MASS FLOW CONTROLLER

Precise MFC with on-unit display and control keys

OVERVIEW

MFC units are used to regulate and control the flow of gases. These devices are used in a wide range of laboratory and industrial applications in various fields of science such as pharmaceuticals, petroleum, chemicals and petrochemicals, medical, and semiconductor industry.

IRASOL devices employ state-of-the-art technologies to determine the rate of gas flow based on the differential pressure as a result of gas fluid.

IRASOL Products are produced in a number of models and accurately cover a range of 0 to 1000 standard cm^3/min, depending on their application. CVD chambers, gas analysis systems, and chemical reactors are examples of setups which need control of gas flow. It should be noted that these devices are not suitable for poisonous or corrosive gases, as well as hydrogen and helium.

SPECIFICATIONS

MFC Technical Specifications		
Inlet Pressure Range	2-7 Bar	
Differential Pressure Range	2-3 Bar	
Resolution	0.1% full scale	
Repeatability	±0.2% Set point	
Accuracy	±1.5% Full scale	
Response Time	< 2 s	
Operating Temperature	0 - 45 °C	
Valve Type	Normally closed	
Measuring range	Model	
	MFC-50B	0-50 sccm
	MFC-100B	0-100 sccm
	MFC-200B	0-200 sccm
	MFC-500B	0-500 sccm
	MFC-1000B	0-1000 sccm
	MFC-3000B	0-3000 sccm
	MFC-5000B	0-5000 sccm
Case Material	Aluminum	
LCD Display	Simultaneously displays set-point, pressure, maximum flow and current flow	
Digital Outlet Signal	USB command base	
Manual Control	Push-buttons on device (No separate control unit)	
Computer Control	Unit software or third party software	
Warning Alarm	Low input pressure	
Power	12 VDC, 2 A	
Electrical Connection	DC Jack	
Dimension (L×H×W)	12 cm × 13.8 cm × 3.0 cm	
Weight	1.2 Kg (1.4 Kg for MFC-1000B)	

FEATURES

- Monitor and control keys on the device
- Device control by computer
- Device controlling software
- No need to a separate control unit
- High accuracy of measurement
- Measurement for different gases

HOW IT WORKS

In IRASOL MFC units, a Laminar flow sensor is used to measure the gas flow. As it is observed in Figure 1, the laminar flow sensor consists of a thin pipe, across which a pressure difference is developed by the flow of gas. The volumetric flow rate of the gas depends approximately on the difference in pressure between the two sides. It is possible to measure the mass flow by measuring the pressure difference, absolute pressure, and gas characteristics. The advantage of this method is that measuring a pressure difference with very high accuracy is possible and moreover, the relationship between the pressure difference and the gas flow is almost linear.

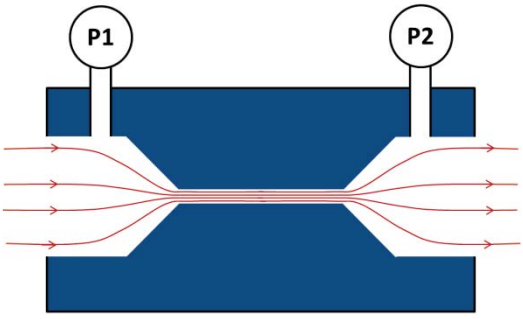

Figure 1. Schematic illustration of the method of gas flow measurement by means of a laminar sensor.

Although the physical concept of the sensor is simple, there are various considerations to make the measurement precise and reliable. For instance, errors due to non-laminar gas flow, in particular at the inner and outer orifices lead to non-linear effects, which should be taken into account. The effect of temperature is also important in the sensing process and should be excluded.

In an MFC, in addition to a sensor, some controlling systems exist to regulate the gas flow rate. At the center of this system, there is a precise solenoid valve which is capable of adjusting the inlet aperture so that the flow of the gas is equivalent to the flow set by the user.

In IRASOL MFCs, we employ specific technologies which make the exact and repeatable adjustment in the valve. The gas flow control circuit instructs the solenoid valve to regulate its opening in order that the gas flow becomes equal to the set flow.

Function diagram of the device is illustrated in Figure 2. The control circuit is connected to the LCD and control keys and reads the pressure and temperature values of the sensors and orders to the solenoid valve.
The calculated or regulated flow is displayed on the monitor and in addition, the control circuit can be used to display and transfer of the data from/to a computer. By means of a user interface, it is possible to identify all the connected MFCs automatically and control them simultaneously using a flow pattern adjusted by the user.

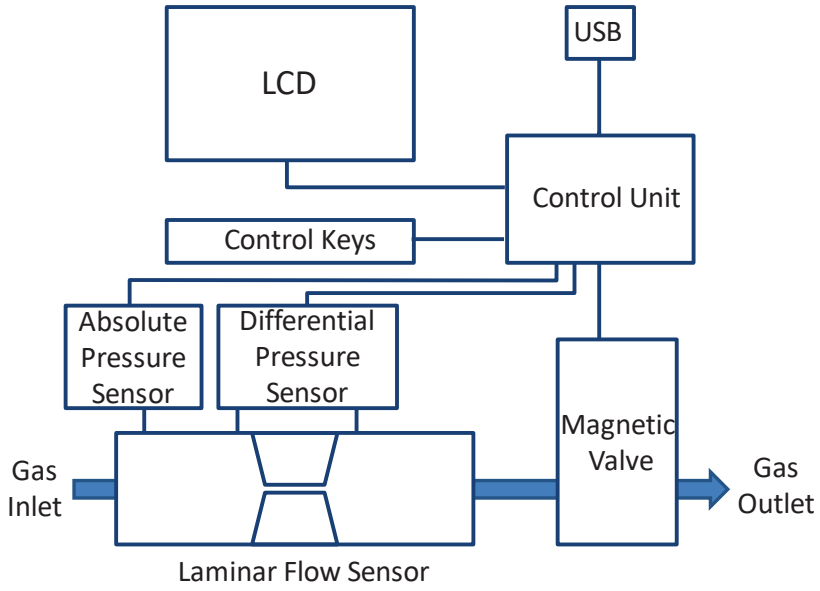

Figure 1. Function diagram of the MFC

SOFTWARE

MFC devices are capable of being controlled by the MFC Controller software application, and also control and display the data by other common programs which can work with a serial port (such as LABVIEW & MATLAB).

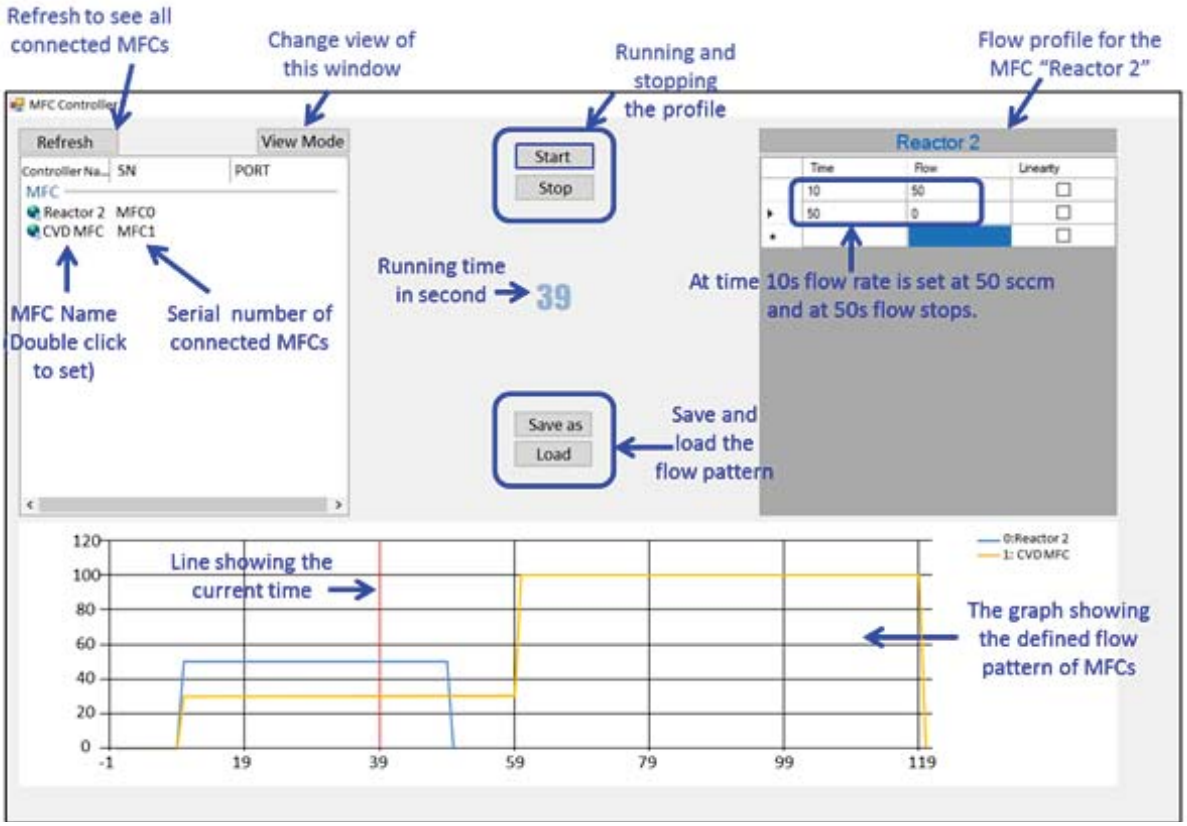

Figure 3. Illustration of MFC control software window.