



# 179C

## ALL-METAL MASS-FLO® METER

The 179C is an all-metal mass flow meter (MFM) designed to measure the flow of gases in a wide variety of applications. The 179 Mass-Flo® meters are available with Full Scales from 10 sccm to 20 slm, providing fast, repeatable flow metering to as low as 0.1 sccm.

The 179C is a direct form-fit-function replacement for the most common MFM's on the market today. The standard 3-inch footprint enables the 179C to drop directly into the same space without modifying existing gas lines. Electrical connectors are the same Type "D" connectors, with similar pin-outs, signals, and functions as their industry counterparts. The 179C is compatible with mass flow controller (MFC) power supply and display electronics from MKS or other manufacturers.

### Features & Benefits

#### Meets Process Demands

- Patented<sup>1</sup> sensor design provides exceptional zero stability
- Full Scale flow ranges from 10 sccm to 20 slm for precise, repeatable flow measurement and control
- Percent of Full Scale accuracy for analog configurations

#### Robust, Reliable Design

- Rigorous design and testing includes MTBF analysis and STRIFE testing to ensure long-term performance
- All metal, 316L stainless steel for more demanding clean applications
- Two year warranty ensures quality and customer satisfaction

<sup>1</sup>U.S. Patent No. 5461913. Foreign Patents Pending.

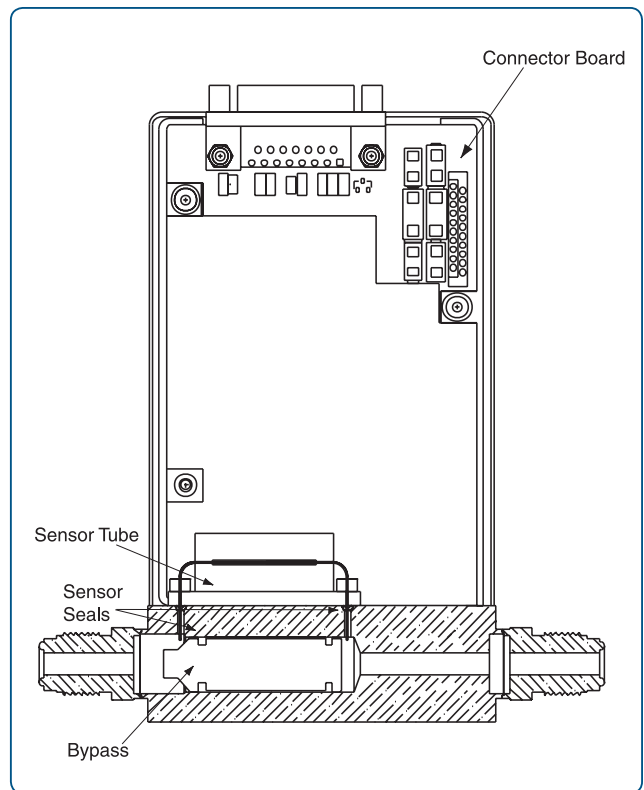


The 179C employs the latest design thermal sensor for mass flow measurement, in a compact industry-standard package. The all-metal 179C is constructed of 316L stainless steel finished to <32 microinches Ra (max.). The 179C is machined without the use of hydrocarbon based lubricants and cleaned using a proprietary process (MKS Spec. #115029), for the more demanding clean applications. Security against accidental damage is provided by a proof pressure of 1000 psig, and a burst pressure rating of 1500 psig.

Power required for the 179C is minimal: the nominal  $\pm 15$  VDC unit consumes only 50 mA during operation (150 mA at initial turn-on). Fast warm-up (<2 minutes) makes the 179C ideal for production applications where MFM replacement often results in expensive downtime.

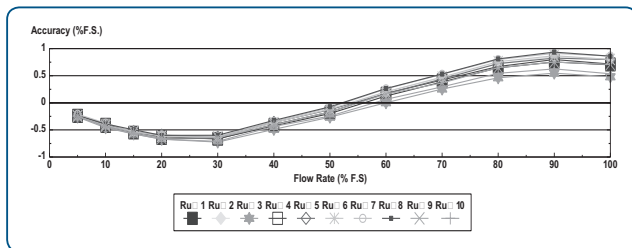
Performance and reliability have been designed into the 179C, and ensured through rigorous MTBF analysis and extensive STRIFE testing, which includes humidity soak and temperature cycling. The 179C MFM also complies with European CE Mark requirements. Zero and span drift are minimal with MKS' new patented sensor, as shown by the graph below. As a statement of our confidence in the performance of the 179C, it carries a two-year warranty.

Size, compatibility, cleanliness, reliability, and low cost make the 179C MFM the ideal choice for the more demanding flow measurement applications.



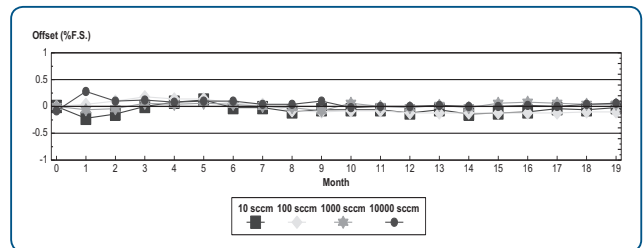
### Cross Section Diagram —

A cross section diagram of a 179C Mass-Flo Meter



### Flow Accuracy and Repeatability —

The above graph shows the typical flow accuracy and repeatability of the 179C MFM. The instrument was measured using the MKS Instruments Califlow® Primary Standard Flow Calibrator.



### Zero and Span Stability —

The above graph shows the excellent zero and span stability of the 179C MFM. The instrument was powered on and randomly tested for zero and span drift over a 300 day period. The total zero drift was less than 10mV while the maximim span drift was less than 32mV.



# Specifications

<b>Full Scale Ranges</b> (N <sub>2</sub> equivalent)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm
<b>Maximum Inlet Pressure</b>	500 psig
<b>Normal Operating Pressure Differential</b> (with atmospheric pressure at the MFM outlet) 10 to 20000 sccm	10 Torr
<b>Measurement Range</b>	1% to 100% of F.S.
<b>Accuracy</b> (analog) (including non-linearity, hysteresis, and non-repeatability referenced to 760 mmHg and 0°C)	±1.0% of F.S.
<b>Repeatability</b>	±0.2% of F.S.
<b>Resolution</b>	0.1% of F.S.
<b>Temperature Coefficients</b>	
Zero	<0.05% of F.S./°C
Span	<0.08% of Rdg./°C
<b>Warm-up Time</b> (to within 0.2% of F.S. of steady state performance)	<2 min
<b>Pressure Coefficient</b>	<0.02% of Rdg./psi
<b>Normal Operating Temperature Range</b>	0°C to 50°C
<b>Input Voltage Required</b>	
Max. at start-up (first 2 sec.)	±15 VDC (±5%) @ 150 mA
Typical at steady state	±15 VDC (±5%) @ 50 mA
<b>Output Signal</b>	0 to 5 VDC into >10K Ω
<b>Output Impedance</b>	<1 Ω
<b>Connector Types</b>	
Analog	9-pin or 15-pin Type "D"(The 15-pin Type "D" connector is electronically compatible with other MKS flow controllers. Consult MKS Applications Engineering at 800-227-8766 for details)
<b>Wetted Materials</b>	
Standard	316L S.S.
Optional	VCO® fittings - consult factory
<b>Leak Integrity</b>	
External (scc/sec He)	<1 x 10 <sup>-9</sup>
<b>Fittings</b> (compatible with)	Swagelok® 4 VCR®, Swagelok® 4 VCO®, ¼" Swagelok®
<b>Compliance</b>	CE



# Ordering Information

## SEMI Gas Codes

SEMI Gas Code	Name	Symbol	Maximum FS, sccm	Flow Rate
001	Helium	He	30000	34C
004	Argon	Ar	30,000	34C
007	Hydrogen	H <sub>2</sub>	20,000	24C
008	Air	--	20,000	24C
013	Nitrogen	N <sub>2</sub>	20,000	24C
015	Oxygen	O <sub>2</sub>	20,000	24C
019	Chlorine	Cl <sub>2</sub>	10,000	14C
025	Carbon Dioxide	CO <sub>2</sub>	10,000	14C
028	Methane	CH <sub>4</sub>	10,000	14C
029	Ammonia	NH <sub>3</sub>	10,000	14C
039	Silane	SiH <sub>4</sub>	10,000	14C
042	Acetylene	C <sub>2</sub> H <sub>2</sub>	10,000	14C
110	Sulfur HexaFluoride	SF <sub>6</sub>	5000	53C

## Ordering Code Example: 179C00412CR3BM

Code	Configuration
179C Mass-Flo Meter	179C

### Gas To Be Calibrated For: (SEMI Gas Code) See table for additional options

Helium	001	004
Argon	004	
Hydrogen	007	
Nitrogen	013	
Oxygen	015	

### Flow Rate To Be Calibrated for SCCM (Maximum 20000 SCCM N<sub>2</sub> Equivalent)

10	11C	12C
20	21C	
50	51C	
100	12C	
200	22C	
500	52C	
1000	13C	
2000	23C	
5000	53C	
10000	14C	
20000	24C	

### Fittings (compatible with)

Swagelok 4 VCR male	R	R
Swagelok 4 VCO male	G	
1/4" Swagelok	S	

### Valve

No valve	3	3
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### Connector

Analog 9-pin Type "D"	A	B
Analog 15-pin Type "D"	B	

### Seal Materials

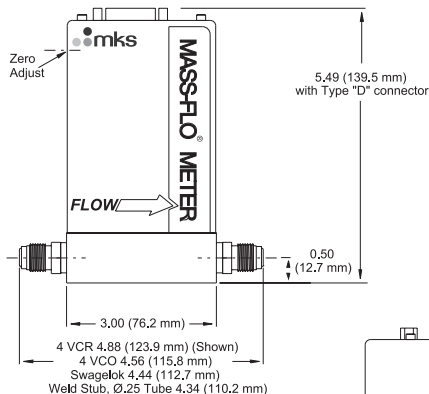
Metal	M	M
Viton® (VCO Only)	V	
Buna-N (VCO Only)	B	
Neoprene® (VCO Only)	N	
Kalrez® (VCO Only)	K	

### Optional Accessories

946 Multi-channel power supply/readout/set point control	946
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### Cabling for 179C:

CB147-12-10 to connect 179C 9-pin Type "D" to 946 and cables
100016744/45/46 to connect 179C 15-pin Type "D" to 946 and cables



## Dimensional Drawing

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



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