GM50A

Metal Sealed, Digital Mass Flow Controller

The GM50A is a general purpose, metal sealed Mass Flow Controller (MFC) well suited for a wide variety of applications requiring flow control capability from 5 sccm to 50 slm Full Scale, N_2 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 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 (excludes PROFINET® and EtherCAT®).

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).

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
- 10µ inch electropolished 316L surface finish enables MFC 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

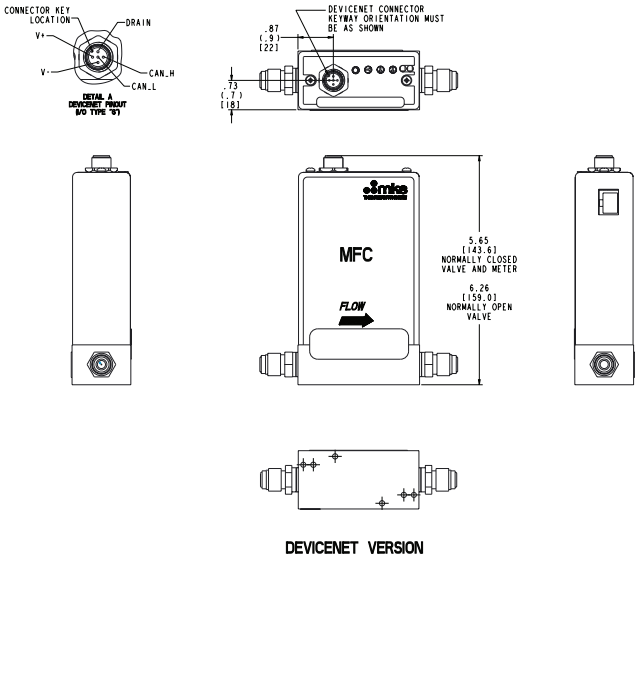
Key Benefits

- Patented thermal sensor design provides exceptional zero stability
- Percent of set point accuracy (calibration gas) enables precise process control

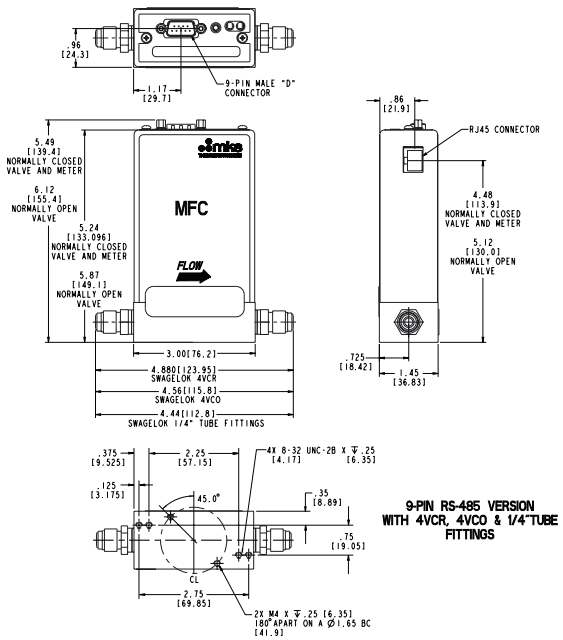
Specifications

Performance		
Full Scale Flow Ranges (N_2 equivalent)		5 - 50000 sccm
Maximum Inlet Pressure	**MFC** **MFM**	• 150 psig (can not exceed pressure differential requirement across MFC) • 500 psi
Normal Operating Pressure Differential (N_2 Full Scale) (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 Full Scale (range on mech.)
Typical Accuracy (with N_2 calibration gas)		• ±1% of Reading for 20 to 100% Full Scale • ±0.2% of Full Scale for 2 to 20% Full Scale • ±1% of Reading for meters
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
Typical Controller Settling Time (per SEMI Guideline E-17-0600)		<750 msec., typical above 5% Full Scale
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)** **Through Closed Valve**	• <1 x 10^{-10} • <1.0% of Full Scale at 40 psig inlet to atmosphere (To assure no flow-through, a separate positive shut-off valve is required.)
Wetted Materials	**Standard** **Valve Seat (MFC only)**	• 316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel, KM45 • Teflon®
Surface Finish	**MFC** **MFM**	• 10µ inch average Ra (electropolished) • 16µ inch average Ra
Weight		<3 lbs (1.4kg)
Electrical Analog I/O		
Input Power Required		+15 to +24 VDC @ (<4 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 (< 4 watts)	+15 to +24 VDC (< 4 watts)	+15 to +24 VDC (< 4 watts)	+24 VDC (< 5 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)	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



DEVICENET VERSION



9-PIN RS-485 VERSION WITH 4VCR, 4VCO & 1/4" TUBE FITTINGS

DeviceNet™ and RS485 with VCR fittings (*see manual for additional I/O and fitting types). Unless otherwise specified, dimensions are nominal values in inches (mm referenced).*

Ordering Information

Ordering Code Example: GM50A013502R6M020	Code	Configuration
Model		
MFC Mass Flow Controller GM50A	GM50A	GM50A
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		
EtherCAT DeviceNet RS485 (uses 9 pin connector) Profibus (1480 Compatible) Profibus (1179B Compatible) 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	8 6 5 4 3 9 A L B M H	6
Valve/Device Type		
Normally Closed/Mass Flow Controller, Teflon® No Valve/Mass Flow Meter Normally Open/Mass Flow Controller, Teflon	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 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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