



Flow Solutions

WWW.MKSINSTITUTE.COM

P250A

MULTI-GAS/MULTI-RANGE MASS FLOW CONTROLLER FOR FLOW RATES UP TO 250 SLM

The MFC, model P250A, is a metal-sealed, multi-gas/multi-range MFC that is capable of being ranged from 100 to 250 slm Nitrogen Full Scale flow with a single device. Enabling this capability is the device's unique control valve design that provides for rapid set point response while maintaining closed conductance leak rates well below other typical high flow MFCs.

The P250A's performance capabilities of fast settling time (less than 2 seconds) and one (1) percent of set point accuracy exceed those of other typical high flow MFCs. Control capability extends down to 2% of the device's configured Full Scale. These capabilities combined with the device's multi-gas/multi-range capability extend the user's ability to minimize required high flow MFC inventory for MOCVD, silicon epitaxy, RTP and diffusion/oxidation applications.

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 or hardware to operate, only a standard web browser and a PC. Already stored on the device are critical gas parameters for typical high flow rate gases in use. It's simply a matter of selecting the gas and specifying the Full Scale flow range to configure the device. This interface also allows the user to perform device diagnostics, plot flow and store data for offline analysis.

Features & Benefits

Improved Performance

- Fast response to set point reduces flow stabilization time for short process steps enhancing process throughput
- Tightly controlled flow accuracy of process gas enables improved chamber process matching
- Reduced inlet pressure (pressure drop) requirement which can simplify gas supply regulation from a single source

Reduces Overall Costs

- Reduces MFC inventory through its multi-gas/multi-range capability
- Accurate flow control over a wide dynamic range, even when down ranged, reduces need for an additional low range MFC

Easy to Integrate and Operate

- Device configuration and diagnostics made simple through standard Ethernet interface
- Uses a standard web browser with no special software required
- Easy viewing of flow rate, gas type and Full Scale flow with its bright LED display



Performance

Full Scale Flow Ranges (N_2 equivalent)	100 to 250 slm
Maximum Inlet Pressure	150 psig (can not exceed pressure differential requirement across MFC)
Normal Operating Pressure Differential (with atmospheric pressure at the MFC outlet)	25 to 45 psid
Proof Pressure	1000 psig
Burst Pressure	1500 psig
Control Range	2% to 100% of F.S. (range on mech.)
Typical Accuracy	± 1% of set point for > 20% to 100% F.S. ± 0.2% of F.S. for 2% to 20% F.S.
Repeatability	± 0.3% of Reading
Resolution	0.1% of Reading
Temperature Coefficients	
Zero	< 0.05% of F.S./°C
Span	< 0.08% of Rdg./°C
Inlet Pressure Coefficient	< 0.02% of Rdg./psi
Typical Controller Settling Time (per SEMI Guideline E-17-0600)	< 3 sec typical above 10% F.S. @ 50 psi
Warm-up Time (to within 0.2% of F.S. 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 85°C
Temperature Readout Units	°C
Temperature Accuracy	± 2°C
Temperature Resolution	0.1°C

Mechanical

Fittings (compatible with)	Swagelok® 8 VCR®
Display	4 digits for value, 4 characters for unit
Leak Integrity	
External (scc/sec He)	< 1×10^{-10}
Through closed valve	< 1.0% of configured F.S. at 40 psia to vac (<500 mTorr) (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, 430FR, Buna-N, Nickel, Polyimide
Surface Finish	10 µinch average Ra
Weight	less than 3 lbs (1.4kg)

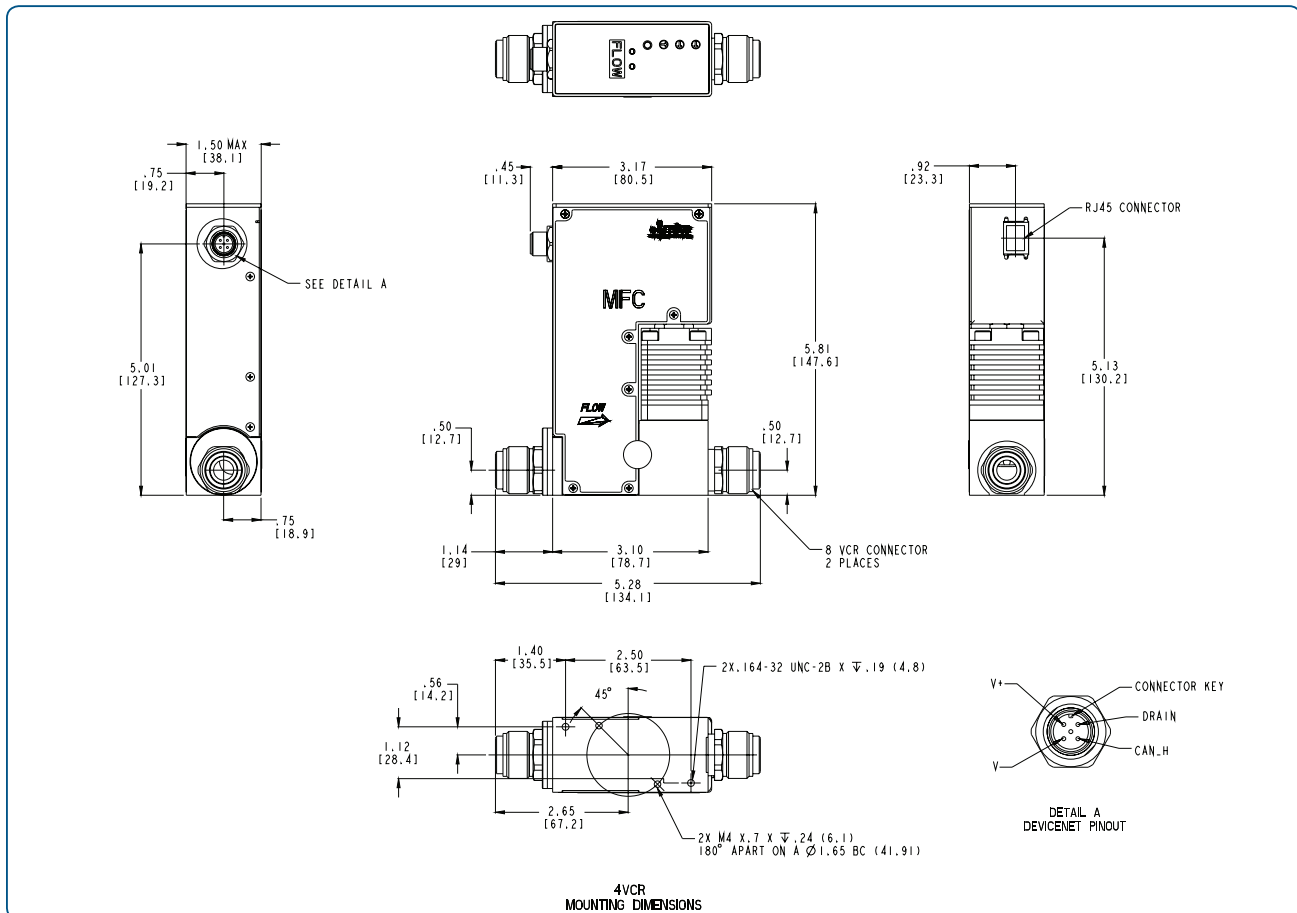


Specifications (cont'd)

Digital I/O

Digital I/O	DeviceNet™
Input Power Required	+11 to +25 VDC per DeviceNet specification (@ < 9 watts)
Connector	5 pin microconnector (DeviceNet)
Data Rate Switch	4 positions: 125, 250, 500K (Default), GM (programmable over the network)
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)
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)
Network Size	Up to 64 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable
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))

Dimensional Drawing



Dimensional Drawing — DeviceNet™

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



Ordering Information

Gas Table 1.5			
Gas Name	Semi Gas Code	Gas Formula	Min - Max FS (slm)
Helium	001	He	140-350
Neon	002	Ne	138-345
Argon	004	Ar	090-222
Hydrogen	007	H ₂	100-250
Nitrogen	013	N ₂	100-250
Arsine	035	AsH ₃	032-080
Germane	043	GeH ₄	033-083
Tetrafluoromethane	063	CF ₄	031-077
Sulfur Hexafluoride	110	SF ₆	016-040
Octafluorocyclobutane (R-c318)	129	C ₄ F ₈	009-023

Ordering Code Example: P250A013255T6M010

MFC High Flow Mass Flow Controller (multigas, multi-range) P250A

Code P250A **Configuration**

Gas*	Code	Configuration
For example: 001 = Helium = He 004 = Argon = Ar 007 = Hydrogen = H ₂ 013 = Nitrogen = N ₂	001 004 007 013	013

Flow Range Full Scale**

100 slm (100,000 sccm)	105	255
150 slm (150,000 sccm)	155	
200 slm (200,000 sccm)	205	
250 slm (250,000 sccm)	255	

Fittings (compatible with)

Swagelok 8 VCR	T	T
----------------	---	---

Connector (Power & Control I/O)

DeviceNet	6	6
15 pin D (Analog I/O)	B	

Valve

Normally Closed	M	M
-----------------	---	---

Reserved for MKS Future Use

Standard	0	0
----------	---	---

Firmware

Unless otherwise specified, MKS will ship firmware revision current to date (DeviceNet only) Alpha characters designates prerelease product versions	10	10
---	----	----

* For gases not listed in the standard products gas table, please contact the MKS applications department for assistance.

** The Full Scale flow rate is designated by a 3 digit number. The first two digits represent the significant digits of the FS flow rate separated by a decimal point. The third digit is the exponent of the power of ten.

Example flow rate code:

255 is 2.5 x 10⁵ sccm or 250 slm

105 is 1.0 x 10⁵ sccm or 100 slm



MKS Instruments, Inc. Global Headquarters

2 Tech Drive, Suite 201
Andover, MA 01810
Tel: 978.645.5500
Tel: 800.227.8766 (in U.S.A.)
Web: www.mksinst.com

MKS Instruments, Inc. Flow Solutions

Six Shattuck Road
Andover, MA 01810
Tel: 978.975.2350