



**Flow**

**& Control  
Measurement**

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# M100B/M10MB

## ECONOMICAL, RANGE ADJUSTABLE MASS-FLO® CONTROLLER/METER

The economical M100B Mass Flow Controller and M10MB Mass Flow Meter are designed to control and measure gas flows in a wide variety of analytical, experimental and industrial applications. The instruments are available with Full Scale ranges of 10 sccm to 50 slm. The M100B can also be used as a pressure controller when connected to an MKS pressure transducer.

The M100B and M10MB utilize industry standard 3-inch footprint and comes with a variety of fittings enabling the instruments to drop into existing gas lines without modification. The instruments are constructed of 316L stainless steel and offer a choice of elastomer seals for use with a wide variety of gases.

### Features & Benefits

#### Accurate

- Patented<sup>1</sup> bypass and electronics provide excellent linearity over a wide range of operating conditions
- Typical 1% F.S. accuracy for flows from 10 sccm to 5 slm

#### Robust

- Electronics design MTBF of over 100 years and STRIFE tested to ensure long term performance
- Elastomer sealed, 316L stainless steel
- Two year warranty ensures quality and customer satisfaction

#### Compatible

- Standard three inch footprint with a selection of fittings for ease of installation
- Class 100 cleanroom manufactured and tested
- CE Mark compliant — meets requirements for European Union
- Compatible with earlier MKS MFC's and power supply readout modules

<sup>1</sup>U.S. Patent No. 5672821

U.S. Patent No. 2582971



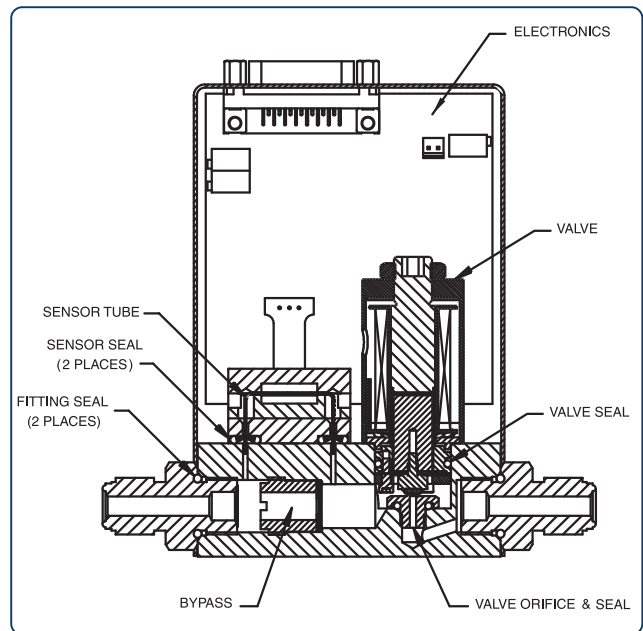
A robust 15-pin "D" electrical connector is provided with MKS standard pinouts. Power required for the M100B controller is minimal: the nominal  $\pm 15$  VDC consumes only 100 mA during operation. The M10MB meter uses even less. These instruments are compatible with MKS power supply and display electronics.

The MKS Type M100B utilizes the latest thermal sensor design for mass flow measurement with a unique and patented re-rangeable bypass. Both the M100B and M10MB (excluding 50 SLM F.S.) can often be re-ranged through simple changing of the sensor section bypass that is accessible through the inlet of the device.

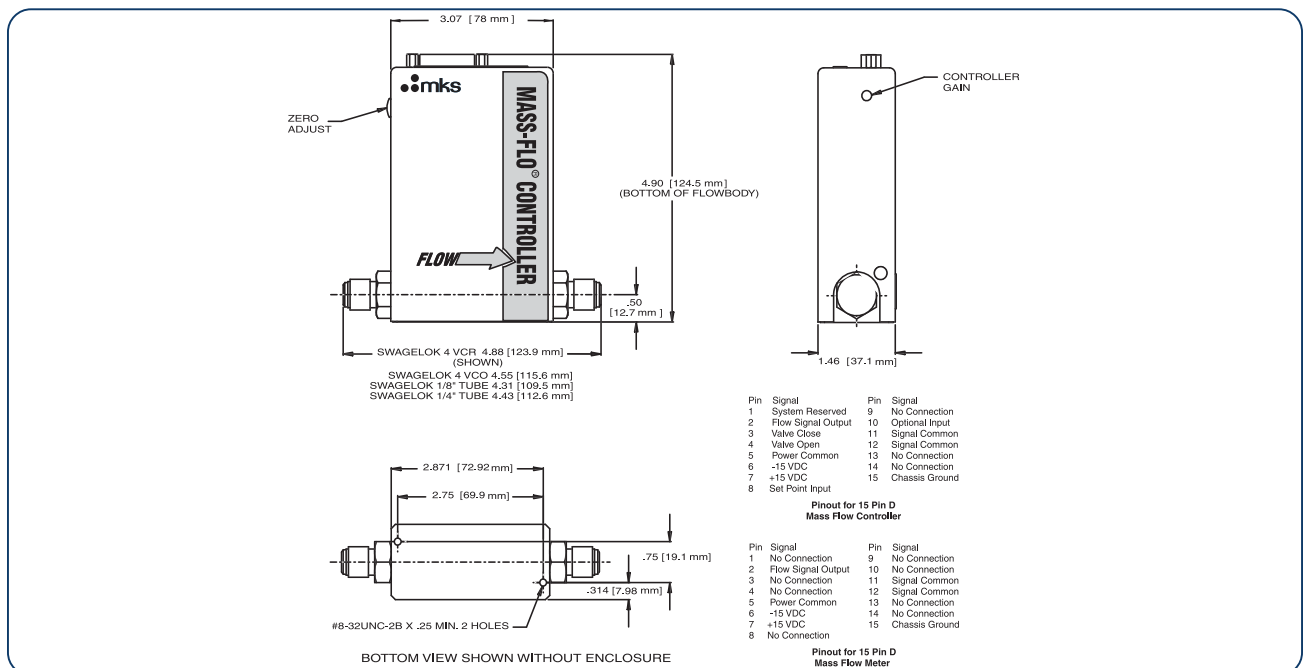
Performance and reliability have been designed into the M100B. The electronics design MTBF is well over one hundred years as determined in accordance with MIL-HDBK-217F. Extensive STRIFE testing including ESD, RFI, vibration and humidity soak ensures the instrument's robust character and capabilities. The M100B also complies with European CE Mark requirements. As a statement of our confidence in the performance of the M100B, it carries a two-year warranty.<sup>1</sup>

Size, compatibility, reliability, and economical price make the M100B and M10MB the ideal choices for gas flow control and metering requirements.

<sup>1</sup> The user is responsible for preventative maintenance.



**Cross Section Diagram —**  
Type M100B Mass-Flo Controller



**Dimensional Drawing —**

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



# Specifications

<b>Full Scale Ranges</b> (N <sub>2</sub> equivalent)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 30000, 50000 sccm
<b>Maximum Inlet Pressure</b>	150 psig
<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
30000 to 50000 sccm	20 to 40 psid
<b>Control Range</b>	2% to 100% of F.S.
<b>Accuracy</b> (Calibration gas, including non-linearity, hysteresis, and non-repeatability referenced to 760 mmHg and 0°C)	
10 to 5000 sccm	± 1% of F.S.
10000 to 20000 sccm	± 1.5% of F.S.
30000 to 50000 sccm	± 2% of F.S.
<b>Repeatability</b>	± 0.2% of F.S.
<b>Resolution</b>	0.1% of F.S.
<b>Temperature Coefficients</b>	
Zero	< 0.10% 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)	< 15 min
<b>Controller Settling Time</b> (per SEMI Guideline E17-91, 0-100%)	< 2 sec (typical); ≤ 3 sec (50 SLM N <sub>2</sub> equivalent)
<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. current at start-up (first 2 sec)	± 15 VDC (± 5%) @ 200 mA
Typical current at steady state	± 15 VDC (± 5%) @ 100 mA
<b>Set Point Command Signal</b>	0 to 5 VDC from < 20K Ω
<b>Output Signal</b>	0 to 5 VDC into > 10K Ω
<b>Output Impedance</b>	< 1 Ω
<b>Connector Type</b>	15-pin Type "D" (The 15-pin Type "D" is electrically compatible with other MKS flow controllers. Consult Applications Engineering for details.)
<b>Wetted Materials</b>	
Standard	316L S.S., Viton®, nickel
Optional (seals and valve seat)	Buna-N, Neoprene®
<b>Leak Integrity</b>	
External (scc/sec He)	< 1 x 10 <sup>-9</sup>
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.)
<b>Fittings</b>	Swagelok® 4 VCR®, Swagelok® 4 VCO®, 1/4" Swagelok®, 1/8" Swagelok®
<b>Electromagnetic Compatibility</b>	Fully CE Compliant to ECD Directive 2004/108/EEC 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	70,000	74C
004	Argon	Ar	70,000	74C
007	Hydrogen	H2	50,000	54C
008	Air	-	50,000	54C
013	Nitrogen	N2	50,000	54C
015	Oxygen	O2	50,000	54C
025	Carbon Dioxide	CO2	30,000	34C
028	Methane	CH4	30,000	34C
029	Ammonia	NH3	30,000	34C
039	Silane	SiH4	30,000	34C
110	Sulfur HexaFluoride	SF6	10,000	14C

Ordering Code Example: M100B00411CR1BV      Code      Configuration

### Model Code

Controller	M100B	M100B
Meter	M10MB	

### 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 50000 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		
30000	34C		
50000*	54C		
*available with 4 VCR and 1/4" Swagelok compression fittings only			

### Fittings (compatible with)

Swagelok 4 VCR male	R	R
Swagelok 4 VCO male	G	
1/4" Swagelok	S	
1/8" Swagelok**	P	
**available for flow rates of <5000 sccm N <sub>2</sub> only		
6mm Swagelok	M	

### Valve

Normally Closed (controller)	1	1
No Valve (meter)	3	

### Connector

Analog 15-pin Type "D"	B	B
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### Seal Materials\*\*\*

Viton	V	V
Buna-N	B	
Neoprene	N	

\*\*\* Acetylene and Chlorine are not compatible with Viton, Buna-N, or Neoprene. Do not use either with M100B or M10MB.

### Optional Accessories

Type 246C single-channel power supply/readout/set point control	246B
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/RS-232	PR4000BS
Type PR4000B two-channel power supply/readout/set point control/RS-232	PR4000BF

### Cabling for M100B:

Type CB259-5-10 to connect M100B 15-pin Type "D" to 246, 247  
 Type CB147-1-10 to connect M100B 15-pin Type "D" to PR4000, 186, 167, 647

Contact Applications Engineering for shielded cables required for CE Compliance.



### Global Headquarters

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