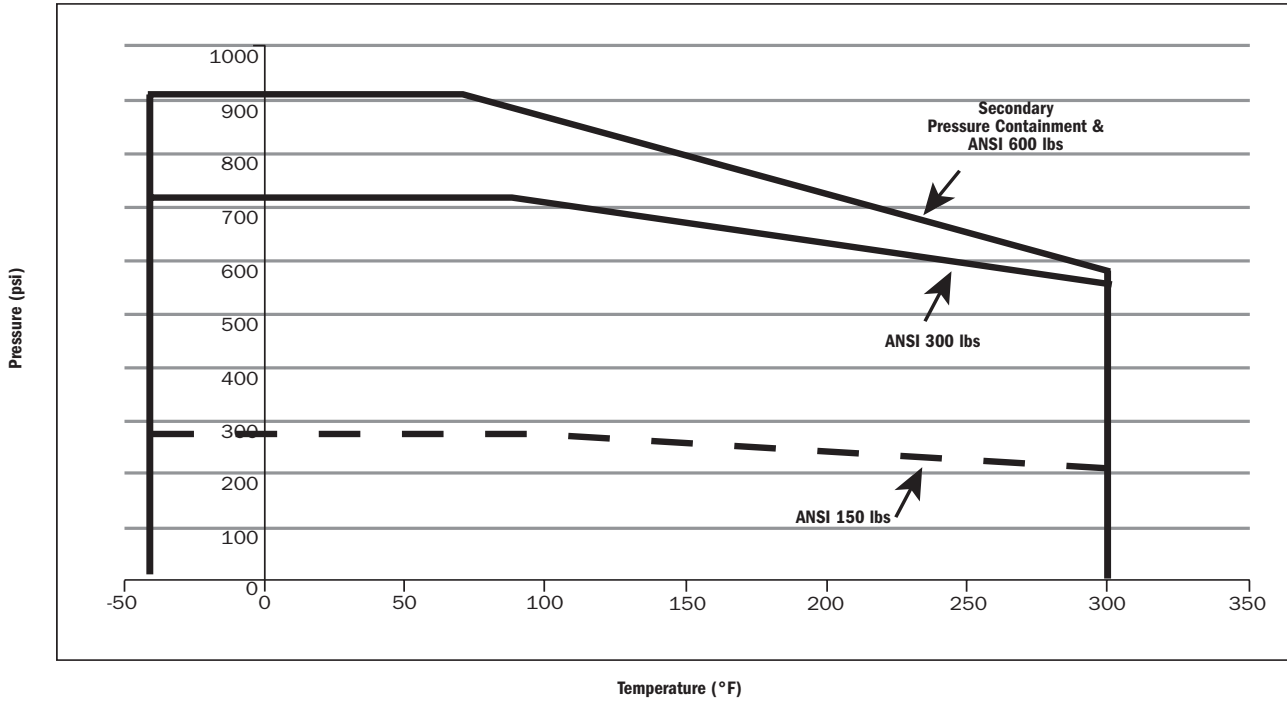
Flange Sizes

Size	ANSI	Metric	JIS
06	1/2"	DN10 / DN15	10A / 15A
10	1/2"	DN10 / DN15	10A / 15A
15	1/2" / 3/4"	DN15 / DN25	15A / 25A
25	1" / 1 1/2"	DN25 / DN40	25A / 40A
40	1 1/2" / 2"	DN40 / DN50	40A / 50A
50	2" / 3"	DN50 / DN80	50A / 80A
80	3" / 4"	DN80 / DN100	80A / 100A

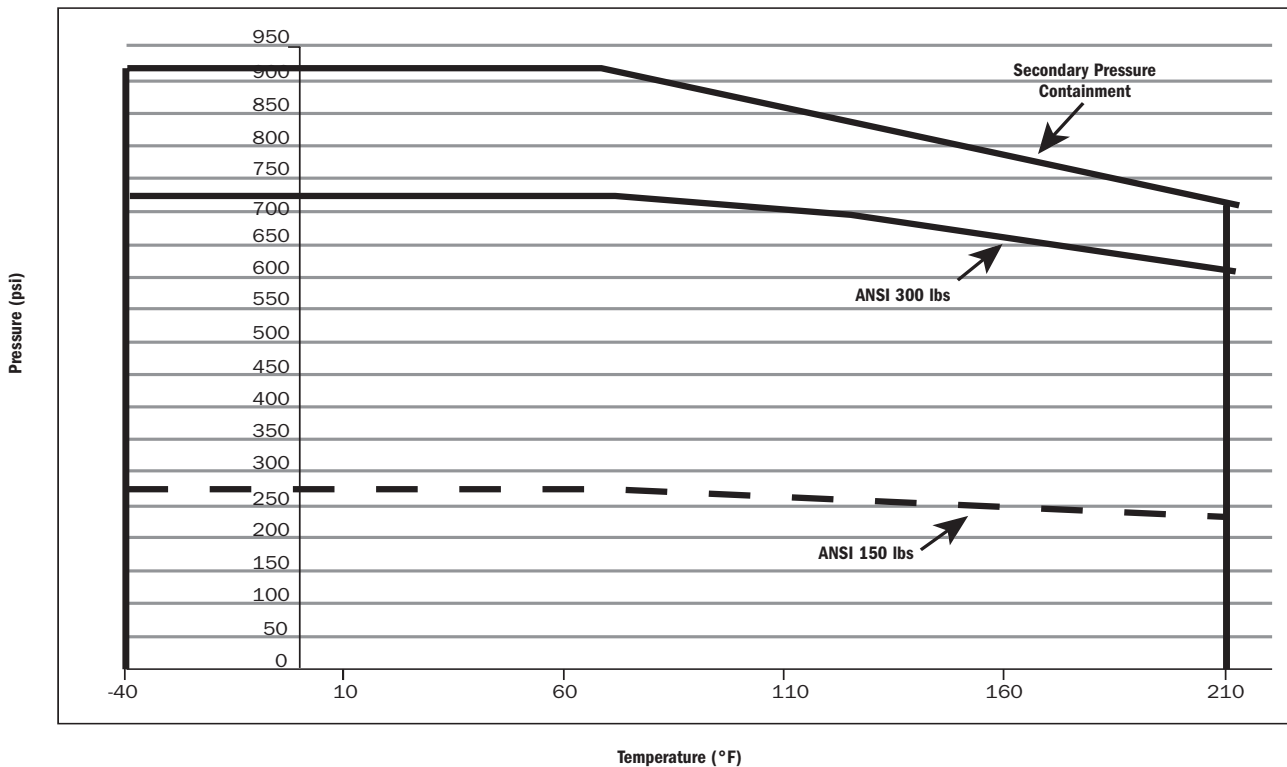
Pressure Derating

In order to ensure that meters are used within their operating limits, the following graphs are shown as a guideline.

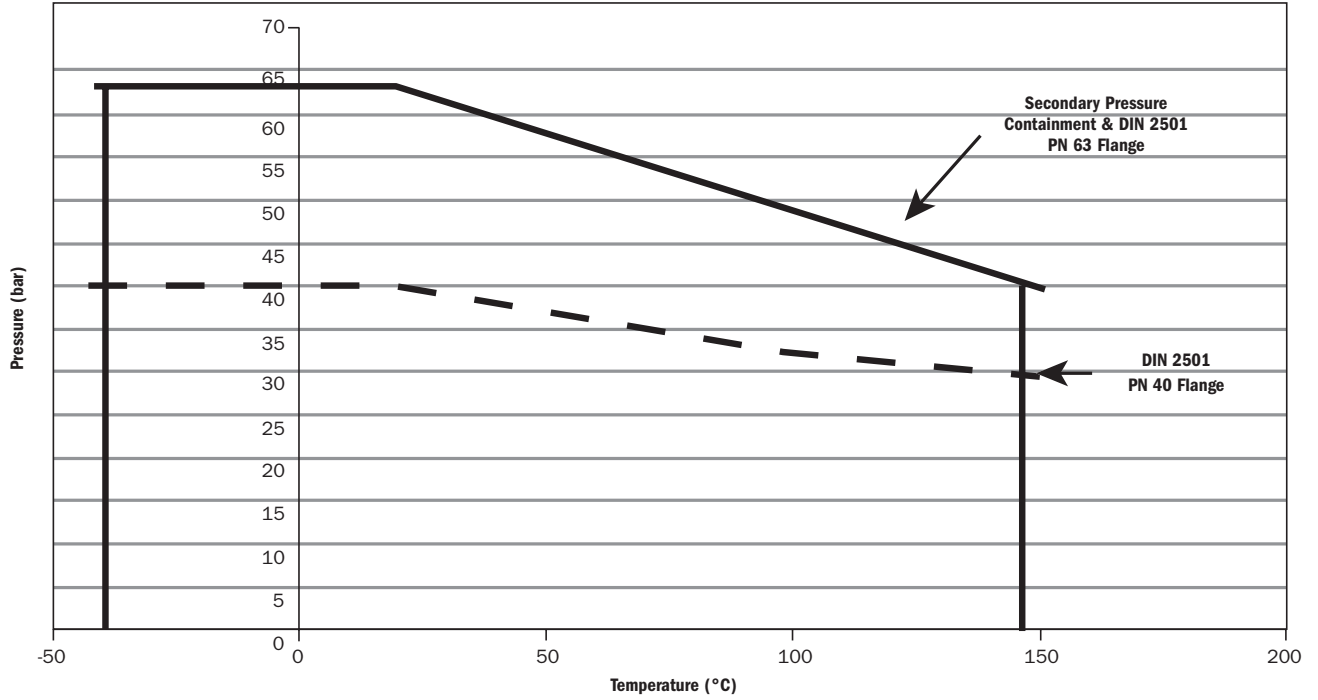
**Pressure/Temperature de-rating for Titanium Gr.9
ANSI 150/300/600 lbs**



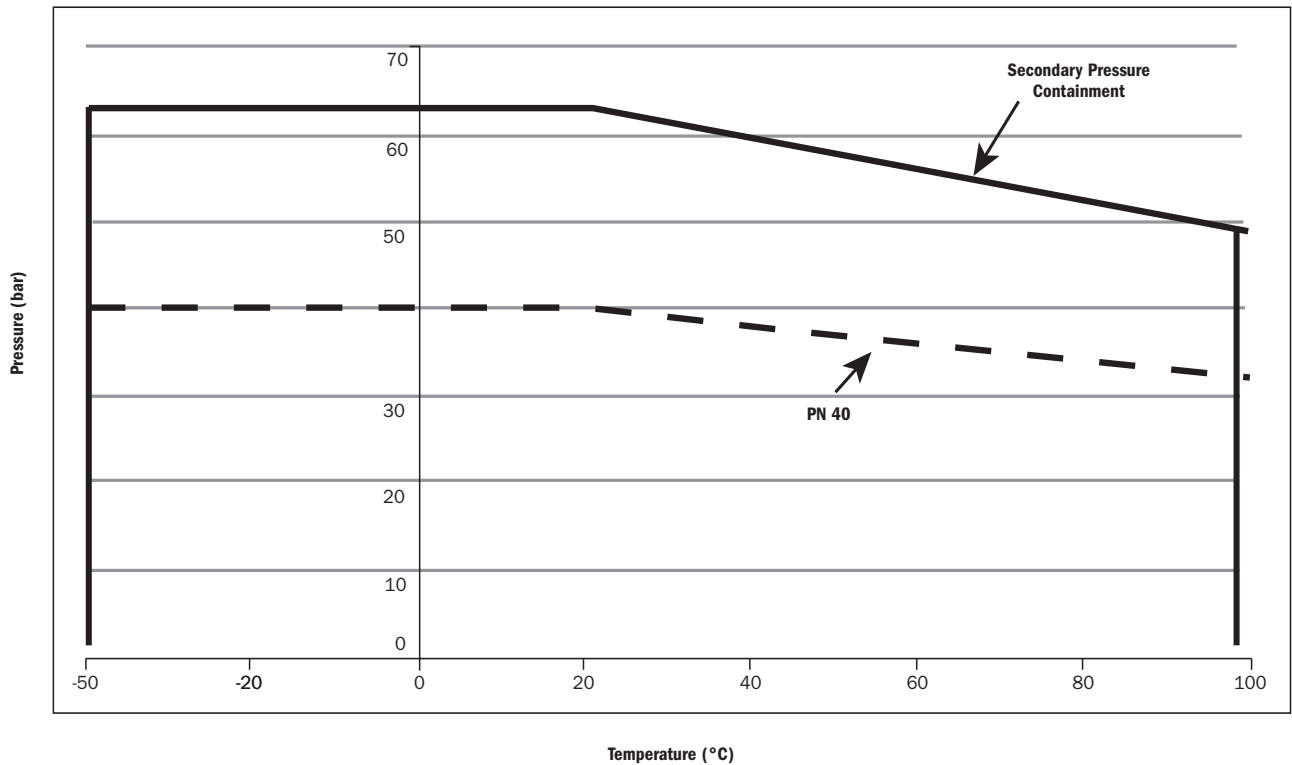
**Pressure/Temperature de-rating for Stainless Steel and Hastelloy C22
ANSI 150 and 300 lbs**



**Pressure/Temperature de-rating for Titanium Gr.9
Metric PN 40 & PN 63**



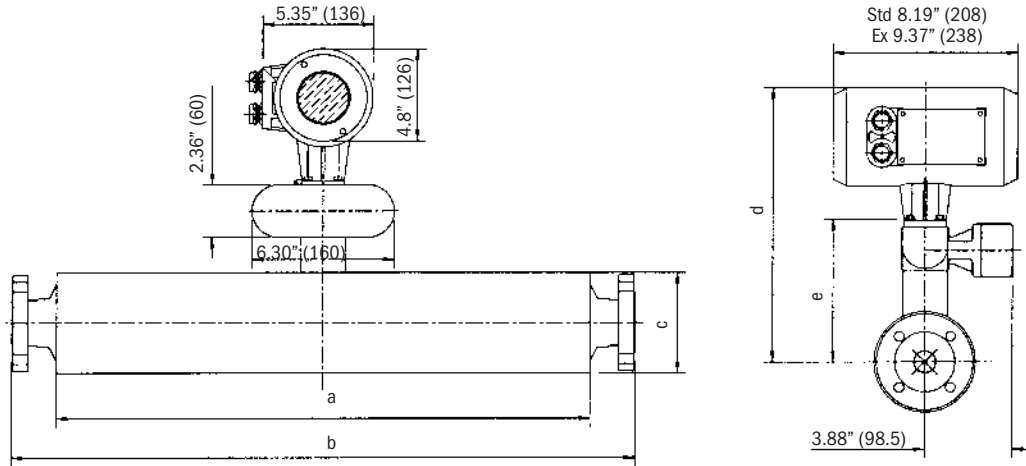
**Pressure/Temperature de-rating for Stainless Steel and Hastelloy C22
Metric PN 40**



Dimensions and weights

Standard Flanges for all sensor materials

(ANSI B16.5 150lb, 300 lb & 600lb, DIN 2501 PN 40 & PN 63, JIS 2238 10K & 20K)



Dimensions inches (mm)	T06/S06	T10/H10/S10	T15/H15/S15	T25/H25/S25	T40/H40/S40	T50/H50/S50	T80/H80/S80
a	13.19 (335)	16.26 (413)	17.72 (450)	23.54 (598)	31.34 (796)	37.32 (948)	50.16 (1274)
b	16.54 (420)	20.07 (510)	21.57 (548)	27.56 (700)	36.42 (925)	43.34 (1101)	57.48 (1460)
c	4.02 (102)	4.02 (102)	4.02 (102)	4.53 (115)	6.65 (169)	8.62 (219)	10.75 (273)
d	12.28 (312)	12.28 (312)	12.28 (312)	12.56 (319)	13.62 (346)	14.61 (371)	15.67 (398)
e*	6.30 (160)	6.30 (160)	6.30 (160)	6.54 (166)	7.60 (193)	8.62 (219)	9.69 (246)
*For remote signal converter build (/F), dimension e refers to the top face of the terminal box							
Measuring tube I.D.	0.24 (6)	0.35 (9)	0.59 (15)	0.95 (24)	1.46 (37)	1.93* (49*)	2.72 (69)
*For S50 the Stainless Steel 318L sensor is narrower at 1.81" (46 mm)							
Weight lbs (kg)	35 (16)	44 (20)	51 (23)	77 (35)	176 (80)	319 (145)	572 (260)

For further information about non-standard flanges ask KROHNE.

Standards and Approvals

Mechanical

Protection category (acc. EN 60 529) IP 67 equivalent to NEMA 4X and 6
 European pressure equipment directives PED 97-23 EC (acc. AD 2000 Regelwerk)

Hazardous area classification

For sensor only with remote (field mount) converter models MFC 050/F or 051/F

ATEX (acc. 94/9/EC) II 2 G EEx ib IIC T6
Factory Mutual Class I, II, III Div 1 groups A, B, C, D, E, F, G

For sensor (meter) with compact/K (integral) converter model MFC 050

ATEX (acc. 94/9/EC) II 2 G EEx de [ib] IIC T6 with "increased safety" terminal housing
 II 2 G EEx d [ib] IIC T6 with "flameproof" terminal housing
Factory Mutual Class I, II, III Div 1 groups A, B, C, D, E, F, G

For sensor (meter) with compact/K (integral) converter model MFC 051

ATEX (acc. 94/9/EC) II (1) 2 G EEx de [ia/ib] IIC T6 with "increased safety" terminal housing
 II (1) 2 G EEx d [ia/ib] IIC T6 with "flameproof" terminal housing
Factory Mutual Class I, II, III Div 1 groups A, B, C, D, E, F, G

Electromagnetic compatibility (EMC)

(acc. CE) EN 50081-1 1992
 EN 50082-2 1994
 Namur NE 21/5.93
 89 / 336 / EEC (EMC)
 72 /23 / EEC (low voltage directive)

Custody transfer

European Union OIML R117; pending

Hygienic and Aseptic duty

European Union EHEDG; pending
 USA 3A
 ASME Bio-processing