GV50A

Elastomer Sealed, Digital Mass Flow Controller

The GV50A 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 GV50A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The GV50A 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 GV50A's analog and digital I/O can easily be used to replace those same I/O types of the 2179A MFCs.

The design of the GV50A 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 GV50A is available with Viton®, Buna, Neoprene®, EPDM and Kalrez® (as an optional seal material) allowing for the device's use with a wide variety of gases.

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
- Integral, normally closed diaphragm type shut-off valve provides positive shut-off to 4x10E^{-09} scc/sec He

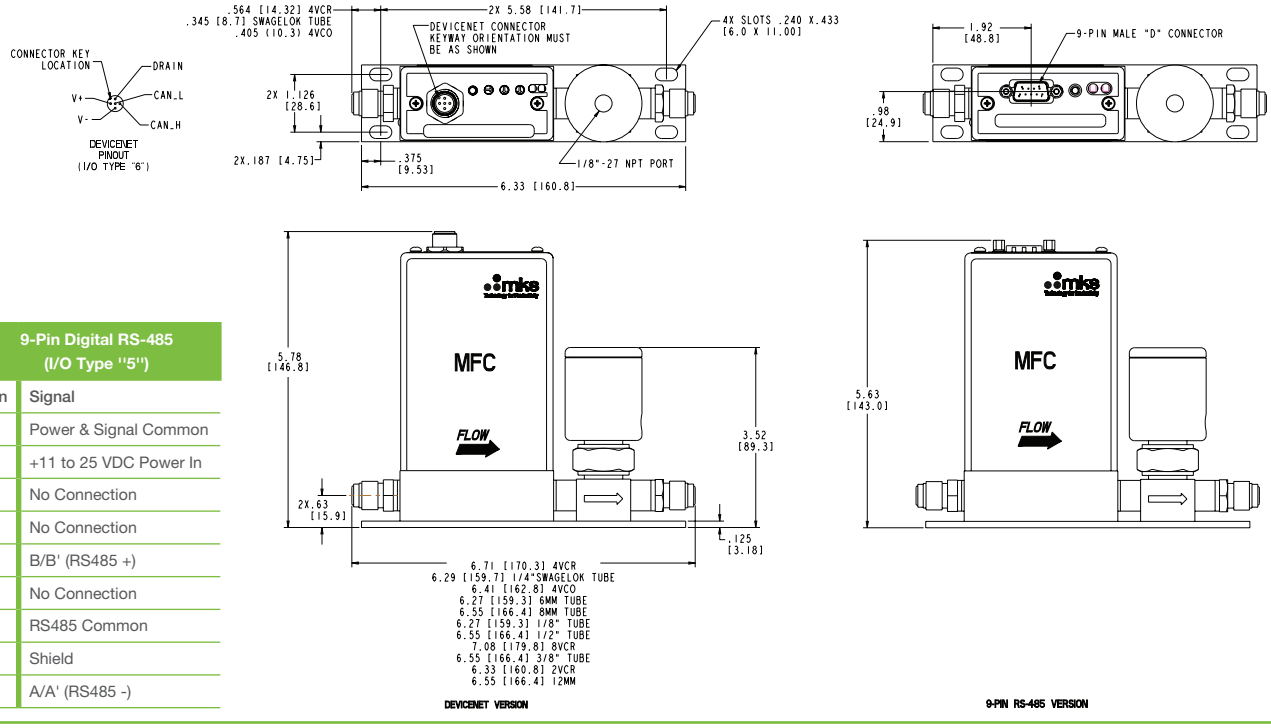
Key Benefits

- 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)		• 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
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** **Span**	• <0.05% of Full Scale/°C • <0.08% of Reading/°C
Inlet Pressure Coefficient		<0.02% of Reading/psi
Typical Controller Settling Time (per SEMI Guideline E-17-0600)		<750 msec., typical above 5% Full Scale
Warm-up Time (to within 0.2% of Full Scale of steady state performance)		30 minutes
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 4 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, 2 VCR male
Leak Integrity	**External (scc/sec He)** **Through Closed Valve** **Through shut-off valve (scc/sec/He)**	• $<1 \times 10^{-09}$ • 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.) • $<4 \times 10^{-09}$
Wetted Materials	**Standard** **Seals and Valve Seat**	• 316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel, Kel-F • Viton, Buna-N, EPDM, Kalrez or Neoprene
Pneumatic Valve Supply Pressure		60 - 120 psig
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)** **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



9-Pin Digital RS-485 (I/O Type "5")	
Pin	Signal
1	Power & Signal Common
2	+11 to 25 VDC Power In
3	No Connection
4	No Connection
5	B/B' (RS485 +)
6	No Connection
7	RS485 Common
8	Shield
9	A/A' (RS485 -)

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: GV50A013502R6V020	Code	Configuration
Model		
MFC Mass Flow Controller GV50A	GV50A	GV50A
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 10mm Swagelok 12mm Swagelok 1/8" Swagelok (for 1000 sccm N_2 equivalent or below) 1/4" Swagelok 1/2" Swagelok 3/8" Swagelok Swagelok 4 VCO male Swagelok 4 VCR male Swagelok 8 VCR male Swagelok 8 VCO Male Swagelok 2 VCR Male (for 1000 sccm N_2 equivalent or below) KF-16	M E P F A S K J G R T D B U	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 EPDM Kalrez	V B N E K	V
Valve/Device Type		
Normally Closed	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 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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