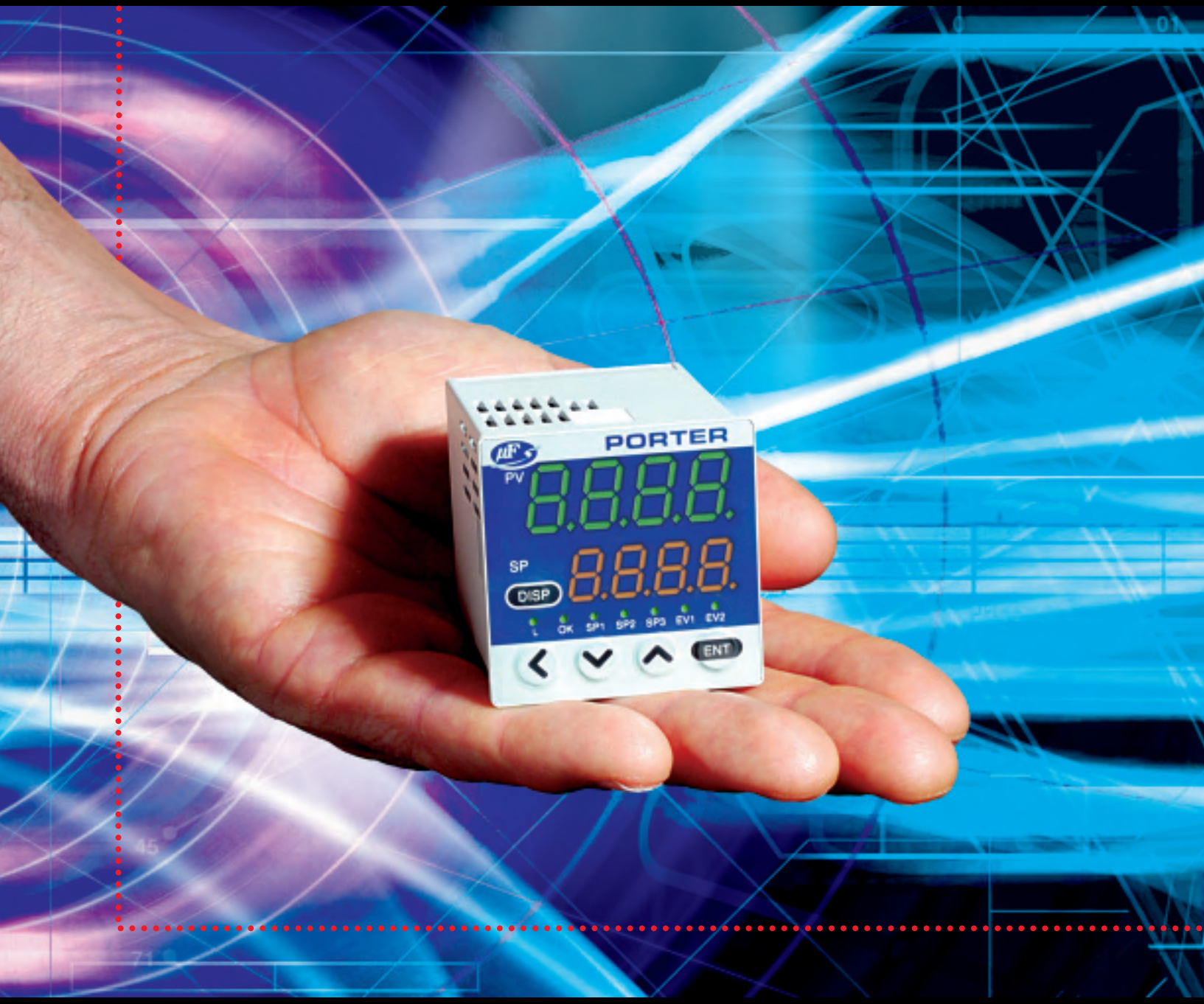
The PORTER MPC

The World's First All-in-One Panel Mount Gas Mass Flow Control System

So compact it fits in the palm of your hand



PORTER
INSTRUMENT COMPANY, INC.

PORTER MPC

reduced size • reduced complexity • reduced cost

PORTER MPC Series Mass Flow Controllers represent a totally new concept in cost-efficient mass flow control. These units contain both a fast and accurate mass flow controller and the necessary electronics for a complete closed-loop control system, all in a compact, panel mount, 1/16 DIN package. The front panel includes the interface for all functions, as well as readouts for setpoint, flow rate and total flow. Alarms, batch control and multiple setpoints are programmable for enhanced versatility. The MPC Series operates on 24 Vdc and has remote analog I/O capability. These controllers are available in full-scale flow rates of 0.5, 2.0, 5.0, and 20.0 SLPM N_2.

ACTUAL SIZE

Simple front panel user interface

Pluggable terminal block electrical connections and 1/8" NPT gas connections easily accessed on rear of body.

1. MULTIPLE SETPOINTS
- Up to 4 setpoints can be switched via front panel or external input.

2. GAS CORRECTION
- Air, N_2, Argon, and CO_2 standard.
- Conversion factors for mixtures and other gases can be entered through front panel.

3. VALVE OVERIDE
- Control valve can be programmed for normal control, full open or full closed.

4. SLOW START FUNCTION
- Response can be set for a ramp of up to 6 seconds.

5. INTEGRATED TOTALIZER
- 8-digit totalizer can be reset via front panel key function. Start/stop/reset via external switching input.
- Valve shut-off can be enabled at preset total flow value.

6. ALARM INDICATION
- Flow alarm can be set to upper and lower deviation limits between setpoint and flow rate.
- Alarm delay time is adjustable
- Alarm condition can trigger external output or valve override open/closed.

7. AUTOMATIC VALVE SHUT-OFF
- Internal control valve can be shut-off when predetermined totalizer value is reached or when alarm occurs.

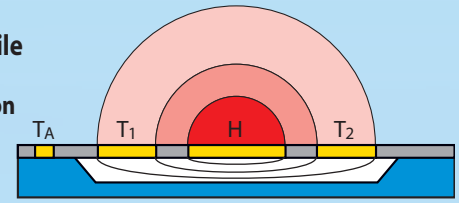
8. VALVE DRIVE OUTPUT MONITOR
- Valve voltage status can prewarn of system abnormalities.

9. OPTIONAL COMPUTER INTERFACE
- Upload and download of setpoint, flow rate, and various function parameters possible via one-to-one computer communications cable.

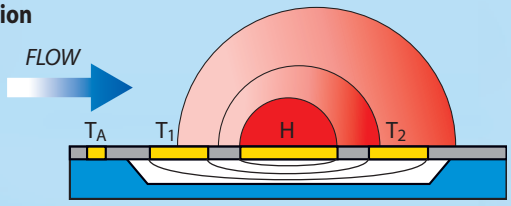
Porter MPC incorporates a fast response, high accuracy MicroFlow sensor unaffected by pressure and temperature fluctuations.

Temperature Distribution Profile

A) No Flow Situation



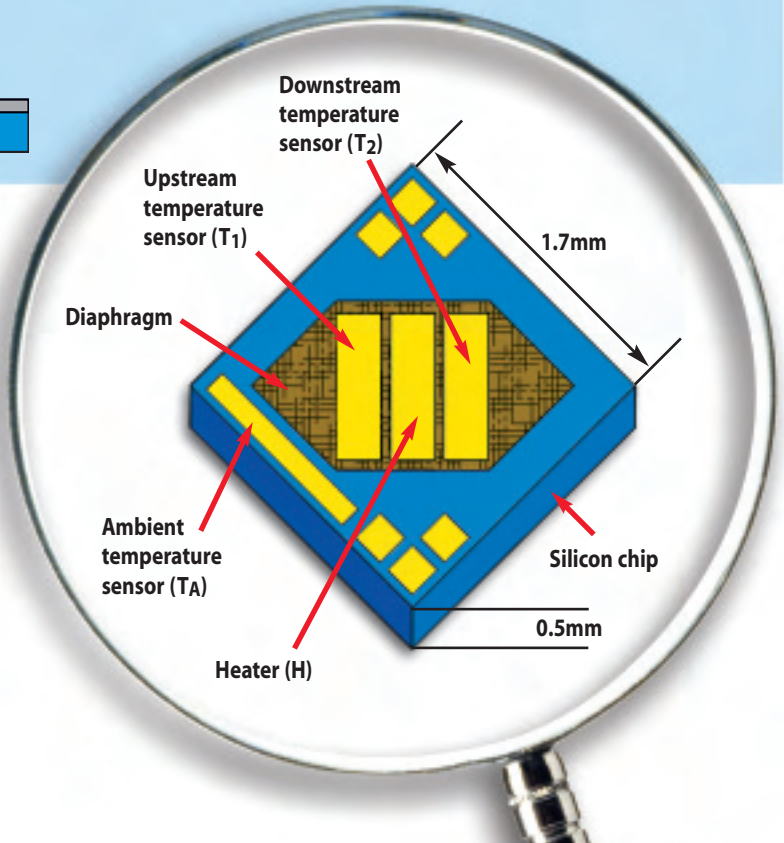
B) Flow Situation



Measurement principle of the MicroFlow sensor

With no gas flow (A) the temperature distribution around the heater (H) is symmetrical. With gas flow (B) there is a distortion of the symmetry in the temperature distribution as the temperature at sensor T_1 begins to decrease, while the temperature at sensor T_2 increases. This temperature difference is used to calculate the mass flow rate.

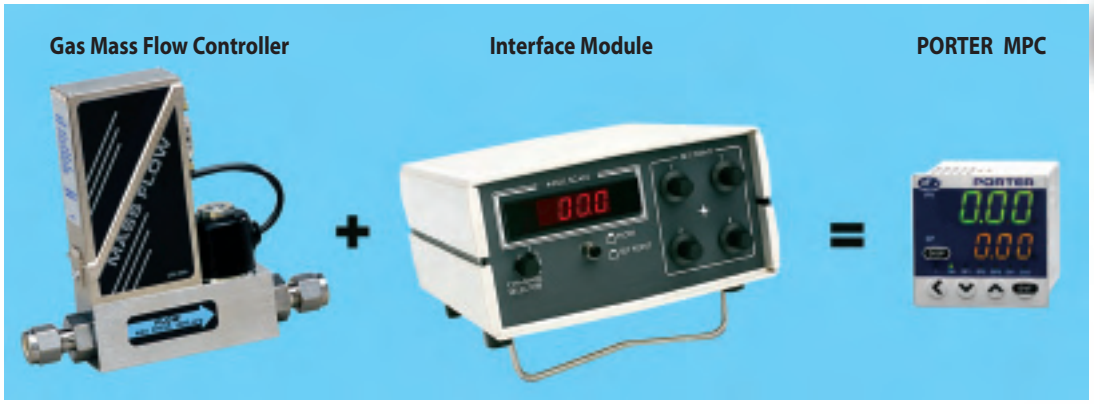
The MicroFlow silicon micro-machined sensor is manufactured utilizing MEMS and thin film technologies. This results in an extremely fast, accurate and reliable thermal mass flow sensor that is unaffected by pressure and temperature fluctuations. The MicroFlow sensor chip measures 1.7 mm x 1.7 mm, with a thickness of 0.5 mm.



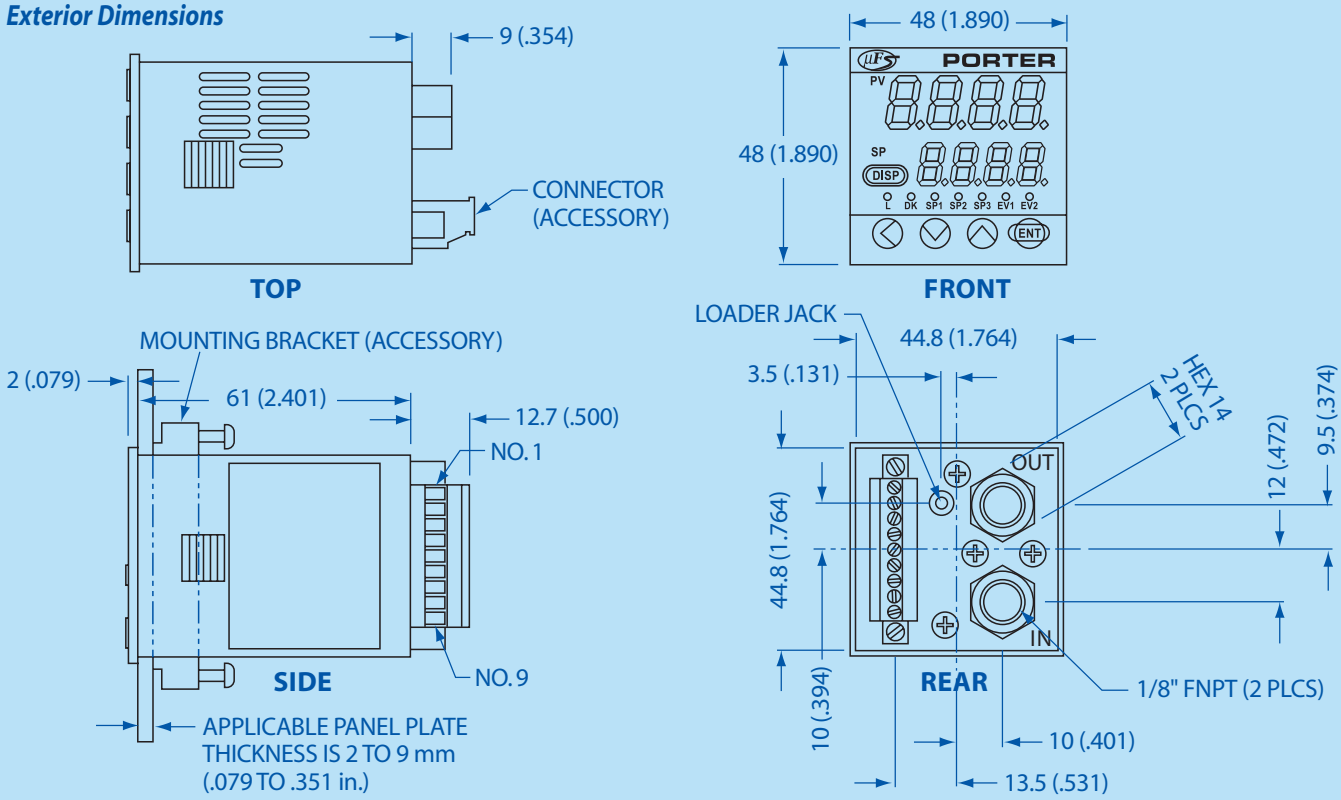
Ordering Information

MODEL NUMBER	NITROGEN EQUIVALENT FLOW RANGE
MPC95-BBNSP1	0.02 to 0.5 SLPM
MPC02-BBNSP1	0.08 to 2.0 SLPM
MPC05-BBNSP1	0.1 to 5.0 SLPM
MPC20-BBNSP1	0.4 to 20 SLPM

One accurate compact unit replaces both gas mass flow controller and interface module.

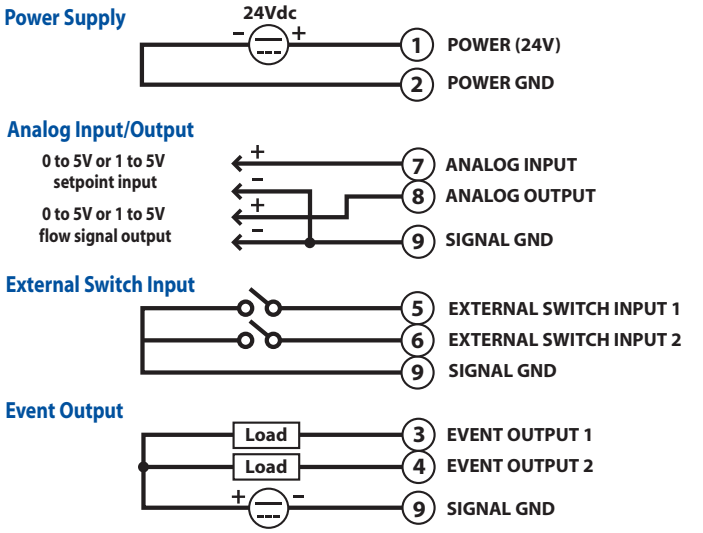


Exterior Dimensions



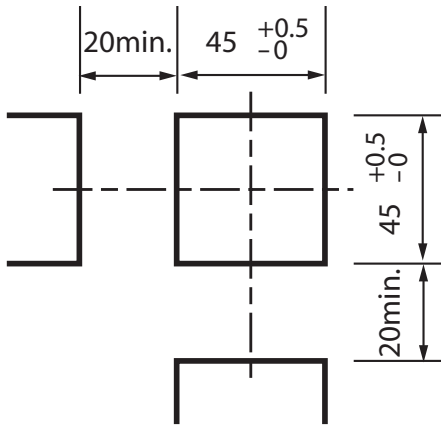
NOTE: Dimensions in parenthesis are inches

Wiring



Panel Cut-Out

Individual mounting



Specifications and dimensions subject to change.

Control Flowrate Range (Table 1)

MODEL NUMBER	MPC95		MPC02		MPC05		MPC20	
	Flow Range (SLPM)	Setpoint/Display Resolution (SLPM)	Flow Range (SLPM)	Setpoint/Display Resolution (SLPM)	Flow Range (SLPM)	Setpoint/Display Resolution (SLPM)	Flow Range (SLPM)	Setpoint/Display Resolution (SLPM)
Nitrogen/Air	0.020 to 0.500	0.002	0.08 to 2.00	0.01	0.10 to 5.00	0.02	0.4 to 20.0	0.1
Argon	0.020 to 0.500	0.002	0.08 to 2.00	0.01	0.10 to 5.00	0.02	0.4 to 20.0	0.1
Carbon Dioxide	0.012 to 0.300	0.001	0.040 to 1.200	0.005	0.06 to 3.00	0.01	0.3 to 16.0	0.1

Note: Please consult factory on applications for Helium and Hydrogen.

Product Specifications

MODEL NUMBER			MPC95	MPC02	MPC05	MPC20
Control Valve Type			Normally closed proportional solenoid valve			
Maximum Flow Capacity (N_2 Equivalent) (Note 1)			0.5 SLPM	2.0 SLPM	5.0 SLPM	20.0 SLPM
Compatible Gases			Nitrogen/air, argon, carbon dioxide Gas must be dry, clean and oil-free			
Control	Rangeability (Control Range) (Refer to Table 1)		25:1 (4 - 100% full scale [FS])		50:1 (2 - 100% FS)	
	Response Time		1.0 second to within ± 2% FS of setpoint (typical)			
	Accuracy		± 2% FS (at 20°C and 30 PSIG)			
	Repeatability		± 1% FS			
	Temperature Coefficient		± 0.1% FS/°C (±0.056% FS/°F)			
	Pressure Coefficient (per 14.5 PSI)	Flow ≥40% FS	0.7% FS	0.4% FS	0.2% FS	0.2% FS
		Flow ≥10% FS Flow <40% FS	1.2% FS	0.7% FS	0.3% FS	
		Flow <10% FS	2% FS	1.2% FS	0.5% FS	
Pressure	Minimum Differential Pressure (note 3)		7 PSIG	7 PSIG	14.5 PSIG	22 PSIG
	Maximum Differential Pressure (note 4)		40 PSIG			
	Calibration Pressure (note 2)		30 PSIG (inlet pressure: 30 PSIG and outlet pressure: 0 PSIG)			
	Maximum Operating Pressure		75 PSIG			
Temperature	Calibration Temperature (note 2)		20°C			
	Operating Temperature Range		-10 to +50°C (14 to 122°F)			
	Storage Temperature Range		-10 to +60°C (14 to 140°F)			
Humidity	Operating Humidity Range		10 to 90% Relative Humidity (non-condensing)			
Setpoint	Setpoint Input		Keypad Operation or External Setpoint Voltage Input			
	Resolution		Refer to Table 1			
	Setpoint Input Voltage		0 to 5 Vdc or 1 to 5 Vdc (selectable)			
Flow Rate Indication	Display Type		7-segment LED; 8 digits (Instantaneous flow rate display: 4 digits; Setpoint flow rate display: 4 digits)			
	Display Resolution		Refer to Table 1			
	Indication Accuracy		±2% FS ±1 digit			
Totalizer Function	Display Range		0.00 to 999,999.99L	0.0 to 9,999,999.9L	0.0 to 9,999,999.9L	0 to 99,999,999L
	Display Resolution		0.01L	0.1L	0.1L	1L
	Totalizer Backup Timing		Every 5L count	Every 20L count	Every 50L count	Every 200L count
			Every hour (time) from the previous backup			
Flow Rate Output	Output Scale		0 to full scale flow rate (scaling selectable)			
	Output Signal Voltage		0 to 5 Vdc or 1 to 5 Vdc (selectable)			
	Maximum Signal Output Voltage		7 Vdc maximum (maximum output signal when flow rate exceeds maximum flow capacity)			
	Accuracy		±0.5% FS (Input impedance of the connected device must be 100k ohms or greater) Overall output accuracy: Indication accuracy ±0.5% FS			
Event Output	Number of Outputs		2			
	Output Rating		30 Vdc, 15 mAdc maximum (open collector non-insulated output)			
	Totalizer Pulse Output Width		100 ms (±10%) (when totalizer pulse output is selected)			
	Totalizer Pulse Output Rate		0.01L/pulse	0.1L/pulse	0.1L/pulse	1L/pulse
External Contact Input	Number of Inputs		2			
	Input Type		Potential-free contact or open collector			
	Contact OFF Terminal Voltage		2.0 Vdc (±0.5 Vdc)			
	Contact ON Terminal Current		Approximately 0.5 mAdc (contact current)			
	Allowable ON Contact Resistance		250 ohms maximum			
	Allowable OFF Contact Resistance		100k ohms minimum			
	Allowable ON Residual Voltage		1.0 Vdc maximum (with open collector)			
	Allowable OFF Leakage Current		50 µAdc maximum (with open collector)			
Communication	System (Note 5)		Loader communication (dedicated cable required)			
	Transmission speed		19200 bps			
Power Supply Requirements			24 Vdc (±5%); current consumption 300 mAdc maximum			
Materials of Construction			Brass (nickel-plated), stainless steel, Teflon®, Viton®			
Process Connections			1/8" FNPT			
Mounting Orientation			Housing horizontal with inlet & outlet ports vertically oriented ('IN' - bottom & 'OUT' - top)			
Weight (Approximate)			10.6 oz. (300 grams)			
Applicable Standard			CENELEC # EN61326: 1997; Amendment A1: 1998; Amendment A2: 2000			
Accessory Components (Included with every MFC)			Mounting bracket and mating electrical connector			

Note 1. *SLPM indicates the volumetric flow corrected to 20°C, 1 atmosphere (14.7 PSIA). The reference temperature can also be changed to 0°C, 25°C and 35°C. The controllable flow range varies according to the gas type. Refer to Table 1 on previous page.*

Note 2. *Temperature and pressure during calibration.*

Note 3. *Differential pressure required for obtaining maximum flow capacity.*

Note 4. *Operation is possible with less than required minimum differential pressure, however, rangeability (control range) decreases.*

Note 5. *Loader communications package (sold separately) is required.*

Teflon® - E.I. DuPont de Nemours & Co., Viton® - DuPont Dow Elastomers L.L.C.

Specifications and dimensions subject to change

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