



Flow Solutions

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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 set point throughout the device control range. Typical response times are on the order of 500 milliseconds. Included is a digital calibration that yields 1% of set point 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. All GM50As include Modbus as an available secondary I/O.

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 available with either a normally closed or normally open valve. The GM50A is also available in an MFM version (not electropolished).

Features & Benefits

- Patented thermal sensor design provides exceptional zero stability
- Percent of set point 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
- Wide choice of digital (EtherCAT, DeviceNet, Profibus, & RS485) or analog (0 to 5 VDC or 4 to 20 mA) I/O
- CE Mark and RoHS Compliance – meeting requirements for the European Union

US Patent No 5461913.



Performance

Full Scale Flow Ranges (<i>N₂ equivalent</i>)	5 - 50000 sccm
Maximum Inlet Pressure	150 psig (can not exceed pressure differential requirement across MFC)
Normal Operating Pressure Differential (<i>N₂ F.S.</i>) (<i>with atmospheric pressure at the MFC outlet</i>)	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 (<i>with N₂ calibration gas</i>)	± 1% of set point for 20 to 100% F.S. ± 0.2% of F.S. for 2 to 20% F.S.
Repeatability	± 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 (<i>per SEMI Guideline E-17-0600</i>)	< 750 msec., typical above 5% F.S.
Warm-up Time (<i>to within 0.2% of F.S. of steady state performance</i>)	< 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 (<i>compatible with</i>)	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
Leak Integrity	
External (scc/sec He)	< 1 x 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

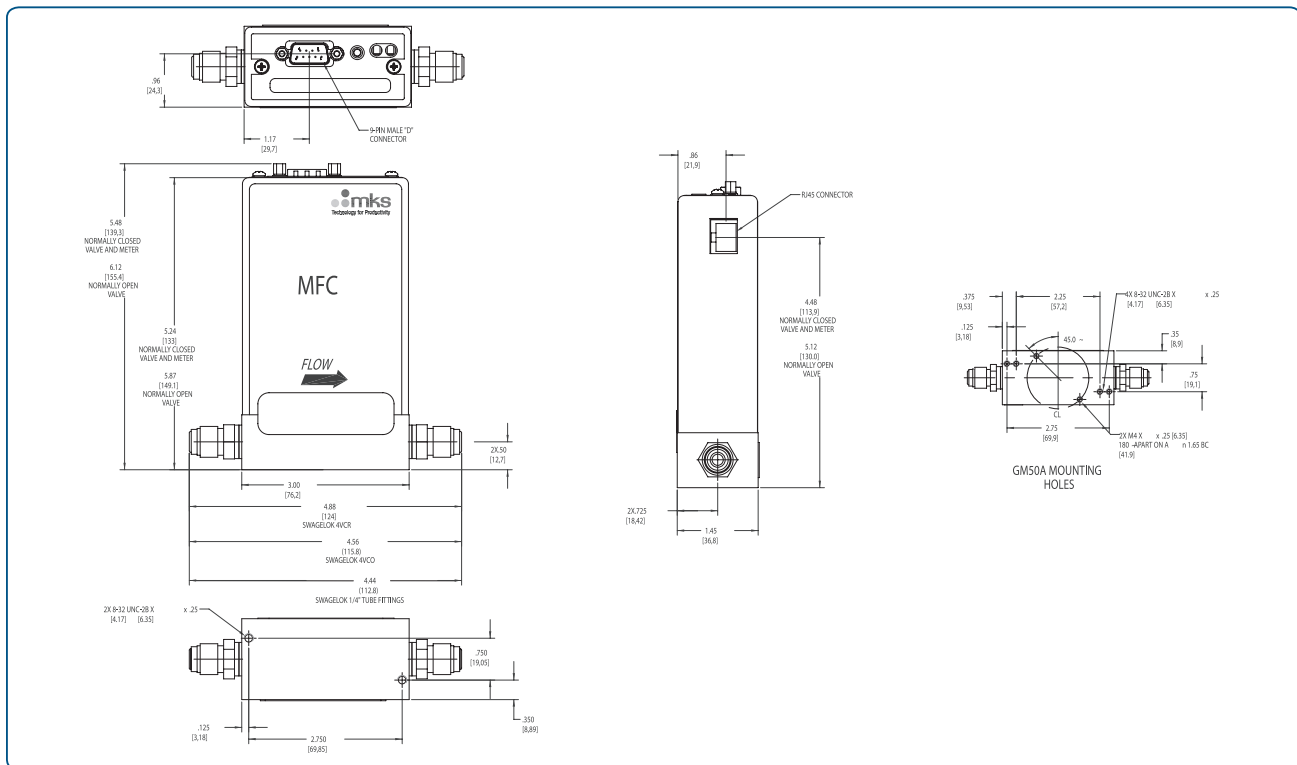


Specifications (cont'd)

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

Digital I/O	DeviceNet™	RS-485	Profibus®	EtherCAT®
Input Power Required	+11 to +25 VDC per (< 4 watts)	+15 to +24 VDC (< 4 watts)	+15 to +24 VDC (< 4 watts)	+24 VDC (< 5 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)
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
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
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
Network Size	Up to 64 nodes	Up to 32 nodes	Up to 99 nodes	Up to 4095 nodes
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)

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: GM50A013502R6M020	Code	Configuration
Type MFC Mass Flow Controller GM50A	GM50A	GM50A
Gas (Per Semi Standard E52-0703)		
For example: 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)		
Swagelok 4 VCR male 1/4" Swagelok C-seal surface mount as per SEMI 2787.1 W-seal surface mount as per SEMI 2787.3F Swagelok 8 VCR male (for 10000 sccm N ₂ equivalent and above) 1/8" Swagelok (for 1000 sccm N ₂ equivalent or below) 1/2" Swagelok (for 10000 sccm N ₂ equivalent and above) 6 mm Swagelok 8 mm Swagelok	R S C H T A K M E	R
Connector		
EtherCAT® DeviceNet™ RS485 (uses 9 pin connector) Profibus® 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)	8 6 5 4 A L B M H	6
Valve/Device Type		
Normally Closed/Mass Flow Controller No Valve/Mass Flow Meter Normally Open/Mass Flow Controller	M0 30 PT	M0
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 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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