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mks

Flow Solutions

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GM100A

METAL SEALED, DIGITAL MASS FLOW CONTROLLER

The GM100A is a general purpose, metal sealed MFC well suited for a wide variety of applications requiring flow control capability from 1 slm to 100 slm FS, N_2 equivalent. The GM100A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The GM100A 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 750 milliseconds. Included is a digital calibration that yields 1% of set point accuracy on the calibration gas. All GM100As include Modbus as an available secondary I/O.

The GM100A utilizes the standard 3-inch footprint most often used by MFCs in the 5 sccm to 50 slm flow rate range without the need to modify existing gas line configurations, and now operates with flow rates up to 100 slm, N_2 equivalent. The GM100A metal sealed MFC, with its electropolished surface finish, is well suited for use in high purity process applications and is available with a normally closed valve. An MFM version is also available (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
  - Adjust flow calibration for chamber-to-chamber and tool-to-tool process matching
- 10µ inch electropolished 316L surface finish enables MFC use for high purity applications
- Compact 3 inch footprint with high flow 4 VCR fittings allows the user to increase system flow rate without the need to modify gas lines.

US Patent No 5461913.

Performance

Full Scale Flow Ranges *(N_2 equivalent)*	50,000 - 100,000 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)*	50,000 - 100,000 sccm; 40 to 80 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)*	± 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 *(per SEMI Guideline E-17-0600)*	< 750 msec., typical above 10% 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® high flow male, Swagelok 8 VCR male, 1/2" Swagelok, 10mm Swagelok, KF-16
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)	Viton®, Buna, EPDM or Neoprene
Surface Finish	
MFC	10µ inch average Ra (electropolished)
MFM	16µ inch average Ra
Weight	< 3 lbs (1.4kg)

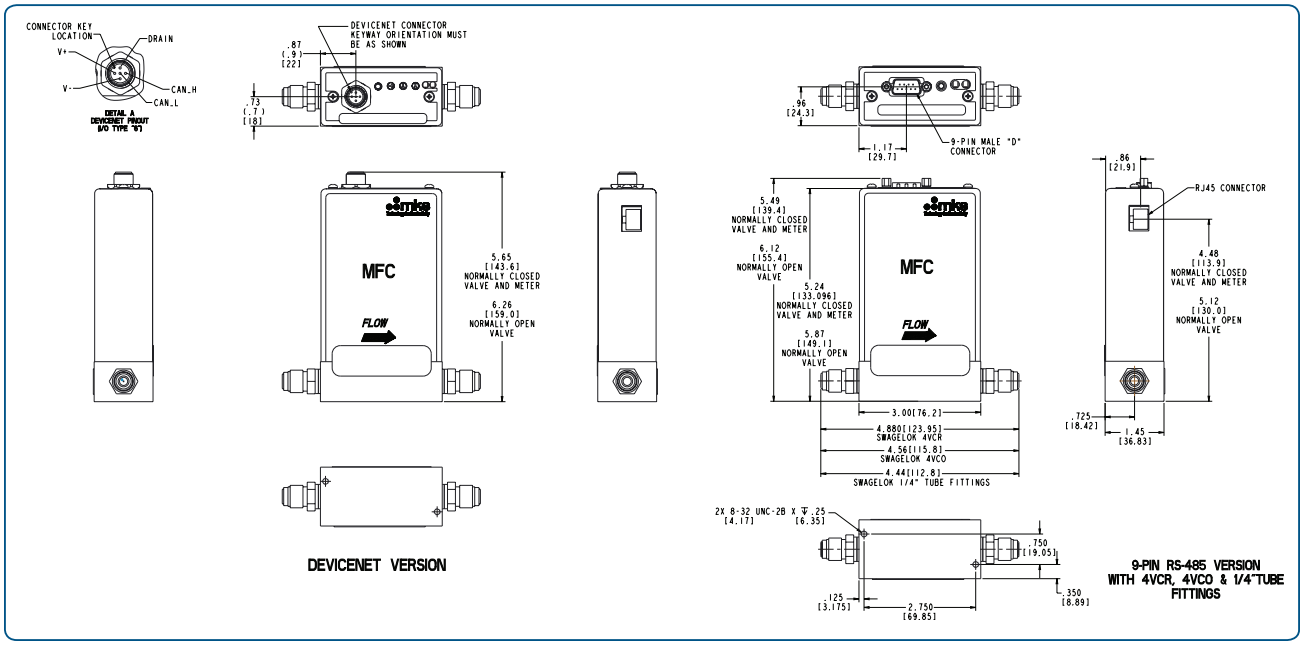
Electrical Analog I/O

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

Specifications

Digital I/O

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



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: GM100A013105T6MB020	Code	Configuration
MFC Mass Flow Controller GM100A	GM100A	GM100A
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*		
50000 sccm 75000 sccm 100000 sccm	504 754 105	105
Fittings *(compatible with)*		
10mm Swagelok 12mm Swagelok 1/2" Swagelok 3/8" Swagelok Swagelok 4 VCR male (high flow) Swagelok 8 VCR male Swagelok 8 VCO male (Consult Factory) KF-16 (Consult Factory)	P F K J R T D U	T
Connector		
DeviceNet™ RS485 (uses 9 pin connector) 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 0 to 5 VDC (15 pin D connector), 1179B 24 VDC Pinout (Consult Factory) Analog 0 to 5 VDC (15 pin D Connector), Brooks Analog 0 to 5 VDC (15 pin D Connector), Celerity Analog 4 to 20 mA (15 pin D connector)	6 5 4(3) 9 A L B M K E U H	6
Valve/Device Type		
Normally Closed Mass Flow Meter	M 3	M
Seal Materials**		
Buna Valve Plug Neoprene Valve Plug Viton Valve Plug EPDM Valve Plug No Valve (MFM Option)	B N V E 0	B
Reserved		
Reserved	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 FS 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 605 is 6.0 x 10^5 or 60000 sccm

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

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