



Flow

& Control Measurement

WWW.MKSINSTR.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. It is available in both analog and digital models. Digital models include both DeviceNet and RS-485.

Features & Benefits

Meets Process Demands

- 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
- 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

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 requirements for European Union
- Three year warranty ensures quality and customer satisfaction

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



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 three year warranty.¹

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

¹The user is responsible for preventative maintenance.

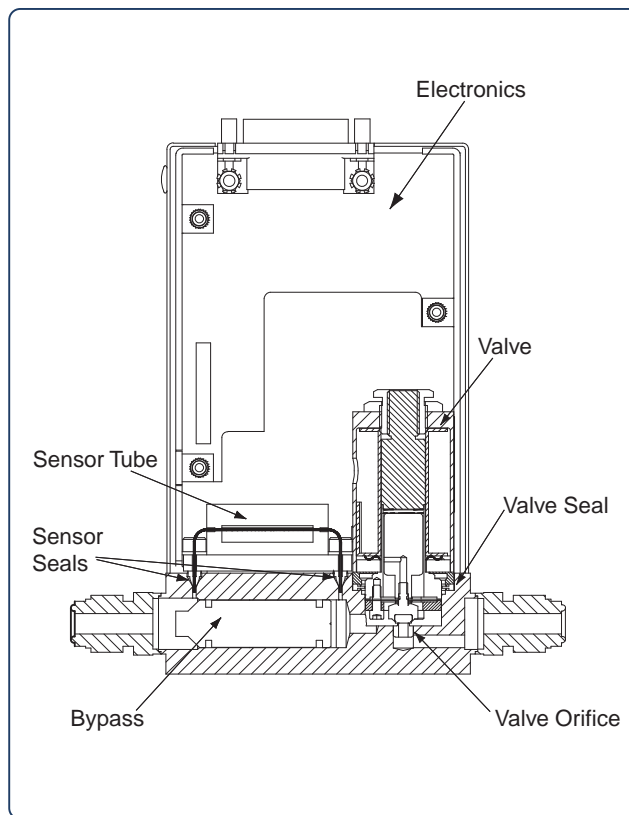
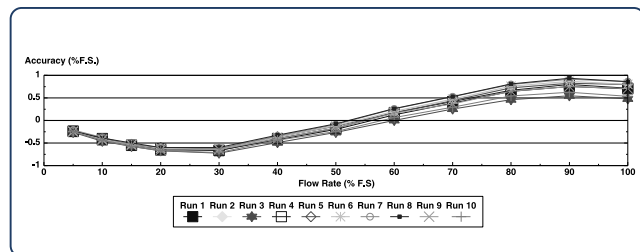
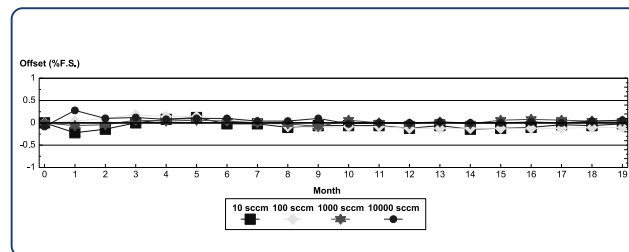


Figure 1 —
Cross section diagram of a Type 1479 Mass-Flo Controller.



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.



Specifications

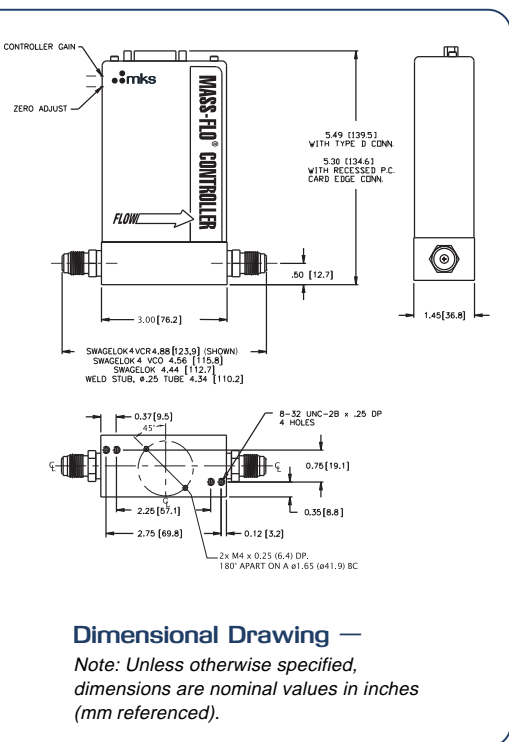
| | |
|--|--|
| Full Scale Ranges (N₂ equivalent) | 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm |
| Maximum Inlet Pressure | 150 psig |
| Normal Operating Pressure Differential (with atmospheric pressure at the MFC outlet) | |
| 10 to 5000 sccm | 10 to 40 psid |
| 10000 to 20000 sccm | 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.) |
| Digital | RS-485, DeviceNet |
| 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 x 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 | 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: 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 | |
| Digital Profibus® | 4 | |
| Digital RS-485 | 5 | |
| Digital DeviceNet™ | 6 | |

| Seals Materials | | |
|---|---|---|
| Metal, with Kel-F valve plug 200 sccm and below, Teflon® valve plug 500 sccm and above | M | M |

| Firmware (DeviceNet only) | | |
|---|-------|-------|
| Unless Specified, MKS will ship v1.01 FW Newer Versions of FW are available, Contact Applications Engineering for Ordering Codes. | BLANK | BLANK |

| 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 |
| Type 146C four-channel power supply/readout/set point control/RS232 | | 146C |

| Cabling for 1479A: | | |
|---|--|--|
| Type CB147-12-10 to connect 1479 9-pin Type "D" to PR4000, 146, 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, 146, 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, 146, 647 | | |

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



1479 - 7/09
 © 2006 MKS Instruments, Inc.
 All rights reserved.

Global Headquarters

2 Tech Drive, Suite 201
 Andover, MA 01810
 Tel: 978.645.5500
 Tel: 800.227.8766 (in U.S.A.)
 Web: www.mksinst.com

Specifications are subject to change without notice.
 Califlow® and Mass-Flo® are registered trademarks of MKS Instruments, Inc., Andover, MA., Swagelok® and VCR® are registered trademarks of Swagelok Marketing Co., Solon, OH. Kel-F® is a registered trademark of 3M Company, Minneapolis, MN. DeviceNet™ is a trademark of the Open DeviceNet Vendor Association, Coral Springs, FL. Teflon® is a registered trademark of E.I. DuPont Co., Inc., Wilmington, DE.

