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1.0 Description

Fathom Technologies GR Series mass flow meters and controllers utilize a capillary type thermal technology to directly measure mass flow. No temperature, pressure, or square root corrections are required.

The GR Series is available with an LCD display and linear 0-5 or 4-20 ma output. Readout may be in mass units such as Gr/s, LB/H, Kg/h...or in volumetric units referenced to a standard pressure and temperature I.E. SCCM, SLPM, SCFH. Fathom uses 70°F and 29.92" Hg or 21° C and 760 Torr as standard reference conditions. (Others available upon request).

The GR series comes standard in 316 SS with Viton O-Rings. Other elastomers are available. The user is responsible to check wetted materials against gas compatibility.

Fathom mass flow meters are calibrated to NIST standards for a specific gas and range selected by the customer; however K factors can be used to measure other gases.

GR Series controllers use an integral electromagnetic proportional valve to control the mass flow rate. Command signal is supplied by the on-board set point pot or a external 0-5 VDC supplied to the D connector.

Fathom's cost saving design supplies a complete flow measurement and control system in one compact package making it ideal for OEM, laboratories, and process control applications.

2.0 Specifications

Wetted Material		
Flow Bodies	<u>Plastic</u>	<u>Stainless Steel</u>
	Delrin, 316 SS & 17-4 SS	316 & 17-4 SS
Elastomers	Standard – Viton	
	Optional – Buna, Kal- Rez, or EPDM	
Output Signal	Linear 0-5 VDC Linear or 4-20 MA	
Input Signal	Standard: 24 VDC @ 350 MA	
	Optional: 12, 15 VDC / 115, 220 VAC with AC adapter	
Accuracy	$\pm 1\%$ FS (including Linearity)	
Connection	9 pin Sub D	
Control Signal	Integral or 0-5 VDC	
Control Valve	Electromagnetic Norm. Closed	
Max Pressure	Plastic Model – 250 PSIG Stainless Model – 500 PSIG	
Response Time	1-2 second	

3.0 Installation

3.1 Plumbing

(Caution: The GR Series has a maximum temperature of 150 F and a maximum pressure 250 psig, 500 PSIG for Stainless Steel Models.)

The GR Series has #4 self tapping mounting holes on the bottom for permanent installations. A variety of fitting options are available including ¼” fnpt, 3/8” fnpt, ¼” swg., and 3/8” swg.

When plumbing meters insure the flow arrow on the front label is in the direction of flow.

Before operation insure system is leak free. Use a thread sealant for fnpt models.

Capillary mass meters are susceptible to clogging. If your line or gas has particulate entrained, use a 50 – 100 micron filter up stream of the meter.

3.21 Power

Fathom GR series meters require 24 VDC @ 250 ma for meters and 320 ma for controllers, via the 9 pin sub D connector. Power is typically supplied with a wall mounted AC adapter.

3.22 Output

Fathom GR series has a standard 0-5 VDC and 4-20ma linear output from the 9 pin sub D connector. The 4-20 ma signal is a self powered “4 wire type” referenced from ground, do not apply power to this line.

3.23 Setpoint

The GR series controllers require a linear 0-5 VDC setpoint. This signal can be supplied from the integral setpoint pot located on the right side of the controller or from a remote source. The integral setpoint is jumpered through the mating sub D connector from pins 9 to 5. To use a remote setpoint signal, open the mating sub D connector housing and remove the jumper between pins 5 & 9 and input the remote 0-5 VDC on pins #5(+), #2(common) and wire remote 0-5 to pins 5 (Hi) & 2 (common).

3.24 D Conn. Pin Out

<u>Pin number</u>	<u>Function</u>
1	Power Supply Ground
2	Setpoint input Lo
3	4-20 ma Output High
4	0-5 VDC Output High
5	Setpoint Input Hi
6	NC
7	24 VDC Power Input
8	Output Ground
9	Local Set Point Supply (Must be jumpered to pin 5 for local setpoint)

4.0 Operation

Apply power through the sub D connector and allow 5-10 minutes warm up time. Controllers should have a zero setpoint. For local setpoint models turn the setpoint adjustment knob fully clockwise

4.1 Zero Check

Zero may shift in shipping or installation. Zero should be adjusted after installation to insure accuracy.

Insure there is no flow through the transducer and check the 0-5 output or display for a zero reading.

4.11 Display Zero

Adjust zero pot (R5) available through the side panel of the transducer until display reads 000.

4.12 0-5 Output Zero

Adjust Zero pot (R5) available through the side panel of the transducer until the output on pins 4 & 8 climbs to + 0.050 VDC or above, then slowly lower output until output stops falling (approx. 0.007 VDC).

4.2 Flow Measurement

The GR series transducers measure mass flow directly and read out in mass units per time. When calibrated for volumetric units, measurements are referenced from a standard temperature and pressure. Outputs are linear over the calibrated flow range with an accuracy of $\pm 1\%$ of Full Scale, 100:1 Turn Down.

4.3 Flow Control

Flow controllers combine a mass flow transducer with a normally closed electromagnetic proportional valve. Valves are not recommended as shut off valves. Controllers use a 0-5 VDC linear setpoint signal supplied from the local setpoint pot or from a remote source. The local setpoint voltage must be connected through the external mating D connector from pins 9 to 5. This will enable the knob on the side of the mass flow controller. For remote setpoint remove this jumper and wire 0-5 VDC to pins #2(common and #5(+)).

5.0 Using K Factors

The GR Series uses a thermal sensor technology which allows the use of conversion factors from the calibrated gas to other gases. To change to a new gas multiply the flow rate reading by the ratio of the K factor for the new gas to the K factor of the calibrated gas.

$$\text{Reading} \quad \times \quad \frac{\text{K Factor New Gas}}{\text{K Factor Cal. Gas}}$$

Accuracy is $\pm 4\%$ using this method.