



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, N₂ 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® 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.

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
- Available in a wide variety of both analog and digital I/O interfaces to meet customer specific 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



Performance

Full Scale Flow Ranges (<i>N₂ equivalent</i>)	5 - 50000 sccm
Maximum Inlet Pressure	150 psig (cannot exceed pressure differential requirement across MFC)
Normal Operating Pressure Differential (<i>N₂ Full Scale</i>) (<i>with atmospheric pressure at the MFC outlet</i>)	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 (<i>with N₂ calibration gas</i>)	±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 (<i>per SEMI Guideline E-17-0600</i>)	<750 msec., typical above 5% Full Scale
Warm-up Time (<i>to within 0.2% of Full Scale of steady state performance</i>)	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 (<i>compatible with</i>)	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, C-Seal
Leak Integrity	
External (scc/sec He)	<1 x 10 ⁻⁰⁹
Through closed valve	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	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., Elgiloy®, Nickel
Seals and Valve Seat	Viton, Buna-N, Neoprene, Kalrez®, EPDM (Class VI), Viton (Class VI)
Surface Finish	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

Input Power Required

Connector

Data Rate Switch/Selection

Data Rate

MAC ID Switches/Addresses

Network Size

Network Topology

Compliance

Profibus®

+15 to +24 VDC (< 4 watts)

9 pin Type D male (power) and
9 pin Type D female (comm.)

No switch

Set Data Rate via Profibus

Data Rate (User Selectable)

9.6 Kbps to 12 Mbps

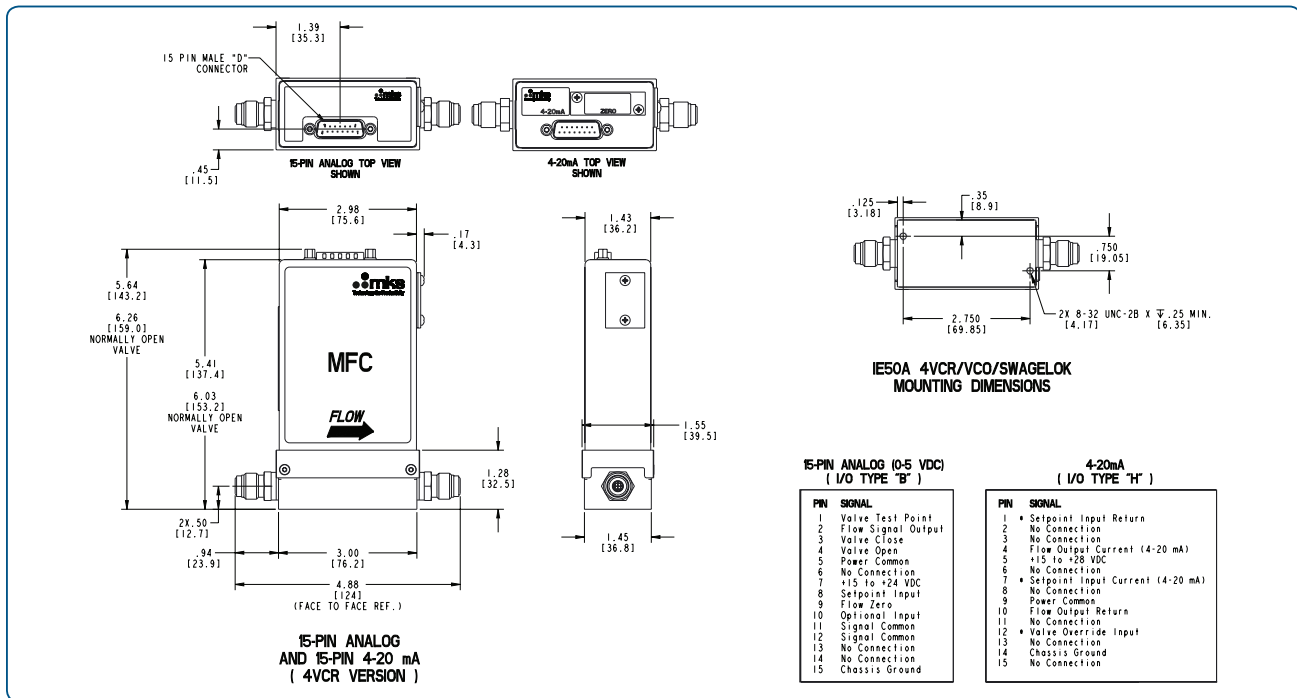
Station Addresses 0,0 to 9,9

Up to 99 nodes

Master/slave

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: IE50A013502RBR020	Code	Configuration
MFC Mass Flow Controller IE50A	IE50A	IE50A
Gas (Per Semi Standard E52-0703)		
For example: 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 3/8" Swagelok 6 mm Swagelok 8 mm Swagelok 10mm Swagelok 12mm Swagelok KF-16 Swagelok 8 VCO Male Swagelok 2 VCR Male (for 1000 sccm N ₂ equivalent or below) C-seal	R G S T A K J M E P F U D B C	R
Connector		
Profibus (1480 Compatible) Profibus (1179B Compatible) Analog 0 to 5 VDC (15 pin D connector) Analog 4 to 20 mA (15 pin D connector) Analog 0 to 5 VDC (15 pin D Connector), Brooks (Consult Factory) Analog 0 to 5 VDC (15 pin D Connector), Celerity (Consult Factory)	4 3 B H E U	B
Seal Materials**		
EPDM (Class VI) Viton (Class VI) EPDM Viton Buna-N Neoprene Kalrez	R W E V B N K	R
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.



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