



**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<sub>2</sub> 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



## Performance

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<b>Full Scale Flow Ranges</b> ( <i>N<sub>2</sub> equivalent</i> )	5 - 50000 sccm
<b>Maximum Inlet Pressure</b>	150 psig (cannot exceed pressure differential requirement across MFC)
<b>Normal Operating Pressure Differential</b> ( <i>N<sub>2</sub> F.S.</i> ) ( <i>with atmospheric pressure at the MFC outlet</i> )	5 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> ( <i>with N<sub>2</sub> calibration gas</i> )	± 1% of set point for 20 to 100% F.S. ± 0.2% of F.S. for 2 to 20% F.S.
<b>Repeatability</b>	± 0.3% of Reading
<b>Resolution</b>	0.1% of Full Scale
<b>Temperature Coefficients</b>	
Zero	< 0.05% of F.S./°C
Span	< 0.08% of Rdg./°C
<b>Inlet Pressure Coefficient</b>	< 0.02% of Rdg./psi
<b>Typical Controller Settling Time</b> ( <i>per SEMI Guideline E-17-0600</i> )	< 750 msec., typical above 5% F.S.
<b>Warm-up Time</b> ( <i>to within 0.2% of F.S. of steady state performance</i> )	< 30 min
<b>Operating Temperature Range (Ambient)</b>	10°C to 50°C
<b>Storage Humidity</b>	0 to 95% relative humidity, non-condensing
<b>Storage Temperature</b>	-20° to 80°C (-4° to 149° F)

## Mechanical

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<b>Fittings</b> ( <i>compatible with</i> )	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
<b>Leak Integrity</b>	
External (scc/sec He)	< 1 x 10 <sup>-10</sup>
Through closed valve	< 1.0% of F.S. at 40 psig inlet 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®, Nickel
Valve Seat (MFC only)	Teflon®
<b>Surface Finish</b>	
MFC	10µ inch average Ra (electropolished)
MFM	16µ inch average Ra
<b>Weight</b>	less than 3 lbs (1.4kg)
<b>Enclosure Rating</b>	IP66

## Electrical Analog I/O

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<b>Input Power Required</b>	+15 to +24 VDC @ (< 4 watts)
<b>Flow Input/Output Signal</b>	
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
<b>Compliance</b>	CE

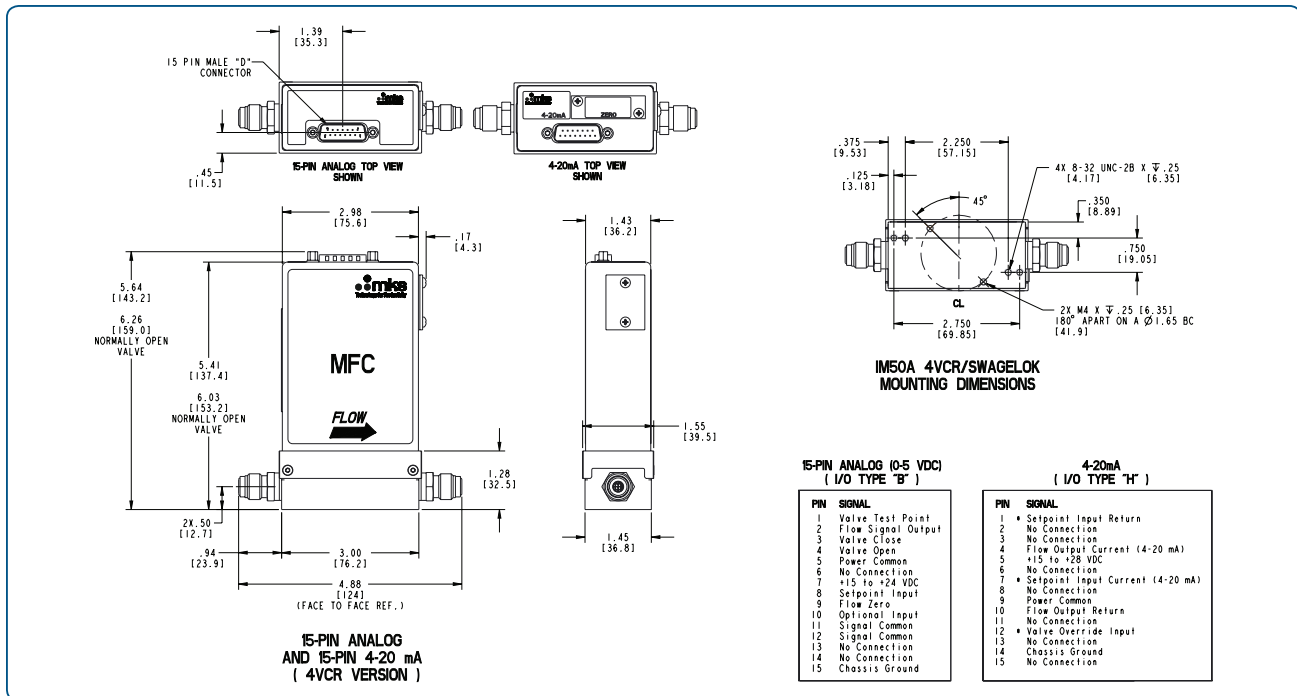


# Specifications

## Digital I/O

<b>Digital I/O</b>	<b>Profibus®</b>
<b>Input Power Required</b>	+15 to +24 VDC (< 4 watts)
<b>Connector</b>	9 pin Type D male (power) and 9 pin Type D female (comm.)
<b>Data Rate Switch/ Selection</b>	No switch Set data rate via Profibus
<b>Data Rate</b>	Data rate (user selectable) 9.6 Kbps to 12 Mbps
<b>MAC ID Switches/Addresses</b>	Station addresses 0,0 to 9,9
<b>Network Size</b>	Up to 99 nodes
<b>Network Topology</b>	Master/slave
<b>Compliance</b>	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
<b>Gas (Per Semi Standard E52-0703)</b>		
For example: 013 = Nitrogen = N <sub>2</sub> 029 = Ammonia = NH <sub>3</sub> 110 = Sulfur Hexafluoride = SF <sub>6</sub>	013 029 110	013
<b>Flow Range Full Scale*</b>		
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
<b>Fittings (compatible with)</b>		
Swagelok 4 VCR male 1/4" Swagelok Swagelok 8 VCR male 1/8" Swagelok (for 1000 sccm N <sub>2</sub> equivalent or below) 1/2" Swagelok 6 mm Swagelok 8 mm Swagelok 10mm Swagelok 12mm Swagelok 3/8" Swagelok Swagelok 2 VCR (for 1000 sccm N <sub>2</sub> equivalent or below) C-Seal KF-16 W-Seal	R S T A K M E P F J B C U H	R
<b>Connector</b>		
Profibus® (1179 Compatible* - Consult Factory) Analog 0 to 5 VDC (15 pin D connector) Analog 4 to 20 mA (15 pin D connector)	4(3*) B H	B
<b>Valve/Device Type</b>		
Normally Closed/ Mass Flow Controller, Teflon® No Valve/Mass Flow Meter Normally Open/Mass Flow Controller, Teflon	M0 30 PT	M0
<b>Firmware</b>		
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<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



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