

# IE50A

IP66 Rated, Elastomer Sealed, Digital Mass Flow Controller



The IE50A is a general purpose, elastomer sealed MFC well suited for use in harsh environments where resistance to liquid or dust ingress are critical. The IE50A meets these requirements with its IP66 rated enclosure design.

The IE50A supports a wide variety of applications requiring flow control capability from 5 sccm to 50 slm Full Scale, N<sub>2</sub> equivalent. The IE50A incorporates the latest in digital flow control electronics along with a well proven, patented thermal sensor and mechanical design.

The IE50A is a digitally controlled MFC offered with analog (0 to 5 VDC or 4-20 mA) as well as digital Profibus® and PROFINET® 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 IE50A 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 IE50A 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 IE50A comes standard with Viton® seals along with options for Buna or Neoprene® allowing for the device's use with gases requiring one of these alternatives.

## Product Features

- IP66 rated enclosure provides protection against ingress of water and dust present in harsh environments
- 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



## 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 <sub>2</sub> equivalent)	5 - 50000 sccm
Maximum Inlet Pressure	150 psig (can not exceed pressure differential requirement across MFC)
Normal Operating Pressure Differential (N <sub>2</sub> Full Scale) (with atmospheric pressure at the MFC outlet)	<ul style="list-style-type: none"> <li>• 10 to 5000 sccm; 10 to 40 psid</li> <li>• 10000 to 20000 sccm; 15 to 40 psid</li> <li>• 30000 to 50000 sccm; 25 to 40 psid</li> </ul>
Proof Pressure	1000 psig
Burst Pressure	1500 psig
Control Range	2% to 100% of Full Scale (range on mech.)
Typical Accuracy (with N <sub>2</sub> calibration gas)	<ul style="list-style-type: none"> <li>• ±1% of Reading for 20 to 100% Full Scale</li> <li>• ±0.2% of Full Scale for 2 to 20% Full Scale</li> </ul>
Repeatability	±0.3% of Reading
Resolution	0.1% of Full Scale
Temperature Coefficients	<b>Zero Span</b> <ul style="list-style-type: none"> <li>• &lt;0.05% of Full Scale/°C</li> <li>• &lt;0.08% of Reading/°C</li> </ul>
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)

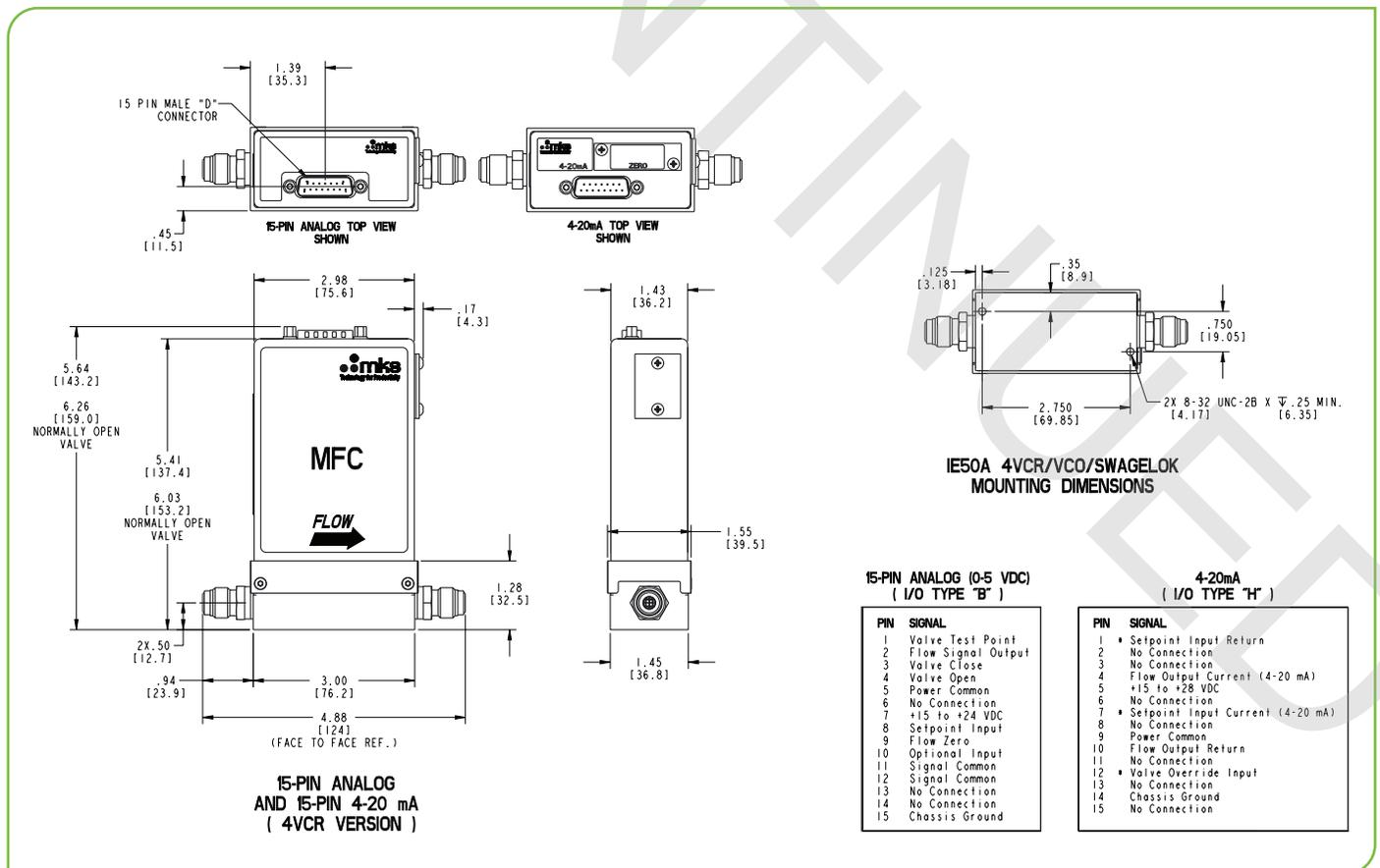
### Mechanical

Fittings (compatible with)	Swagelok® 4 VCR® male, Swagelok VCO® male, ¼" Swagelok compression seal, Swagelok 8 VCR male, ⅙" Swagelok, ½" Swagelok, 6 mm Swagelok, 8 mm Swagelok, KF-16, ⅜" Swagelok, 8 VCO Male, 10mm Swagelok, 12mm Swagelok, 2 VCR male, C-seal
Leak Integrity	<b>External (scc/sec He) Through Closed Valve</b> <ul style="list-style-type: none"> <li>• &lt;1 x 10<sup>-09</sup></li> <li>• Up to 10K valve &lt;0.1% of Full Scale at 40 psig to atmosphere</li> <li>• 20K - 50K valve &lt;1.0% of Full Scale at 40 psig to atmosphere (To assure no flow-through, a separate positive shut-off valve is required.)</li> </ul>
Wetted Materials	<b>Standard Seals and Valve Seat</b> <ul style="list-style-type: none"> <li>• 316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel</li> <li>• Viton, Buna-N, Neoprene, Kalrez®, EPDM (Class VI), Viton (Class VI)</li> </ul>
Surface Finish	16µ inch average Ra
Weight	<3 lbs (1.4kg)
Enclosure Rating	IP66

### Electrical Analog I/O

Input Power Required	+15 to +24 VDC @ (<4 watts)
Flow Input/Output Signal	<b>Voltage (0 to 5 VDC)</b> <ul style="list-style-type: none"> <li>• 15 pin Type "D" male, 9 pin Type "D" male</li> </ul> <b>Current (4 to 20 mA)</b> <ul style="list-style-type: none"> <li>• 15 pin Type "D" male</li> </ul>
Compliance	CE

Digital I/O	Profibus®	PROFINET®
Input Power Required	+15 to +24 VDC (< 4 watts)	+24 VDC (< 5 watts)
Connector	<ul style="list-style-type: none"> <li>• 9 pin Type D male (power)</li> <li>• 9 pin Type D female (comm.)</li> </ul>	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)
Data Rate Switch/Selection	<ul style="list-style-type: none"> <li>• No switch</li> <li>• Set data rate via Profibus</li> </ul>	No switch
Comm. Rate(s)	9.6 Kbps to 12 Mbps	100 Mbps
MAC ID Switches/Addresses	2 switches, 10 positions	N/A
Network Size	Up to 99 nodes	N/A
Visual Indicators	<ul style="list-style-type: none"> <li>• LED Comm (green/red)</li> <li>• LED Error (green/red)</li> </ul>	<ul style="list-style-type: none"> <li>• LED Maint (amber)</li> <li>• LED BUS Fault (red)</li> <li>• LED Ready (green)</li> <li>• LED Sys Fault (red)</li> </ul>
Compliance	CE	CE



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). Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

## Ordering Information

Ordering Code Example: IE50A013502RBR020			Code	Configuration
Model				
MFC Mass Flow Controller IE50A			IE50A	IE50A
Gas (per Semi Standard E52-0703)				
Name	Code	Formula		
Nitrogen	013	N <sub>2</sub>	013	013
Ammonia	029	NH <sub>3</sub>	029	
Sulfur Hexafluoride	110	SF <sub>6</sub>	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 <sub>2</sub> equivalent or below)			A	
1/2" Swagelok			K	
3/8" Swagelok			J	
6 mm Swagelok			M	
8 mm Swagelok			E	
10 mm Swagelok			P	
12 mm Swagelok			F	
KF-16			U	
Swagelok 8 VCO Male			D	
Swagelok 2 VCR Male (1000sccm N <sub>2</sub> equivalent or below)			B	
C-Seal			C	
Connector				
Profibus (1480 Compatible)			4	B
Profibus (1179B Compatible)			3	
PROFINET			9	
Analog 0 to 5 VDC (15 pin D connector)			B	
Analog 4 to 20 mA (15 pin D connector)			H	
Seal Materials**				
EPDM (Class VI)			R	R
Viton (Class VI)			W	
EPDM			E	
Viton			V	
Buna-N			B	
Neoprene			N	
Kalrez			K	
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<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

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