Flow Solutions

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IM50A

IP66 RATED, METAL SEALED, DIGITAL MASS FLOW CONTROLLER

The IM50A is a general purpose, metal sealed MFC well suited for use in harsh environments where resistance to liquid or dust ingress are critical. The IM50A meets these requirements with its IP66 rated enclosure design.

The IM50A supports a wide variety of applications requiring flow control capability from 5 sccm to 50 slm Full Scale, N_2 equivalent. The IM50A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The IM50A is a digitally controlled MFC offered with analog (0 to 5 VDC or 4-20 mA) as well as digital Profibus® 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 IM50A 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 IM50A metal sealed MFC with its electropolished internal surface finish is well suited for use in high purity process applications. The IM50A is also available in an MFM version (not electropolished).

Features & Benefits

- IP66 rated enclosure provides protection against ingress of water and dust present in harsh environments
- Patented thermal sensor design provides exceptional zero stability
- Percent of set point accuracy (calibration gas) enables precise process control
- 10µ inch electropolished 316L surface finish enables MFC use in high purity applications
- 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
- Available in a wide variety of both analog and digital I/O interfaces to meet customer specific applications

US Patent No 5461913.

Performance

Full Scale Flow Ranges *(N_2 equivalent)*	5 - 50000 sccm
Maximum Inlet Pressure	150 psig (cannot 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 (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
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, 1/4" Swagelok compression seal, Swagelok 8 VCR male, 1/8" Swagelok, 1/2" Swagelok, 6 mm Swagelok, 8 mm Swagelok, 10mm Swagelok, 12mm Swagelok, 3/8" Swagelok, Swagelok 2 VCR Male, KF-16, C-Seal, W-Seal
Leak Integrity	
External (scc/sec He)	$<1 \times 10^{-10}$
Through closed valve	<1.0% of Full Scale 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)	Teflon®
Surface Finish	
MFC	10µ inch average Ra (electropolished)
MFM	16µ inch average Ra
Weight	less than 3 lbs (1.4kg)
Enclosure Rating	IP66

Electrical Analog I/O

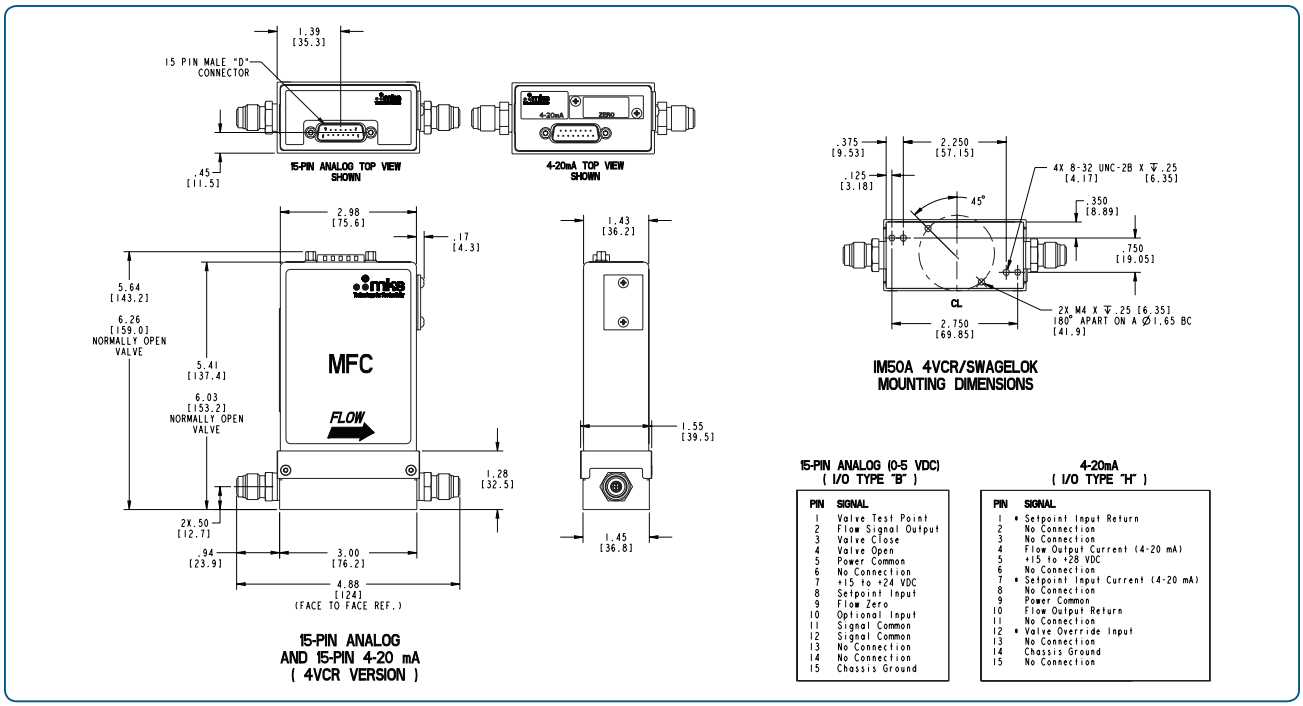
Input Power Required	+15 to +24 VDC @ (<4 watts)
Flow Input/Output Signal	
Voltage (0 to 5 VDC)	15 pin Type "D" male, 9 pin Type "D" male
Current (4 to 20 mA)	15 pin Type "D" male
Compliance	CE

Specifications

Digital I/O

Digital I/O	**Profibus®**
Input Power Required	+15 to +24 VDC (< 4 watts)
Connector	9 pin Type D male (power) and 9 pin Type D female (comm.)
Data Rate Switch/ Selection	No switch Set data rate via Profibus
Data Rate	Data rate (user selectable) 9.6 Kbps to 12 Mbps
MAC ID Switches/Addresses	Station addresses 0,0 to 9,9
Network Size	Up to 99 nodes
Network Topology	Master/slave
Compliance	CE

Dimensional Drawing



Dimensional Drawing — Analog 15 pin D for either 0 to 5 VDC or 4 to 20 mA I/O shown above 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: IM50A013502RBM020	Code	Configuration
MFC Mass Flow Controller IM50A	IM50A	IM50A
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
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	
10mm Swagelok	P	
12mm Swagelok	F	
3/8" Swagelok	J	
Swagelok 2 VCR (for 1000 sccm N_2 equivalent or below)	B	
C-Seal	C	
KF-16	U	
W-Seal	H	
Connector		
Profibus® (1179 Compatible* - Consult Factory)	4(3*)	B
Analog 0 to 5 VDC (15 pin D connector)	B	
Analog 4 to 20 mA (15 pin D connector)	H	
Valve/Device Type		
Normally Closed/ Mass Flow Controller, Teflon®	M0	M0
No Valve/Mass Flow Meter	30	
Normally Open/Mass Flow Controller, Teflon	PT	
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

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