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mks
Technology for Productivity

Flow Measurement & Control

WWW.MKSINST.COM

Type 1479A

METAL-SEALED MASS-FLO® CONTROLLER

The MKS Type 1479 is an economical metal-sealed mass flow controller designed to measure and control the flow of gases in high purity applications. The Type 1479 Mass-Flo® Controller is available with Full Scales from 10 sccm to 20 slm, providing fast, repeatable flow control to as low as 0.2 sccm. The 1479 can also be used as a pressure controller when connected to a suitable pressure transducer.

The 1479 is a direct form-fit-function replacement for the most common MFC's on the market today. The standard 3-inch footprint enables the 1479 to drop directly into the same space without modifying existing gas lines. 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 1479 is compatible with MFC power supply and display electronics from MKS or other manufacturers.

Features & Benefits

Meets Process Demands

- Patented[1] 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

Robust, Reliable Design

- Rigorous design and testing includes MTBF analysis and STRIFE testing to ensure long-term performance
- <10 RA electropolish finish of wetted stainless surfaces, cleanroom processing, and use of metal seals enable use in high purity applications
- CE Mark compliant – meets require ments for European Union
- Two year warranty ensures quality and customer satisfaction

[1]U.S. Patent No. 5461913. Foreign Patents Pending.

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The Type 1479 combines MKS's patented thermal sensor and electronics along with a highly reliable solenoid proportioning control valve and metal seals in a compact, industry standard package. The Type 1479 provides the features necessary for high purity applications at an economical price and cost of ownership. The use of metal seals eliminates permeation from the atmosphere and the outgassing and particle generation inherent to elastomeric-sealed MFC's.

The Type 1479 is constructed of vacuum arc remelt (VAR) 316L stainless steel which is electropolished and has a surface finish of 10 microinches Ra maximum. Components are machined without the use of hydrocarbon-based lubricants, are cleaned using a proprietary cleaning process (MKS SPEC#115209) and assembled in a Class 100 cleanroom to assure product cleanliness.

Power required for the Type 1479 is minimal: the nominal ± 15 VDC unit consumes less than 100 mA during operation (less than 200 mA during start-up for 5 seconds). Typical instrument warm-up time of less than one minute allows immediate use for the accurate control of gas flow.

Reliability is designed into the 1479 and ensured through rigorous MTBF analysis and STRIFE testing. The sensor and electronics provide excellent long-term measurement accuracy and stability. Zero and span drift are minimal as shown in the graph below, right. The Type 1479 complies with European CE mark requirements. As a statement of our confidence in the performance of the 1479, it carries a two year warranty.[1]

Measurement accuracy, stability, cleanliness and reliability make the Type 1479 an ideal choice for semiconductor and other high purity applications.

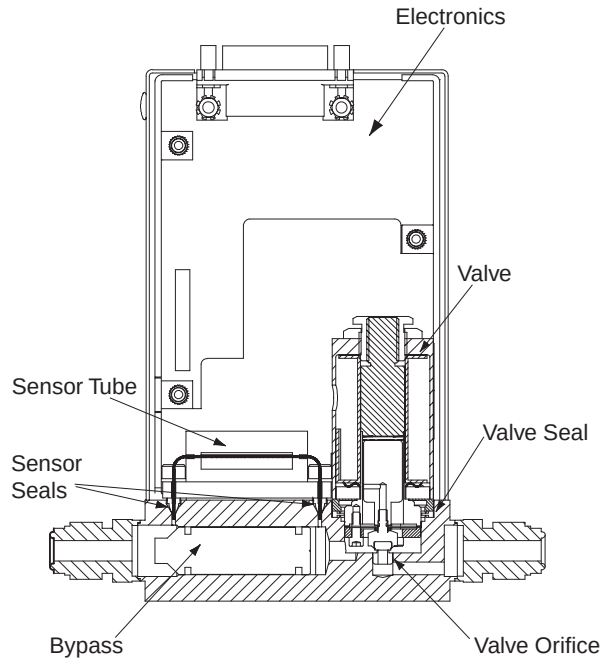
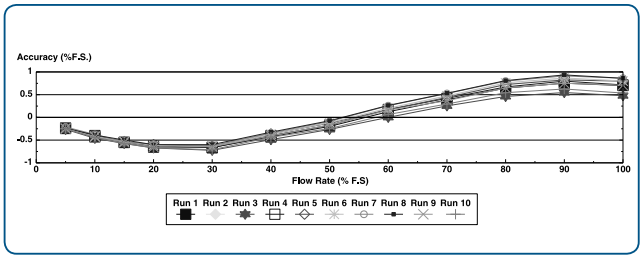
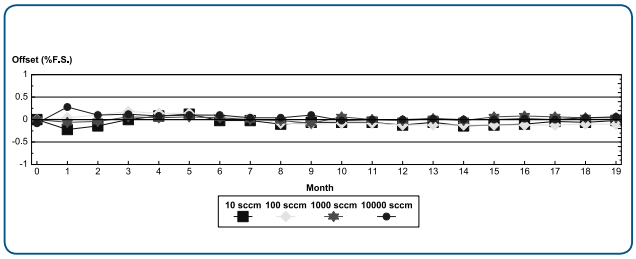


Figure 1 —
Cross section diagram of a Type 1479 Mass-Flo Controller.

[1]The user is responsible for preventative maintenance.



Flow Accuracy and Repeatability —
Shows the typical flow accuracy and repeatability of the analog Type 1479 MFC. The instrument was measured 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 Type 1479 sensor. The instruments were powered on and randomly tested for zero and span drift over a 19 month period.

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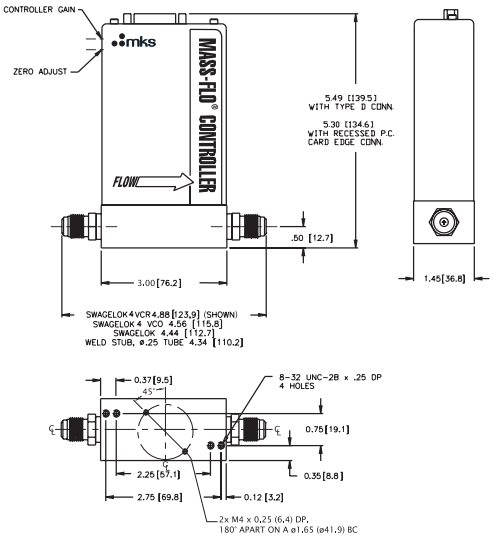
Specifications

Full Scale Ranges (N_2 equivalent)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm
Maximum Inlet Pressure	150 psig
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) (Calibration Gas)	
Analog	± 1.0% of F.S.
Digital	± 1.0% of Reading; 20-100% of F.S. ± 0.2% F.S. , < 20% 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 5 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 Ω
Output Signal	0 to 5 VDC into >10K Ω
Output Impedance	<1 Ω
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	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., nickel
Valve Seat	Kel-F® for ≤200 sccm, Teflon® for ≥500 sccm configurations
Leak Integrity	
External (scc/sec He)	$<1 \times 10^{-10}$
Through closed valve	<1.0% of F.S. at 40 psig inlet to atmosphere (To assure no flow-through, a separate positive shut-off valve is recommended.)
Fittings (compatible with)	Swagelok® 4 VCR®, ¼” Swagelok®, surface mount
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.

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_2H_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: 1479A00411CR1BM	Code	Configuration
Type 1479A Mass-Flo Controller	1479A	1479A
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_2 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
¼" Swagelok	S	
C-Seal surface mount as per SEMI 2787.1	C	
W-Seal surface mount as per SEMI 2787.3F	H	
Valve		
Normally closed	1	1
Connector		
Analog 9-pin Type D	A	B
Analog 15-pin Type D	B	
Analog 20-pin edge card	C	
Seals Materials		
Metal, with Kel-F valve plug 200 sccm and below, Teflon® valve plug 500 sccm and above	M	M

Optional Accessories

Type 246C single-channel power supply/readout/set point control	246C
Type 247D 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 1479A:

Type CB147-12-10 to connect 1479 9-pin Type "D" to PR4000, 246, 247, 647
Type CB259-5-10 to connect 1479 15-pin Type "D" to 246, 247
Type CB147-1-10 to connect 1479 15-pin Type "D" to PR4000, 647
Type CB259-10-10 to connect 1479 20-pin edge card to 246, 247
Type CB147-7-10 to connect 1479 20-pin edge card to PR4000, 647

Contact Applications Engineering at 800-227-8766 for shielded cables required for CE Compliance.

Global Headquarters

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Andover, MA 01810

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Web: www.mksinst.com

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