Flow Solutions

WWW.MKSINST.COM

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 5 sccm to 50 slm Full Scale, N_2 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 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 GE50A's analog and digital I/O can easily be used to replace those same I/O types of the 1179A MFCs. All GE50As include Modbus as an available secondary I/O (excludes PROFINET® and EtherCAT®).

The GE50A 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 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®, EPMD or Kalrez® allowing for the device's use with gases requiring one of these alternatives. The GE50A MFC is available with either a normally closed or a normally open valve.

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
- Wide choice of digital (EtherCAT, DeviceNet™, Profibus®, PROFINET and RS485) or analog (0 to 5 VDC or 4 to 20 mA) I/O

US Patent No 5461913.

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 Full Scale) (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
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 set point for 20 to 100% Full Scale ±0.2% of Full Scale for 2 to 20% Full Scale
Repeatability	±0.3% of Reading
Resolution	0.1% of Full Scale
Temperature Coefficients	
Zero	<0.05% of Full Scale/°C
Span	<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 149° F)

Mechanical

Fittings *(compatible with)*	Swagelok® 4 VCR® male, Swagelok VCO® male, 1/4" Swagelok compression seal, Swagelok 8 VCR male, 1/8" Swagelok, 1/2" Swagelok, 6 mm Swagelok, 8 mm Swagelok, KF-16, 3/8" Swagelok, 8 VCO Male, 10mm Swagelok, 12mm Swagelok, C-seal, 2 VCR male
Leak Integrity	
External (scc/sec He)	<1 x 10^{-09}
Through closed valve	Up to 10K valve <0.1% of Full Scale at 40 psig to atmosphere 20K - 50K valve <1.0% of Full Scale at 40 psig 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
Seals and Valve Seat	Viton, Buna-N, Neoprene, Kalrez, EPDM
Surface Finish	16µ inch average Ra
Weight	Less than 3 lbs (1.4kg)

Electrical Analog I/O

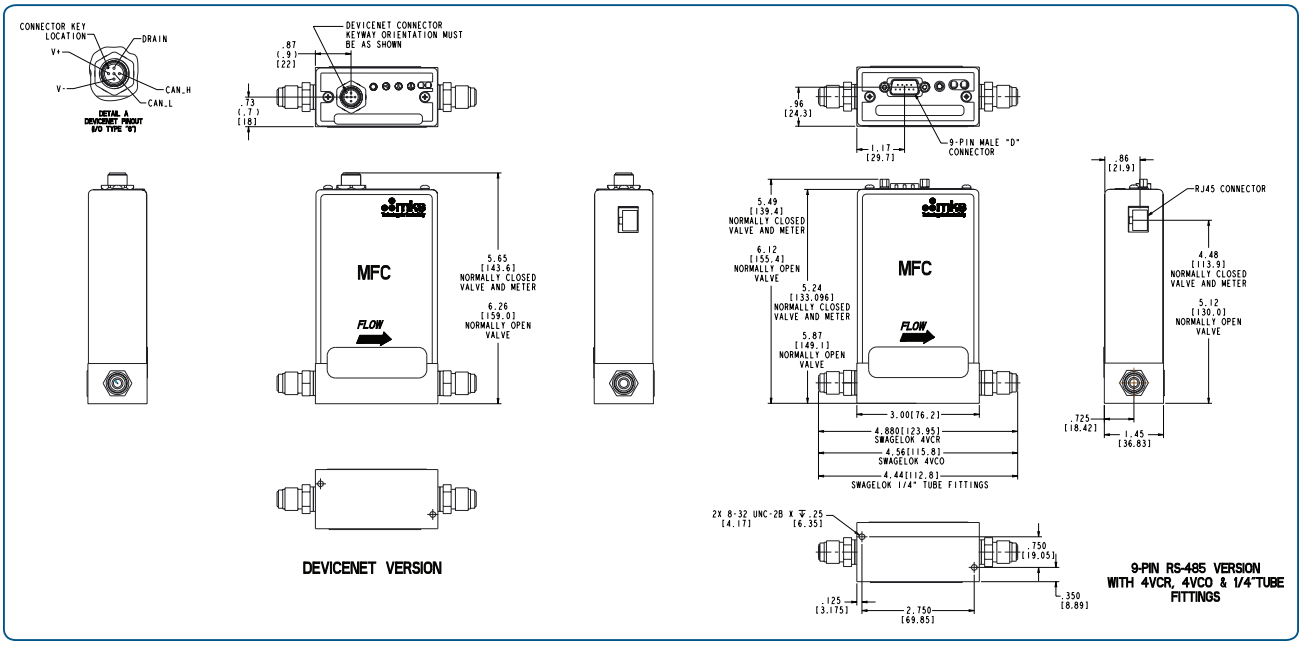
Input Power Required	+15 to +24 VDC @ (<4 watts)
Flow Input/Output Signal	
Voltage (0 to 5 VDC)	15 pin Type "D" male, 9 pin Type "D" male
Current (4 to 20 mA)	15 pin Type "D" male
Compliance	CE

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



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: GE50A013502R6V020	Code	Configuration
MFC Mass Flow Controller GE50A	GE50A	GE50A
Gas (Per Semi Standard E52-0703)		
For example:		
013 = Nitrogen = N_2	013	013
029 = Ammonia = NH_3	029	
110 = Sulfur Hexafluoride = SF_6	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
Swagelok 4 VCO male	G	
1/4" Swagelok	S	
Swagelok 8 VCR male	T	
1/8" Swagelok (for 1000 sccm N_2 equivalent or below)	A	
1/2" Swagelok	K	
6 mm Swagelok	M	
8 mm Swagelok	E	
KF-16	U	
Swagelok 8 VCO Male	D	
Swagelok 2 VCR Male (1000sccm N_2 equivalent or below)	B	
10 mm Swagelok	P	
12 mm Swagelok	F	
3/8" Swagelok	J	
C-Seal	C	
Connector		
EtherCAT	8	6
DeviceNet	6	
RS485 (uses 9 pin connector)	5	
Profibus (1480 Compatible)	4	
Profibus (1179B Compatible)	3	
PROFINET	9	
Analog 0 to 5 VDC (9 pin D connector)	A	
Analog 0 to 5 VDC (9 Pin D connector), Tied Grounds	L	
Analog 0 to 5 VDC (15 pin D connector)	B	
Analog 0 to 5 VDC (15 pin D connector), Tied Grounds	M	
Analog 4 to 20 mA (15 pin D connector)	H	
Analog 0 to 5 VDC (15 pin D Connector), Brooks	E	
Analog 0 to 5 VDC (15 pin D Connector), Celerity	U	
Seal Materials**		
Viton	V	V
Buna-N	B	
Neoprene	N	
Kalrez	K	
EPDM	E	
Valve/Device Type		
Normally Closed	0	0
Normally Open	P	
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.

MKS Instruments, Inc.
Global Headquarters
2 Tech Drive, Suite 201
Andover, MA 01810
Tel: 978.645.5500

MKS Instruments, Inc.
Flow Solutions
Six Shattuck Road
Andover, MA 01810
Tel: 978.975.2350

GE50A - 10/18

© 2012-2018 MKS Instruments, Inc.
All rights reserved.

MKS products provided subject to the US Export Regulations. Diversion or transfer contrary to US law is prohibited. Specifications are subject to change without notice. mksinst™ is a trademark of MKS Instruments, Inc., Andover, MA. Swagelok® and VCR® are registered trademarks of Swagelok Marketing Co., Solon, OH. Viton®, Neoprene®, and Kalrez® are registered trademarks of E.I. Dupont, Wilmington, DE. Elgiloy® is a registered trademark of Elgiloy Limited Partnership, Elgin, IL. DeviceNet™ is a trademark of the Open DeviceNet Vendor Association, Coral Springs, FL. Profibus® and PROFINET® are registered trademarks of Profibus International, Karlsruhe, Germany. EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.