



# Type GE50A

## ELASTOMER SEALED, DIGITAL MASS FLOW CONTROLLER

The GE50A is a general purpose, elastomer sealed MFC well suited for a wide variety of applications requiring flow control capability from 10 sccm to 50 slm FS, N<sub>2</sub> equivalent. The GE50A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The GE50A digitally controlled MFC is available with either RS485 or DeviceNet 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 I/O protocols are designed so that the GE50A can easily replace the RS485 and DeviceNet versions of the 1179A with minor coding required.

The GE50A utilizes the standard 3-inch footprint most often used by MFCs in the 10 sccm to 50 slm flow rate range enabling its use without the need to modify existing gas line configurations. The design of the GE50A incorporates a minimal use of elastomers. There is only one external elastomer seal and elastomer valve plug. Otherwise, all wetted surfaces are of metal. The GE50A comes standard with Viton® seals along with options for Buna, Neoprene® or Kalrez® allowing for the device's use with gases requiring one of these alternatives.

### 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
- Compatible RS485 and DeviceNet™ profiles allow the GE50A to replace its 1179A counterparts
- CE Mark and RoHS Compliance – meeting requirements for the European Union



## Performance

<b>Full Scale Flow Ranges</b> ( $N_2$ equivalent)	10 - 50000 sccm (consult factory for available flow ranges)
<b>Maximum Inlet Pressure</b>	150 psig (can not exceed pressure differential requirement across MFC)
<b>Normal Operating Pressure Differential</b> ( $N_2$ F.S.) (with atmospheric pressure at the MFC outlet)	10 to 5000 sccm; 10 to 40 psid 10000 to 20000 sccm; 15 to 40 psid 30000 to 50000 sccm; 25 to 40 psid
<b>Proof Pressure</b>	1000 psig
<b>Burst Pressure</b>	1500 psig
<b>Control Range</b>	2% to 100% of F.S. (range on mech.)
<b>Typical Accuracy</b> (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.
<b>Repeatability</b>	$\pm 0.3\%$ of Reading
<b>Resolution</b>	0.1% of Full Scale
<b>Temperature Coefficients</b>	
Zero	$< 0.05\%$ of F.S./ $^{\circ}\text{C}$
Span	$< 0.08\%$ of Rdg./ $^{\circ}\text{C}$
<b>Inlet Pressure Coefficient</b>	$< 0.02\%$ of Rdg./psi
<b>Typical Controller Settling Time</b> (per SEMI Guideline E-17-0600)	$< 500$ msec., typical above 5% F.S.
<b>Warm-up Time</b> (to within 0.2% of F.S. of steady state performance)	$< 30$ min
<b>Operating Temperature Range (Ambient)</b>	10 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$
<b>Storage Humidity</b>	0 to 95% Relative Humidity, non-condensing
<b>Storage Temperature</b>	-20 $^{\circ}$ to 80 $^{\circ}\text{C}$ (-4 $^{\circ}$ to 149 $^{\circ}\text{F}$ )

## Mechanical

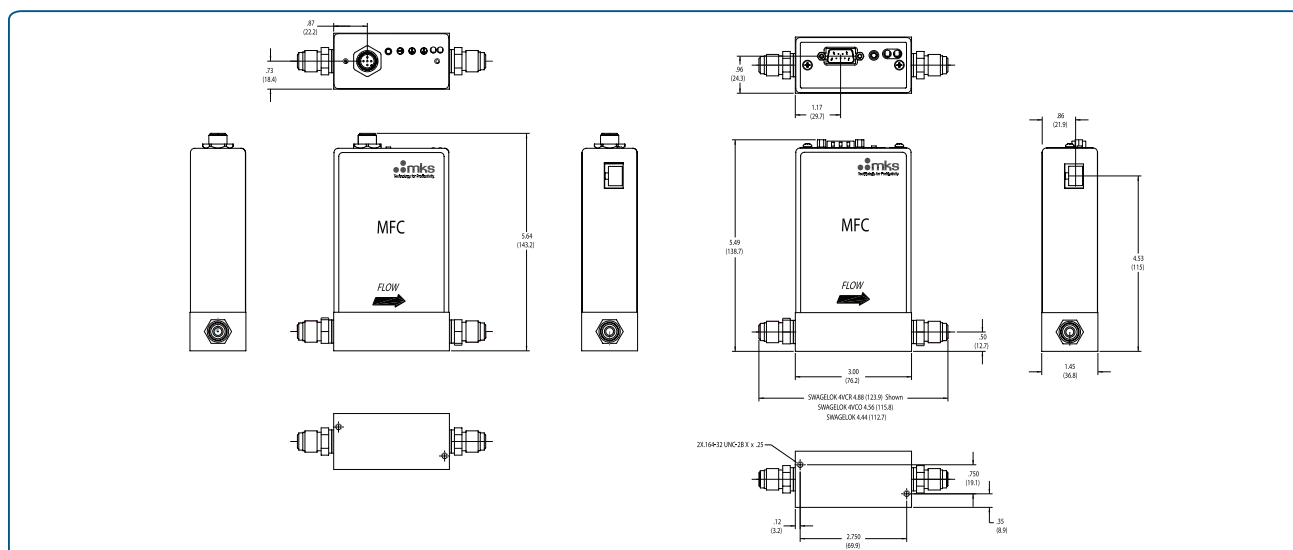
<b>Fittings</b> (compatible with)	Swagelok <sup>®</sup> 4 VCR <sup>®</sup> , Swagelok VCO <sup>®</sup> , or Swagelok
<b>Leak Integrity</b>	
External (scc/sec He)	$< 1 \times 10^{-09}$
Through closed valve	Up to 10K valve $< 0.1\%$ of FS at 40 psig to atmosphere 20K - 50K valve $< 1.0\%$ of FS at 40 psig to atmosphere (To assure no flow-through, a separate positive shut-off valve is required.)
<b>Wetted Materials</b>	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy <sup>®</sup> , Nickel
Seals and Valve Seat	Viton, Buna-N, Neoprene
<b>Surface Finish</b>	16 $\mu$ inch average Ra
<b>Weight</b>	less than 3 lbs (1.4kg)



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

	DeviceNet™	RS-485
<b>Digital I/O</b>		
<b>Input Power Required</b>	+11 to +25 VDC per DeviceNet specification (@ <3.5 watts)	+15 to +24 VDC @ 350mA max
<b>Connector</b>	5 pin microconnector (DeviceNet)	9 pin Type D male
<b>Data Rate Switch</b>	4 positions: 125, 250, 500K (Default), PGM (programmable over the network)	9.6, 19.2, 38.4K (Default) Set Data Rate via RS485
<b>Data Rate/Network Length</b>	Data Rate (User Selectable) 125 Kbps, 500 meters (1,640 feet) 250 Kbps, 250 meters (820 feet) 500 Kbps, 100 meters (328 feet)	Data Rate (User Selectable) 9.6 Kbps, 1200 meters (4,000 feet) 19.2 Kbps, 1200 meters (4,000 feet) 38.4 Kbps, 1200 meters (4,000 feet)
<b>MAC ID Switches/Addresses</b>	2 switches, 10 positions; 0,0 to 6,3 are hardware ID numbers; 7,0 to 9,9 are software ID numbers; (6,4 to 6,9 are unused and, if selected will default to hardware ID number 6,3)	Set address over RS485 Available MAC ID's are 3,2 to 9,9.
<b>Network Size</b>	Up to 64 nodes	Up to 32 nodes
<b>Network Topology</b>	Linear (trunkline/dropline) power and signal on same network cable	Master/slave
<b>Visual Communication Indicators</b>	LED network status (green/red) LED module status (green/red)	LED Comm (green/red) LED Error (green/red)

## Dimensional Drawing



## Dimensional Drawing — RS-485 and DeviceNet™ with VCR Fittings

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



## Ordering Information

Ordering Code Example: GE50A013502R6V010		Code	Configuration
Type MFC Mass Flow Controller GE50A		GE50A	GE50A
Gas (Per Semi Standard E52-0703)			
For example:			
013 = Nitrogen = N <sub>2</sub>	013	013	013
029 = Ammonia = NH <sub>3</sub>	029	029	
110 = Sulfur Hexafluoride = SF <sub>6</sub>	110	110	
Flow Range Full Scale*			
10 sccm	101		502
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
Swagelok 4 VCO male	G		
¼" Swagelok	S		
Connector			
DeviceNet™	6		6
RS485 (uses 9 pin connector)	5		
Profibus™	4		
Seal Materials**			
Viton	V		V
Buna-N	B		
Neoprene	N		
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 10<sup>4</sup> or 25000 sccm

153 is 1.5 x 10<sup>3</sup> or 1500 sccm

601 is 6.0 x 10<sup>1</sup> 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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