

MASS FLOW METERS FOR GAS APPLICATIONS

Model 50X Series
Thermal Mass Flow Meters



APPLICATION IDEAS

- Compressor or pump output monitoring
- Rotameter replacement or upgrade
- Verification of sample gas streams in analytical equipment
- Precision gas injection and dosing
- Leak testing

Product Description

McMillan Model 50X Series Mass Flow Meters are capable of measuring virtually any clean, dry gas as low as 0-20 sccm or as high as 0-500 L/minute. Repeatable results are achieved using a patented thermal mass flow sensor design. This proven design minimizes zero drift while maintaining fast response and linear outputs.

Because of the compact size and economical cost of these products, the Model 50X Series Mass Flow Meters are suitable for a wide variety of industrial, commercial, laboratory and O.E.M. applications.

Principle of Operation

Thermal mass flow meters feature fast response, virtually zero maintenance, and precise measurement. These are all very important qualities among today's variety of applications.

The McMillan Model 50X Series Mass Flow Meters utilize this thermal sensing technology. Flow enters the unit, and a portion of the flow is redirected into a small tube. This tube has two coils, one downstream from the other. The first coil introduces a small amount of heat into the gas stream. As the gas passes through the tube, the smart electronics sense the amount of heat transferred from one coil to the other. McMillan's proprietary design system insures that the zero remains stable and the sensor is extremely repeatable.

The output of the thermal mass flow sensor is directly related to the specific heat characteristic of the gas being measured. Therefore, if a unit is calibrated for air, it is a relatively simple calculation to figure the calibration for nitrogen or some other similar gas. This advantage offers flexibility not found on many other types of flow sensors.

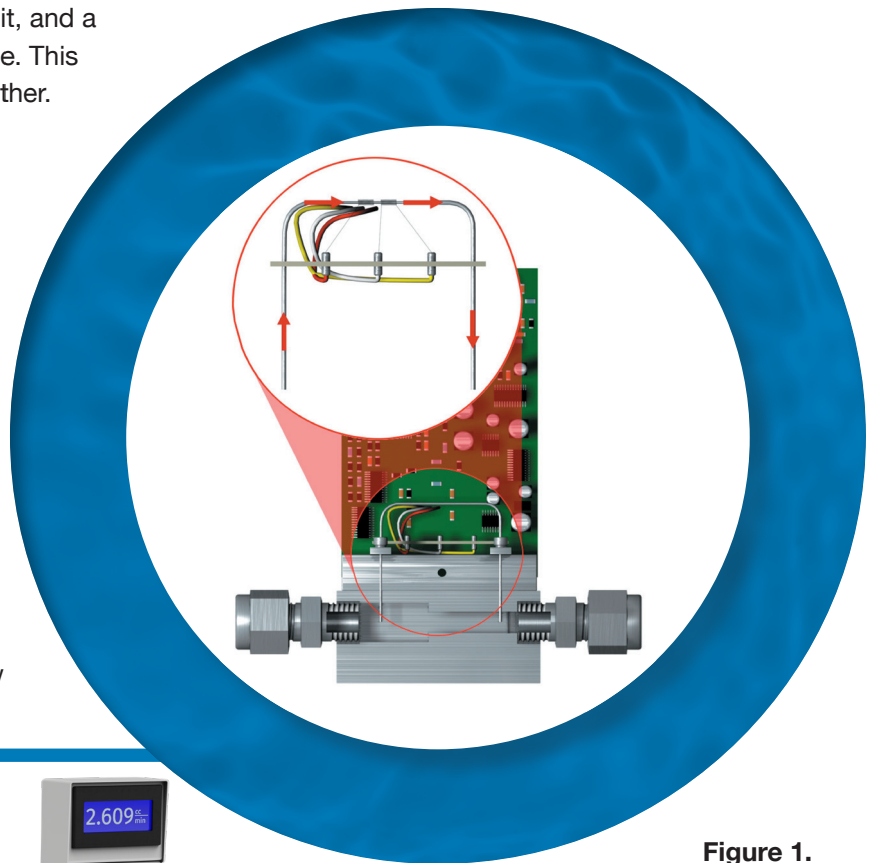


Figure 1.
Cutaway of sensor technology.



Features and Options

FLOW RANGES

Flow ranges from 0-20 sccm up to 0-500 L/minute are available. Consult the factory for custom requirements.

POWER

Units may be ordered to operate with either 12 VDC or 24 VDC power. Various power adapters are available for use with 12 VDC versions.

SIGNAL INPUTS & OUTPUTS

Choose from either 0-5VDC or 4-20mA linear outputs.

ACCURACY/LINEARITY

All models have a standard accuracy specification of $\pm 1.5\%$ F.S. accuracy (including linearity). NIST traceable calibration certificates are optional on some models.

FLUID CONNECTIONS

All units have compression-type tube fittings as standard. Consult Fitting Availability Chart for available materials and sizes.

ELECTRICAL CONNECTIONS

All units have a 36" (92 cm) output cable, terminated with a 6-pin PS/2 style connector. An optional mating cable assembly, terminated with pigtail leads, is recommended to facilitate wiring.

WETTED MATERIALS

All units feature metal construction. See specifications for detailed materials in gas path. Model 50S and 50SD feature stainless steel construction; other models constructed from aluminum.

DISPLAYS

For units with integrated displays, choose the Model 50D or 50SD. Units for ranges 2-7 will display flow in cc/min, and ranges 8-15 will display flow in L/min. Units without integrated displays may be used with McMillan's line of external remote displays. Please request additional information from factory on remote displays available.

CALIBRATION GASES

Units may be calibrated for virtually any clean, dry gas. Several non-standard gas selections are available as indicated in Ordering Information. Contact factory for calibration information on non-standard gases.

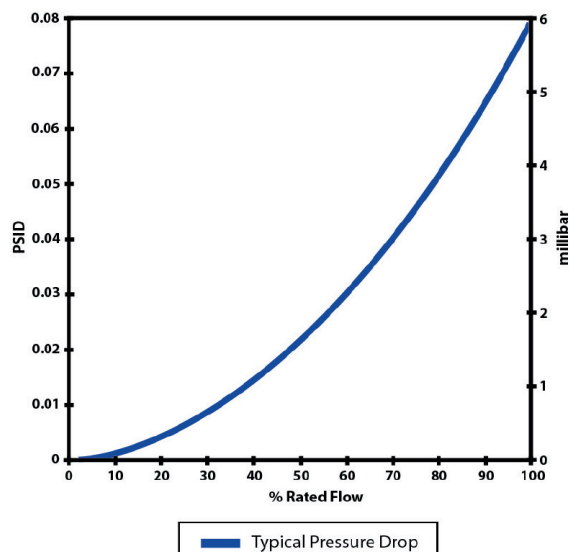


Specifications

	Model 50K	Model 50D	Model 50S	Model 50SD
Accuracy (including linearity)	±1.5% Full Scale*			
Repeatability	±0.25% Full Scale*			
Pressure Rating	150 psig (10.3 bar)		500 psig (34.5 bar)	
Pressure Sensitivity	±0.02% Full Scale* per psi (per 69 mbar)			
Temperature Rating	Operating Range: 10 to 50°C Storage Range: 0 to 70°C			
Temperature Sensitivity	±0.15% F.S.* or less per °C			
Body Leak Integrity (not including fittings)	1 x 10 ⁻⁷ sccs of He			
Wetted Materials	Aluminum 304 Stainless Steel 316 Stainless Steel		303 Stainless Steel 304 Stainless Steel 316 Stainless Steel Epoxy	
O-Ring Material	Viton®		n/a	
Fitting Material	Choose from acetal, brass, or stainless steel			
Recommended Filtration	20 microns or less			
Compatible gases	Clean, dry gases compatible with wetted materials			
0-5 VDC Output Signal	Minimum 2.5 Kohm load			
4-20 mA Output Signal	Maximum 300 ohm loop resistance			
Warm-Up Time	Less than 5 minutes			
Integrated Display	none	128x32 pixel backlit LCD	none	128x32 pixel backlit LCD
Power Requirement	Suffix B: 22-25VDC Suffix C: 15-25 VDC Suffix D: 12-15 VDC			
Typical Power Consumption	120 mA			
Peak Power Consumption	160 mA			
Electrical Connections	Integrated 36" (92 cm) cable, terminated with 6-pin Mini-DIN (PS/2 Style)			
Settling Time	Typically <1 second for 97% of final value			
Reliability	100,000 Hours MTBF			

*Specifications from 10-100% of rated flow. Linearity is best fit straight line. All calibrations performed with air unless otherwise stated on calibration certificate.

Typical Pressure Drop

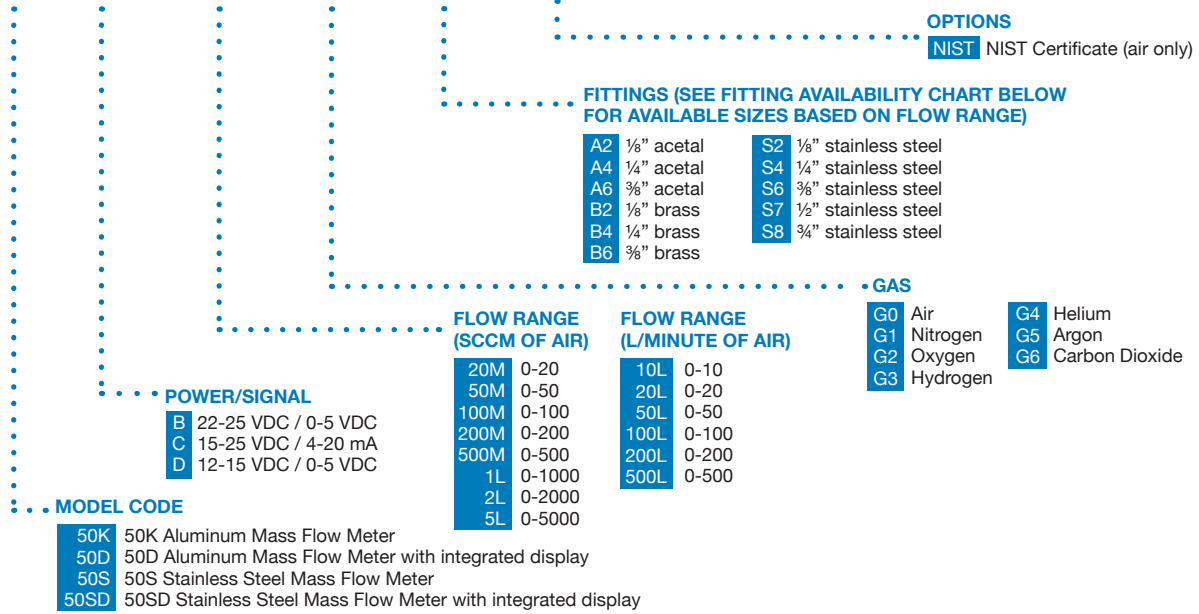


Ordering Information

Form part number as follows:

(Model Code) - (Power/Signal) - (Flow Range) - (Gas) - (Fittings) - (Options)

50 - - - - -



RANGE	A2	A4	A6	B2	B4	B6	S2	S4	S6	S7	S8
20M	✓	✓		✓	✓		✓	✓			
50M	✓	✓		✓	✓		✓	✓			
100M	✓	✓		✓	✓		✓	✓			
200M	✓	✓		✓	✓		✓	✓			
500M	✓	✓		✓	✓		✓	✓			
1L	✓	✓		✓	✓		✓	✓			
2L		✓	✓		✓	✓		✓	✓		
5L		✓	✓		✓	✓		✓	✓		
10L		✓	✓		✓	✓		✓	✓		
20L						✓			✓	✓	
50L									✓	✓	
100L										✓	✓
200L										✓	✓
500L										✓	✓

RANGE	S2	S4	S6	S7	S8
20M	✓	✓			
50M	✓	✓			
100M	✓	✓			
200M	✓	✓			
500M	✓	✓			
1L	✓	✓			
2L		✓	✓		
5L		✓	✓		
10L		✓	✓		
20L			✓	✓	
50L			✓	✓	
100L				✓	✓
200L					
500L					

EXAMPLES

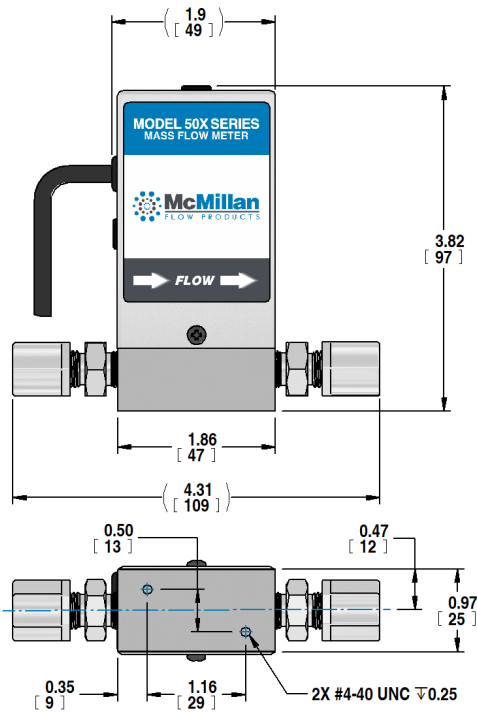
50K-B-200M-G1-B2 would provide an aluminum-body mass flow sensor with no display, a 0-5 VDC linear output, would require 24VDC power, have 1/8" brass tube fittings, and would be calibrated to measure 0-200 sccm of nitrogen.

50SD-D-50L-G0-S7-NIST would provide a stainless-steel mass flow meter with integrated display, a 0-5 VDC linear output, would require 12VDC power, have 1/2" stainless steel tube fittings, would be calibrated to measure 0-50 L/minute of air, and would come with an NIST-traceable calibration certificate.

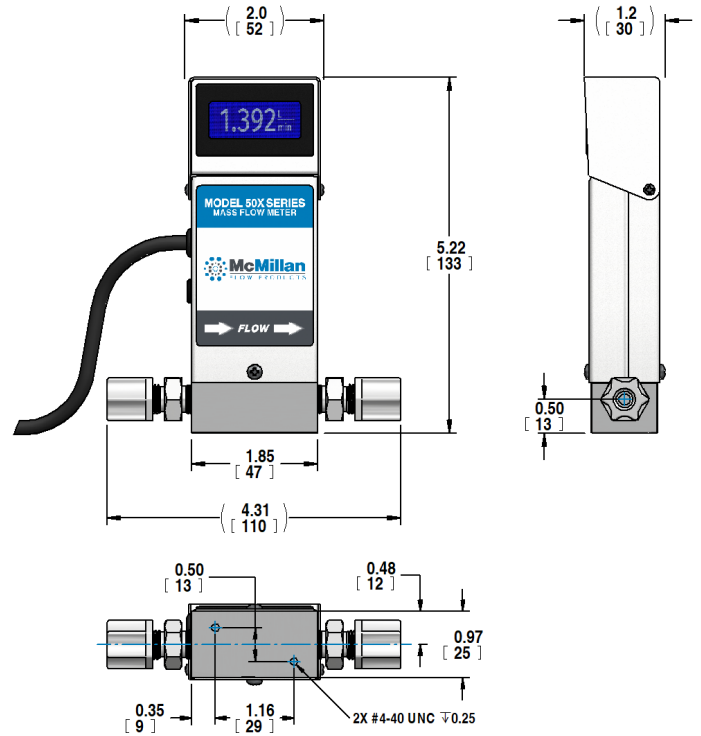
50D-C-20M-G6-A4 would provide an aluminum-body mass flow meter with integrated display, a 4-20 mA linear output, would provide 24 VDC power, have 1/4" plastic tube fittings, and would be calibrated to measure 0-20 sccm of carbon dioxide.

Dimensions

50K and 50S



50D and 50SD



*Dimensions shown in inches [mm] and are for shown with Acetal (A2) fittings. Other model/fitting combinations have similar dimensions. Dimensional drawings for other model codes are available by request from the factory.

Options & Accessories

CODE	DESCRIPTION
50-C-X	6-pin mating cable with pigtail leads (36" length)
A-115VAC	115 VAC Power Package, 0-5 VDC Output, only use with D Power/Signal Option
A-230VAC	230 VAC Power Package, 0-5 VDC Output, only use with D Power/Signal Option
275A/275B	External panel mount digital flow rate display
250/250E	External panel mount digital flow rate and totalizer display



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