

**Flow**

**Measurement & Control**

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# 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  $4 \times 10^{-9}$  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

- Patented<sup>1</sup> sensor design provides exceptional zero stability
- Full scale flow ranges from 10 sccm to 20 slm for precise and repeatable flow measurement and control
- Available in both Analog and Digital (RS-485 and DeviceNet™) versions
- Percent of full scale accuracy for analog configurations
- Percent of reading accuracy with digital 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  $4 \times 10^{-9}$  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
- Three year warranty ensures quality and customer satisfaction

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



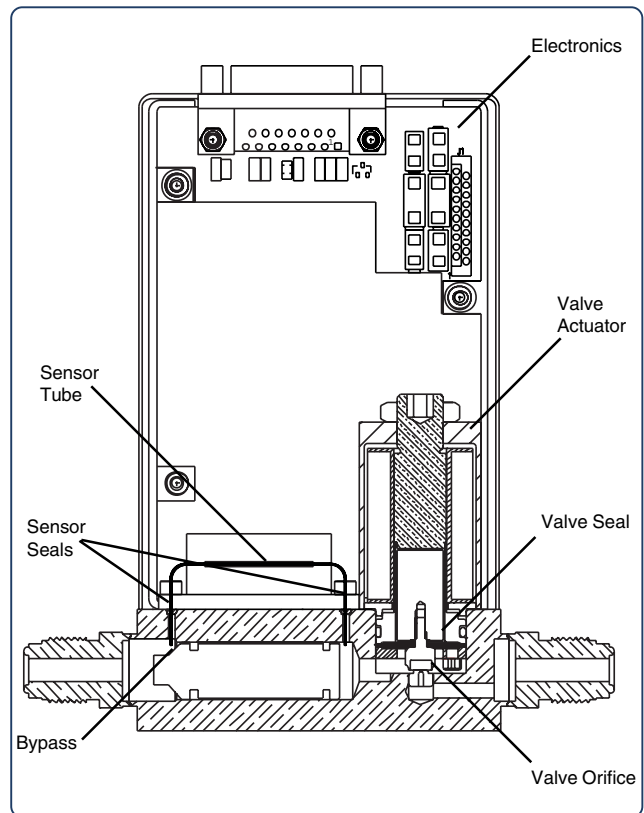
It is available in both analog and digital models. Digital models include both DeviceNet and RS-485. See Bulletins DeviceNet and RS-485-7/97 for more information.

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.

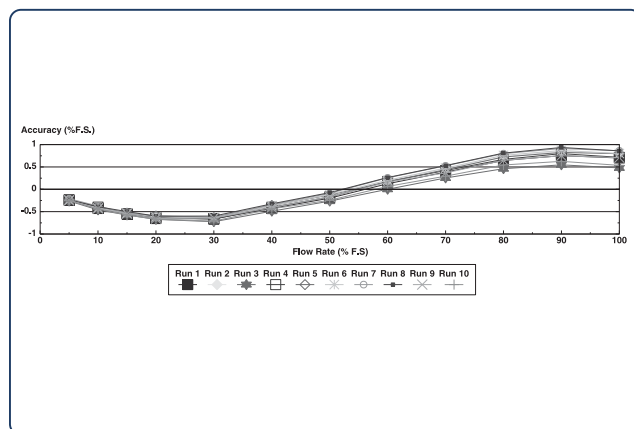
Power required for the 2179 is minimal: the nominal  $\pm 15$  VDC unit consumes only 100 mA during operation (200 mA at initial turn-on). Fast warm-up (< 2 minutes) makes the 2179 ideal for production applications where MFC replacement often results in expensive downtime.

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. As a statement of our confidence in the performance of the 2179, it carries a three-year warranty.<sup>1</sup>

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

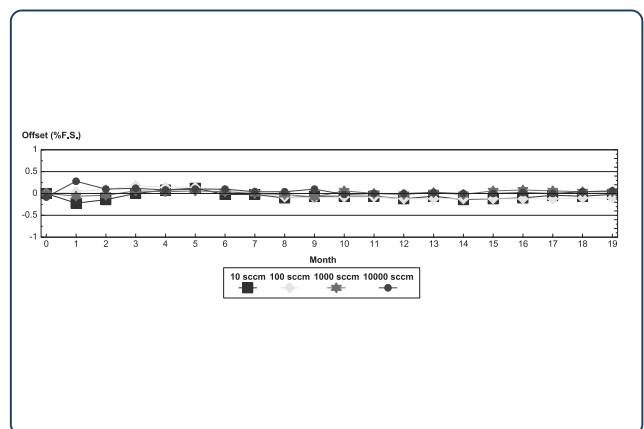


**Figure 1 —**  
Cross section diagram of a Type 1179 Mass-Flo Controller, which is at the heart of the Type 2179



**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

<b>Full Scale Ranges (N<sub>2</sub> equivalent)</b>	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm
<b>Maximum Inlet Pressure</b>	145 psig DP valve
<b>Normal Operating Pressure Differential</b> (with atmospheric pressure at the MFC outlet)	
10 to 5000 sccm	10 to 40 psid
10000 to 20000 sccm	15 to 40 psid
<b>Control Range</b>	2% to 100% of F.S.
<b>Accuracy</b> (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>Controller Settling Time</b> (per SEMI Guideline E17-91)	< 2 sec
<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%) @ 200 mA
Typical at steady state	± 15 VDC (± 5%) @ 100 mA
<b>Set Point Command Signal</b>	0 to 5 VDC from < 20K W
<b>Output Signal</b>	0 to 5 VDC into > 10K W
<b>Output Impedance</b>	< 1 W
<b>Connector Types</b>	
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.)
Digital	RS-485, DeviceNet (Year 2000 compliant)
<b>Wetted Materials</b>	
MFC, Standard	316L S.S., Viton®, nickel
MFC, Optional (seals and valve seal)	Buna-N, Neoprene®, Kalrez®
Shut-Off Valve, Standard	Kel-F® seat
<b>Shut-off Valve Pneumatic Supply Pressure</b>	60 to 120 psig
<b>Leak Integrity</b>	
External (scc/sec He)	< 4 x 10 <sup>-9</sup>
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 <sup>-9</sup>
<b>Fittings</b> (compatible with)	
Mechanical	Swagelok® 4 VCR®, 1/4" Swagelok®
Pneumatic Valve	1/8" - 27 NPT
<b>Electromagnetic Compatibility</b>	Fully CE Compliant to EMC Directive 89/336/EEC 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	H2	20,000	24C
008	Air	-	20,000	24C
013	Nitrogen	N2	20,000	24C
015	Oxygen	O2	20,000	24C
019	Chlorine	Cl2	10,000	14C
025	Carbon Dioxide	CO2	10,000	14C
028	Methane	CH4	10,000	14C
029	Ammonia	NH3	10,000	14C
039	Silane	SiH4	10,000	14C
042	Acetylene	C2H2	10,000	14C
110	Sulfur HexaFluoride	SF6	5000	53C

Ordering Code Example: 2179A00411CR1BKXX

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

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	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	
Digital Profibus®	4	
Digital RS-485	5	
Digital DeviceNet™	6	

Seal Materials

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

Firmware (DeviceNet only)

Unless otherwise specified, MKS will ship firmware revision current to date of order	XX	XX
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Optional Accessories

Type 246 single-channel power supply/readout/set point control	246C
Type 167 single-channel readout/set point control (external PS required)	167A
Type 247C four-channel power supply/readout/set point control	247D
Type 647B four-channel power supply/readout/set point control/RS-232	647C4R0N
Type 647B eight-channel power supply/readout/set point control/RS-232	647C8R0N
Type PR4000A one-channel power supply/readout/set point control RS232	PR4000AS
Type PR4000A two-channel power supply/readout/set point control RS232	PR4000AF
Type 146C four-channel power supply/readout/set point control/RS232	146C
Type 186B eight-slot displayless process controller	186B

Cabling for 2179A:

Type CB147-12-10 to connect 2179 9-pin Type "D" to PR4000, 146, 186, 246, 247, 167, 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, 146, 186, 167, 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, 146, 186, 167, 647

Contact Applications Engineering for shielded cables required for CE Compliance.

- \* Matches length of 1259C-XXXXX-RX
- \*\* Matches length of 1259C-XXXXX-SX

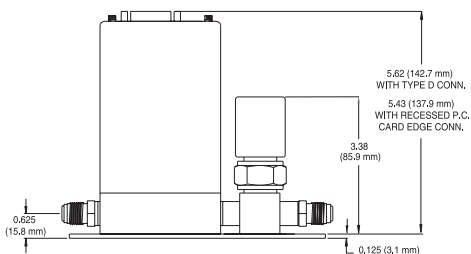
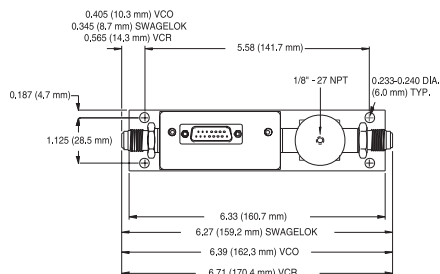
## Global Headquarters

90 Industrial Way  
Wilmington, MA 01887-4610

Tel: 978.284.4000  
Tel: 800.227.8766 (in U.S.A.)  
Web: www.mksinst.com

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## Dimensional Drawing —

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



2179 - 8/06  
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