CMA10B

Compact, Fast Response Mass Flow Controller

The CMA10B Mass Flow Controller (MFC) is a compact, fast response model using a Micro-Electro-Mechanical Systems (MEMS) based flow sensor for non-corrosive gas applications. The device is available in Full Scale flow rates from 15 sccm to 14000 sccm, N_2 with a control range from as low as 0.1% of Full Scale up to 100% of Full Scale and is also available as a flow meter. Either analog (0 to 5 VDC) or digital (RS485, PROFINET® or Modbus TCP/IP) communication interfaces are available. The required power supply voltage is 24 VDC nominal.

The CMA10B compact design is only 1" (25.4 mm) and less than 4.4'' (111.8 mm) high. It has standard lengths of 4.88" (124 mm) for 4 VCR® male and 4.54" (113 mm) for ¼" compression seal gas line connections and downmount O-ring seal.

A low thermal mass MEMS sensor provides rapid sensing of flow changes with low noise output. The solid state design of the sensor makes it resistant to water condensation, particles, pressure shock and vibration.

Fast response, wide dynamic control range, and 0.8% of set point accuracy make this MFC an excellent choice for flow control in critical process applications where non-corrosive gases are used. Typical uses can be found in mass spectroscopy, vacuum coating, bioreactor as well as many other applications. The CMA10B incorporates a fast-acting solenoid control valve coupled with the flow sensor via the MFC's superior flow signal processing and control algorithm. This results in response times to set point of less than 100 milliseconds.

Product Features

- Ultrafast response time of <100 msec
- Control range from 0.1% to 100% of Full Scale
- Accuracy of ±0.8% of set point
- Minimal zero and span drift assure long term reproducibility
- Standard length for drop in replacement of other MFCs
- Surface mount interface available for compact gas panel design
- Embedded web browser for setup and diagnostics

Key Benefits

- Achieve and maintain process conditions quickly
- Provide consistent process results device to device
- Provide consistent process results over extended periods

Performance		
Full Scale Range		15 sccm to 14000 sccm, N_2 (For other gases, see table on page 4)
Maximum Inlet Pressure		80 psig
Normal Operating Pressure Differential (with atmospheric pressure at the MFC outlet)		• 15 to 7000 sccm: 10 to 45 psid (N_2) • 7001 to 14000: 15 to 45 psid (N_2)
Proof Pressure		232 psi/16 bar
Burst Pressure		1000 psi/70 bar
Typical Control Range	**Digital I/O** **Analog I/O**	• 0.1% to 100% of Full Scale • 0.2% to 100% of Full Scale
Typical Accuracy (with N_2 calibration gas)		• ±0.8% of set point for 20 to 100% Full Scale • ±0.16% of Full Scale for <20% of Full Scale
Repeatability		±0.2% of Reading
Temperature Coefficients	**Zero** **Span**	• ≤0.005% of Full Scale/°C • ≤0.06% of Reading/°C
Pressure Coefficient		<0.025% of Reading/psi
Typical Response Time[1] (per SEMI Guideline E-17-0600)		• ≤100 ms typical above 10% Full Scale, 50 sccm - 5 slm Full Scale models • ≤150 ms typical above 10% Full Scale, 10 slm Full Scale models
Warm-up Time (to within 0.2% of Full Scale of set point)		≤1 min
Normal Operating Temperature Range		10°C to 50°C (32°F - 122°F)
Storage Temperature		0°C to 60°C (32°F - 140°F)

[1] *Response times may vary due to gas type and line pressure conditions.*

Mechanical		
Fittings (compatible with)		Swagelok® 4 VCR® male, surface mount (o-ring), ¼" Swagelok compression
Leak Integrity	**External (scc/sec He)** **Through Closed Valve**	• <1 x 10^{-09} • <0.1% of max. Full Scale range using valve closed override command (To assure no flow-through, a separate positive shut-off valve is required.)
Wetted Materials	**Standard** **Valve Seat**	• Aluminum, Elgiloy®, 20# Steel, Stainless Steel, Silicon, Silicon Oxide, Silicon Carbide, Viton®, Glob Top • Viton
Weight		0.68 lbs (310 grams) (VCR)
Valve Type		Normally Closed

Electrical Analog I/O	
Input Power Required	24 VDC @ (±10%), <4 watts
Set Point Command Signal	0 to 5 VDC (0 to 10 VDC, optional)
Output Signal	0 to 5 VDC (0 to 10 VDC, optional)
Connector	9-pin Type "D"
Compliance	CE

Digital I/O	RS485	PROFINET®	Modbus
Input Power Required	24 VDC @ (±10%), <4 watts	+24 VDC (<5 watts)	+24 VDC (<5 Watts)
Connector	9 pin Type ''D'' male (power and comm.)	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)	1x RJ-45 (Comm.) Male, DC Power Plug
Data Rate Switch/Selection	• No switch • Set data rate via RS485	No Switch	N/A
Comm. Rate(s)	• 9.6 Kbps • 19.2 Kbps • 38.4 Kbps	100 Mbps	N/A
MAC ID Switches/Addresses	• Set address over RS485 • Station addresses 0,0 to 9,9	N/A	N/A
Network Size	Up to 32 nodes	N/A	N/A
Visual Indicators	• LED PWR • RUN (green)	• LED Maint (amber) • LED BUS Fault (red) • LED Ready (green) • LED Sys Fault (red)	• LED Module • LED Network
Compliance	CE	CE	CE

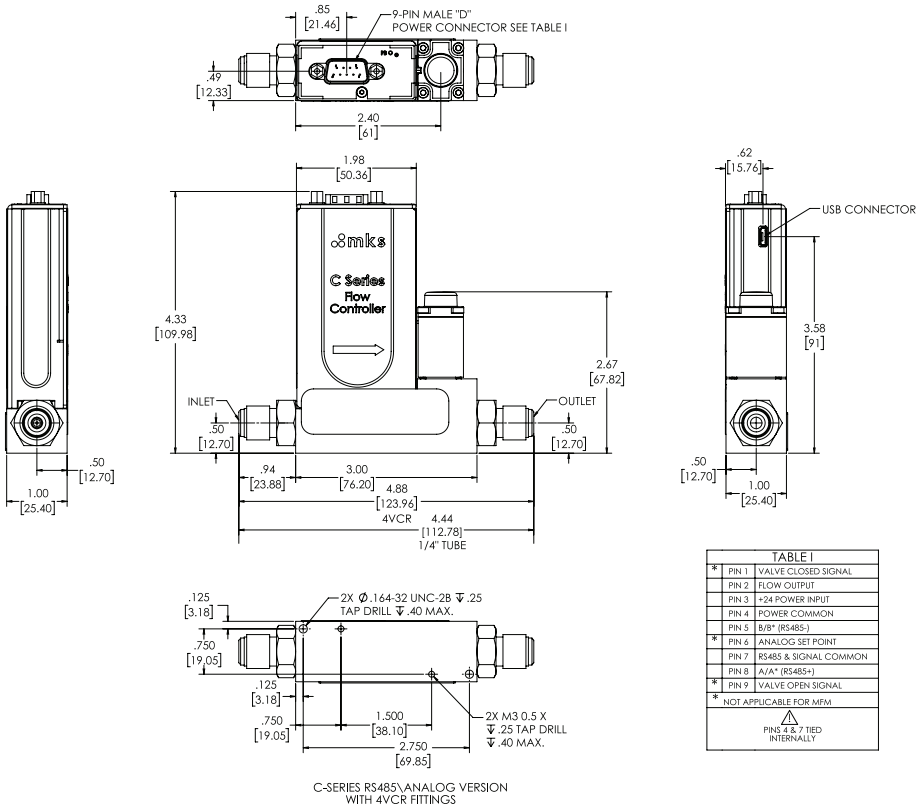
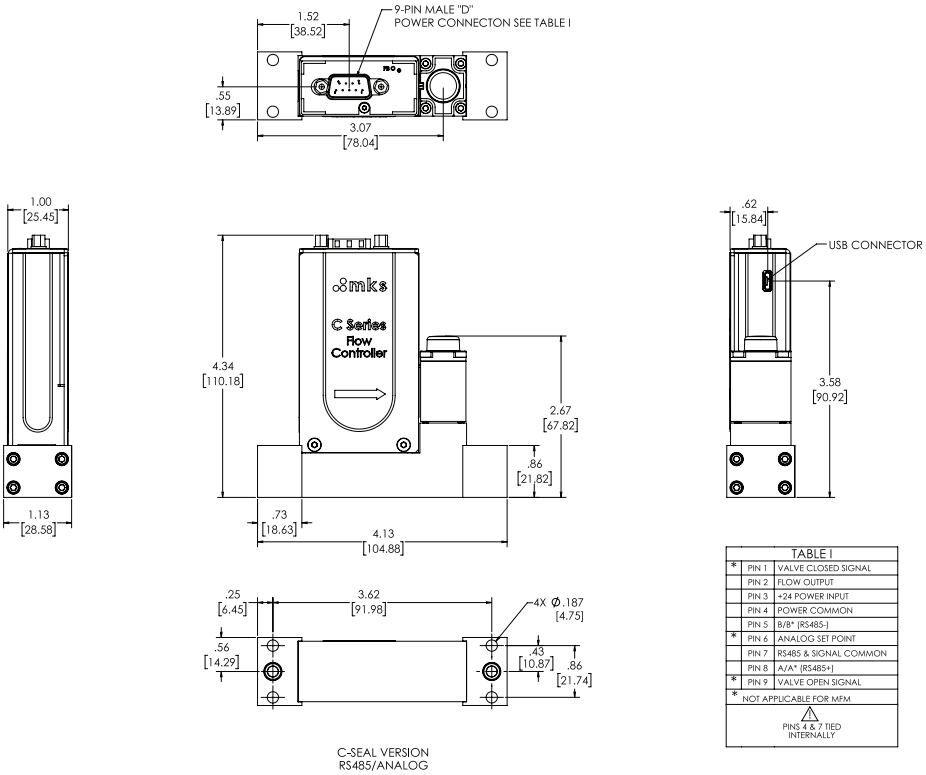


	TABLE I	
*	PIN 1	VALVE CLOSED SIGNAL
	PIN 2	FLOW OUTPUT
	PIN 3	+24 POWER INPUT
	PIN 4	POWER COMMON
	PIN 5	B/B* (RS485-)
*	PIN 6	ANALOG SET POINT
	PIN 7	RS485 & SIGNAL COMMON
	PIN 8	A/A* (RS485+)
*	PIN 9	VALVE OPEN SIGNAL
*	NOT APPLICABLE FOR MFM	
	⚠ PINS 4 & 7 TIED INTERNALLY	

C-SERIES RS485\ANALOG VERSION
WITH 4VCR FITTINGS



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C-SEAL VERSION
RS485/ANALOG

Dimensional Drawing

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

Ordering Information

Ordering Configuration Example: CMA10B013102VCV1010	Code	Configuration
Model		
MEMS Mass Flow Controller (Type based on gas and range per bottom table)	CMA10B	CMA10B
Gas (per Semi Standard E52-0703)*		
Name / Code / Formula Helium / 001 / He Argon / 004 / Ar Air / 008 / — Nitrogen / 013 / N_2 Oxygen / 015 / O_2 Sulfur hexafluoride / 110 / SF_6	 001 004 008 013 015 110	013
Flow Range Full Scale		
50 sccm 100 sccm 200 sccm 500 sccm 1000 sccm 2000 sccm 5000 sccm 10000 sccm	501 102 202 502 103 203 503 104	102
Fittings (compatible with)		
4 VCR male ¼" Compression Downmount O-Ring Seal	R S V	V
Connector		
Dual I/O (Analog 9-Pin/RS485 ASCII) RS-485 Primary Dual I/O (Analog 9-Pin/RS485 ASCII) Analog Primary Modbus TCP Profinet	R C M 9	C
Seal Materials		
Viton	V	V
Valve/Device Type		
Normally Closed/MFC No Valve/MFM (Same length as MFC) No Valve/MFM (Reduced Length)**	1 3 4	1
Reserved #1 (for future use)		
Standard Build	0	0
Firmware (unless otherwise specified)		
RS485/Analog Dual I/O Modbus TCP Profinet	10 10 10	10

** For other gases, please consult factory.*

*** Reduced length is not available for Downmount O-ring Seal fittings.*

Gas SEMI#	Gas Symbol	CMA10B Min Full Scale	CMA10B Max Full Scale
1	He	23	16000
4	Ar	40	14000
8	Air	15	14000
13	N_2	15	14000
15	O_2	14	13000
110	SF_6	7	4500

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