P9B

Multi-Gas/Multi-Range Mass Flow Meter with Integrated Pressure Transducer

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The MKS, model P9B MFM, is the next generation of MKS multi-gas/multi-range MFM for critical process gas flow measurement. The device uses the latest in electronics enabling it to meet the most critical of process gas flow measurement requirements.

The P9B Mass Flow Meter has an integrated Baratron, 0-100 psia Full Scale, pressure transducer that allows the user to measure and monitor line pressure. The pressure can be observed via the multi-directional LED display located on the top of the MFM.

Utilization of the multi-gas/multi-range capability is made simple through the device's embedded software and standard Ethernet interface that requires no special software, only a standard web browser and a PC. Already stored on the device are critical gas parameters for most of the gases in use today by the semiconductor industry. It is a simple matter of selecting the gas and specifying the range to configure the device. Through this interface the user can also perform device monitoring diagnostics while the device is operating.

Product Features

- Embedded 100 psia pressure transducer allows the user to monitor MFM line pressure

- Accurate flow measurement over a wide dynamic range, even when down ranged, reduces need for an additional low range MFM

- Embedded configuration and diagnostics software that allows the user to check MFM functionality without device removal from the tool

- Uses a standard web browser; no special software required
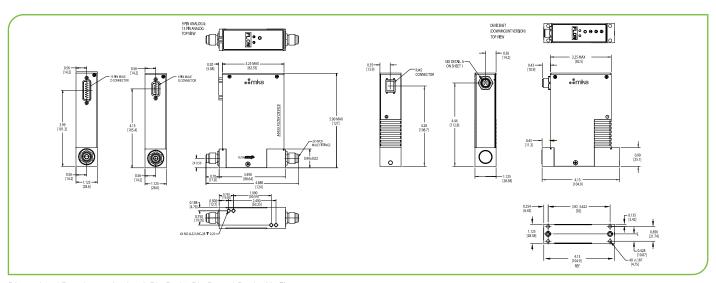
Key Benefits

- Reduces MFM inventory through its multi-gas/ multi-range capability

- Easy viewing of flow rate, gas type and Full Scale flow with its bright, self orienting LED display

Performance

Full Scale Ranges (N$_2$ equivalent)	5 - 50000 sccm
Maximum Inlet Pressure	500 psig
Proof Pressure	1000 psig
Burst Pressure	1500 psig
Measurement Range	0.1% to 100% of Full Scale (range on mech.)
Typical Accuracy	• ±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
Warm-up Time (to within 0.2% of Full Scale of steady state performance)	<30 min
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)
Pressure Display	0 to 100 psia
Pressure Readout Units	psia, kPA
Pressure Accuracy	1% Full Scale
Pressure Resolution	0.1 psia
Temperature Display	0 to 100°C
Temperature Readout Units	°C
Temperature Accuracy	±2°C
Temperature Resolution	0.1°C
Attitude Insensitivity	0.25% of Full Scale for indicated zero, span and actual span

Mechanical

Fittings (compatible with)	Swagelok® 4 VCR®, 1-1/8" surface mount (C-seal, W-seal), 1½" W-seal
Display	4 digits for value, 4 characters for unit
Leak Integrity **External (scc/sec He)**	<1 x 10^{-10}
Wetted Materials **Standard**	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S.
Surface Finish	10µ inch average Ra
Weight	<2.5 lbs (1.1kg)

Electrical Analog I/O

Input Power Required	+15 to +24 VDC @ 200mA max
Flow Input/Output Signal	0 to 5 VDC
Output Impedance	< 1 Ω
Connector	15-pin Type "D" Male, 9 pin Type "D" Male
Compliance	CE

Digital I/O	DeviceNet™	EtherCAT®
Input Power Required	+11 to +25 VDC per DeviceNet specification (@ <2.0 watts)	+24 VDC (<5 watts)
Connector	5 pin microconnector (DeviceNet)	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)
Data Rate Switch	4 positions: 125, 250, 500K (Default), PGM (programmable over the network)	No switch
Data Rate/Network Length	Data rate (user selectable) • 125 Kbps, 500 meters (1,640 feet) • 250 Kbps, 250 meters (820 feet) • 500 Kbps, 100 meters (328 feet)	100 Mbps
MAC ID Switches	2 switches, 10 positions; 0,0 to 6,3 are hardware ID numbers; 7,0 to 9,9 are software ID numbers; (6,4 to 6,9 are unused and, if selected will default to hardware ID number 6,3)	3 switches, 16 positions
Network Size	Up to 64 nodes	Up to 4095 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable	N/A
Visual Communication Indicators	• LED network status (green/red) • LED module status (green/red) • Scrolling LED displays (MFC Type, Flow Full Scale, Gas Type, IP address, Instance Number (1 to 31)	• LED Power (green) • LED Run (green) • LED Error (red) • LED Comm (green)
Compliance	CE	CE

Dimensional Drawing — Analog 9 Pin D, 15-Pin D, and DeviceNet™
Unless specified, dimensions are nominal values in inches (mm referenced). Dimensions shown are for normally closed valve configuration.
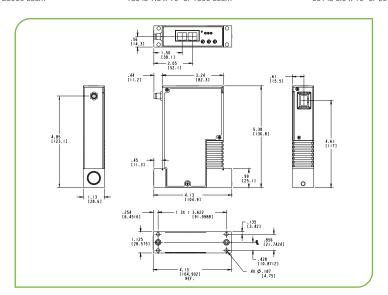*For normally open valve configuration dimensions, contact MKS.*

Ordering Code Example: P9B013502C60030	Code	Configuration
Model		
MFM Mass Flow Meter (multi-gas, multi-range)	P9B	P9B
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)		
Swagelok 4 VCR C-seal (1.125") W-seal (1.125") W-seal (1.15")	R C H F	C
Connector		
DeviceNet EtherCAT 15 pin D (Analog I/O) 9 pin D (Analog I/O)	6 8 B A	6
Valve		
No Valve (MFM)	0	0
Reserved for MKS Future Use		
Standard	0	0
Firmware		
EtherCAT All Other I/O Unless otherwise specified, MKS will ship firmware revision current to date.	10 30	30

* 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.
254 is 2.5×10^4 or 25000 sccm　　*153 is 1.5×10^3 or 1500 sccm*　　*601 is 6.0×10^1 or 60 sccm*

Dimensional Drawing — EtherCAT® Downmount Unless specified, dimensions are nominal values in inches (mm referenced).

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