

1661e Series

High Purity MultiFlo Universal Flow Controller

- » 1% digital setpoint accuracy and <1 second response
- » High reliability and repeatability
- » MultiFlo® technology
- » Digitals are backward-compatible to analog MFCs
- » Process transparent with 1661 model



Advanced control systems

The 1661e model MultiFlo mass flow controller offers state-of-the-art, advanced control systems unequalled in the market today. The underlying algorithms provide the best-in-class accuracy of $\pm 1\%$ setpoint and response of <1 second. The 1661e model can meet specifications for any gas over a large inlet/outlet pressure range, over a wide temperature range, and over a large range of flow rates.

MultiFlo® technology



MultiFlo®

Unit digital mass flow controllers and meters with MultiFlo technology are the industry's most accurate mass flow devices offering $\pm 1\%$ of setpoint accuracy.

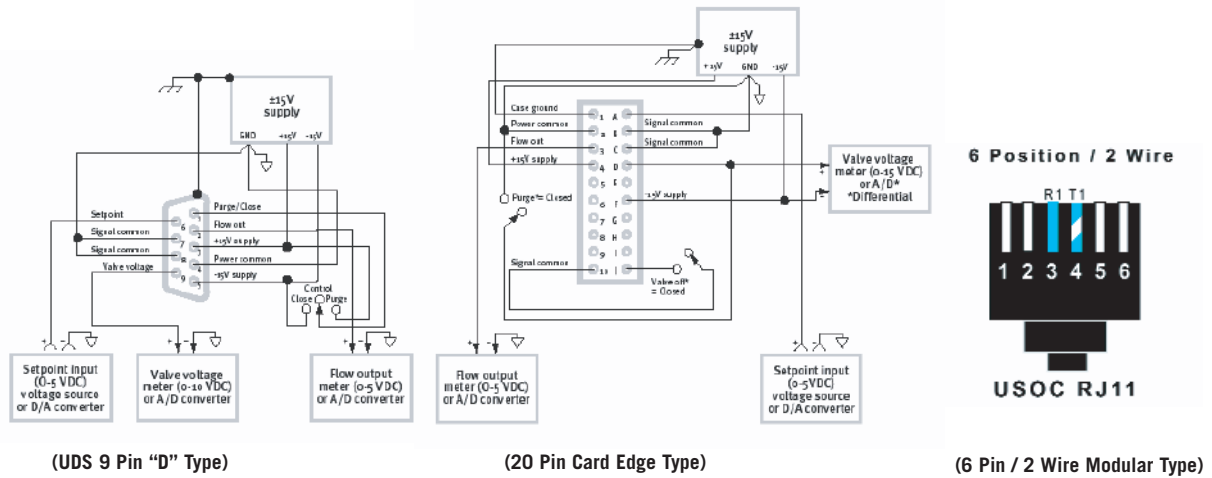
Other mass flow controllers and meters measure accuracy in percentage of full scale. The high resolution calibration control utilizes a 32 point calibration table for each gas, resulting in a ten-fold improvement in accuracy. We guarantee a zero drift to less than 0.6% per year, reducing the number of periodic calibrations needed.

Each MultiFlo digital device can be field programmed for unlimited process gases with a programmable full scale from 33% to 100% of the maximum specified range. This eliminates the need to purchase spares for each application and lowers the cost of ownership. In addition, it reduces costs associated with change of gas and range. The response time can be programmed from less than 1 second up to 20 seconds to meet process requirements. Further, real time in situ calibration, monitoring, diagnostics, and trouble-shooting reduce equipment down-time and cost of ownership.

MultiFlo® benefits

- Replacement MFCs are available in only a few minutes
- Nine standard MFC part numbers cover 85% of all applications
- Enables on-site gas and range changes with no surrogate gas requirements
- Enables last minute changes in gas panel integration without impacting on-time delivery
- Dramatically reduces inventory requirements
- Increases tool uptime

Electrical Specifications



The 1661e has a dual connector and can be operated in either RS485 or analog mode. When operating in the analog mode, the RS485 port can still be used to read flow and change gases and ranges.

Better by design

The Unit 132 valve incorporated within the 1661e is the premier proportional control valve in the market today. Its unique design has been optimized to eliminate threads and shims that can trap dirt and moisture. In testing, it is subjected to over 10 million cycles with no degradation in performance. The electromagnetic actuator is proven to have superior reliability to piezo actuators and can also operate over a larger pressure range. This design has been used in over 200,000 precision mass flow controllers demonstrating unmatched reliability.

The 3 sigma guarantee

At Celerity, we stand behind our specifications. While others give only one or two sigma limits (66.7% or 95%), Celerity guarantees 3 sigma limits, or 99.7% confidence, on critical parameters.

CrossChek™ metrology system



CrossChek is a method of ensuring unit-to-unit reproducibility of manufactured flow control products. With CrossChek, a manufacturing transfer standard or "calibrator" is compared against another transfer standard once per day. This "check" ensures that transfer standards operate within a statistical margin of error from calibrator to calibrator. The result: mass flow controllers and meters comply with published accuracy specifications and lot-to-lot variation is eliminated.

Universal electrical interfaces

Both analog and RS485 protocol options are supported via three built-in connector types:

- 9 Pin D-Sub (analog)
- 20 Pin Cardedge (analog)
- Dual daisy chain 6 position modular jack (RS485)

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Electrical

Certifications	EMC 89/336/EEC
Power	160mA (max), ±15 VDC or 11 to 25 VDC

Materials

Gas Path Materials	316L SS/ 7 Mo (SEMI F20)
Surface Finish	10 or 16 μ inch Ra (SEMI F19)
Weight	≤ 2.65 lbs (1.20 kg)

Options

See next page for ordering options

Operating Limits*

	Normally Closed	Normally Open
Burst Pressure	500 psig	500 psig
Proof Pressure	140 psig	140 psig
Inlet Pressure		
Atmospheric Exhaust	20 psia to 60 psia	20 psia to 55 psia
Vacuum Exhaust	20 psia to 55 psia	20 psia to 50 psia
Differential Pressure		
≤ 1 L	7 psid to 45 psid	7 psid to 40 psid
≤ 2.6 L	9 psid to 45 psid	9 psid to 40 psid
≤ 15 L	10 psid to 45 psid	10 psid to 40 psid
≤ 30 L	15 psid to 45 psid	15 psid to 40 psid
Control Valve		
Operating Range	10% to 100%	
Setpoint Range	2% to 100% (2% enables auto shut-off)	
Flow	60 minutes	
Operating Range	30 to 30,000 sccm	30 to 30,000 sccm
Setpoint Range	1 to 30,000 sccm	1 to 30,000 sccm
Turndown Ratio	Up to 25:1	Up to 25:1
Supported Gas List	Please refer to Celerity document FSB-001-0020.	
Temperature	0 °C to 45 °C	0 °C to 45 °C

Performance (Accuracy)*

Flow	
Calibration	
10% to 34%	± 0.35% F.S.
35% to 100%	± 1.0% S.P.
Downrange	Contact Factory for Details.
Gas Conversion	Contact Factory for Details.
Δ Temp (Span)	0.10% F.S. per °C
Zero (No Flow)	
Drift	≤ 0.60% F.S. per yr
Offset	± 0.20% F.S.
Δ Temp (Zero)	0.05% F.S. per °C

Performance (General)*

Leak Integrity	
External	≤ 1 x 10 ⁻¹⁰ atm.cc/sec He (SEMI E16)
Internal	≤ 1% F.S. (SEMI F1)
Linearity	± 0.50% F.S. (SEMI E27)
Repeatability	± 0.15% F.S. (SEMI E56)
Settling Time	< 1 sec (SEMI E17)

Factory Calibration Conditions

Calibration Gas	Nitrogen
Cardinal Verification Pts	0%, 10%, 25%, 100%
Downrange Ratio	1:1 (Non-downranged)
Inlet Pressure	30 to 45 psia
Temperature	21 °C ± 3 °C
Mounting Attitude	Horizontal Base Down
Warm Up Time	60 minutes (SEMI E68)
Zero Procedure	Contact Factory for Details.

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

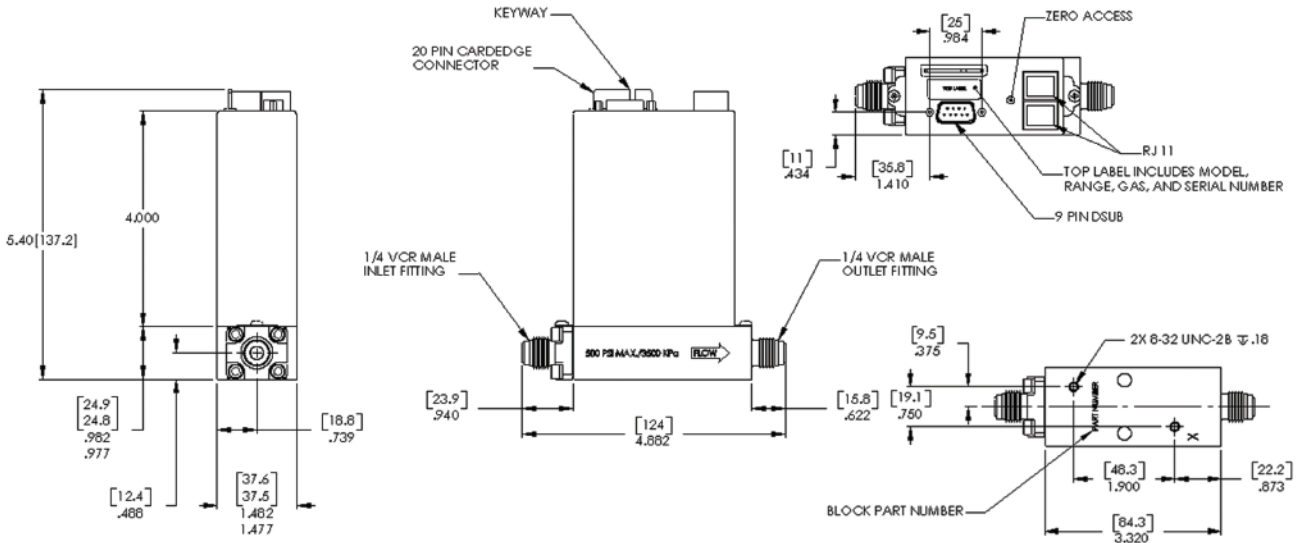
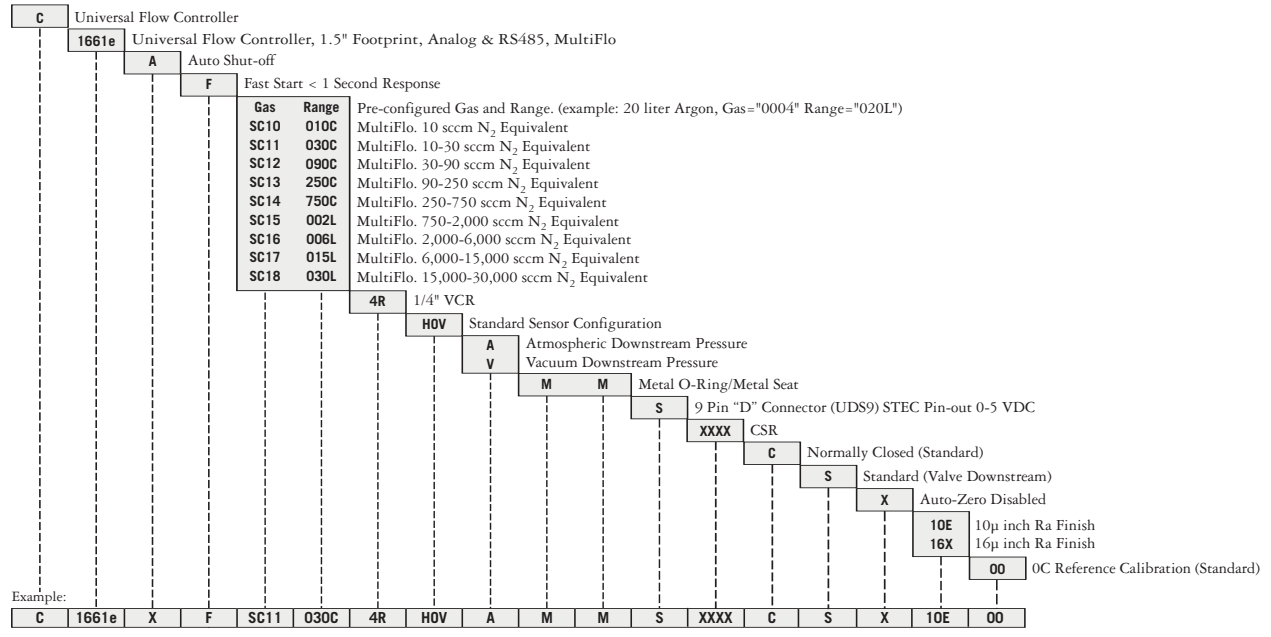
- 3 year standard warranty
- Extended warranty option available

Please contact the factory regarding recommended zeroing procedures and operating practices for actual use conditions.

* Performance and operating limits comply with Factory Calibration Conditions.

Specifications and features are subject to change without notice.

1661e Series Product Configuration



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UNIT

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