GM51A

1.125" Metal Sealed, Digital Mass Flow Meter

The GM51A is a 1.125" wide, general purpose metal sealed, Mass Flow Meter (MFM) well suited for a wide variety of applications requiring flow metering from 5 sccm to 50 slm Full Scale, N_2 equivalent.

The GM51A digitally calibrated MFM is available with either analog or digital I/O. The digital electronics utilize the latest MKS algorithms providing multi-gas/multi-range measurement capability. Included is a digital calibration that yields 1% of Reading accuracy on the calibration gas. The GM51A's analog and digital I/O can easily be used to replace those same I/O types of the 179A MFCs. All GM51As include Modbus as an available secondary I/O (excludes PROFINET® and EtherCAT®).

The GM51A utilizes the standard 3-inch footprint most often used by MFMs in the 5 sccm to 50 slm flow rate range. The GM51A metal sealed MFM, with its all-metal 316 stainless steel body, is well suited for use in high purity process applications.

Product Features

- Embedded user interface provides the ability to
  - —Easily change device range and user gas reducing inventory requirements
  - —Monitor device functionality and collect performance data in-situ
- 10 micro-inch 316L surface finish enables MFM use for high purity applications
- Wide choice of digital (EtherCAT, DeviceNet™, Profibus®, PROFINET and RS485) or analog (0 to 5 VDC or 4 to 20 mA) I/O

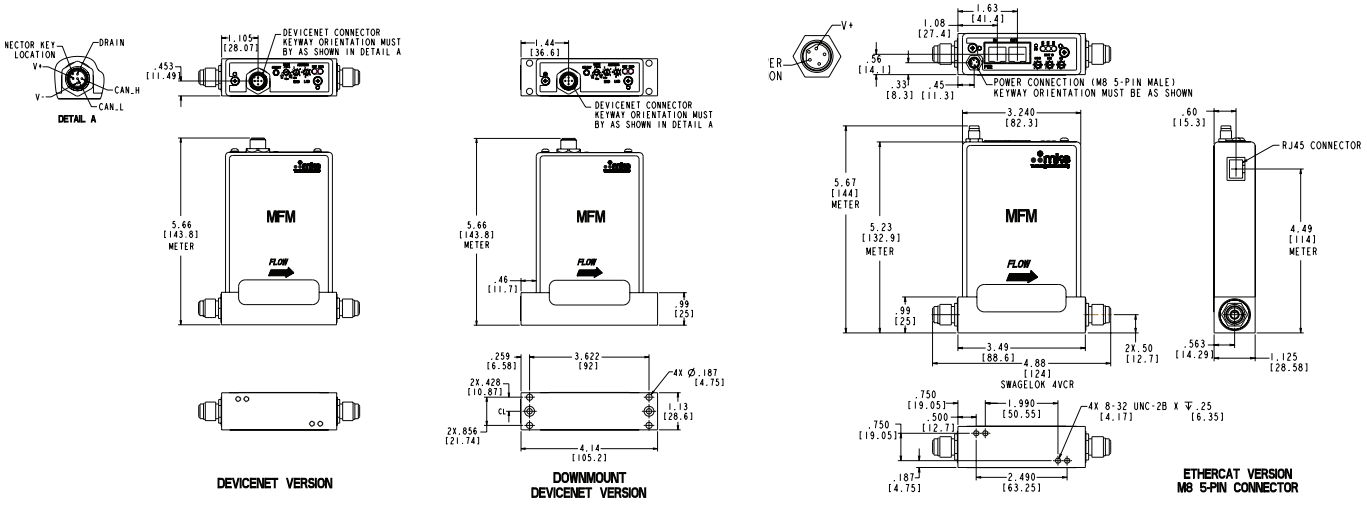
Key Benefits

- Patented thermal sensor design provides exceptional zero stability
- Percent of Reading accuracy (calibration gas) enables precise process metering

Specifications

Performance		
Full Scale Flow Ranges (N_2 equivalent)		5 - 50000 sccm
Maximum Inlet Pressure		500 psi
Proof Pressure		1000 psig
Burst Pressure		1500 psig
Measurement Range		0.1% to 100% of Full Scale (range on mech.)
Typical Accuracy (with N_2 calibration gas)		±1% of Reading
Repeatability		±0.3% of Reading
Resolution		0.1% of Full Scale
Temperature Coefficients	**Zero** **Span**	• <0.05% of Full Scale/°C • <0.08% of Reading/°C
Inlet Pressure Coefficient		<0.02% of Reading/psi
Warm-up Time (to within 0.2% of Full Scale of steady state performance)		30 minutes
Operating Temperature Range (Ambient)		10°C to 50°C
Storage Humidity		0 to 95% relative humidity, non-condensing
Storage Temperature		-20° to 80°C (-4° to 176° F)
Mechanical		
Fittings (compatible with)		Swagelok® 4 VCR® male, 1/4'' Swagelok compression seal, surface mount, Swagelok 8 VCR male, 1/8'' Swagelok, 1/2'' Swagelok, 6 mm Swagelok, 8 mm Swagelok, KF16, 3/8'' Swagelok, 12mm Swagelok, 2 VCR male
Leak Integrity	**External (scc/sec He)**	$<1 \times 10^{-10}$
Wetted Materials	**Standard**	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality)
Surface Finish		10µ inch average Ra
Weight		<2.5 lbs (1.1 kg)
Electrical Analog I/O		
Input Power Required		+15 to +24 VDC @ (<2 watts)
Flow Input/Output Signal	**Voltage (0 to 5 VDC)** **Current (4 to 20 mA)**	• 15 pin Type ''D'' male, 9 pin Type ''D'' male • 15 pin Type ''D'' male
Compliance		CE

Digital I/O	DeviceNet™	RS485	Profibus®	EtherCAT®	PROFINET®
Input Power Required	+11 to +25 VDC per (<2 watts)	+15 to +24 VDC (<2 watts)	+15 to +24 VDC (<2 watts)	+24 VDC (<3 watts)	+24 VDC (<3 watts)
Connector	5 pin micro connector (power and comm.)	9 pin Type D male (power and comm.)	9 pin Type D male (power) 9 pin Type D female (comm.)	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)
Data Rate Switch/Selection	4 positions: 125, 250, 500K (Default), (programmable over network)	No switch Set data rate via RS485	No switch Set data rate via Profibus	No switch	No switch
Comm. Rate(s)	125 Kbps; 250 Kbps; 500 Kbps	9.6 Kbps; 19.2 Kbps 38.4 Kbps	9.6 Kbps to 12 Mbps	100 Mbps	100 Mbps
MAC ID Switches/ Addresses	2 switches, 10 positions; 0,0 to 6,3 1 to 254	Set address over RS485 Station Addresses 0,0 to 9,9	2 switches, 10 positions	3 switches, 16 positions	N/A
Network Size	Up to 64 nodes	Up to 32 nodes	Up to 99 nodes	Up to 4095 nodes	N/A
Visual Indicators	LED Network (green/red) LED Module (green/red)	LED Comm (yellow) LED Error (red)	LED Comm (green/red) LED Error (green/red)	LED Power (green) LED Run (green) LED Error (red) LED Comm (green)	LED Maint (amber) LED BUS Fault (red) LED Ready (green) LED Sys Fault (red)
Compliance	CE	CE	CE	CE	CE



Dimensional Drawings: DeviceNet™, Downmount with VCR® fittings and EtherCAT® with VCR fittings**

*Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced). *(See manual for additional I/O and fitting types)*

Ordering Information

Ordering Code Example: GM51A013502R830020	Code	Configuration
Model		
MFM Mass Flow Meter GM51A	GM51A	GM51A
Gas (per Semi Standard E52-0703)		
013 = Nitrogen = N_2 029 = Ammonia = NH_3 110 = Sulfur Hexafluoride = SF_6	013 029 110	013
Flow Range Full Scale*		
5 sccm 10 sccm 20 sccm 50 sccm 100 sccm 200 sccm 500 sccm 1000 sccm 2000 sccm 5000 sccm 10000 sccm 20000 sccm 30000 sccm 50000 sccm	500 101 201 501 102 202 502 103 203 503 104 204 304 504	502
Fittings (compatible with)		
6 mm Swagelok 8 mm Swagelok 10 mm Swagelok 12 mm Swagelok 1/8'' Swagelok (for 1000 sccm N_2 equivalent or below) 1/4'' Swagelok 1/2'' Swagelok 3/8'' Swagelok Swagelok 4 VCR male Swagelok 8 VCR male C-seal surface mount as per SEMI 2787.1 W-seal surface mount as per SEMI 2787.3F KF16 Swagelok 2 VCR (for 1000 sccm N_2 equivalent or below)	M E P F A S K J R T C H U B	R
Connector		
Profibus (179B Compatible) Profibus (180A Compatible) RS485 (uses 9 pin connector) DeviceNet EtherCAT PROFINET Analog 0 to 5 VDC (9 pin D connector) Analog 0 to 5 VDC (9 Pin D connector), Tied Grounds Analog 0 to 5 VDC (15 pin D connector) Analog 0 to 5 VDC (15 pin D connector), Tied Grounds Analog 4 to 20 mA (15 pin D connector) Analog 0 to 5 VDC (15 pin D Connector), Brooks Analog 0 to 5 VDC (15 pin D Connector), Celerity	3 4 5 6 8 9 A L B M H E U	8
Valve/Device Type		
No Valve/Mass Flow Meter	30	30
Reserved for MKS Future Use		
Standard	0	0
Firmware		
Unless otherwise specified, MKS will ship firmware revision current to date.	20	20

** The Full Scale flow rate is designated by a 3 digit number. The first two digits represent the significant digits of the Full Scale flow rate separated by a decimal point. The third digit is the exponent of the power of ten. Example flow rate code:*

254 is 2.5 x 10^4 or 25000 sccm *153 is 1.5 x 10^3 or 1500 sccm* *601 is 6.0 x 10^1 or 60 sccm*

*** The user should consult with their gas supplier on the appropriate elastomer which is compatible with the selected gas.*

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