

Type 2179A

GENERAL PURPOSE MASS-FLO® CONTROLLER

The MKS Type 2179 is a general purpose mass flow controller with an integral shut-off valve, designed to measure and control the flow of gases in a wide variety of applications. Type 2179 Mass-Flo® Controllers are available with Full Scales from 10 sccm to 20 slm, providing fast, repeatable flow control to as low as 0.2 sccm. It can also be used as a pressure controller when connected to a suitable pressure transducer.

The normally closed, shut-off valve provides positive shut-off to 4×10^{-9} scc/sec He. Electrical connectors are the same PC card edge or Type "D" connectors, with the same pin-outs, signals, and functions as their industry counterparts, so no cable or connector rewiring is necessary. The 2179 is compatible with MFC power supply and display electronics from MKS or other manufacturers.

Features & Benefits

For Demanding Processes

- Patented¹ sensor design provides exceptional zero stability
- Full scale flow ranges from 10 sccm to 20 slm for precise and repeatable flow measurement and control
- Percent of full scale accuracy for analog configurations
- Fast warm-up time minimizes expensive production downtime
- Compatible with earlier MKS MFCs and power supply/readout modules
- Integral, normally closed diaphragm type shut-off valve provides positive shut-off to 4×10^{-9} scc/sec He

Robust, Reliable Design

- Rigorous design and testing includes MTBF analysis and STRIFE testing to ensure long-term performance
- Surface finish of wetted stainless surfaces, cleanroom processing, and minimal use of elastomer seals enable use in demanding processes
- CE Mark compliant – meets requirements for European Union
- Two year warranty ensures quality and customer satisfaction

¹US Patent No. 5461913. Foreign Patents Pending.

The Type 2179 employs the latest design thermal sensor for mass flow measurement, with a fast acting proportioning valve and control circuitry and a positive shut-off valve in a compact package. The 2179 is constructed of 316L stainless steel finished to <32 max. microinches Ra, with minimal use of elastomer seals, for the more demanding clean applications. The control valve and shut-off valve are normally closed. The positive shut-off diaphragm valve has a replaceable seat should maintenance be required.

Power required for the 2179 is minimal: the nominal ± 15 VDC unit consumes only 100 mA during operation (200 mA at initial turn-on). Fast warm-up (< 2 minutes) makes the 2179 ideal for production applications where MFC replacement often results in expensive downtime.

Performance and reliability have been designed into the 2179, and ensured through rigorous MTBF analysis and extensive STRIFE testing. The 2179 complies with IEC-801 specifications for tolerance to ESD and RFI environments. Zero and span drift are minimal with MKS' new patented sensor, as shown by the graph below. The 2179 also complies with European CE Mark Requirements.

Size, compatibility, cleanliness, reliability, and low cost make the MKS Type 2179 MFC the ideal choice for the more demanding flow control applications.

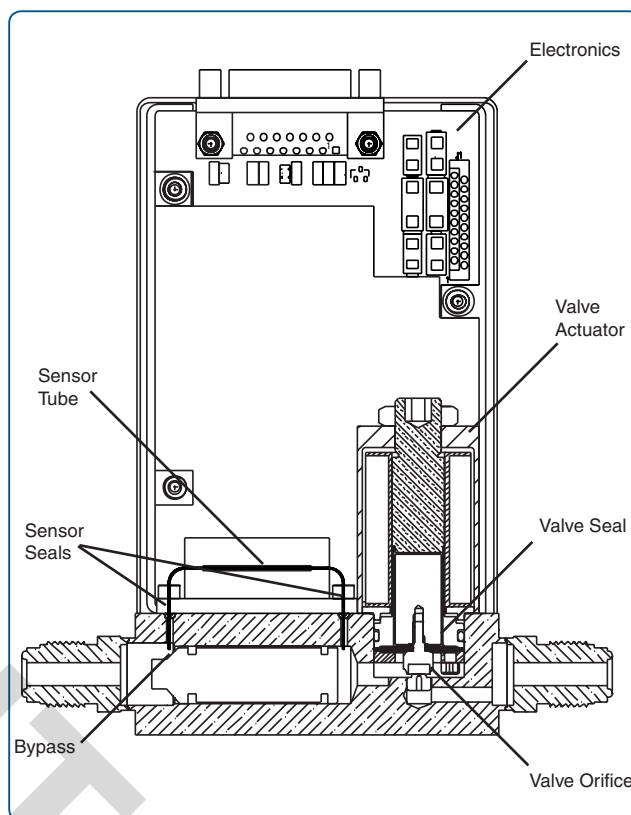
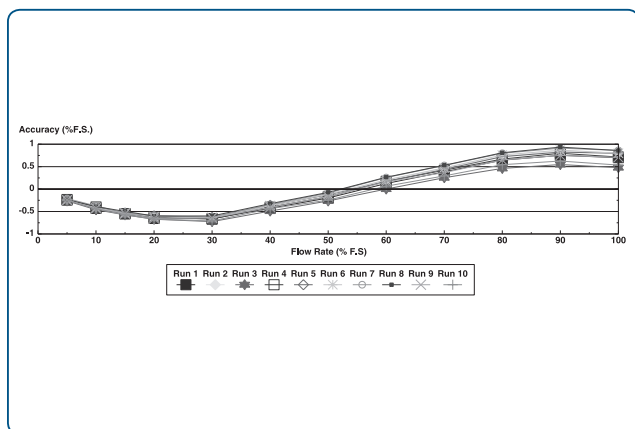
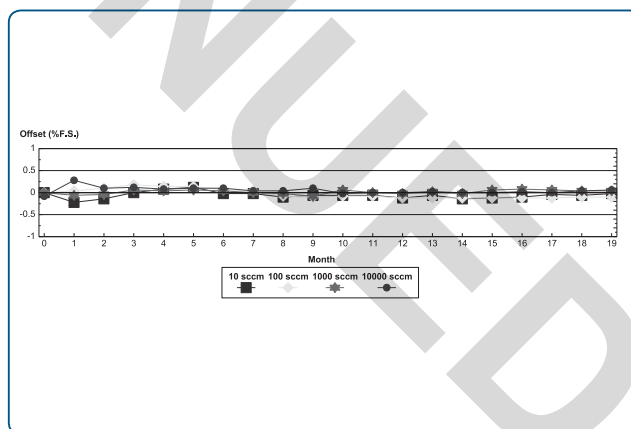


Figure 1 —
Cross section diagram of a Type 1179 Mass-Flo Controller, which is at the heart of the Type 2179



Flow Accuracy and Repeatability —

Shows the typical flow accuracy and repeatability of the analog MFCs in the 2179 family. Measurements were made using the MKS Instruments Califlow® Primary Standard Flow Calibrator over a 10 day period.



Zero Stability —

Shows the excellent zero and span stability of the sensor used in the 2179 family. The instruments were powered on and randomly tested for zero and span drift over a 19 month period.



Specifications

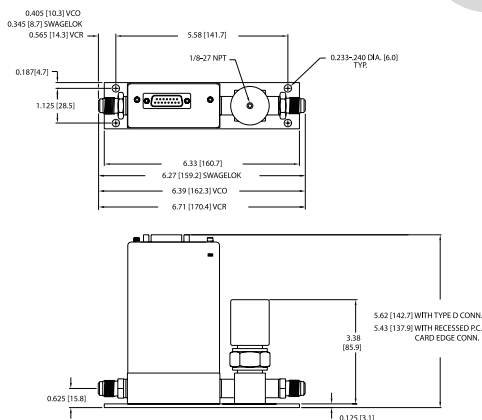
Full Scale Ranges (N₂ equivalent)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm
Maximum Inlet Pressure	145 psig DP valve
Normal Operating Pressure Differential (with atmospheric pressure at the MFC outlet)	
10 to 5000 sccm	10 to 40 psid
10000 to 20000 sccm	15 to 40 psid
Control Range	2% to 100% of F.S.
Accuracy (including non-linearity, hysteresis, and non-repeatability referenced to 760 mmHg and 0°C)	± 1.0% of F.S.
Repeatability	± 0.2% of F.S.
Resolution	0.1% of F.S.
Temperature Coefficients	
Zero	< 0.05% of F.S./°C
Span	< 0.08% of Rdg./°C
Warm-up Time (to within 0.2% of F.S. of steady state performance)	< 2 min
Controller Settling Time (per SEMI Guideline E17-91)	< 2 sec
Pressure Coefficient	< 0.02% of Rdg./psi
Normal Operating Temperature Range	0°C to 50°C
Input Voltage Required	
Max. at start-up (first 2 sec)	± 15 VDC (± 5%) @ 200 mA
Typical at steady state	± 15 VDC (± 5%) @ 100 mA
Set Point Command Signal	0 to 5 VDC from < 20K W
Output Signal	0 to 5 VDC into > 10K W
Output Impedance	< 1 W
Connector Types Analog	9-pin or 15-pin Type "D", 20-pin card edge (The 15-pin Type "D" and card edge connectors are electronically compatible with other MKS flow controllers. Consult Applications Engineering at 800-227-8766 for details.)
Wetted Materials	
MFC, Standard	316L S.S., Viton®, nickel
MFC, Optional (seals and valve seal)	Buna-N, Neoprene®, Kalrez®
Shut-Off Valve, Standard	Kel-F® seat
Shut-off Valve Pneumatic Supply Pressure	60 to 120 psig
Leak Integrity	
External (scc/sec He)	< 4 x 10 ⁻⁹
Through closed control valve	< 1.0% of F.S. at 40 psig inlet to atmosphere
Through closed shut-off valve (scc/sec He)	4 x 10 ⁻⁹
Fittings (compatible with)	
Mechanical	Swagelok® 4 VCR®, 1/4" Swagelok®
Pneumatic Valve	1/8" - 27 NPT
Electromagnetic Compatibility	Fully CE Compliant to EMC Directive 2004/108/EC when used with an overall metal braided shielded cable, properly grounded at both ends. (except edge card version)



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 ₂	20,000	24C
008	Air	--	20,000	24C
013	Nitrogen	N ₂	20,000	24C
015	Oxygen	O ₂	20,000	24C
019	Chlorine	Cl ₂	10,000	14C
025	Carbon Dioxide	CO ₂	10,000	14C
028	Methane	CH ₄	10,000	14C
029	Ammonia	NH ₃	10,000	14C
039	Silane	SiH ₄	10,000	14C
042	Acetylene	C ₂ H ₂	10,000	14C
110	Sulfur HexaFluoride	SF ₆	5000	53C



Dimensional Drawing —

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

Ordering Code Example: 2179A00411CR1BK

Code	Configuration
Type 2179A Mass-Flo Controller	2179A
2179A	2179

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 N₂ Equivalent)

10	11C	11C
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	
¼" Swagelok	S	
Length adapter w/4 VCR fittings*	L	
Length adapter w/¼" Swagelok fittings**	W	

Valve

Normally closed	1	1
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Connector

Analog 9-pin Type D	A	B
Analog 15-pin Type D	B	
Analog 20-pin edge card	C	

Seal Materials

Viton®	V	K
Buna-N	B	
Neoprene®	N	
Kalrez®	K	

Optional Accessories

Type 246 single-channel power supply/readout/set point control	246C
Type 247C four-channel power supply/readout/set point control	247D
Type 647C four-channel power supply/readout/set point control/RS-232	647C4R0N
Type 647C eight-channel power supply/readout/set point control/RS-232	647C8R0N
Type PR4000B one-channel power supply/readout/set point control RS232	PR4000BS
Type PR4000B two-channel power supply/readout/set point control RS232	PR4000BF

Cabling for 2179A:

Type CB147-12-10 to connect 2179 9-pin Type "D" to PR4000, 246, 247, 647
Type CB259-5-10 to connect 2179 15-pin Type "D" to 246, 247
Type CB147-1-10 to connect 2179 15-pin Type "D" to PR4000, 647
Type CB259-10-10 to connect 2179 20-pin card edge to 246, 247
Type CB147-7-10 to connect 2179 20-pin card edge to PR4000, 647

Contact Applications Engineering for shielded cables required for CE Compliance.

* Matches length of 1259C-XXXX-RX

** Matches length of 1259C-XXXX-SX



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