Unit 8160 Series

High performance mass flow controllers and meters

» MultiFlo™ option for superior performance, reduced inventory and in situ support
» Advanced design using proven technology for the high performance that is required for next generation semiconductor applications
» Best performance and reliability in the industry
» Popular ultra-high purity metal seal flow controller
» Available with analog, RS485, and DeviceNet™ interfaces

Features at a glance

- Advanced corrosion resistance via passivated 316L SS
- Ultra-high purity 4µ inch Ra surface finish
- 50% reduction in dry-down time compared to high-purity 1660 Series models. Dry-down is reduced because of better surface smoothness and chemistry. 8160 Series also have higher purge flows than conventional MFCs.
- Sealed with high leak integrity metal seals. Uses metal seals to produce a leak integrity of 1 x 10^{-10} atm-cc/sec (He)
- Higher reliability – MTBF of 550,000 hours and ultra-low drift of less than 0.6% per year to reduce year-to-year maintenance, increase uptime and reduce cost of ownership
- Statistically verified accuracy. Allows you to easily replicate processes from tool-to-tool and fab-to-fab and to use a single MFC over a wider range of flows.
- Minimized dead space for increased accuracy and faster response time under all turn-on conditions
- Designed to meet the SEMI standard for Sensor Actuator Network Communications for DeviceNet (SEMI E54-97). Model 8165 specifically designed for full ODVA compliance

The Celerity advantage

- Digital control
- Designed to operate on tools designed for analog MFCs
- Increased reliability with over 585,000 hours MTBF
- High resolution calibration control that utilizes a 32 point calibration table for each gas
- MultiFlo MFCs can be reconfigured for multiple gases and flow ranges. They eliminate the need to purchase spares for each application, reducing associated inventory
- Real time in situ reranging, monitoring, diagnostics and trouble-shooting to reduce equipment downtime and
- Alarm-ready with zero drift warning

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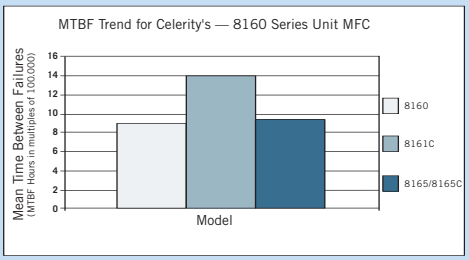
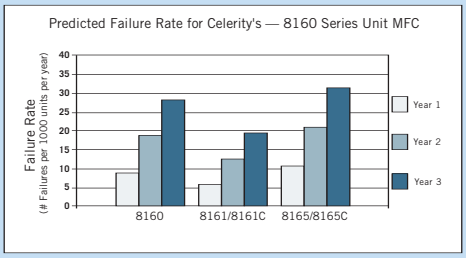
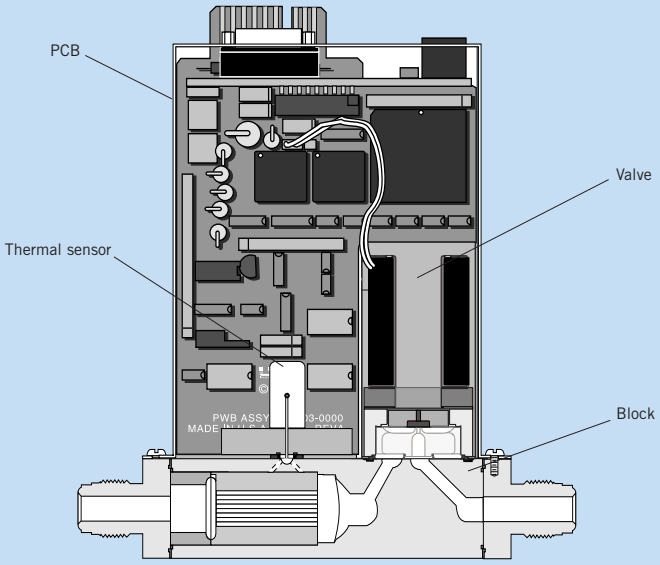






Typical mass flow controller cutaway view

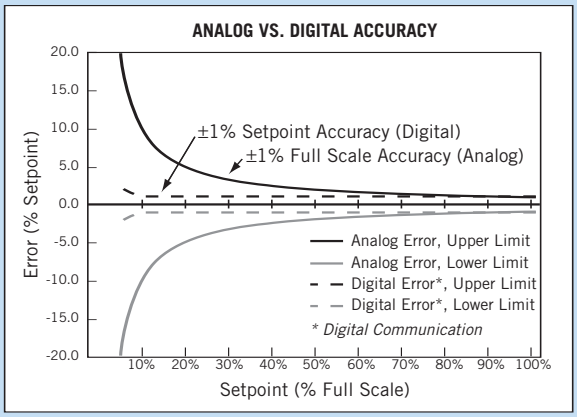
Description

The Unit 8160 series high performance mass flow controllers control gas flows using a high precision electromagnetic valve responding to flow measurements through a sensor using the thermal properties of gases. Since the thermal mass flow measurement is independent of pressure and temperature, this method provides a stable measurement with changing process conditions. The patented IsoSensor™ is a high stability sensor that produces ultra-low drift, reducing the need for frequent recalibration. It also eliminates thermal siphoning effects. The precision electromagnetic control valve has a wide dynamic range that provides superior precision and control. It has been subjected to over 8 million cycles with no degradation in performance. It has proven to have superior reliability to piezo actuators and can also operate over a larger pressure range. It was designed with fewer parts to enhance speed, responsiveness and long-term reliability.

Unit 8160 series mass flow controllers are designed for superior corrosion resistance for the large number of corrosive and reactive gases used in semiconductor device manufacturing that can contribute to the microcontamination of the silicon wafer surface when they oxidize the steel of the gas distribution system. Enhanced corrosion resistance and moisture dry-down performance directly reduce wafer microcontamination.

Unit 8160 series MFCs provide advanced corrosion resistance with 316L SS material passivated with a highly effective proprietary environmentally-friendly organic/chelant passivation process.

316L stainless steel has an intrinsic corrosion resistance because of its ability to form a protective chromium oxide (Cr_2O_3) or “passive” layer that protects the steel from oxidation. The corrosion resistance at the steel surface can be further enhanced by increasing the depth of the chromium oxide layer and the chromium enrichment level. Celerity uses an organic acid/chelate passivation process that produces higher oxide thickness, higher chromium-to-iron ratio and chromium oxide/iron oxide ratio and faster moisture challenge response than traditional electropolishing process.



Digital model 8161 and 8165 have an accuracy of ±1% of setpoint, while the analog model 8160 has an accuracy of ±1% of full scale. (Accuracy chart reflects primary standard calibration option.)

Model description

Unit 8160	Analog control	Analog interface
Unit 8161 MultiFlo	Digital control	Analog and RS485 interfaces
Unit 8165 MultiFlo	Digital control	DeviceNet interface

24/7 service and support

Celerity is unmatched in the industry for service and support. We have worldwide service locations with calibration, application support, and repair capabilities, operating 24 hours a day, 7 days a week. Celerity's website also provides updated application and technical support.

Visit us at www.celerity.net.

Warranty

- 3 year standard warranty
- Extended warranty option available

Unit 8160 Series Specifications

Materials

Pre-Filter	1 to 2 µm
Gas Path	SEMI F20 Compliant
Surface Finish	4 µ inch Ra
Seals	Metal
Weight	<2.65 lbs (1.2 kg)

Electrical

Current/Voltage (D/A)	160mA max @ +15 VDC and 200mA max @ –15 VDC
Power (D/A)	5.0 watts max
Current/Voltage (DNet)	600 mA @ 12 VDC and 300 mA @ 24 VDC
Power (DNet)	7.2 watts max
Certifications	EMC 89/336 EEC

Performance	**SC10-SC14**	**SC15-SC16**	**SC17-SC18**
Settling Time	≤1 sec	≤1 sec	≤1 sec
Flow Range	3–750 sccm	751–6000 sccm	6001–30000 sccm
Differential Pressure*	7 to 45 psid	10 to 45 psid	15 to 45 psid
Accuracy (Model 8161, 8165)			
2%	Valve Shut-off	Valve Shut-off	Valve Shut-off
2% to 5%	Not Specified	Not Specified	Not Specified
5% to 35%	±0.35% F.S.	±0.35% F.S.	±0.35% F.S.
35% to 100%	±1.0% S.P.	±1.0% S.P.	±1.0% S.P.
Accuracy (Model 8160)	±1.0% F.S.		
Repeatability	±0.15% F.S.		
Linearity	±0.5% F.S.		
Ambient Temperature Coefficient			
Zero	0.005% F.S. per °C		
Span	0.1% F.S. per °C		
Leak Integrity	$1x10^{-10}$ atm-cc/sec (He)		
Zero Drift	0.6% F.S. per year		
Valve Leakby Rate	1% F.S.		
Proof Pressure	500 psia max		
Burst Pressure	1500 psia max		
Valve Configuration	Normally Closed or Normally Open		
Temperature Range	10°C–50°C		
Warm Up Time	30 minutes		
Mounting Position	HOV or HOS		

**30slm to 50slm flow range is specified to 1% Full Scale Accuracy per the operating conditions defined within the customer special request reference number.*

**Argon gas applications require an additional 10 psid differential pressure.*

Please reference Digital and Analog Mass Flow Controllers and Meters User's Guide *for recommended zeroing procedures and operating practices. Inquire with Celerity Technical Services for special application requests. Unless otherwise stated, all specifications and features comply with factory calibration conditions.*

This document is subject to revision without notification. Please verify this copy is the most recent one before using.

Specifications and features are subject to change without notice. All specifications reflect nitrogen calibration using Molbloc/Molbox™ transfer standards. Calibration by primary standards and surrogate gases is available as an additional charge option.

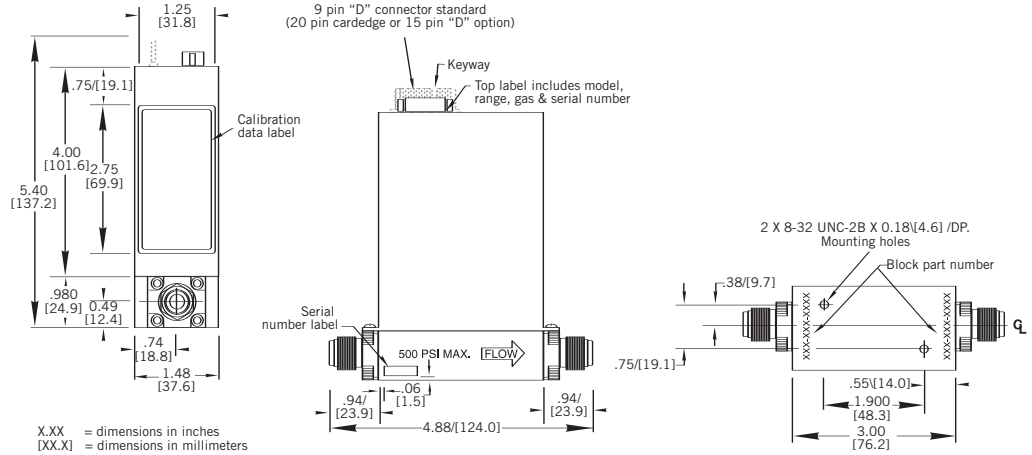
Unit 8160 Series Product Configuration

C	Gas Flow Controller																
M	Gas Flow Meter																
8160	Analog, Metal Seal																
8161	Digital, Metal Seal																
8161C	Digital, Metal Seal, Configurable MultiFlo®																
8165	DeviceNet, Metal Seal																
8165C	DeviceNet, Metal Seal, Configurable MultiFlo®																
		A	Auto Shut-off (Std)														
		X	No Auto Shut-off														
				F	Fast Start <1 Second Response (Std)												
				S	5 Second Linear Soft Start												
				T	6 – 10 Second Soft Start												
				V	10 – 15 Second Soft Start												
				X	No Valve (Flow Meter)												
						XXXX	**XXXX**	Specify Gas Code and Range, i.e. "0004" = Argon and "010L" = 10 slm									
						SC10	**010C**	Standard Configuration #10, 3–10 sccm N_2 equivalent									
						SC11	**030C**	Standard Configuration #11, 11–30 sccm N_2 equivalent									
						SC12/SH12	**090C**	Standard Configuration #12, 31–90 sccm N_2 equivalent									
						SC13/SH13	**250C**	Standard Configuration #13, 91–250 sccm N_2 equivalent									
						SC14/SH14	**750C**	Standard Configuration #14, 251–750 sccm N_2 equivalent									
						SC15	**002L**	Standard Configuration #15, 751–2000 sccm N_2 equivalent									
						SC16	**006L**	Standard Configuration #16, 2001–6000 sccm N_2 equivalent									
						SC17	**015L**	Standard Configuration #17, 6001–15000 sccm N_2 equivalent									
						SC18	**030L**	Standard Configuration #18, 15001–30000 sccm N_2 equivalent									
								4R	1/4" VCR (Std)								
								4S	1/4" Swagelok								
								DB	Downported – C Seal								
								DW	Downported – W Seal								
									HOV	Horizontal or Vertical Mounting Position (Std)							
									HOS	Horizontal or Side Mounting Position							
										A	Atmospheric Downstream Pressure							
										V	Vacuum Downstream Pressure							
											M	**M**	Metal O-Ring /Metal Seat (Std)				
											M	**F**	Metal O-Ring /Kel F Seat				
											M	**X**	Metal O-Ring /No Valve (Flow Meter)				
													D	DeviceNet			
													E	Card Edge Connector, 0–5 VDC			
													S	9 Pin "D", UDS9 Pin Out, 0–5 VDC			
													T	9 Pin "D", UDT9 Pin Out, 0–5 VDC			
													U	15 Pin "D", UDU15 Pin Out, 0–5 VDC			
														XXXX	Customer Special Request No.		
															C	Normally Closed Solenoid Valve (Std)	
															O	Normally Open Solenoid Valve	
															X	No Valve (Flow Meter)	
																S	Valve Downstream (Std)
																B	Valve Upstream (Buffered)
																X	No Valve (Flow Meter)
																	A Auto-Zero Enabled
																	X Auto-Zero Disabled
																	04E 4 µ in Ra (Std)
																	XXX Reference Calibration
																	000 0°C Reference (Std)
																	XXXX Version Code

Example:

C	8161C	A	F	SC12	090C	4R	HOV	V	M	M	S	XXXX	C	S	X	04E	000	0001

*Select "SH" series configurations for the following corrosive gas species: BCl_3, Cl_2, HBr or HCl.



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