Introduction

Matheson mass flow controllers and mass flowmeters are among the most sophisticated flow sensing and control systems available. These units feature 316 stainless steel flow sensing transducers and control valves, which are an integral part of the controllers.

Mass flow measuring devices generate a signal, which is proportional to the mass flow of gas, by detecting heat transport in an area of the gas stream. Since the specific heat of any gas is a unique property of the gas, and is essentially independent of pressure considerations, mass flow devices are absolute measuring instruments.

If the signal voltage is used only to indicate flow, the unit is considered a mass flowmeter. If the signal is used in conjuction with a reference signal and a controlling valve, the unit is considered a mass flow controller.

Matheson's 8170 Mass Flowmeter System consists of a flow transducer which senses the flow of gas, and a digital readout box that converts the analog signal to a direct reading digital display. Accuracy is ±1% full scale or one digit accuracy in flow control.

Matheson's 8270 Mass Flow Controller System consists of a flow transducer that senses the flow of the gas, an electronically linked control valve, and a digital readout and control box that converts the analog signal to a direct reading digital display. Accuracy is ±1% (up to 30 slpm) full scale or one digit accuracy in flow control.

Since these systems sense or control mass flow of a gas, the indicated flow is independent of system pressure or minor temperature variations. The systems are also calibrated to specific customer requirements.

Matheson offers many innovative mass flow configurations. The **Model 8280 Series Dynamic Gas Blending Systems,** used in conjunction with additional mass flowmeters or mass flow controllers, are used to prepare accurate mixtures of different gases. **Matheson's Cal-MAT™ 4000 and 4040 Series** provide gas blending or dilution capabilities, and are controlled via communication with an end-user's PC system.

8170 Mass Flowmeter System

Cal-MAT™ 4040 Series Gas Dilution System

Mass Flow Product Overview

Application	Features	Specifications	Function	Page No.
8112 Self-Contained Mass Flowmeter				
Application: Flow measurement; bridges the gap between standard rotameters and higher priced mass flowmeters	**Includes:** • VDC or mA (optional) output signal • Adjustable zero • Power supply • Threaded mounting holes in body • Self-contained direct reading of flow rate • 3 1/2 digital display	**Accuracy:** • ±1.5% full scale **Repeatability:** • ±0.5% full scale	**Function:** Use with non-corrosive gases to monitor flow rate.	376
8124 Series Totalizer				
Application: Compiles total amount of gas used over a period of time	**Includes:** • 6 digit LED readout • 2 alarm setpoints • Half rack or bench mountable	**Accuracy:** • ±1% full scale	**Function:** Use with 8170 Mass Flowmeter System, 8270 Mass Flow Controller System, or 8280 Dyna-Blender to compile the total amount of gas used, regardless of varying flow rates over a period of time.	377
8170 Series Mass Flowmeter System				
Application: Flow Measurement	**Includes:** • Flowmeter transducer (Model 8172/8173 Series) • 8170 digital readout power supply box • Control cables and connectors • Swagelok fittings on inlet and outlet • High/low alarm setpoints (user selectable) •Half rack or bench mountable	**Accuracy:** • ±1% full scale for units up to 30 slpm • ±2% for units 50 - 300 slpm • ±3% over 300 slpm **Repeatability:** • 0.2% for units up to 200 slpm • 0.5% for units over 200 slpm	**Function:** Applications requiring monitoring of a single gas flow. May also be used with Model 8124 Totalizer and Model 8280/8284 (see pages 368 and 374). This model provides flow monitoring only; no flow control.	377
8175 Series Multiple Mass Flowmeter Readout Box				
Application: Digital readout for flow measurement of up to four gas streams	**Includes:** • 4 position selector switch • Digital display – % of range • 4 individual cables for transducers • High/low alarm setpoints for each channel (user selectable) • Full rack or bench mountable **Required:** • A Model 8172 or 8173 Series Mass Flowmeter for each channel to be used	**Resolution:** • 3.5 digit display **Power:** • 110 VAC standard, 220 VAC optional **Output:** • 0-5 VDC • 4-20 mA (optional)	**Function:** Continuously monitors up to 4 mass flowmeters (one flowmeter displayed at a time). It is not required to use all 4 channels; they may be reserved for future expansion.	379
8270 Series Mass Flow Controller System				
Application: Flow Measurement and Flow Control	**Includes:** • Flow controller transducer (Model 8272/8273 Series) • 8270 digital readout/power supply box • Feedback circuit for flow control • Integral control valve • Control cables and connectors • High/low alarm setpoints (user selectable) • Half rack or bench mountable	**Accuracy:** • ±1% full scale for units up to 30 slpm • ±2% for units 50 - 300 slpm **Repeatability:** • 0.2% for units up to 200 slpm • 0.5% for units over 200 slpm	**Function:** Applications requiring monitoring and controlling a single gas flow. May also be used with Model 8124 Totalizer and Model 8280/8284 (see pages 368 and 374).	380

Mass Flow Product Overview *(continued)*

Application	Features	Specifications	Function	Page No.
8274 Series Multiple Mass Flow Controller Box				
Application: Flow measurement and flow control of up to four gas streams	**Includes:** • 8 position selector switch (4 read and 4 set) • Digital display – % of range • Individual override control valve switches • Individual flow potentiometers for setting flow rate • 4 individual control cables for transducers • High/low alarm setpoints for each channel (user selectable) • Full rack or bench mountable **Required:** • A Model 8272 or 8273 Series Mass Flow Controller for each channel to be used	**Resolution:** • 3.5 digit display **Power:** • 110 VAC standard, 220 VAC optional **Output:** • 0-5 VDC • 4-20 mA (optional)	**Function:** Continuously monitors and controls up to 4 mass flow controllers (one controller displayed at a time). Each channel requires the use of a Model 8272 or 8273 Series Mass Flow Controller. It is not required to use all 4 channels; they may be reserved for expansion.	382
8280 Series Modular Dyna-Blender				
Application: Gas blending	**Includes:** • Mass flow controller transducer • 8280 control box with digital readout • Control cables for transducer • Patch cords for inputs • Half rack or bench mountable **Required:** • Additional flow monitoring or control systems (8170, 8270, or 8280).	**Accuracy:** • ±1% full scale for units up to 30 slpm • ±2% for units 50 - 300 slpm **Repeatability:** • 0.2% for units up to 200 slpm • 0.5% for units over 200 slpm	**Function:** Each 8280 system controls one gas stream only. Use in conjunction with additional 8170, 8270, or 8280 systems for blending of multiple streams. Several units may be used together to blend additional streams.	383
8284 Series Multichannel Dyna-Blender				
Application: Gas blending	**Includes:** • 4 channels with individual potentiometers and control switches • 8 position set switch displays reading in % of range • Control cables for transducers • Patch cords for inputs • Full rack or bench mountable **Required:** • Model 8272 or 8273 Mass Flow Controller transducer for each channel	**Accuracy:** • ±1% full scale for units up to 30 slpm • ±2% for units 50 - 300 slpm **Repeatability:** • 0.2% for units up to 200 slpm • 0.5% for units over 200 slpm	**Function:** Low cost blending of up to 4 gas streams for laboratory and process applications. It is not required to use all 4 channels, they may be reserved for expansion.	383

Mass Flow Product Overview *(continued)*

Application	Features	Specifications	Function	Page No.
Cal-MAT™ Series 4000 Multi-Component Gas Blending System				
Application: Gas blending via integral mass flow controllers and the user's PC	**Includes:** • One balance gas mass flow controller and one component gas mass flow controller standard (up to 4 mass flow controllers available as an option) • RS-232 interface • 3 modes of operation: – Concentration mode (user enters target gas concentrations for each cylinder and desired output flow for the mix) – Flow mode (user specifies the flow rate out of each cylinder) – Program mode (the instrument may be programmed for unattended operation) **Required:** • User supplied PC	**Accuracy:** • ±1% full scale **Repeatability:** • ±1% full scale **Flow:** • ±1% full scale	**Function:** Blends up to 4 gas streams (3 component gases, 1 balance gas) to create calibration standards for calibration of analytical instruments or process instruments. The standard unit blends 2 gases; 4 gases available as an option.	386
Cal-MAT™ Series 4040 Gas Dilution System				
Application: Gas dilution	**Includes:** • One dilution gas mass flow controller and one component gas mass flow controller standard (up to 4 mass flow controllers available as an option) • RS-232 interface • 4 modes of operation: – Concentration mode (user enters target gas concentrations for each cylinder and desired output flow for the mix) – Divider mode (user operates the unit as an automated 10-step gas divider) – Flow mode (user specifies the flow rate out of each cylinder) – Program mode (the instrument may be programmed for unattended operation) **Required:** • User supplied PC	**Accuracy:** • ±1% full scale **Repeatability:** • ±1% full scale **Flow:** • ±1% full scale	**Function:** Dilutes a high concentration gas with a balance gas to create calibration standards for multi-point calibration of analytical instruments.	387

See the individual product descriptions that follow for detailed specifications.