

7320 Series

Mass Flow Controller/Meter with Shut-off Valve and Elastomer Seals

- » Outstanding reliability
- » Outstanding repeatability
- » Flexible analog or digital control
- » Less than 1 second response time
- » Incorporates MultiFlo™ technology

Features at a glance

- Control signal: -0-5 VDC, 4-20 mA, RS485 and 0-5 VDC (dual connector), DeviceNet™ or PROFIBUS™
- Range 5 sccm—30 slm (N₂ equivalent)
- Reliable MTBF over 300,000 hours (analog)
- Reliable MTBF over 340,000 hours (digital)
- Repeatability ±0.15% of setpoint
- ±1% setpoint accuracy (digital)
- Zero drift: < 0.6% per year
- 1 x 10⁻⁹ atm-cc/sec (He) leak rate
- 2 year warranty
- 316L stainless steel
- Attitude insensitive
- Class 100 cleanroom manufacturing and packaging

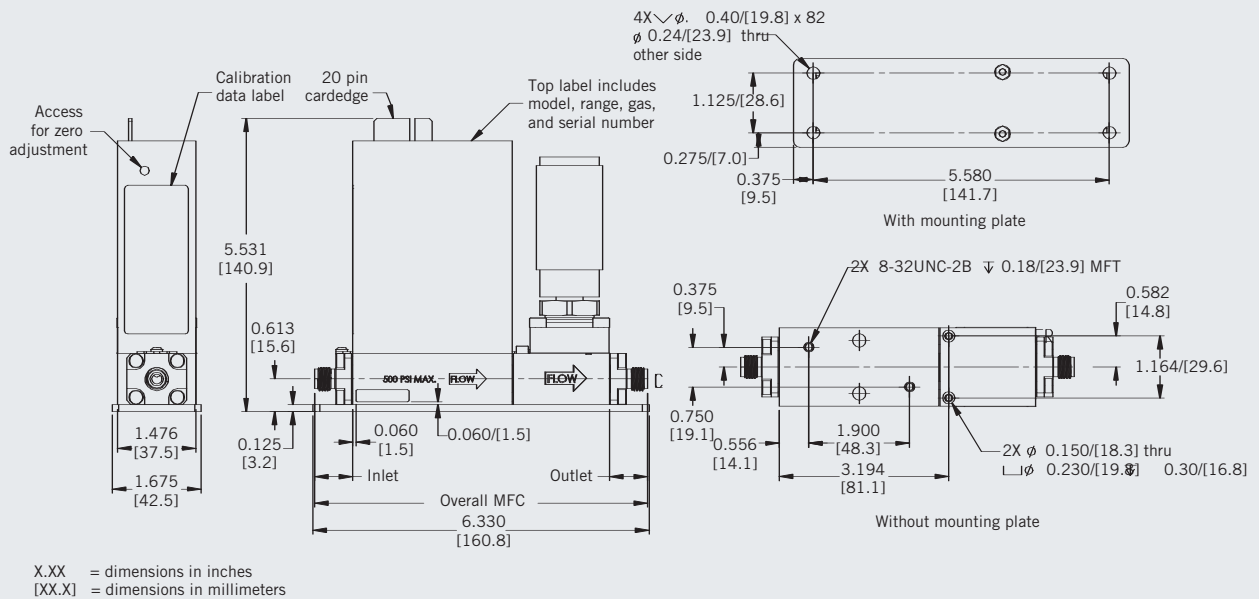
Air actuated shut-off valve features

- Downported pneumatic shut-off valve
- Less than 4 x 10⁻⁹ atm-cc/sec (He) leak rate
- Low internal volume
- Vespel® or PCTFE seats
- No internal springs
- Actuation pressure 70 psig (4.8 bar) minimum to 125 psig (8.6 bar) minimum

Typical applications

- Non-corrosive
- General process control
- Laser welding or cutting
- Fiber optics and glass coating
- Vacuum processes
- Combustion control
- Leak testing
- Purging
- Gas chromatography
- Chemical and petrochemical gas analysis
- Pharmaceutical manufacturing

Product dimensions



- Cv = 0.17 standard or 0.5 for high flow
- Color coded for normally open or closed configuration

Performance

The high performance 7320 Series mass flow controller (MFC) with shut-off valve utilizes the industry's most advanced elastomer seal instrument combined with a semiconductor grade air operated shut-off valve. At the heart of the 7320 Series is the high performance 7300 Series MFC. The 7300 Series MFC is available in an analog, digital MultiFlo, and DeviceNet MultiFlo configuration. In the analog configuration, the instrument provides 1% full scale accuracy. In the MultiFlo configuration the instrument provides 1% setpoint accuracy for 90% of the range.

The 7320 Series utilizes the C-seal SEMI PR 3.1 standard and downported air actuated shut-off valve. The 7300 Series is a standard product and can be serviced at any Celerity service center. The MFC integrates a high performance semiconductor grade shut-off valve for superior reliability. The downported design of the shut-off valve allows for easy maintenance.

Unmatched repeatability

The features that provide Unit MFCs superior repeatability are the IsoSensor™, the unique frictionless free-floating solenoid control valve, and the advanced

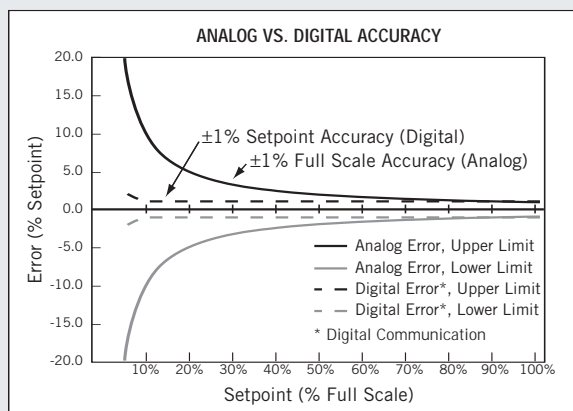
control electronics with temperature compensation. The Unit 7300 Series provides the same process result within 0.15% of full scale time after time, exceeding industry standards for repeatability.

Tested and field-proven reliability

Reliability is designed into the 7320 Series in a variety of ways. The electronics provide easier calibration, low drift, and linear accuracy. The single valve spring retains its tension, even after millions of flex operations, giving longer life to the MFC. Typically, our stable sensor allows for up to 2 years between calibrations. Further, based on actual field data, the 7320 Series has a proven MTBF of over 300,000 hours in the analog version and 340,000 hours in the digital version.

Advanced sensor design

A mass flow device is only as good as its mass flow sensor. The 7300 Series' patented thermal IsoSensor is designed using sophisticated modeling techniques to maximize output and minimize noise. In addition, stringent environmental testing has been performed to improve durability. The result is high output, high stability, and superior accuracy and reliability. Celerity is the only mass flow device manufacturer to offer an attitude insensitive sensor with no thermal siphoning effects.



Unit digital specification: 1% of setpoint with digital input for flows down to 10% of full scale and 0.1% full scale for setpoints below 10% full scale. Digital products utilize true setpoint accuracy as opposed to the full scale accuracy which is available on analog products. (Accuracy chart reflects primary standards calibration.)

Precision electromagnetic valve

The Unit 132 valve incorporated within the 7300 Series is the premier proportional control valve on today's market. Its unique design has been optimized to eliminate threads and shims that can trap dirt and moisture. In testing, it is subjected to over 8 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 Celerity MultiFlo™ advantage



Unit digital mass flow controllers and meters with MultiFlo technology are the 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

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Product specifications

All specifications are 3 sigma (exceeding with 99.7% confidence)

Accuracy	
7320	$\pm 1\%$ full scale
7321/7324	$\pm 1\%$ setpoint, 35% to 100% full scale $\pm 0.35\%$ full scale, < 35% full scale
Repeatability	$\pm 0.15\%$ full scale
Turn down ratio	50:1
Linearity	$\pm 0.15\%$ full scale
Operating pressure:	
Maximum inlet pressure	500 psig
Proof pressure	1,500 psig
Pressure drop (controller)	7 to 40 psid
Pressure drop (meter)	< 4 torr
Response:	
Fast	< 1 second
Ramp	Various linear ramps available
Operating temperature	0 to 50°C
Temperature coefficient:	
Zero	$\pm 0.03\%$ per °C
Span	$\pm 0.05\%$ per °C
Pressure coefficient	0.0025% per psi
Zero drift	< 0.58% per year
Leak integrity	1×10^{-9} atm-cc/sec (He)
Warm-up time	30 minutes
Power:	
Controller	+15 VDC (100 mA max.), -15 VDC (200 mA max.)
Meter	+15 VDC (50 mA max.), -15 VDC (50 mA max.)
Input impedance	100,000 ohm minimum
Output impedance	10 ohm maximum
Wetted materials	316L stainless steel, elastomer seal, 304 stainless steel spring
EMI/EFI Resistance	Completely shielded electronics
Certification	Fully CE certified
Calibration	National Institute of Standards and Technology (N.I.S.T.) traceable

Shut-off valve specifications

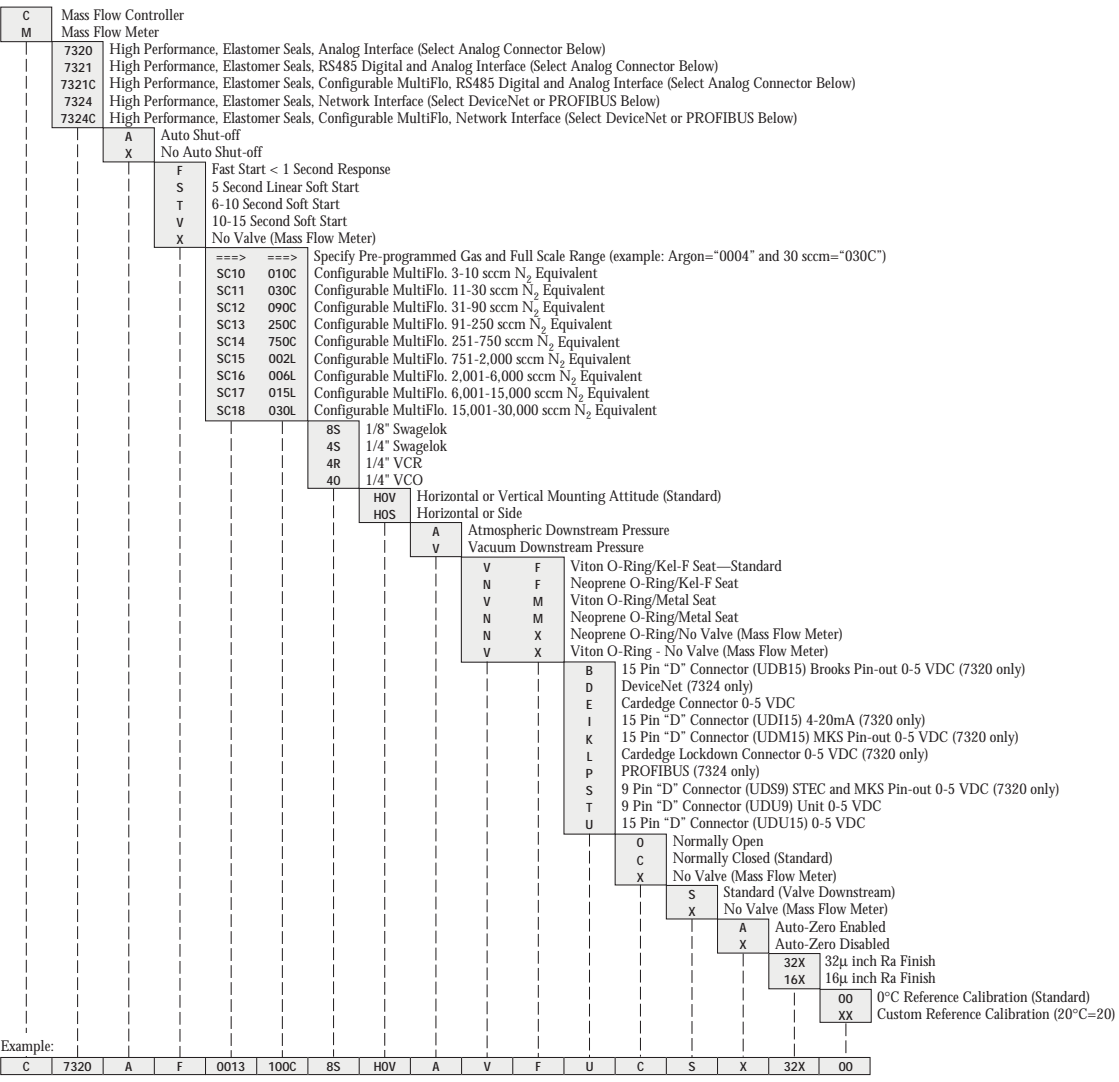
Pressure rating	Per criteria of ANSI/ASME B31.3
Maximum pressure rating	125 psig (8.6 bar)
Materials in contact with media:	
Body	316L VAR stainless steel
Valve seat	PCTFE
Diaphragm	Elgiloy
Remaining parts	316 stainless steel
Flow capacity	$C_v = 0.17$ standard model
Internal surface finish	10 Ra
Certified max. inboard leak rate:	
Seat	4×10^{-9} atm cc/sec (He)
Diaphragm	1×10^{-9} atm cc/sec (He)
Actuator port	10-32 UNF
Media temperature PCTFE:	-65°F to +140°F (-54°C to +60°C)
Actuation pressure	70 psig min. (4.8 bar) to 125 psig max. (8.6 bar)

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.

7320 Series Product Configuration



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 troubleshooting, reduce equipment down-time and cost of ownership.

MultiFlo digital model 7321 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, change gases and ranges. The DeviceNet and PROFIBUS model 7324 utilize either the PROFIBUS or Open DeviceNet Vendors Association (ODVA) compliant interfaces.

CrossChek™ metrology system



CrossChek™

Celerity's world-class CrossChek calibration methodology maintains SPC-verified calibration accuracy within ±3 sigma limits (99.7% confidence level).

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.



CELERITY, INC.
22600 Savi Ranch Parkway
Yorba Linda, California 92887
Telephone 714.279.3500
Facsimile 714.921.0804
www.celerity.net



For technical assistance, contact Celerity Applications Engineering at 714.279.3500.

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