

FuelCell Addendum – Multi-Range Mass Flow Controllers

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Introduction

This addendum describes the use of multi-range mass flow controllers. Multi-range controllers use a parallel combination of a small range MFC with a larger range MFCs. This allows a combination of accurate control of small fuel flows with large maximum flow capabilities.

Software Support

Requires FuelCell version 3.8d1 or later. The software version is displayed in the FuelCell program Help | About FuelCell... screen.

Hardware Support

Requires the 850/890 Load Unit with Firmware version 3.17 or later. The firmware is displayed on the 850/890 LCD display screen during power up.

The multi range flow control uses signals normally reserved for Reformate Simulation. Contact your Gas Control Unit supplier or Scribner Associates for information on accessing the Reformate Mass Flow Controller signals.

Enabling Multi Range MFC Support

Multi Range MFC support is enabled through the Instrument Configuration screens in the FuelCell program.

- Start the FuelCell program and select File | Instrument Configuration...

Some 890C systems are designed to use 2 mass flow controllers (small and large) in parallel to supply the main fuel gas. This design can be used to allow large flow rates while retaining high resolution flow control at low flow rates. When the **Fuel Flow Controller Type** to **Gas / Multi Range MFC** the following settings are displayed:

Anode (H2/Fuel):	
Fuel Flow Control Type:	Gas / Multi Range MFC
Stoichiometric Type:	H2
Full Flow of Controller (Liters/Minute):	1
Controller #2 (Liters/Minute):	2 Ch1
Controller #3 (Liters/Minute):	10 Ch2
Purge Gas flows through Mass Flow Controller	<input checked="" type="checkbox"/>
Pure Fuel Stoich. (cc/min/Amp):	7
Pure Fuel Fraction:	1

Controller #2 (Liters/Minute) sets the full flow size of the second main gas controller. The second controller must be larger than the primary controller. The **Channel Number** selects the Reformate simulator channel that will be used to control the second main gas controller.

Controller #3 (Liters/Minute) sets the full flow size of the third main gas controller. The third controller must be larger than the second controller. The **Channel Number** selects the Reformate simulator channel that will be used to control the third main gas controller. If Channel Number is set to *None*, the third controller will not be used.

Operation of Multi Range MFCs

The operation of the multi range mass flow controllers is completely transparent to the user. There are no additional controls and the user is not required to select which controller is used.

When the selected flow rate is less than the size of the first (smaller) controller, all gas will flow through the first controller.

When the selected flow rate exceeds the size of the first controller, additional gas will flow through the second (larger) controller.

The maximum allowable flow rate is the sum of the three controllers.