



Type GM50A

METAL SEALED, DIGITAL MASS FLOW CONTROLLER

The GM50A is a general purpose, metal sealed MFC well suited for a wide variety of applications requiring flow control capability from 5 sccm to 50 slm FS, N₂ equivalent. The GM50A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The GM50A digitally controlled MFC is available with either analog or digital I/O. The digital control electronics utilize the latest in MKS control algorithms providing fast and repeatable response to setpoint throughout the device control range. Typical response times are on the order of 500 milliseconds. Included is a digital calibration that yields 1% of setpoint accuracy on the calibration gas. The GM50A's analog and digital I/O can easily be used to replace those same I/O types of the 1479A MFCs.

The GM50A utilizes the standard 3-inch footprint most often used by MFCs in the 5 sccm to 50 slm flow rate range enabling its use without the need to modify existing gas line configurations. The GM50A metal sealed MFC with its electropolished surface finish is well suited for use in high purity process applications. The GM50A is also available in an MFM version (not electropolished).

Features & Benefits

- Patented thermal sensor design provides exceptional zero stability
- Percent of setpoint accuracy (calibration gas) enables precise process control
- 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
- 10μ inch electropolished 316L surface finish enables MFC use for high purity applications
- Compatible analog and digital (RS485, Devicenet and Profibus) I/O allow the GM50A to replace its 1479A counterparts
- CE Mark and RoHS Compliance – meeting requirements for the European Union

US Patent No 5461913.



Flow Measurement & Control

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Performance

Full Scale Flow Ranges (N_2 equivalent)	5 - 50000 sccm
Maximum Inlet Pressure	150 psig (can not exceed pressure differential requirement across MFC)
Normal Operating Pressure Differential (N_2 F.S.) (with atmospheric pressure at the MFC outlet)	5 to 5000 sccm; 10 to 40 psid 10000 to 20000 sccm; 15 to 40 psid 30000 to 50000 sccm; 25 to 40 psid
Proof Pressure	1000 psig
Burst Pressure	1500 psig
Control Range	2% to 100% of F.S. (range on mech.)
Typical Accuracy (with N_2 calibration gas)	$\pm 1\%$ of setpoint for 20 to 100% F.S. $\pm 0.2\%$ of F.S. for 2 to 20% F.S.
Repeatability	$\pm 0.3\%$ of Reading
Resolution	0.1% of Full Scale
Temperature Coefficients	
Zero	< 0.05% of F.S./°C
Span	< 0.08% of Rdg./°C
Inlet Pressure Coefficient	< 0.02% of Rdg./psi
Typical Controller Settling Time (per SEMI Guideline E-17-0600)	< 750 msec., typical above 5% F.S.
Warm-up Time (to within 0.2% of F.S. of steady state performance)	< 30 min
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 149° F)

Mechanical

Fittings (compatible with)	Swagelok® 4 VCR® or ¼" Swagelok compression seal, surface mount
Leak Integrity	
External (scc/sec He)	< 1×10^{-10}
Through closed valve	< 1.0% of F.S. at 40 psig inlet to atmosphere (To assure no flow-through, a separate positive shut-off valve is required.)
Wetted Materials	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel
Valve Seat (MFC only)	Teflon®
Surface Finish	
MFC	10µ inch average Ra (electropolished)
MFM	16µ inch average Ra
Weight	less than 3 lbs (1.4kg)

Electrical Analog I/O CE Compliant to EMC Directive 2004/108/EC

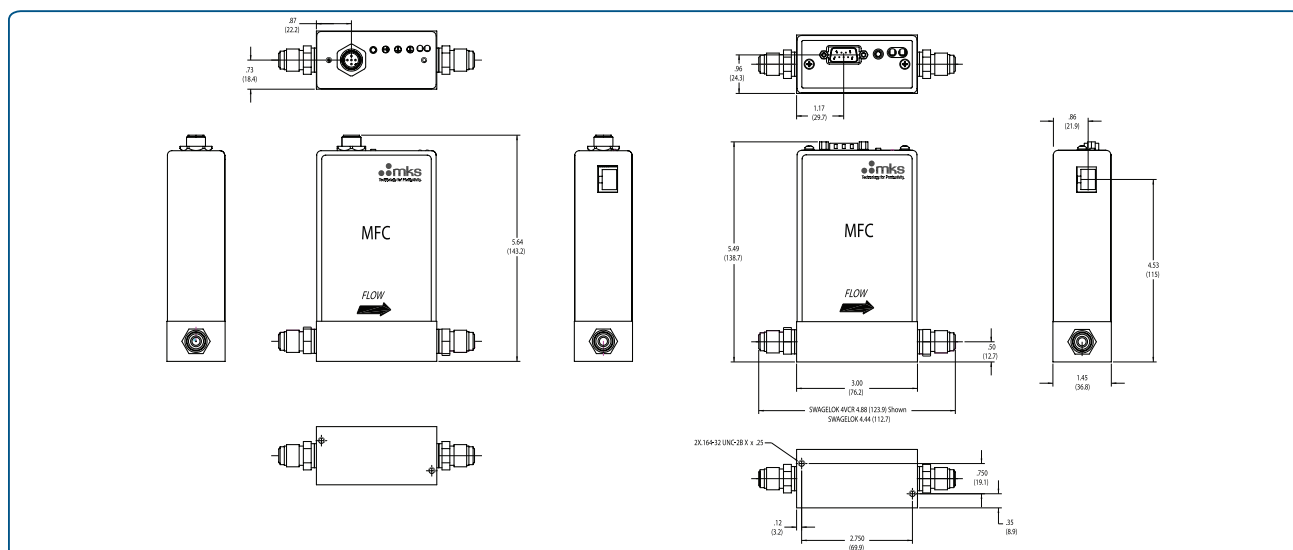
Input Power Required	+15 to +24 VDC @ (< 4 watts)
Flow Input/Output Signal	
Voltage (0 to 5 VDC)	15 pin Type "D" male, 9 pin Type "D" male
Current (4 to 20 mA)	15 pin Type "D" male



Digital I/O CE Compliant to EMC Directive 2004/108/EC

Digital I/O	DeviceNet™	RS-485	Profibus®
Input Power Required	+11 to +25 VDC per DeviceNet specification (< 4 watts)	+15 to +24 VDC (< 4 watts)	+15 to +24 VDC (< 4 watts)
Connector	5 pin microconnector (DeviceNet)	9 pin Type D male	9 pin Type D male (power) and 9 pin Type D female (comm.)
Data Rate Switch/ Selection	4 positions: 125, 250, 500K (Default), PGM (programmable over the network)	No switch Set Data Rate via RS485	No switch Set Data Rate via Profibus
Data Rate	Data Rate (User Selectable) 125 Kbps 250 Kbps 500 Kbps	Data Rate (User Selectable) 9.6 Kbps 19.2 Kbps 38.4 Kbps	Data Rate (User Selectable) 9.6 Kbps to 12 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
Network Size	Up to 64 nodes	Up to 32 nodes	Up to 99 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable	Master/slave	Master/slave
Visual Communication Indicators	LED network status (green/red) LED module status (green/red)	LED Comm (yellow) LED Error (red)	LED Comm (green/red) LED Error (green/red)

Dimensional Drawing



Dimensional Drawing — Devicenet and RS485 with VCR Fittings

**(See manual for additional I/O and fitting types)*

Note: Unless specified, dimensions are nominal values in inches (mm referenced).



Ordering Information

Ordering Code Example: GM50A013502R6M010		Code	Configuration
Type MFC Mass Flow Controller GM50A		GM50A	GM50A
Gas (Per Semi Standard E52-0703)			
For example:			
013 = Nitrogen = N ₂	013	013	013
029 = Ammonia = NH ₃	029	029	
110 = Sulfur Hexafluoride = SF ₆	110	110	
Flow Range Full Scale*			
5 sccm	500		502
10 sccm	101		
20 sccm	201		
50 sccm	501		
100 sccm	102		
200 sccm	202		
500 sccm	502		
1000 sccm	103		
2000 sccm	203		
5000 sccm	503		
10000 sccm	104		
20000 sccm	204		
30000 sccm	304		
50000 sccm	504		
Fittings (compatible with)			
Swagelok 4 VCR male	R		R
¼" Swagelok	S		
C-seal surface mount as per SEMI 2787.1	C		
W-seal surface mount as per SEMI 2787.3F	H		
Connector			
DeviceNet™	6		6
RS485 (uses 9 pin connector)	5		
Profibus™	4		
Analog 0 to 5 VDC (9 pin D connector)	A		
Analog 0 to 5 VDC (15 pin D connector)	B		
Analog 4 to 20 mA (15 pin D connector)	H		
Device Type			
Mass Flow Controller	M		M
Mass Flow Meter	3		
Reserved for MKS Future Use			
Standard	0		0
Firmware			
Unless otherwise specified, MKS will ship firmware revision current to date	10		10

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

Example Flowrate code:

254 is 2.5 x 10⁴ or 25000 sccm

153 is 1.5 x 10³ or 1500 sccm

601 is 6.0 x 10¹ or 60 sccm



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