

TS-606  
Rev. D  
Coriolis Mass Flowmeters  
m400-XXXXXX

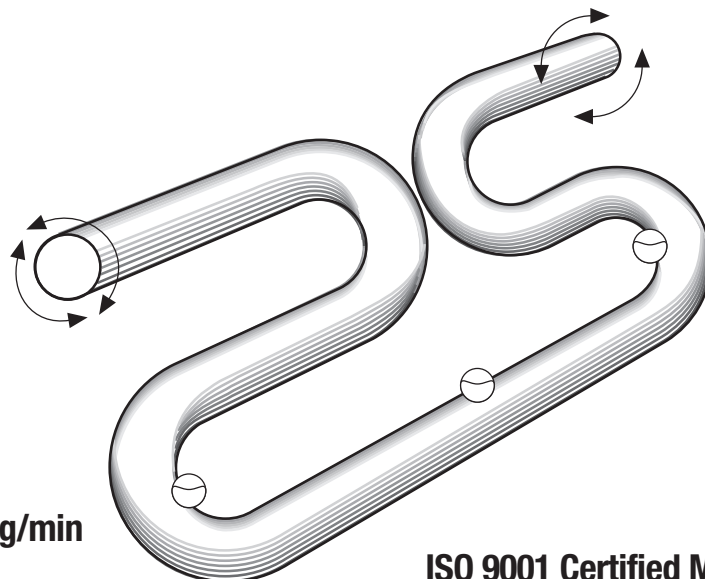
# Itron!



**m400**

## Coriolis Mass Flowmeters

Flow rate 68.04 to 6804 kg/min  
(150 to 15,000 lb/min)



ISO 9001 Certified Manufacturing Facility

### SPECIFICATIONS

#### DESCRIPTION

The **m**<sup>®</sup> m400 provides accurate, continuous, direct measurement of mass, density, temperature and percent solids over the flow range 68.0 to 6804 kg/min (150 to 15,000 lb/min).

#### DESIGN FEATURES

##### ACCURACY

Patented dual omega-shaped tubes provide outstanding sensitivity to Coriolis forces. **m**<sup>®</sup> mass flow accuracy is  $\pm 0.10\%$  and the mass flow rate repeatability is  $\pm 0.10\%$ . Its density accuracy is  $\pm 0.008$  g/cc over its operating range.

##### LOW PRESSURE DROP AND 100:1 TURNDOWN

The **m**<sup>®</sup> transducer is more sensitive to Coriolis forces than conventional mass flowmeters, providing a greater mechanical gain. Fluid velocity requirements are much lower to produce a given signal. This results in a lower pressure drop and unequaled 100:1 turndown. Therefore, accuracy never has to be compromised to obtain an acceptable pressure drop.

##### RELIABILITY

The smooth-bore, non-obtrusive flow path is free from moving parts, seals and bellows. The omega shapes produce torsional loading instead of bending loading for improved reliability.



- Direct mass, density and temperature measurement
- Patented omega-shaped flowtubes provide unequaled sensitivity to Coriolis force
- Wide 100:1 turndown
- Lowest pressure drop
- Smooth-bore, non-obtrusive flow path free from moving parts
- 3A-Authorized version available
- 6804 kg/min (15,000 lb/min) capacity
- Ideal for liquid sugar, viscous fluids, caustic liquors, lime slurries, desulfurization slurries, kiln feeds, lube oil blending, bulk loading/unloading

**MATERIALS OF CONSTRUCTION**

Wetted parts: 316L stainless steel  
 Sensor housing: 304L stainless steel

**ELECTRONICS**

**DATAMATE 2200™ Mass Flow Computer:**  
 (Complete information is available in Technical Specification Form No. TS-612.)

**NexGen® SFT100 Mass Flow Transmitter:**  
 (Complete information is available in Technical Specification No. TS-620.)

**NexGen® SFT200 Mass Flow Transmitter:**  
 (Complete information is available in Technical Specification No. TS-621.)

**HAZARDOUS AREA CLASSIFICATION TABLE**

Agency	Components	Method	Class	Div. Zone	Group	Temp. Class	Ambient Temp.
CSA	Transducer	Intrinsic Safety	I, II, III	1,2	C,D,E,F,G	T5	Note 1
	Datamate 2200	Non-incendive	I	2	A,B,C,D	T3C	Note 2
	Nexgen	Explosion Proof	I,II,III	1	C,D,E,F,G	T6	Note 2
		Non-incendive	I	2	A,B,C,D	T4	Note 2
LCIE	Transducer	Ex ia		0,1,2	IIB	T5,T4,T2	Note 3
	Nexgen	Ex id		1,2	IIB	T6	Note 2

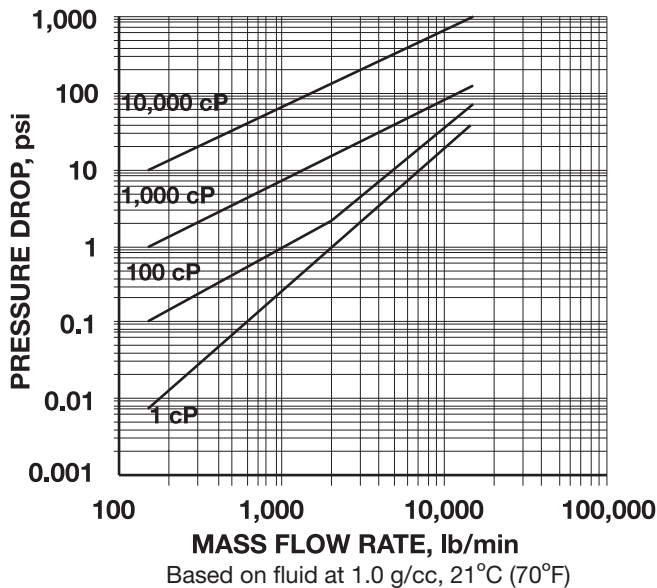
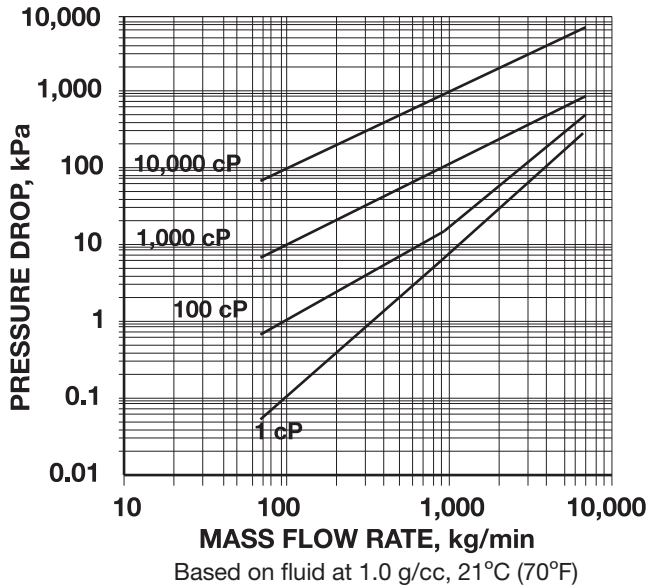
Note 1: -20°C to 40°C (-4°F to 104°F)  
 Note 2: -20°C to 65°C (-4°F to 149°F)  
 Note 3: T5 where ambient temperature is: -20°C to 40°C (-4°F to 104°F)  
 T4 where ambient temperature is: +40°C to +60°C (104°F to 140°F)  
 T2 where ambient temperature is: +60°C to +200°C (140°F to 392°F)

**m400 OPERATING SPECIFICATIONS**

<b>METERING ELEMENT</b>	
<b>Connections:</b> Connection type	ANSI: 4", 6", 8"; 150#, 300#, 600#, 900# RF DIN: DN100, DN150, DN200; PN40, PN100
<b>Meter:</b> Tube material Tube shape Housing Hazardous area classification  Mass accuracy <sup>1</sup> Mass Repeatability Mass zero stability Turndown ratio Density range Density accuracy Density repeatability Temperature measurement Temperature accuracy Signal output	316L SST  Omega 304L SST Transducer is intrinsically safe when connected to an approved mass flow computer (See table above for approval ratings)  ±0.10% of rate ± zero stability ±0.10% of rate ±0.7516 kg/min (1.657 lb/min) 100:1 0.4 to 2.0 g/cc ±0.0008 g/cc ±0.0002 g/cc 100 ohm platinum resistance sensor 0.56°C (±1°F) 8-core shielded twisted pair
<b>Fluid:</b> Flow rate Max. temperature Min. temperature  Max. operating pressure Max. pressure drop	6804 kg/min (15,000 lb/min) 204°C (400°F) -45°C (-50°F)  103 bar (1500 psi); limited by flange rating Less than 2.76 bar (40 psi) for water at 20°C (68°F) at 6804 kg/min (15,000 lb/min)
<b>ASSOCIATED INSTRUMENT</b>	
Max. length of signal cable Manufacturer Meter model number Instrument model number	300 m (1000 ft.) 8 core Belden 89892 shielded twisted pair Itron, Inc. M400 XXXXXX (refer to Ordering Information, page 3) Refer to electronics Technical Specification Form Datamate 2200: TS-612 NexGen SFT100: TS-620 NexGen SFT200: TS-621
<sup>1</sup> All calibration equipment traceable to N.I.S.T.	

Itron, Inc. pursues a policy of continuous development and product improvement. The specifications in this document may therefore be changed without notice.

## PRESSURE DROP VERSUS FLOW RATE



### CALCULATING ACTUAL ACCURACY

Use the following formula to calculate **m**<sup>®</sup> accuracy for your selected flow rate:

$$\% \text{ accuracy, } \pm_{\text{actual}} = \{ [(0.0010 m) + S_0] / m \} \times 100\%$$

where:

m = mass flow rate, kg/min or lb/min  
 S<sub>0</sub> = mass zero stability, kg/min or lb/min for the m400 flowmeter

### DETERMINING PRESSURE DROP

1. Flow rate vs. pressure drop varies with viscosity. To approximate m400 pressure drop for fluids with viscosity approximating that of water, locate the point on the 1-cP curve corresponding with your desired flow rate.
2. From that point, locate the nearest horizontal line and follow it to the vertical scale on the left, which indicates pressure drop for the flow rate you selected.
3. Divide the pressure drop indicated on the graph by the specific gravity (S) of the process fluid:

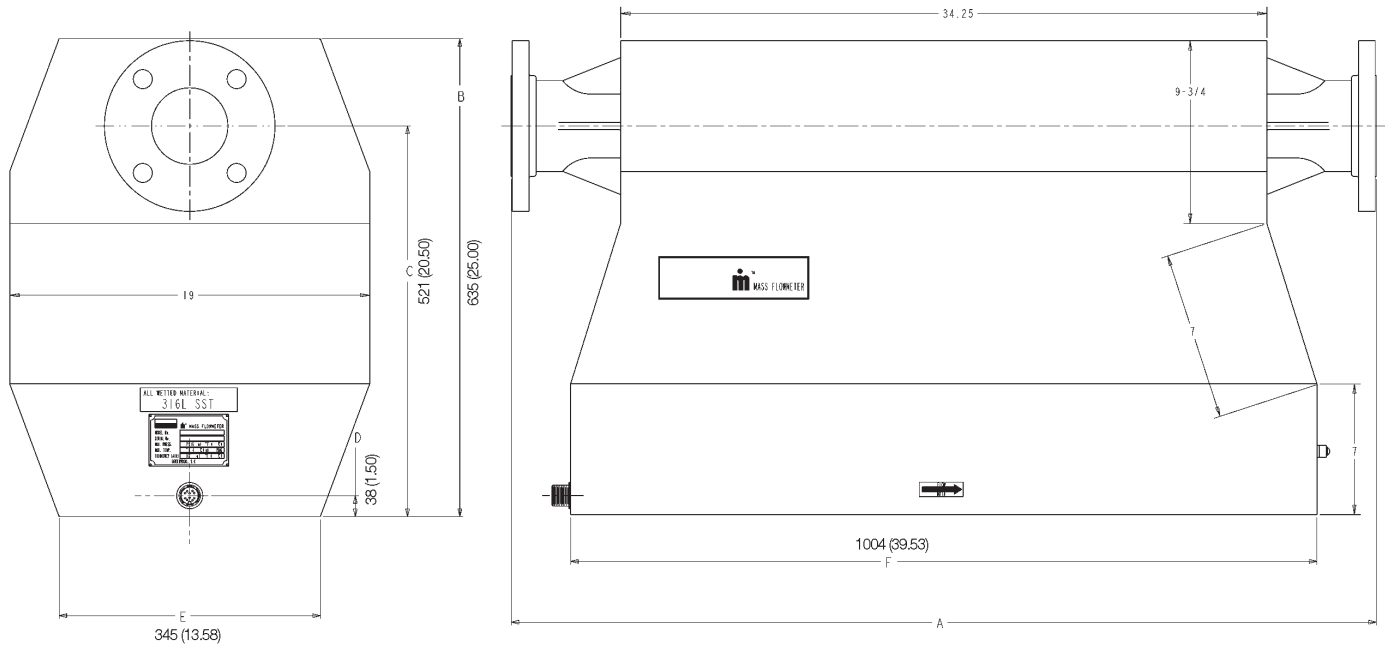
$$\Delta P_{\text{actual}} = \Delta P_{\text{plotted}} / \text{Sp. gr.}$$

## m400 MASS FLOWMETER ORDERING INFORMATION

MODEL NUMBER		DESCRIPTION
M100	X X X X X X	
	8 9	<b>Type</b> Transducer 4" SST 150/300lb. <sup>1</sup> Transducer 4" SST 600/900lb. <sup>1</sup>
	872 882 892 893 897 8HE 8IE 8IE XXX	<b>Flange</b> 4" 150lb. ANSI RF 6" 150lb. ANSI RF 8" 150lb. ANSI RF 8" 300lb. ANSI RF 8" 900lb. ANSI RF DN100 PN40 SST DN150 PN40 SST DN150 PN40 SST Special - Contact Factory
	0 2	<b>Approvals</b> General Purpose CSA
	0 W	<b>W &amp; M</b> None Custody Transfer (Weights & Measures)
	000 101 102 103 105 110	<b>Cable</b> No Cable ASM CBL KIT 10Ft. <sup>3</sup> ASM CBL KIT 20Ft. <sup>3</sup> ASM CBL KIT 30Ft. <sup>3</sup> ASM CBL KIT 50Ft. <sup>3</sup> ASM CBL KIT 100Ft. <sup>3</sup>
	0 02 03	<b>Electronics</b> No Electronics For Use With Nexgen For use With Datamate 2200

<sup>1</sup>Note: Wetted materials and connection materials must be the same.  
<sup>3</sup>Note: For a complete list of available cables, contact factory.

## DIMENSIONAL DATA, mm (in.)




DIMENSIONS <sup>1</sup>													
ANSI	4"	4"	4"	4"	6"	6"	6"	6"	8"	8"	8"	8"	
FLANGES	150#	300#	600#	900#	150#	300#	600#	900#	150#	300#	600#	900#	
DIN		DN100,		DN100,		DN150,		DN150,		DN200,	DN200,		
FLANGES		PN40		PN100		PN40		PN100		PN40	PN100		
OVERALL	1178	1178	1257	1257	1178	1178	1257	1257	1178	1178	1257	1257	
LENGTH, "A"	(46.38)	(46.38)	(49.50)	(49.50)	(46.38)	(46.38)	(49.50)	(49.50)	(46.38)	(46.38)	(49.50)	(50.00)	

<sup>1</sup> Dimensions shown are for 316L SST flowmeter.

## WEIGHTS OF COMPONENTS

Transducer:	approx. shipping wt. 163.2 kg (360 lb), depending on flanges
Datamate 2200:	approx. 5.2 kg (11.5 lbs)
NexGen SFT100:	
Blind	approx. 6.4 kg (14.1 lbs)
w/Display/keypad	approx. 7.1 kg (15.6 lbs)
NexGen SFT200:	approx. 1.8 kg (4 lbs)

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