

P4B

Multi-Gas/Multi-Range Mass Flow Meter for Accurate Measurement of Critical Process Gases



The P4B is a 1.125" body, multi-gas/multi-range, metal sealed, Mass Flow Meter (MFM). The P4B well suited for a wide variety of applications requiring flow metering from 5 sccm to 50 slm Full Scale, N₂ equivalent. The P4B meter incorporates the latest in digital flow meter electronics along with a well proven, patented thermal sensor and mechanical design.

The P4B digitally calibrated MFM is available with either analog or digital I/O (DeviceNet™). The digital electronics utilize the latest MKS algorithms providing multi-gas/

multi-range measurement capability. Included is a digital calibration that yields 1% of Reading accuracy on the calibration gas.

The P4B utilizes a 1.125" footprint most often used by MFMs in the 5 sccm to 50 slm flow rate range. The P4B metal sealed MFM, with its all-metal 316 stainless steel body, is well suited for use in high purity process applications.

Product Features

- Tightly controlled flow accuracy of process gas enables improved chamber process matching
- 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	<ul style="list-style-type: none"> • ± 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 <ul style="list-style-type: none"> • <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)
Temperature Display	0 to 100°C
Temperature Readout Units	°C
Temperature Accuracy	±2°C
Temperature Resolution	0.1°C

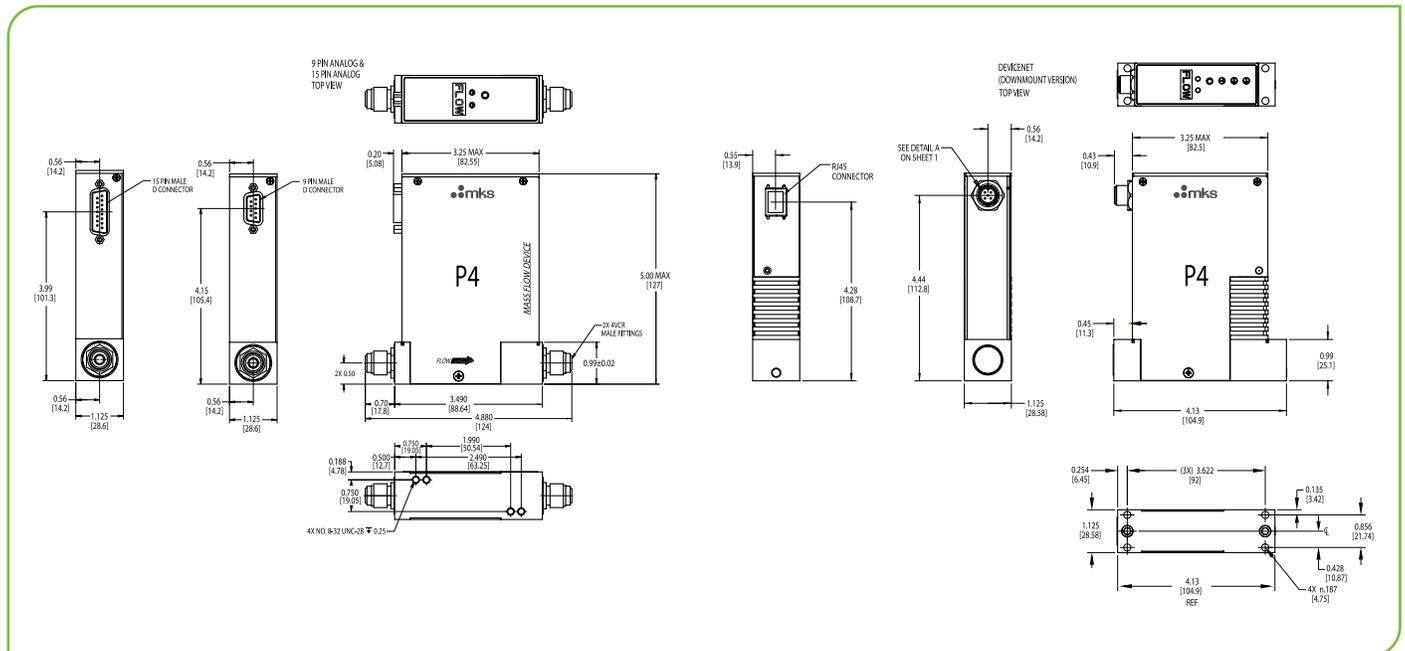
Mechanical

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™
Input Power Required	+11 to +25 VDC per DeviceNet specification (@ <2.0 watts)
Connector	5 pin microconnector (DeviceNet)
Data Rate Switch	4 positions: 125, 250, 500K (Default), PGM (programmable over the network)
Data Rate/Network Length	Data rate (user selectable) <ul style="list-style-type: none"> • 125 Kbps, 500 meters (1,640 feet) • 250 Kbps, 250 meters (820 feet) • 500 Kbps, 100 meters (328 feet)
MAC ID Switches/Addresses	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)
Network Size	Up to 64 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable
Visual Communication Indicators	<ul style="list-style-type: none"> • 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))
Compliance	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: P4B013502C60030	Code	Configuration
Model		
MFM Mass Flow Meter (multi-gas, multi-range)	P4B	P4B
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")	R C H	C
Connector		
DeviceNet 15 pin D (Analog I/O) 9 pin D (Analog I/O)	6 B A	6
Valve		
No Valve (MFM)	0	0
Reserved for MKS Future Use		
Standard	0	0
Firmware		
Unless otherwise specified, MKS will ship firmware revision current to date.	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 x 10⁴ or 25000 sccm 153 is 1.5 x 10³ or 1500 sccm 601 is 6.0 x 10¹ or 60 sccm