CMA10B
Compact, Fast Response Mass Flow Meter

mks

The CMA10B Mass Flow Meter (MFM) 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 flow measurement from as low as 0.1% of Full Scale up to 100% of Full Scale. Communication interfaces are either analog (0 to 5 VDC) or digital (RS485, PROFINET® or Modbus TCP/IP). 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 range, and 0.8% of accuracy make this MFM an excellent choice for flow measurement 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.

Product Features

- Ultrafast response time of <100 msec
- Measurement 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 MFMs
- Surface mount interface available for compact gas panel design
- Embedded web browser for setup and diagnostics
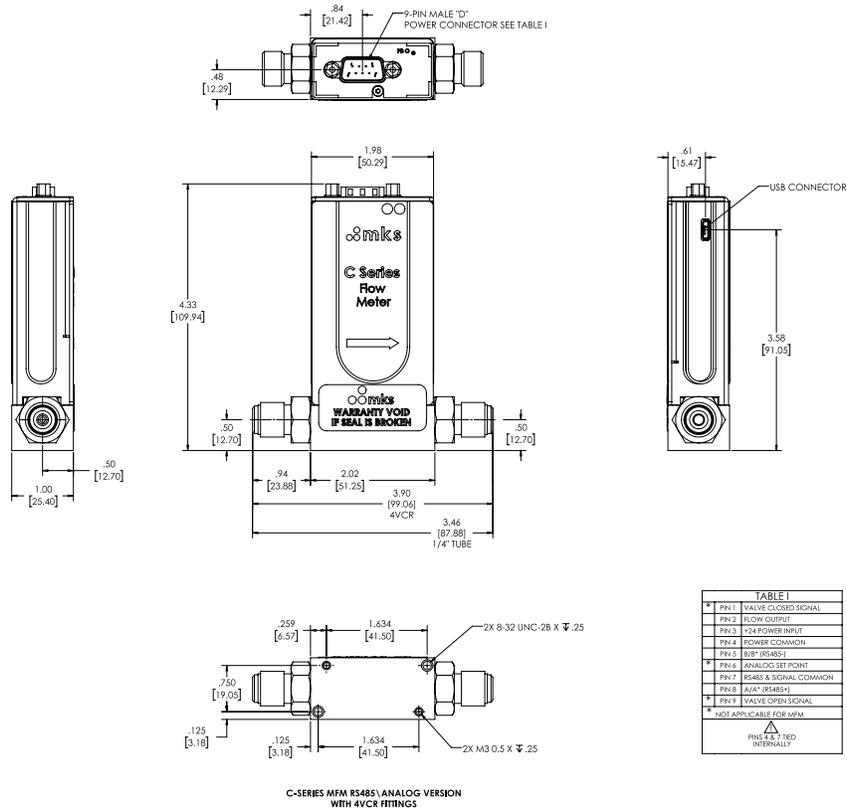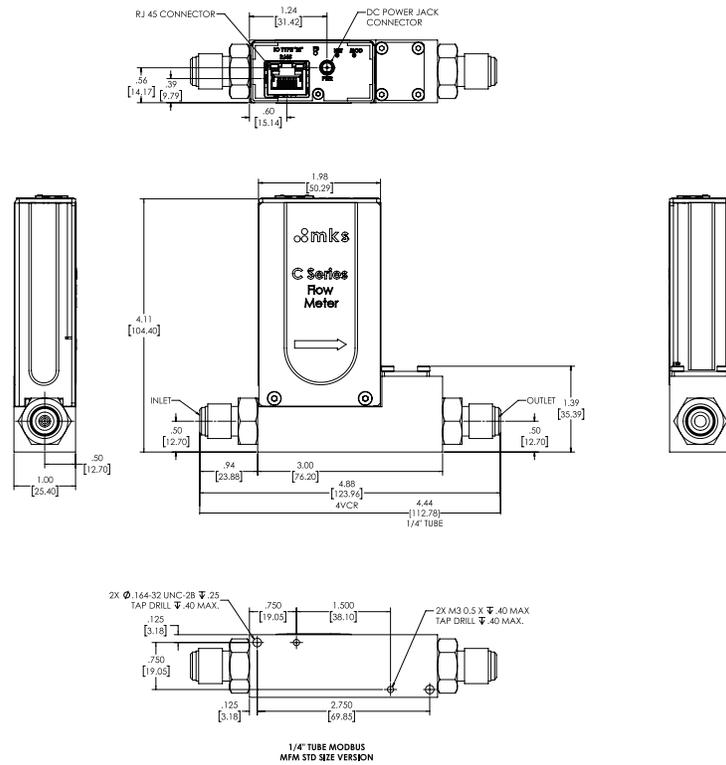
Key Benefits
- Achieve and maintain process conditions quickly
- Provide consistent process results device to device
- Provide consistent process results over extended periods

Performance

Full Scale Range	15 sccm to 14000 sccm, N_2 (For other gases, see table on page 4)
Maximum Inlet Pressure	80 psig
Proof Pressure	232 psi/16 bar
Burst Pressure	1000 psi/70 bar
Measurement Range	0.1% to 100% of Full Scale
Typical Accuracy	±0.8% of Reading
Repeatability	±0.2% of Reading
Resolution	0.1% of Full Scale
Temperature Coefficients **Zero** **Span**	• ≤0.005% of Full Scale/°C • ≤0.06% of Reading/°C
Inlet Pressure Coefficient	<0.025% of Reading/psi
Warm-up Time (to within 0.2% of Full Scale of steady state performance)	≤1 min
Operating Temperature Range (Ambient)	10°C to 50°C (32°F - 122°F)
Storage Humidity	0 to 95% relative humidity, non-condensing
Storage Temperature	0°C to 60°C (32°F - 140°F)

Mechanical

Fittings (compatible with)	Swagelok® 4 VCR® male, surface mount (o-ring), ¼" Swagelok compression
Leak Integrity **External (scc/sec He)**	<1 x 10^{-09}
Wetted Materials **Standard**	Aluminum, Stainless Steel, Silicon, Silicon Oxide, Silicon Carbide, Viton®, Glob Top
Weight	0.45 lbs (204 grams) (VCR)

Electrical Analog I/O

Input Power Required	24 VDC @ (±10%), <2 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%), <2 watts	+24 VDC (<3 watts)	+24 VDC (<3 Watts)
Connector	9 pin Type ''D'' male (power and comm.)	2 x RJ-45 (comm.) male, M8 male, 5 pin (power)	1 x RJ-45 (comm.) male, DC power plug
Data Rate Switch/Selection	• No switch • Set data rate via RS485	N/A	N/A
Comm. Rate(s)	• 9.6 Kbps • 19.2 Kbps • 38.4 Kbps	N/A	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

RJ 45 CONNECTOR
1.24 [31.42]
DC POWER JACK CONNECTOR

.56 [14.17]
.39 [9.79]
.60 [15.14]

1.98 [50.29]

.·mks
C Series
Flow
Meter

4.11 [104.40]

INLET
.50 [12.70]
OUTLET
1.39 [35.39]
.50 [12.70]

.94 [23.88]
3.00 [76.20]
4.88 [123.96]
4VCR
4.44 [112.78]
1/4" TUBE

.50 [12.70]
1.00 [25.40]

2X Ø .164-32 UNC-2B ▼ .25
TAP DRILL ▼ .40 MAX.
.125 [3.18]
.750 [19.05]
1.500 [38.10]
2X M3 0.5 X ▼ .40 MAX
TAP DRILL ▼ .40 MAX.

.750 [19.05]

.125 [3.18]
2.750 [69.85]

1/4" TUBE MODBUS
MFM STD SIZE VERSION

.84 [21.42]
9-PIN MALE "D"
POWER CONNECTOR SEE TABLE I

RS-O

.48 [12.29]

1.98 [50.29]

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C Series
Flow
Meter

.61 [15.47]
USB CONNECTOR

4.33 [109.94]

.·mks
WARRANTY VOID
IF SEAL IS BROKEN

3.58 [91.05]

.50 [12.70]
.50 [12.70]

.94 [23.88]
2.02 [51.25]
3.90 [99.06]
4VCR
3.46 [87.88]
1/4" TUBE

.50 [12.70]
1.00 [25.40]

.259 [6.57]
1.634 [41.50]
2X 8-32 UNC-2B X ▼ .25

.750 [19.05]

.125 [3.18]
.125 [3.18]
1.634 [41.50]
2X M3 0.5 X ▼ .25

C-SERIES MFM RS485\ANALOG VERSION
WITH 4VCR FITTINGS

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

Dimensional Drawing - Standard Length (top); Reduced Length (bottom)
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

Ordering Information

Ordering Configuration Example: CMA10B013102RCV3010	Code	Configuration
Model		
MEMS Mass Flow Meter (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 C	R
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		
No Valve/MFM (Same length as MFC) No Valve/MFM (Reduced Length)**	3 4	3
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 O-ring Seal fittings.

Gas SEMI#	Gas Symbol	CMA10B	
		Min Full Scale	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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