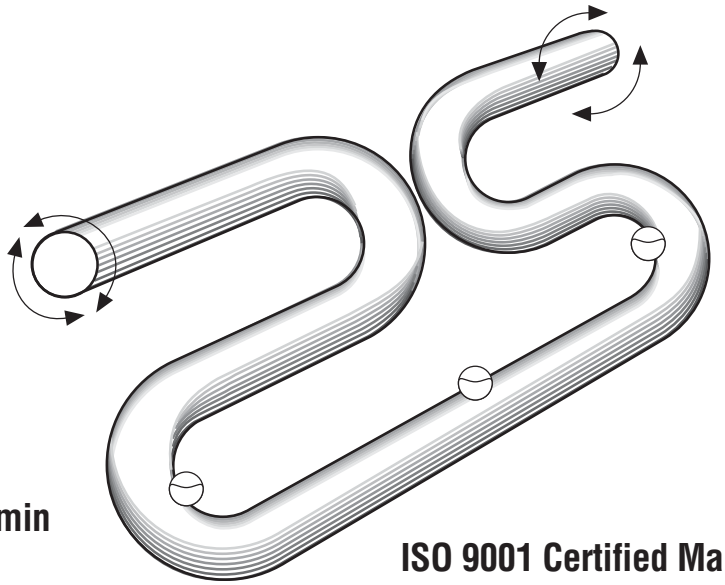
TS-601
Rev. D
Coriolis Mass Flowmeters
m012-XXXX0

ACTARIS
metering systems

m®
m012

Coriolis Mass Flowmeters



Flow rate 0.09 to 9.0 kg/min (0.2 to 20 lb/min)

ISO 9001 Certified Manufacturing Facility

SPECIFICATIONS

DESCRIPTION

The m® m012 provides accurate, continuous, direct measurement of mass, density, temperature and percent solids over the flow range 0.09 to 9.0 kg/min (0.2 to 20 lb/min).

DESIGN FEATURES

ACCURACY

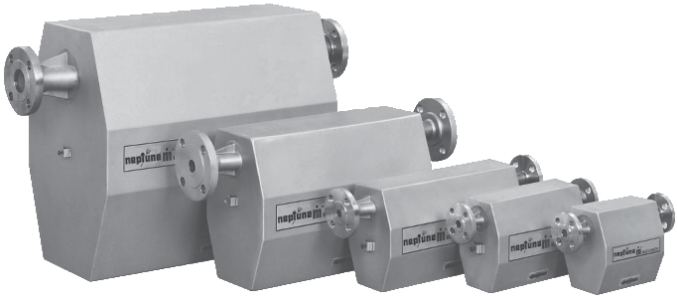
Patented dual omega-shaped tubes provide outstanding sensitivity to Coriolis forces. m® mass flow accuracy is ±.10% with the NexGen transmitter and ±0.15% with the Datamate 2100. The m012 m® mass flow rate repeatability is ±0.10%. Its density accuracy is ±0.005 g/cc over its operating range.

LOW PRESSURE DROP AND 100:1 TURNDOWN

The m® 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**
- **316L stainless steel or optional HASTELLOY® C-22 wetted parts**
- **3A-Authorized version available**

MATERIALS OF CONSTRUCTION

Wetted parts: 316L stainless steel (HASTELLOY® C-22 optional)
Sensor housing: 304L stainless steel
3A-Authorized version: Connection facing and flowtube surface finish is equivalent to 32 Ra or better

ELECTRONICS

DATAMATE 2100™ Mass Flow Computer:
(Complete information is available in Technical Specification No. TS-610.)

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

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	Non-incendive	I	2	C,D	T4A	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
	Datamate	N/A	N/A	N/A	Safe Area		
	Nexgen	Ex id		1, 2	IIB	T6	Note 4

Note 1: -20˚C to 40˚C (-4 to 104˚F)
Note 2: -20˚C to 65˚C (-4 to 149˚F)
Note 3: T5 where ambient temperature is: -20˚C to +40˚C (-40F 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)
Note 4: -20˚C to 65˚C (-4F to 149˚F)

m012 OPERATING SPECIFICATIONS

METERING ELEMENT	
Connections:	
Connection type	VCO: 3/8" female ANSI: 1/2"; 150# 300# RF 3A-Authorized: 1-1/2" Tri-Clamp®
Meter:	
Tube material	316L SST or HASTELLOY® C-22 optional
Tube shape	Omega
Nominal tube bore	3 mm (1/8")
Housing	304L SST
Hazardous area classification	Transducer is intrinsically safe when connected to an approved mass flow computer (see table above for approval ratings)
Mass accuracy	Datamate 2100: ±0.15% of rate ± zero stability[1] NexGen: ±0.10% of rate ±zero stability[1]
Mass repeatability	±0.10% of rate
Mass zero stability	Datamate 2100: ±0.0012 kg/min (0.0027 lb/min) NexGen SFT100: ±0.0014 kg/min (0.0031 lb/min)
Turndown ratio	100:1
Density range	0.4 to 2.0 g/cc
Density accuracy	±0.005 g/cc
Density repeatability	±0.0005 g/cc
Temperature measurement	100 ohm platinum resistance sensor
Temperature accuracy	0.56°C (±1°F)
Signal output	8-core shielded twisted pair
Fluid:	
Flow rate	0.09 to 9.0 kg/min (0.2 to 20 lb/min)
Max. temperature	204°C (400°F)
Min. temperature	-45°C (-50°F)
Max. operating pressure	137 bar (2000 psi); limited by flange rating
ASSOCIATED INSTRUMENT	
Function	Refer to electronics Technical Specification Form No. TS-610 and TS-620.
Max. length of signal cable	Datamate 2100: 150m (500 ft.) 8 core Belden 89892 shielded twisted pair NexGen SFT100: 300m (1000 ft.) 8 core Belden 89892 shielded twisted pair
Electrical connections	Screw terminal
Manufacturer	Actaris U.S. Luquid Measurement Division, Inc.
Meter model number	m012-X XXX X X XXX X (refer to Ordering Information, page 3)
Instrument model number	Refer to electronics Technical Specification Form Datamate 2100: TS-610 NexGen SFT100: TS-620

[1] All calibration equipment traceable to N.I.S.T.

Actaris U.S. Liquid Measurement Division, Inc. pursues a policy of continuous development and product improvement. The specifications in this document may therefore be changed without notice.

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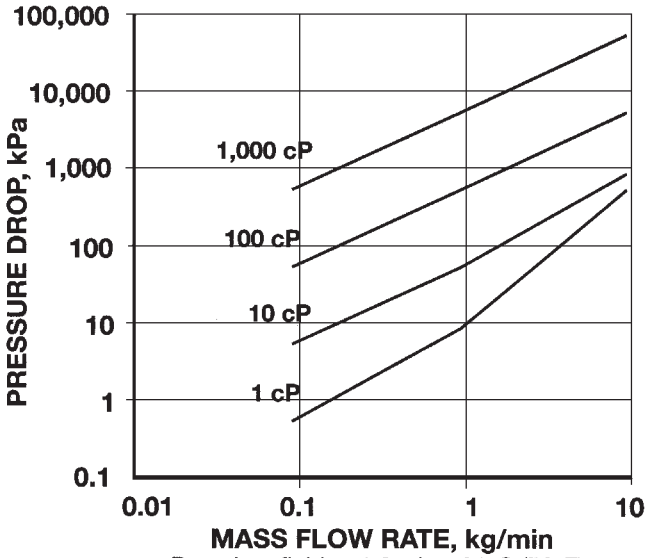
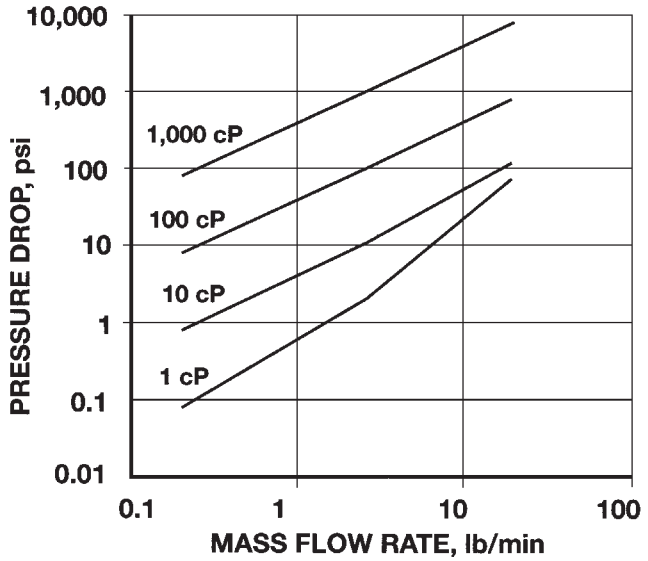
PRESSURE DROP VERSUS FLOW RATE



Based on fluid at 1.0 g/cc, 21°C (70°F)



Based on fluid at 1.0 g/cc, 21°C (70°F)

CALCULATING ACTUAL ACCURACY

Use the following formula to calculate m® accuracy for your selected flow rate:

Datamate: % accuracy, $\pm_{(actual)} = \{[(0.0015\ m) + \dot{S}_0] / m\} \times 100\%$

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

where:

m = mass flow rate, kg/min or lb/min
S_0 = zero stability, kg/min or lb/min for the m012 flowmeter

Note that Actaris offers a free selection program on three 3-1/2" diskettes to assist you in your selection.

DETERMINING PRESSURE DROP

1. Flow rate vs. pressure drop varies with viscosity. To approximate m012 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:

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

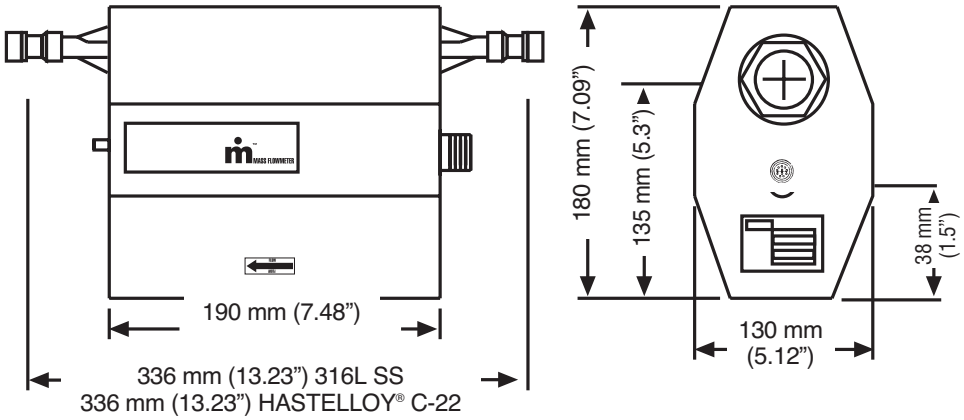
m012 MASS FLOWMETER ORDERING INFORMATION

MODEL NUMBER						DESCRIPTION
M012	X	X	X	X	X	
	2					**TYPE** Transducer 1/8" Hastelloy® C-22[1]
	8					Transducer 1/8" SST[1]
	S					Transducer 1/8" SST Sanitary Tri Clamp[1]
		000				**FLANGE** 1-1/2" 3A SST Sanitary Tri Clamp
		212				1/2" 150 LB ANSI RF Hastelloy® C-22
		213				1/2" 300 LB ANSI RF Hastelloy® C-22
		801				3/8" CAJON VCO[2]
		812				1/2" 150 LB ANSI RF SST
		813				1/2" 300 LB ANSI RF SST
		XXX				Special - Contact Factory
			0			**APPROVALS** General Purpose
			2			CSA
			3			LCIE
				000		**CABLE** No Cable
				101		ASM CBL Kit 10 Ft.[3]
				102		ASM CBL Kit 20 Ft.[3]
				103		ASM CBL Kit 30 Ft.[3]
				105		ASM CBL Kit 50 Ft.[3]
				110		ASM CBL Kit 100 Ft.[3]
					0	**ELECTRONICS** No Electronics
					D	For Use With Datamate
					N	For Use With NexGen

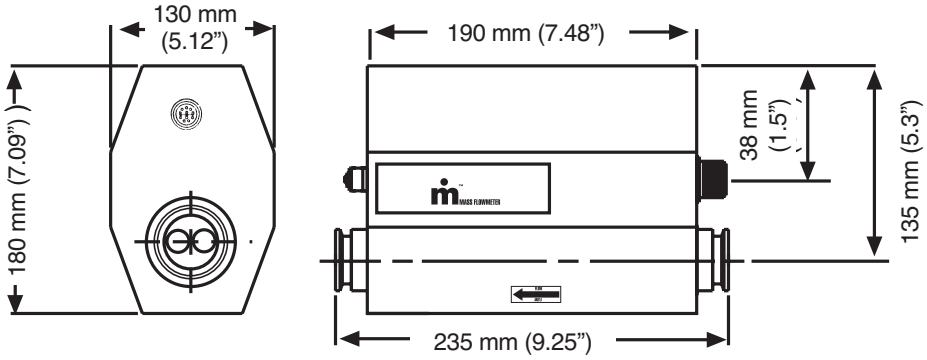
[1] Wetted materials and connection materials must be the same.
[2] Only available as 3/8" female CAJON VCO® connections. Requires male CAJON VCO 8-VCO by SWAGELOCK®.
[3] For a complete list of available cable lengths, consult your local Actaris distributor.

DIMENSIONAL DATA, mm (in.)

m012 3/8” VCO Transducer

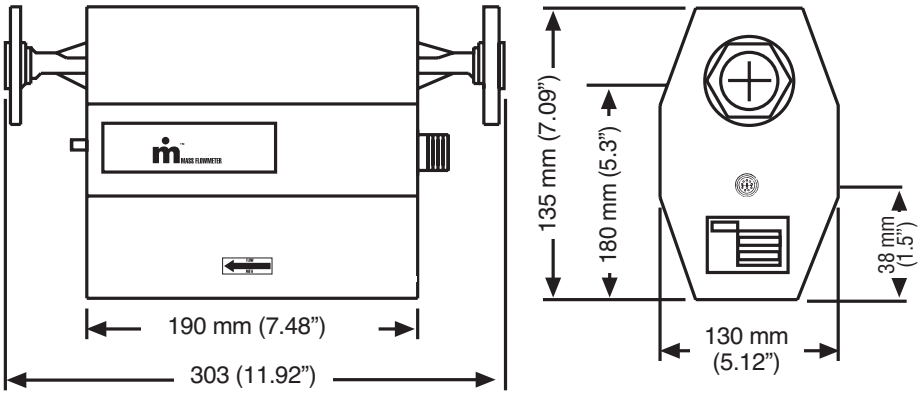


m012 3A-Authorized Transducer



Optional 1-1/2” x 1/2” Tri-Clamp® eccentric reducers are available.

m012 ANSI RF Transducer



	Dimensions	
Connection	A 316L SS Wetted Parts	A[1] Hastelloy C-22 Wetted Parts
1/2! 150# ANSI RF	303 (11.92)	NA

WEIGHTS OF COMPONENTS

Transducer: approx. 4.6 kg (10 lbs)
Datamate: approx. 6.6 kg (14 lbs)
NexGen: approx. 7.1 kg (15.6 lbs)

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ACTARIS metering systems

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