MultiFlo™ Technology

Unit Mass Flow Controllers

» Supports over 180 gases and mixtures
» Reconfigure MFCs in seconds
» User-friendly software
» Reduces user's unique part number count
» Supports 1% setpoint accuracy

UNIT 150

CELERITY

MultiFlo™ Overview

MultiFlo is an enabling technology that allows users to configure Unit mass flow controllers (MFCs) for a broad spectrum of gases and gas ranges. MultiFlo MFCs support over 180 gases and mixtures via 9 standard configurations (SC). SC's may be configured before and after installation, using MultiFlo Configurator software. No calibration gas or special test fixture is required.

MultiFlo MFCs are compatible with all popular Analog and Digital communication options (i.e. 4-20mA, 0-5V, DeviceNet, PROFIBUS, RS485, etc.). In addition, MultiFlo supports 1% setpoint digital accuracy.

MultiFlo™ Technology

MultiFlo is the first physics-based solution to the problem of accommodating multiple gases on a single device.

Three factors enable MultiFlo:

(1) An advanced IsoSensor™, with an isotropic coil design that maximizes the signal to noise ratio. The IsoSensor's robust, and compact packaging enhances durability, reduces sensitivity to vibration and provides a sensor option that eliminates thermal siphoning concerns.

(2) The model 132 proportional control valve enables a 1000:1 turn-down ratio and operates over eight million cycles with no

MFC Technology Evolution

Analog
-1% of full-scale accuracy
-Slower response
-5 points for calibration
-Single gas/range
-Difficult/costly to reconfigure

Conventional Digital
-1% of setpoint accuracy
-Faster response
-Can store multiple calibration pages,
 but needs to be pre-programmed
-Available from most MFC manufacturers

MultiFlo
-Is the **next generation digital product**
->180 gases on a single device
-No surrogate gas or calibration gas required
-OEM and end-user acceptance worldwide
-Celerity is the only MFC provider offering
 MultiFlo

degradation to performance. This is achieved by means of a frictionless free floating plunger design that functions without threads or shims (that trap debris and moisture). The valve assembly utilizes only three wetted parts, enabling industry leading reproducibility and down-ranging within MultiFlo MFCs.

(3) We have modeled the fluid dynamics and thermal characteristics of over 180 different gases and mixtures with the known mechanical attributes of our valve, and the linear performance of our IsoSensor. This data is embedded in every MultiFlo MFC, and is the core enabling facet of our technology

MFC Technology Evolution

Ever since technology drove the need to replace rotometers with electronic mass flow controllers, users have dealt with the challenge of accommodating different gases. In the first analog devices, a complicated, and usually expensive re-range was required whenever a different gas was to be used in the device. This was due to the discrete and unique characteristics of both the gas and the MFC. With the first digital devices, users were able to "store" multiple calibrations, usually 10-12, on a single unit. This method increased the level of complexity of each device, was typically more expensive than analog, and was very limited in terms of user configurability. Now, MultiFlo allows users to easily program a single device to accurately measure and control any one of over 180 different gases and mixtures,

and to change the scale of the device by a factor of 3, without any change in performance. Enabled by our IsoSensor, our 132 valve, and our extensive analysis and characterization of gas properties, MultiFlo technology raises the bar when it comes to performance and reliability, with an MTBF measured in millions, setpoint accuracy, and setting time ≤ 1 second (within 2% of set-point).

Attribute	Analog	Conventional Digital	MultiFlo
Gases support on a single device	1	<12	>180
Rangeability*	1:1	1:1	3:1
Accuracy	1% Full-Scale	1% Setpoint to 35%	1% Setpoint to 10%**
Reliability (typical MTBF)	300,000 hrs	500,000 hrs	1,500,000 hrs
Configuration history stored on devices	No	Yes	Yes
Surrogate required for calibration	Yes	Yes	No
Additional cost for extra curves on devices	N/A	Yes	No

*Defined as the ability to alter the full-scale range on a single device without loss of accuracy or change in specifications.

**Calibration by primary standards and surrogate gases is an additional charge option, enabling accuracy performance from 10% to 100% of full-scale range.

20 sccm CH4   20 sccm CF4

20 sccm He

10 sccm 30% O_2/He

15 sccm N_2 25 sccm N_2 10 sccm CHF3   20 sccm N_2

20 sccm 30% O_2/He

10 sccm O_2

30 sccm He

20 sccm O_2

MultiFlo™ Benefits

- Optimal MFC flexibility: any gas, any range, anytime, anywhere, with no factory preconfiguration required

- Configuration history is automatically stored on the MFC

- Replacement MFCs can be configured in a few minutes from a set of standard "blanks"

- User-friendly software allows on-the-fly flexibility for bench top or test stand applications

- Enables on-site gas and range changes with no calibration or surrogate gas requirements

- Dramatically reduces inventory requirements or discrete part number count

- Increases equipment uptime

- MultiFlo Configuration Kit allows for in-situ re-gas and re-range and is easily installed on user's PC or equipment controller

- The MultiFlo Configurator Kit is quick, user-friendly, and requires minimal training

MultiFlo™ Configurator

By simply connecting the communications cable to the MFC, the user can reconfigure the MFC in seconds. The user selects the desired gas and range from a drop-down menu and hits the configure icon on the screen. Then, MultiFlo Configurator automatically configures the SC to the desired gas and range and prints labels to be applied to the MFC. A printer and blank label stock are provided with the software.

MultiFlo SCs cover a range from 3 to 30,000 sccm. They are available on both universal (UFC) and integrated (IFC) flow controllers in the following ranges:

UFC SC Range

SC10	3-10 sccm N_2
SC11	11-30 sccm N_2
SC12	31-90 sccm N_2
SC13	91-250 sccm N_2
SC14	251-750 sccm N_2
SC15	751-2,000 sccm N_2
SC16	2,001-6,000 sccm N_2
SC17	6,001-15,000 sccm N_2
SC18	15,001-30,000 sccm N_2

IFC SC Range

SC20	3-10 sccm N_2
SC21	11-30 sccm N_2
SC22	31-92 sccm N_2
SC23	93-280 sccm N_2
SC24	281-860 sccm N_2
SC25	861-2,600 sccm N_2
SC26	2,601-7,200 sccm N_2
SC27	7,201-15,000 sccm N_2
SC28	15,001-30,000 sccm N_2

MultiFlo Configurator
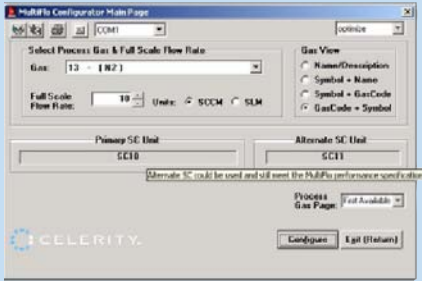
Step 1. Select Gas & Range

Step 2. Select Configure

Step 3. Print Customer Part # Label

Minimum Operating Specifications

- Windows 95/98, Windows 2000, Windows XP
- 128MB RAM
- 120MB Hard Drive
- 9-pin serial port (for RS485 comm)
- PCI slot for DeviceNet communication
- Printer port or USB port for printer
- Pentium 133 MHz or higher

MultiFlo™ Configurator Kit Options

Part Number	Description	MultiFlo™ S/W Kit	DeviceNet COM/ Power Supply (PCMCIA)	RS485 COM Kit	RS485 Power Supply	Printer Kit	Laptop PC
535-400-1002	MultiFlo Configurator Kit, Standard, DeviceNet	●	●				
535-400-1001	MultiFlo Configurator Kit, Plus, DeviceNet	●	●			●	
535-400-1003	MultiFlo Configurator Kit, Deluxe, DeviceNet	●	●			●	●
535-400-2003	MultiFlo Configurator Kit, Plus, DeviceNet + RS485	●	●	●	●	●	
535-400-2004	MultiFlo Configurator Kit, Deluxe, DeviceNet + RS485	●	●	●	●	●	●
535-400-2006	MultiFlo Configurator Kit, Basic, RS485	●		●			
535-400-2005	MultiFlo Configurator Kit, Standard, RS485	●		●	●		
535-400-2001	MultiFlo Configurator Kit, Special Edition, RS485	●		●		●	
535-400-2000	MultiFlo Configurator Kit, Plus, RS485	●		●	●	●	
535-400-2002	MultiFlo Configurator Kit, Deluxe, RS485	●		●	●	●	●
540-300-1058	Printer Labels, Qty 500						
001-152-2003	Printer Ribbon, Thermal Transfer, Qty 1						
350-301-2001	MultiFlo Configurator Software, Demo						
350-301-2000	MultiFlo Configurator Software, Single Seat License						