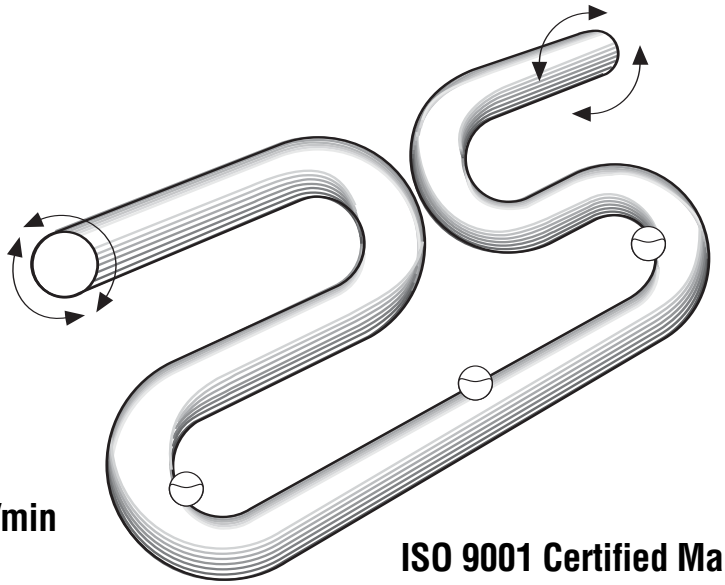
TS-603
Rev. B
Coriolis Mass Flowmeters
m050-XXXXX

ACTARIS
metering systems

m050

Coriolis Mass Flowmeters



Flow rate 1.36 to 136 kg/min (3 to 300 lb/min)

ISO 9001 Certified Manufacturing Facility

SPECIFICATIONS

DESCRIPTION

The m® m050 provides accurate, continuous, direct measurement of mass, density, temperature and percent solids over the flow range 1.36 to 136 kg/min (3 to 300 lb/min).

DESIGN FEATURES

ACCURACY

Patented dual omega-shaped tubes provide outstanding sensitivity to Coriolis forces. m® mass flow accuracy is ±0.10% with the NexGen transmitter and ±0.15% with the Datamate 2100. The m050 m® mass flow rate repeatability is ±0.10%. Its density accuracy is ±0.002 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**
- **Weights & Measures approved for custody transfer applications**
- **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 150 grit (Ra 32 or 0.80 µm) 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 Technial Specification No. TS-620.)

HAZARDOUS AREA CLASSIFICATION TABLE

Agency	Components	Method	Class	Div./*Zone*	Group	Temp. Class	Ambient Temp.
FM	Transducer	Intrinsic Safety	I, II, III	1	C,D,E,F,G	T5*	2
				2	A,B,C,D	T5*	2
	Datamate	Non-incendive	I	2	A,B,C,D	T5	4
	NexGen	Explosion-Proof	I,II,III	1	C,D,E,F,G	T6	4
				2	A,B,C,D	T4	4
CSA	Transducer	Intrinsic Safety	I,II,III	1	C,D,E,F,G		2
				2	C,D,E,F,G		2
	Datamate	Non-incendive	I,II,III	2	C,D	T4A	4
	NexGen	Explosion Proof	I,II,III	1	C,D,E,F,G	T6	4
				2	A,B,C,D,E,F,G	T4	4

Ambient temperature limits:
2 –20°C to 40°C (–4 to 104°F)
4 –20°C to 65°C (–4 to 149°F)

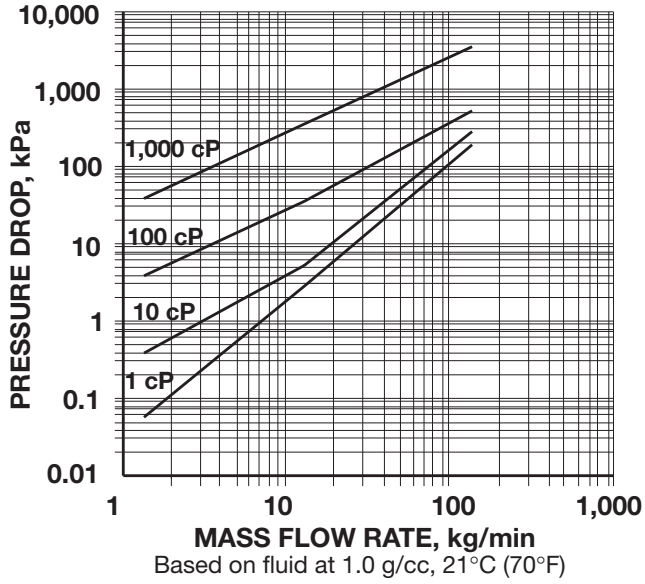
*M300 rated at T6

m050 OPERATING SPECIFICATIONS

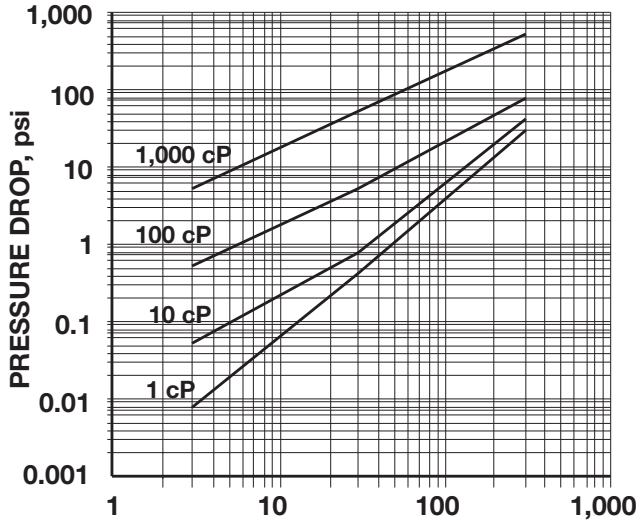
METERING ELEMENT	
Connections:	
Connection type	VCO: 1" female ANSI: 1/2", 3/4", 1"; 150#, 300#, 600# RF DIN: DN15, DN25; PN40, PN100 3A-Authorized: 2" Tri-Clamp® Industrial Tri-Clamp®: 1-1/2"
Meter:	
Tube material	316L SST or HASTELLOY® C-22 optional
Tube shape	Omega
Nominal tube bore	12.7 mm (1/2")
Housing	304L SST
Hazardous area classification	Transducer is intrinsically safe when connected to an approved mass flow computer (See table above for approval rating)
Mass accuracy[1]	Datamate 2100: ±0.15% of rate ± zero stability NexGen SFT100: ±0.10% of rate ± zero stability
Mass Repeatability	±0.10% of rate
Mass zero stability	Datamate 2100: ±0.0168 kg/min (0.037 lb/min) NexGen SFT100: ±0.0135 kg/min (0.0299 lb/min)
Turndown ratio	100:1
Density range	Datamate 2100: 0.4 to 2.0 g/cc NexGen SFT100: 0.4 to 3.0 g/cc
Density accuracy	±0.002 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	1.36 to 136 kg/min (3 to 300 lb/min)
Max. temperature	204°C (400°F)
Min. temperature	-45°C (-50°F)
Max. operating pressure	204 bar (3000 psi); limited by flange/connection rating
ASSOCIATED INSTRUMENT	
Max. length of signal cable	Datamate 2100: 150 m (500 ft.) 8 core Belden 89892 shielded twisted pair NexGen SFT100: 300 m (1000 ft.) 8 core Belden 89892 shielded twisted pair
Electrical connections	Screw terminal
Manufacturer	Actaris U.S. Liquid Measurement, Inc.
Meter model number	m050 XXXXXX (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, 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



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

where:
m = mass flow rate, kg/min or lb/min
S_0 = mass zero stability, kg/min or lb/min for the m050 flowmeter

Note that Actaris offers a free sizing 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 m050 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:

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

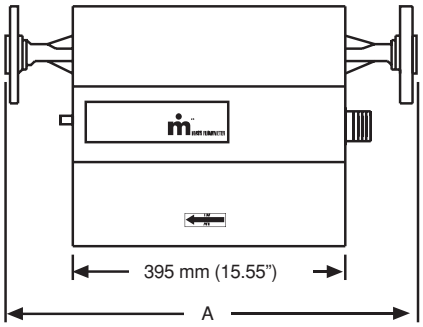
m050 MASS FLOWMETER ORDERING INFORMATION

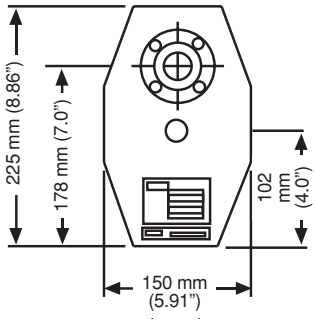
MODEL NUMBER							DESCRIPTION
M050	X	X	X	X	X	X	
							Type
	2						Transducer 1/2" Hastelloy® C-22 [1]
	8						Transducer 1/2" SST [1]
	S						Transducer 1/2" SST Sanitary Tri Clamp [1]
							Flange
	000						2" 3A SST Sanitary Tri Clamp [4]
	232						1" 150lb. ANSI RF Hastelloy® C-22
	233						1" 300lb. ANSI RF Hastelloy® C-22
	811						NUT VCO CAJON SST [2]
	812						1/2" 150lb. ANSI RF SST
	813						1/2" 300lb. ANSI RF SST
	822						3/4" 150lb. ANSI
	823						3/4" 300lb. ANSI RI SST
	832						1" 150lb. ANSI RF SST
	833						1" 300lb. ANSI RF SST
	846						1-1/2: SST Industrial Tri Clamp [4]
	8BE						DN15 PN40 SST
	XXX						Special - Contact Factory [5]
							Approvals
		0					General Purpose
		1					FM
		2					CSA
							W & M
			0				None
			W				Custody Transfer (Weights & Measures)
							Cable
				000			No Cable
				101			ASM CBL KIT 10Ft. [3]
				102			ASM CBL KIT 20Ft. [3]
				103			ASM CBL KIT 30Ft. [3]
				105			ASM CBL KIT 50Ft. [3]
				110			ASM CBL KIT 100Ft. [3]
							Electronics
					O		No Electronics
					D		For Use With Datamate
					N		For use With Nexgen

[1]Note: Wetted materials and connection materials must be the same.
[2]Note: Only available as 1" female CAJON VCO connections.
Requires male CAJON VCO -16- VCO by SWAGELOCK®.
[3]Note: For a complete list of available cables, contact factory.
[4]Note: The 1-1/2" industrial and 2" 3A tri-clamp connections are available in 316L SS wetted materials only.
[5]Note: The special 2" mating flanges to the MT truck accessories are no charge (NC).

DIMENSIONAL DATA, mm (in.)

m050 Transducer

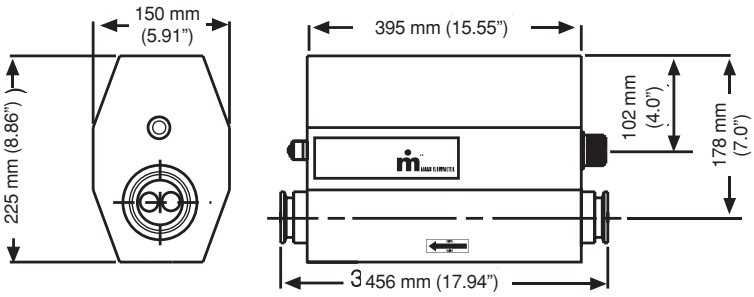




CONNECTION	DIMENSIONS	
	A 316L SS Wetted Parts	A[1] HASTELLOY® C-22 Wetted Parts
1/2" 150# ANSI RF	559 (22.0)	650 (25.6)
1/2" 300# ANSI RF	574 (22.6)	650 (25.6)
1/2" 600# ANSI RF	584 (23.0)	650 (25.6)
3/4" 150# ANSI RF	559 (22.0)	650 (25.6)
3/4" 300# ANSI RF	579 (22.8)	650 (25.6)
3/4" 600# ANSI RF	591 (23.27)	650 (25.6)
1" 150# ANSI RF	561 (22.1)	650 (25.6)
1" 300# ANSI RF	582 (22.9)	650 (25.6)
1" 600# ANSI RF	594 (23.39)	650 (25.6)
DN15 PN 40	561 (22.10)	N/A
DN25 PN 40	561 (22.10)	N/A

[1]All HASTELLOY® C-22 wetted parts dimensions are for lap-joint flanges.

m050 3A-Authorized Transducer



Optional 2" x 1" Tri-Clamp® eccentric reducers (P/N 101630-002) are available.

WEIGHTS OF COMPONENTS

Transducer:	approx. 11.3 kg (25 lbs)
Datamate:	approx. 6.6 kg (14 lbs)
NexGen:	
Blind	approx. 6.4 kg (14.1 lb.)
w/Display/keypad	approx. 7.1 kg (15.6 lb.)

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ACTARIS metering systems