

GE50A

Elastomer Sealed, Digital Mass Flow Controller



The GE50A is a general purpose, elastomer 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, N₂ 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 with only one external elastomer seal and elastomer valve plug. All wetted surfaces are of metal. The GE50A comes standard with Viton® seals along with options for Buna, Neoprene®, EPDM 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.

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
- 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 Range (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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • ±1% of Reading 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 Span <ul style="list-style-type: none"> • <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 min
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)

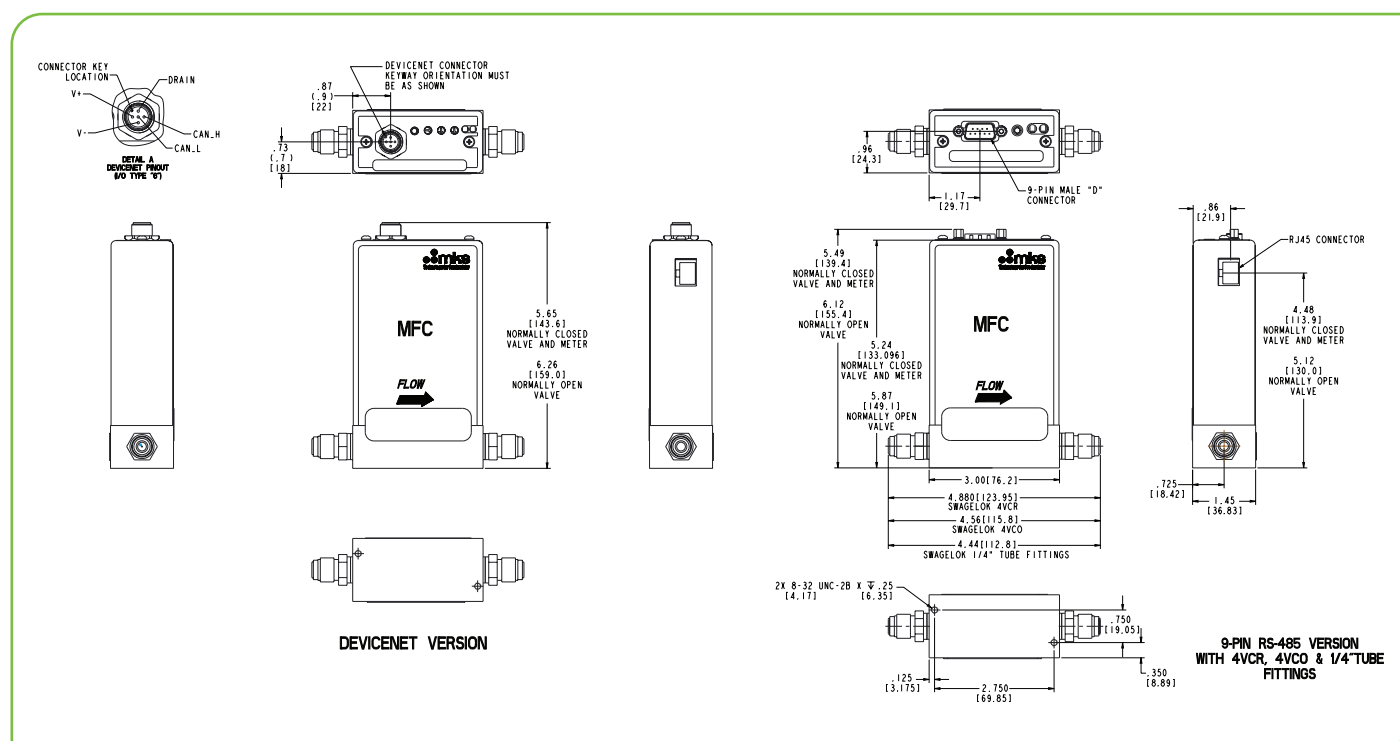
Mechanical

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) <ul style="list-style-type: none"> • <1 x 10⁻⁰⁹ Through Closed Valve <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel • Viton, Buna-N, Neoprene, Kalrez, EPDM Seals and Valve Seat
Surface Finish	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) <ul style="list-style-type: none"> • 15 pin Type "D" male, 9 pin Type "D" male Current (4 to 20 mA) <ul style="list-style-type: none"> • 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™ 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: GE50A013502R6V020	Code	Configuration
Model		
MFC Mass Flow Controller GE50A	GE50A	GE50A
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)		
Swagelok 4 VCR male Swagelok 4 VCO male 1/4" Swagelok Swagelok 8 VCR male 1/8" Swagelok (for 1000 sccm N ₂ equivalent or below) 1/2" Swagelok 6 mm Swagelok 8 mm Swagelok KF-16 Swagelok 8 VCO Male Swagelok 2 VCR Male (1000sccm N ₂ equivalent or below) 10 mm Swagelok 12 mm Swagelok 3/8" Swagelok C-Seal	R G S T A K M E U D B P F J C	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
Seal Material		
Viton Buna-N Neoprene Kalrez EPDM	V B N K E	V
Valve/Device Type		
Normally Closed Normally Open	0 P	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 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

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