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Flow Controllers.  
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# McMillan

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## STANDARD PRODUCT CATALOG

Third Edition  
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UHP Product Catalog (available Winter '02/'03) may also be requested.

### Ordering Information



#### Terms of Payment

If an account has not already been set up, we invite your company to do so. Three trade references and your banking information submitted along with your order will be sufficient (please allow 5-7 working days for approval). A Dun & Bradstreet rating may speed your approval. Net 30 will be the terms for all new, approved corporate accounts.

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email: [sales@mcmflow.com](mailto:sales@mcmflow.com)

fax: (512) 863-0671

mailing address:

P.O. Box 1340  
Georgetown, TX 78627

physical address:

7075 RR 2338  
Georgetown, TX 78628

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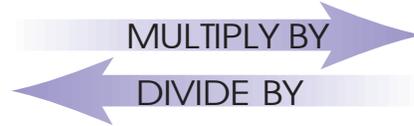
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# Conversion Chart

Unit.....	Factor .....	Unit
Atmospheres.....	14.6959 .....	PSI
Bar .....	14.504 .....	PSI
Cc .....	1 .....	Milliliters (mL)
Cm <sup>3</sup> .....	1 .....	Milliliters (mL)
Cubic Feet.....	28.3168 .....	Liters (L)
Cubic Feet.....	28316.8.....	Milliliters (mL)
Cubic Inches .....	16.3872.....	Milliliters (mL)
Day .....	1440 .....	Minute
Fluid Ounces.....	29.573 .....	Milliliters (mL)
Gallons (U.S.) .....	3.7854 .....	Liters (L)
Gallons (U.S.) .....	3785.4 .....	Milliliters (mL)
Hour .....	.60 .....	Minute
Inches .....	25.4 .....	mm
Inches of Water.....	0.03613 .....	PSI
Milliliter (mL).....	0.001 .....	Liter (L)
mm Hg.....	0.0193368 .....	PSI
Ounces (Fluid) .....	29.575 .....	Milliliters (mL)
Quart .....	1.1012 .....	Liter (L)
Second .....	0.0166667.....	Minute
Torr.....	0.01934 .....	PSI



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## Description of Technologies

This section is designed to help customers understand how our products work and why the McMillan Company patented\* designs are superior.

On the top right hand corner of each page an icon is shown describing the type of technology used for the products on that page. The following information describes those technologies and how they are utilized for precise flow measurement and control.

## Pelton Turbine Wheel Design

The McMillan Company micro-turbine flow sensor works for both gas and liquid applications. A miniature sapphire shaft floating in a sapphire bearing produces very little friction. In most cases, units will function reliably for years with little or no maintenance.



Because the turbine wheel is so small and lightweight, the customer can expect the unit to function across a large dynamic range, usually 10% or lower of the maximum flow rate (20% of maximum flow rate for gas applications). Repeatability of turbine flow sensors is excellent; since the design inherently has no zero drift, no adjustments need to be made to maintain repeatability.

### Standard McMillan turbine design (Figure 1)

Most McMillan products utilize a small, Ryton® turbine wheel. The rotation of the Pelton-type turbine wheel is linear over a large dynamic range. To sense flow rate, these flow sensors use an electro-optical system. This system consists of an infrared diode beaming light through a glass window onto the

turbine wheel. “Spokes” deposited on the turbine wheel alternately reflect and absorb the light. The reflected light is sensed by a photo-diode, and advanced electronics convert those pulses into a signal proportional to flow rate.

### McMillan turbine design made with Teflon® PTFE (Figures 2 & 3)

Certain liquid flow products (the Model 106, I-106, 106F and 401) made with Teflon® PTFE use a slightly different optical system. This system allows them to see through even seemingly translucent or opaque liquids, such as ink or polishing slurries. This type of design allows usage of a sub-miniature microturbine wheel about the size of a quarter in both diameter and thickness. The turbine wheel is then supported on a very small sapphire shaft held in position by two sapphire bearings. Because of the very light weight of both the wheel and the shaft, the microturbine wheel virtually floats in the liquid. This flotation effect causes the turbine wheel to be suspended in the middle of the bearings and thus eliminates shaft and bearing wear. This design allows these products to be used for ultraclean applications - no particles are generated.

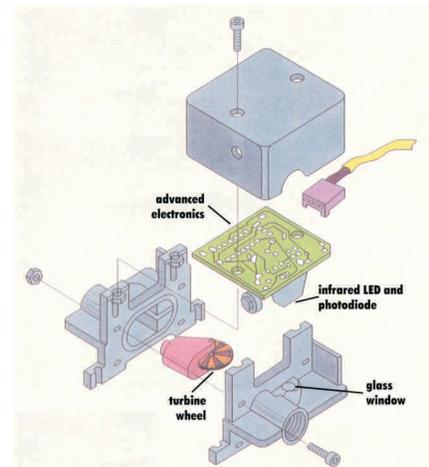


Figure 1: Standard McMillan turbine sensors

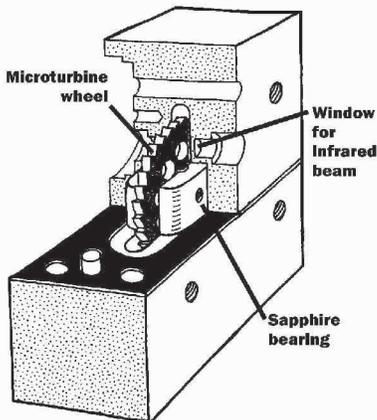


Figure 2: Teflon® McMillan turbine sensors

As flow passes through the flow sensor, it is directed onto the teeth of the wheel using a precision-machined orifice, which is sized according to flow range. The flow is projected onto the wheel, spinning the wheel faster as flow increases. This speed increase is directly proportional to the increase in flow rate.

The microturbine wheel features 8 small holes, spaced evenly around the center of the wheel. As the wheel spins, an infrared beam is projected through a Teflon window and onto the wheel. A sensor on the other side of the wheel detects each hole and translates those signals into pulses. Thus, as the wheel spins faster, more pulses are generated. When the wheel stops, no pulses are generated.

\* Patent Numbers 4,467,660; 5,542,302; 5,728,949; DE 19680105 T1; GB 0163785; GB 2302175B; GB 2332064B; Japan 1770103. Other patents pending.

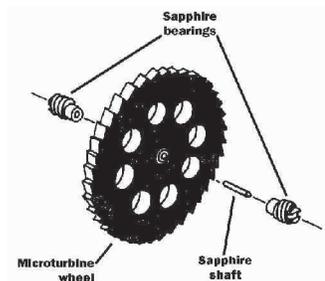


Figure 3: Turbine wheel assembly

## Thermal (Hot Wire) Design



Thermal mass flow sensors, meters, and controllers feature many benefits. Fast response, virtually zero maintenance, and precise measurements are very important among today's variety of applications.

The McMillan Company Model 50 & 80 Series products 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 (see Figure 4). Each coil is heated, and, as the gas passes through the tube, the smart electronics sense the amount of

heat transferred from one coil to the other. McMillan Company's patented\* system ensures the zero remains stable and the sensor is extremely repeatable.



**Figure 4: Sensing Coil on McMillan Thermal Sensors**

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.

If you need to accurately measure or control a dry gas, the McMillan 50/80 Series may be the best choice for you. Take a look at pages 9-10 for more details, and order yours today!

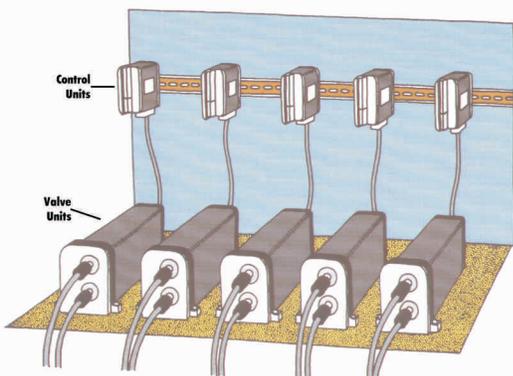
## Liquid Flow Controller Designs

For applications where a flow rate needs to be automatically maintained regardless of small pressure changes, flow controllers save users time and money. A flow controller combines a needle valve and flow sensor with smart electronics that compare the setpoint vs. actual flow and adjust the valve automatically.

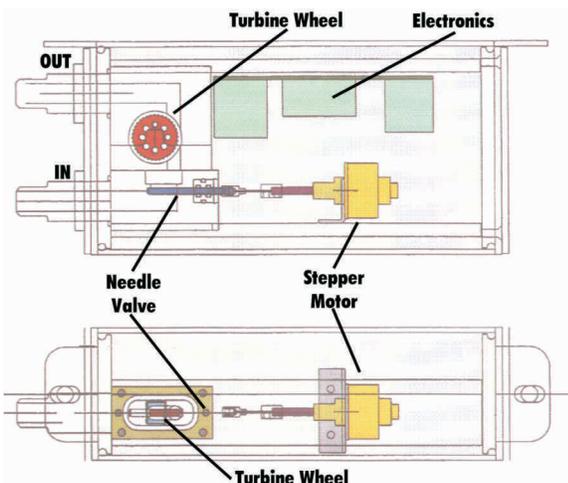


By sending an analog signal to the unit, the flow rate may be adjusted from a remote location (i.e. computer or control station). Flow rates can then be varied and verified to adjust chemical blends, dispense amounts, or chemical usage automatically and reliably.

Figure 5 illustrates the design of the Model 401, the world's first microprocessor-controlled flow controller made with Teflon® PTFE for precision flow rate control. Figure 6 shows how several liquid flow controllers, such as the Model 401, can be used together for precise mixing and blending of corrosive and pure liquids. Higher yields result when blending and dispensing are consistently monitored and controlled.



**Figure 6: Precision blending system**



**Figure 5: Design of 401 Valve unit**

The Model 400/470 package is well suited for laboratory, non-corrosive applications. The Model 401 is designed for corrosive applications such as acid dilution, water treatment, cleaning processes, etc.

See pages 16 & 20 for more information on liquid flow control!

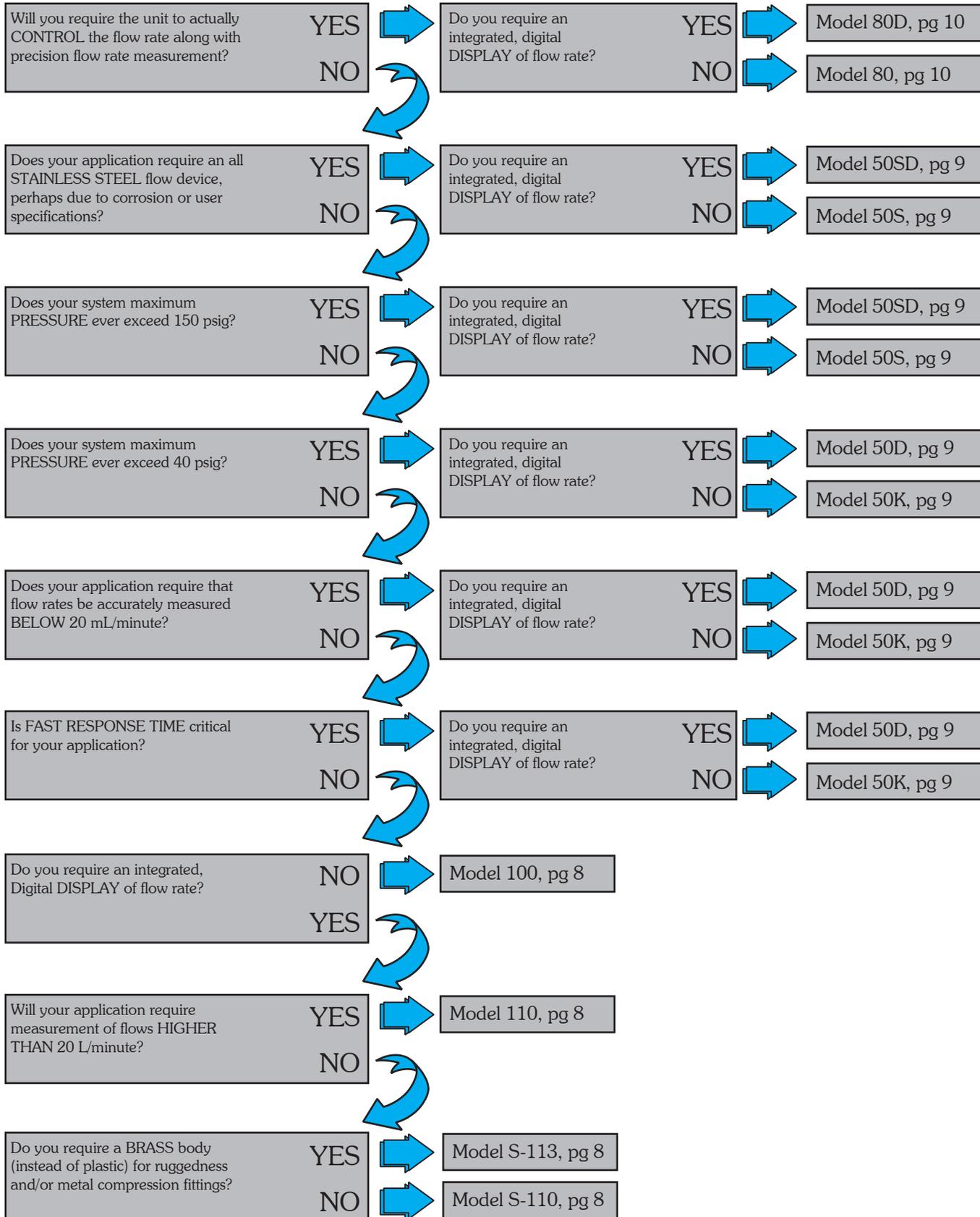
\*Patent #'s 6,119,730; 6,038,921; 6,240,776; GB2358930; GB234722; GB2370647. Other patents pending.

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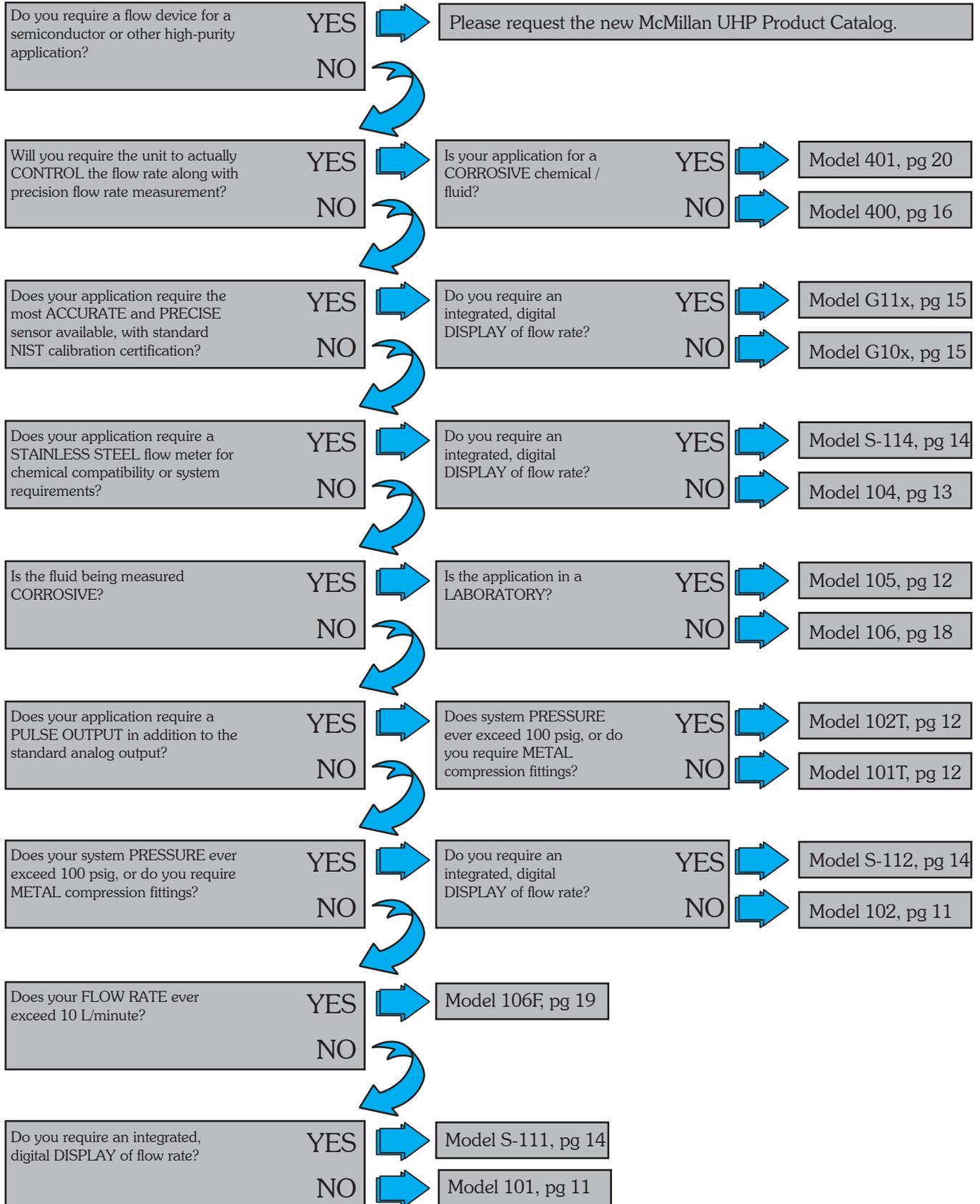
# GAS Application Guide

This guide is designed to assist you in selecting the correct product for your GAS application. If you have any questions, or need further assistance, please do not hesitate to call or email any of our Applications Specialists.



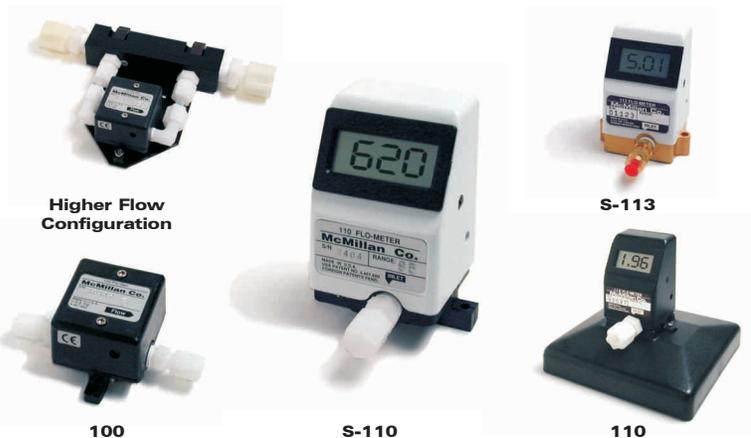
# LIQUID Application Guide

This guide is designed to assist you in selecting the correct product for your LIQUID application. If you have any questions, or need further assistance, please do not hesitate to call or email any of our Applications Specialists.



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# Model 100, 110, S-110 & S-113



- **Our most affordable gas flow sensors and meters**
- **Work well with mixed gases**
- **Advanced turbine design maintains excellent accuracy and repeatability**
- **Several configurations**

For OEM or laboratory applications, where an affordable flow sensor needs to be installed, the Model 100 is an excellent choice. Its time-proven turbine design will keep measuring accurately for years with little or no maintenance. It features a 0-5VDC output standard. **A power adapter or cable assembly (below) is required for operation.**

The Model 110 Flo-Meters are great for laboratory benchtop gas applications. An integrated 3½ digit flow rate display informs the user of actual flow, and the 0-5VDC output can be interfaced to a data acquisition system. **A power adapter (USA unless specified) is included for plug-and-go operation.**

The Model S-110 and S-113 Flo-Meters have a wide variety of uses. They too incorporate an LCD, 3½ digit display of flow rate, but can be less expensive than the Model 110. The S-110 has a plastic body with acetal fittings, and the S-113 is constructed from brass & includes brass fittings. **A power adapter or cable assembly (below) is required.**

Wetted Parts: Ryton®, acetal, sapphire, glass, epoxy, Viton® O-rings standard. EPDM O-rings available - use suffix "Q".  
The Model S-113 also contains brass.

Dimensions, (excluding fittings): *Model 100:* 2.35"x1.65"x1.50" *Model S-110, S-113:* 1.88"x3.00"x1.75"  
*Model 110:* 5.00"x4.50"x5.00" **Call for dimensions on units over 5 L/minute.**

100	110	S-110	S-113	Standard Flow Range	"C" Flow Range	Max. Pressure Drop	Standard Fittings
100-3	110-3	S-110-3	S-113-3	20-100 mL/minute	0.04-0.2 SCFH	20" water	1/8" tube
100-4	110-4	S-110-4	S-113-4	40-200 mL/minute	0.1-0.5 SCFH	8" water	1/8" tube
100-5	110-5	S-110-5	S-113-5	100-500 mL/minute	0.2-1.0 SCFH	2" water	1/8" tube
100-6	110-6	S-110-6	S-113-6	200-1000 mL/minute	0.4-2.0 SCFH	2" water	1/8" tube
100-7	110-7	S-110-7	S-113-7	0.4-2.0 L/minute	1.0-5.0 SCFH	2" water	1/4" tube
100-8	110-8	S-110-8	S-113-8	1.0-5.0 L/minute	2.0-10.0 SCFH	2" water	1/4" tube
100-9	110-9	S-110-9	S-113-9	2.0-10.0 L/minute	4.0-20.0 SCFH	3" water	1/4" tube
100-10	110-10	S-110-10	...	4.0-20.0 L/minute	10-50 SCFH	3" water	3/8" tube
100-11	110-11	S-110-11	...	10-50 L/minute	20-100 SCFH	3" water	3/8" tube
100-12	110-12	S-110-12	...	20-100 L/minute	40-200 SCFH	3" water	1/2" tube
100-13	110-13	S-110-13	...	40-200 L/minute	100-500 SCFH	5" water	1/2" tube
100-14	110-14	S-110-14	...	100-500 L/minute	200-1000 SCFH	20" water	1/2" tube

**NIST Calibration Certificate is optional at an added cost.**

All units calibrated for air unless specified; certain unusual gases or blends may incur added costs. Call for details.  
Standard units calibrated for mL or L/minute; units with "C" suffix calibrated for SCFH (i.e., a Model 100-5C for 0.2-1.0 SCFH)  
See detailed specifications on page 23.

## Options and Accessories

**100-17 Cable Assembly** - 3 foot long cable terminated with pigtail leads. Includes all cables for input/output.

**S-PS-08** - 115VAC (USA) power adapter and output leads. Order **S-PS-18** for 230VAC (European) applications.

**Displays** - See pages 21-22 for our full line of displays. These displays are compatible with the Model 100:

*Model 210R:* Flow rate display

*Model 250:* Multi-function; batch, programmable, alarms, etc.



# Model 50K, 50S, 50D, & 50SD



Model 50K-9 with Model 91 Filter



Model 50K-11



Model 50SD-9



Model 50D-15

- **All-metal construction - for ruggedness & reliability**
- **Affordable pricing + features means great VALUE**
- **Advanced coil design for fast performance and virtually no zero drift**

The McMillan line of mass flow sensors and meters continues to sell more and more each year. Why? Because no other mass flow products on the market maintain such high quality standards at such an affordable price. All-metal construction. Calibration certificate standard on all units. Minimum 96-hour burn-in. Fast response. High repeatability. Years of reliability. You have a lot of choices for mass flow sensors, so we strive to make a product that you will find superior.

The Model 50S and 50SD are all-stainless steel, and come standard with stainless steel compression fittings. The Model 50K and 50D feature anodized aluminum construction and come standard with brass fittings unless indicated. Both the Model 50D and the Model 50SD incorporate a 3½ digit flow rate display and come standard with a NIST-Traceable Certificate. All units include 3-foot cable terminated with connector. **Cable assembly or option package required for operation.**

Wetted Parts: 50S/50SD: 316, 303, & 304 stainless steel. Stainless steel fittings standard on all ranges.  
 50K/50D: 316, 303 & 304 stainless steel, anodized aluminum, & Viton®. Ranges 2- 10 feature acetal fittings; range 11 has brass fittings; ranges 12-15 have stainless fittings. On ranges 2-10, metal fittings are available at an extra charge.

Dimensions (not including fittings): 50K, 50S: 1.87"x1.03"x3.55" 50D, 50SD: 1.87"x1.03"x5.00"  
**Call for dimensions on units above 10 L/minute.**

50K	50S	50D	50SD	Standard Flow Range	"C" Flow Range	Max. Pressure Drop	Standard Fittings
50K-2	50S-2	50D-2	50SD-2	0-20 sccm	n/a	1" water	1/8" tube
50K-3	50S-3	50D-3	50SD-3	0-50 sccm	0-0.10 scfh	1" water	1/8" tube
50K-4	50S-4	50D-4	50SD-4	0-100 sccm	0-0.20 scfh	2" water	1/8" tube
50K-5	50S-5	50D-5	50SD-5	0-200 sccm	0-0.50 scfh	2" water	1/8" tube
50K-6	50S-6	50D-6	50SD-6	0-500 sccm	0-1.00 scfh	2" water	1/8" tube
50K-7	50S-7	50D-7	50SD-7	0-1000 sccm	0-2.00 scfh	3" water	1/8" tube
50K-8	50S-8	50D-8	50SD-8	0-2.0 L/minute	0-5.00 scfh	3" water	1/4" tube
50K-9	50S-9	50D-9	50SD-9	0-5.0 L/minute	0-10.0 scfh	3" water	1/4" tube
50K-10	50S-10	50D-10	50SD-10	0-10.0 L/minute	0-20.0 scfh	5" water	3/8" tube
50K-11	50S-11	50D-11	50SD-11	0-20.0 L/minute	0-50.0 scfh	6" water	3/8" tube
50K-12	50S-12	50D-12	50SD-12	0-50 L/minute	0-100 scfh	6" water	3/8" tube
50K-13	50S-13	50D-13	50SD-13	0-100 L/minute	0-200 scfh	6" water	1/2" tube
50K-14	...	50D-14	...	0-200 L/minute	0-500 scfh	6" water	1/2" tube
50K-15	...	50D-15	...	0-500 L/minute	0-1000 scfh	6" water	1/2" tube

**NIST Calibration Certificate standard on Model 50D & 50SD, and is optional on Model 50K & 50S at an added cost.**

**All units calibrated for air unless specified; certain unusual gases or blends may incur added costs. Call for details.**

**Standard units calibrated for sccm or L/minute; units with "C" suffix calibrated for SCFH (i.e., a Model 50D-6C for 0-1.00 SCFH)**

See detailed specifications on page 23.

## Options and Accessories

**Model 90 & 91 In-Line Filter** - 20 micron filtering. Order Model 90 for ranges 2-7; Model 91 for ranges 8-10.

**50-C-X Cable Assembly** - 3 foot long cable terminated with pigtail leads. Includes all wiring for 0-5VDC output.

**A-115VAC Adapter Package** - 115VAC(USA) power adapter & cabling for 0-5VDC. Order **A-230VAC** for Europe.

**B-115VAC Adapter Package** - 115VAC(USA) power adapter & cabling for 4-20 mA. Order **B-230VAC** for Europe.

**Displays (for Model 50K & 50S)** See page 21-22 for our line of displays. The Model 210R & 250 are compatible.

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## Model 80, 80S, 80D, & 80SD Mass Flo-Controllers



Model 80D shown with optional Model 90 Filter

Model 80

Units shown with optional acetal fittings. Brass fittings are standard.

- **All-metal construction - for ruggedness & reliability**
- **80S & 80SD provide stainless steel construction at an exceptional value**
- **Model 80D & 80SD can be calibrated for up to 3 gases (select on front panel)**

With all of the mass flow controllers on the market, it can be difficult to decide which is best for your application. Well, if your application requires fast performance and a low price, then the McMillan Mass Flo-Controllers fit the bill. High quality, all metal construction (instead of plastic) guarantees you won't strip any threads. Advanced coil design prevents zero drift, which means your setpoints will always produce the same flow rates. The Model 80S and 80SD are constructed from stainless steel for enhanced chemical compatibility.

The Model 80D and Model 80SD add an integrated 3½ digit flow rate display. Also, customers may order the Model 80D/80SD calibrated for up to three gases (one is standard, each additional incurs added charges). If the Model 80D/80SD has been programmed at the factory for multiple gases, the user may select which gas the unit is measuring simply by setting the switches on the front panel. In addition, the 80D/80SD also allows the user to select internal or external setpoint - two dials (coarse and fine) are provided for setting the internal setpoint. External setpoint input for all units is 0-5VDC.

**A cable assembly or option package is required for operation (see below).**

Wetted Parts: 80S/80SD: 303, 304, & 316 stainless steel, and epoxy. Stainless fittings standard.  
80/80D: Anodized aluminum, stainless steel, brass, and Viton® O-rings. Brass fittings standard. Stainless steel fitting upgrade available at an added cost; acetal fittings available at no extra charge.

Dimensions, excluding fittings: Model 80/80S -- 3.17" x 1.03" x 3.80" Model 80D/80SD -- 3.17" x 1.03" x 5.26"

80	80S	80D	80SD	Standard Flow Range	"C" Flow Range	Recom. Diff. Pressure	Standard Fittings
80-3	80S-3	80D-3	80SD-3	0-50 sccm	0-0.10 scfh	15-40 psi	1/8" tube
80-4	80S-4	80D-4	80SD-4	0-100 sccm	0-0.20 scfh	15-40 psi	1/8" tube
80-5	80S-5	80D-5	80SD-5	0-200 sccm	0-0.50 scfh	15-40 psi	1/8" tube
80-6	80S-6	80D-6	80SD-6	0-500 sccm	0-1.00 scfh	15-40 psi	1/8" tube
80-7	80S-7	80D-7	80SD-7	0-1000 sccm	0-2.00 scfh	15-40 psi	1/8" tube
80-8	80S-8	80D-8	80SD-8	0-2.0 L/minute	0-5.00 scfh	15-40 psi	1/4" tube
80-9	80S-9	80D-9	80SD-9	0-5.0 L/minute	0-10.0 scfh	15-45 psi	1/4" tube
80-10	80S-10	80D-10	80SD-10	0-10.0 L/minute	0-20.0 scfh	15-45 psi	3/8" tube

**NIST Calibration Certificate included with Model 80D & 80SD, and is optional for Model 80 & 80S at an added cost.**

**All units calibrated for air unless specified; certain unusual gases or blends may incur added costs. Call for details.**

**Standard units calibrated for sccm or L/minute; units with "C" suffix calibrated for SCFH (i.e., a Model 80D-9C for 0-10.0 SCFH)**

See detailed specifications on page 23.

### Options and Accessories

**Model 90 & 91 In-Line Filter** - 20 micron filtering. Order Model 90 for ranges 3-7; Model 91 for ranges 8-10.

**50-C-X Cable Assembly** - 3 foot long cable terminated with pigtail leads. Includes all cables for input/output.

**C-115VAC Adapter Package** - Includes 115VAC (USA) power adapter and all cables required for input/output.

**C-230VAC Adapter Package** - Includes 230VAC (Europe) power adapter and all cables required for input/output.

**Displays (Model 80/80S)** - See pg 21-22 for our line of displays. The Model 210R & 250 displays are compatible.

# Model 101 & 102 Liquid Flo-Sensors



Model 102



Model 101

- **Our most popular line of liquid flow sensors**
- **Affordable pricing + features means great VALUE**
- **Simple design creates a reliable product with enhanced repeatability**

For liquid flow measurement, the Model 101 & 102 Flo-Sensors have been setting the pace. Their advanced Pelton-turbine design provides large turn-down ratios, fast response, and repeatable accuracy. Combined with an affordable price, you cannot beat their value. A 0-5VDC analog output is standard.

The Model 101 is constructed from plastic, and come standard with acetal compression fittings. It is well-suited for accurate measurement of water, mild acids, or other slightly corrosive fluids. With a pressure rating of 100 psi maximum, it can be used with most applications.

The Model 102 is made from brass, and include brass compression fittings. It is well-suited for fuels, light oils (less than 10 cS), or any other application that may require high pressures (500 psi rating).

**Either a cable assembly or power adapter is required for operation (see below).**

Wetted Parts: Ryton®, acetal, sapphire, glass, epoxy, Viton® O-rings standard. EPDM O-rings are available at an added cost - use suffix "Q". The 102 also contains brass.

Dimensions (not including fittings): 2.35" x 1.65" x 1.50"

101(Ryton®)	102 (brass)	Flow Range	Max. Pressure Drop	Standard Fittings
101-3	102-3	13-100 mL/minute	10 psi	1/8" tube
101-4	102-4	20-200 mL/minute	10 psi	1/4" tube
101-5	102-5	50-500 mL/minute	10 psi	1/4" tube
101-6	102-6	100-1000 mL/minute	6 psi	1/4" tube
101-7	102-7	0.2-2.0 L/minute	10 psi	1/4" tube
101-8	102-8	0.4-5.0 L/minute	10 psi	3/8" tube
101-9	102-9	1.0-10.0 L/minute	10 psi	3/8" tube
101-5G	102-5G	1-10 GPH	12 psi	1/4" tube
101-8G	102-8G	8-100 GPH	12 psi	3/8" tube

**For increased accuracy and a NIST Calibration Certificate, order precision models with the "P" suffix (ex., 101-8GP)**

See detailed specifications on page 23. All units are calibrated with deionized water.

## Options and Accessories

**100-17 Cable Assembly** - 30 inch, 3-wire cable with pigtail leads. Connections for 12VDC power and 0-5VDC out.

**S-PS-08 Power Adapter** - 115 VAC(USA) power adapter. Plugs into standard wall outlet, with signal output leads.

**S-PS-18 Power Adapter** - 230 VAC(EUR) power adapter. Plugs into standard wall outlet, with signal output leads.

**Displays** - See pages 21-22 for our full line of displays. These displays are compatible with the 101 & 102 Sensors:

*Model 210R:* Flow rate display

*Model 250:* Multi-function; batch, programmable, alarms, etc.

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# Model 101T, 102T & 105 Flo-Sensors



- **Combined with the Model 220 Display, you can create a low cost flow totalizing system**
- **Provides both 0-5VDC and pulse outputs for versatility**
- **Fast response, extremely linear, and reliable year in and year out**

For liquid flow totalizing applications, the McMillan 101T, 102T and 105 Flo-Sensors can't be beat. With standard analog 0-5VDC and pulse outputs, these units can be set up in any application where accurate measurements of flow rate and total flow are required.

Combined with either the Model 220 Rate Meter and Totalizer, or the Model 250 Multi-Function Display, an affordable flow totalizing package can be finally realized. The Model 101T is made from plastic with standard acetal tube compression fittings, whereas the Model 102T features brass construction and comes standard with brass compression fittings. The Model 105 is made with Teflon® PTFE and includes PFA compression fittings. It features an integrated 3-foot long cable terminated with pigtail leads.

**A cable assembly or power adapter is required for operation for the 101T and 102T only (see below).**

Wetted Parts: 101T & 102T: Ryton®, acetal, stainless steel, sapphire, glass, epoxy, Viton® O-rings standard. EPDM O-rings available at an added cost - use suffix "Q". The Model 102T also contains brass.  
 105: Teflon® PTFE brand resin, Kal-Rez®, and sapphire.

101T	102T	105	Flow Range	Max. Pressure Drop	Standard Fittings
101-3T	102-3T	105-3	13-100 mL/minute	10 psi	1/8" tube
101-4T	102-4T	105-4	20-200 mL/minute	10 psi	1/4" tube
101-5T	102-5T	105-5	50-500 mL/minute	10 psi	1/4" tube
101-6T	102-6T	105-6	100-1000 mL/minute	6 psi	1/4" tube
101-7T	102-7T	105-7	0.2-2.0L/minute	10 psi	1/4" tube
101-8T	102-8T	105-8	0.4-5.0L/minute	10 psi	3/8" tube
101-9T	102-9T	105-9	1.0-10.0L/minute	10 psi	3/8" tube
101-5TG	102-5TG	105-5G	1-10 GPH	12 psi	1/4" tube
101-8TG	102-8TG	105-8G	8-100 GPH	12 psi	3/8" tube

**For increased accuracy and a NIST Calibration Certificate, order precision models with the "P" suffix (ex., 102-8TGP)**

See detailed specifications on page 23. All units calibrated with deionized water.

## Options and Accessories

- 100-17T Cable Assembly (101T/102T)** - 30" cable with 4 wires for power, ground, 0-5VDC out and pulse out.
- 110-00-08T Adapter (101T/102T)** - 115VAC (USA) power adapter. Wires included for analog and pulse outputs.
- 110-00-18T Adapter (101T/102T)** - 230VAC (Eur) power adapter. Wires included for analog and pulse outputs.
- 105-10-08 Adapter (105)** - 115VAC (USA) power adapter. Terminal strip included for easy connections.
- 105-10-18 Adapter (105)** - 230VAC (Eur) power adapter. Terminal strip included for easy connections.

**Displays** - See pages 21-22 for our full line of displays. These displays are compatible with these sensors:

- Model 210R: Flow rate display
- Model 220: Rate & total flow display
- Model 250: Multi-function; batch, programmable, alarms, etc.

# Model 104 & 107 Flo-Sensors



INCLUDED



Model 104

- **A quality, low-cost stainless steel flow sensor with  $\pm 1.0\%$  full scale or better accuracy**
- **Now available with integrated 4-20 mA output**
- **NIST-Traceable Calibration Certificate included**

For years, our customers have asked for a sensor similar to our Model 101 Flo-Sensor, but made out of 316L stainless steel. Well, the time has come. The new stainless steel line of Flo-Sensors, based on the time-proven Model 101, feature a stainless steel housing and come standard with stainless steel compression fittings. The Model 104 comes with two outputs: 0-5VDC and pulse outputs for connection to any of our displays (below). The Model 107 features a 4-20 mA output, for use in many industrial and OEM applications. Both Flo-Sensors are rated up to 500 psig.

**Either a cable assembly or power adapter is required for operation (see below).**

Wetted Parts: 316L stainless steel, Ryton<sup>®</sup>, sapphire, glass, epoxy, Viton<sup>®</sup> O-rings standard. EPDM O-rings available at an added cost - use suffix "Q".

The dimensions of all flow ranges(not including fittings): 104 -- 2.04" x 1.61" x 1.50" (LxWxH)  
107 -- 2.04" x 1.61" x 2.17"

104	107	Flow Range	Max. Pressure Drop	Standard Fittings
104-3	107-3	13-100 mL/minute	10 psi	1/8" tube
104-4	107-4	20-200 mL/minute	10 psi	1/4" tube
104-5	107-5	50-500 mL/minute	10 psi	1/4" tube
104-6	107-6	100-1000 mL/minute	6 psi	1/4" tube
104-7	107-7	0.2-2.0 L/minute	10 psi	1/4" tube
104-8	107-8	0.4-5.0 L/minute	10 psi	3/8" tube
104-9	107-9	1.0-10.0 L/minute	10 psi	3/8" tube
104-5G	107-5G	1-10 GPH	12 psi	1/4" tube
104-8G	107-8G	10-100 GPH	12 psi	3/8" tube

See detailed specifications on page 23. All units calibrated with deionized water.

## Options and Accessories

**100-17T Cable Assembly** - 30 inch, 4 wire cable. Has red wire for 12VDC power, black wire for common ground, and white & green wires for output.

**110-00-08T Power Adapter** - 115 VAC (USA) power adapter for Model 104. Plugs into standard wall outlet, and has pigtail leads for 0-5VDC signal out and pulse output. Order **110-00-18T** for European applications.

**104-10-08 Power Adapter** - 115 VAC (USA) power adapter for Model 107. Plugs into standard wall outlet, and has wires for 4-20 mA signal out. Order **104-10-18** for European applications.

**Displays** - See page 21-22 for our full line of displays. These displays are compatible with the Model 104 Flo-Sensor:

*Model 210R*: Flow rate display

*Model 220*: Rate & total flow display

*Model 250*: Multi-function; batch, programmable, alarms, etc.

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## S-111, S-112 & S-114 Flo-Meters



Model S-112

- **Our most popular line of liquid flow meters**
- **Affordable pricing + features means great VALUE**
- **Simple design creates a reliable product with enhanced repeatability**

For liquid flow metering with integrated rate display, the S-Series Flo-Meters have been setting the pace. Their advanced Pelton-turbine design provides large turn-down ratios, fast response, and repeatable accuracy. Combined with an affordable price, you cannot beat their value. A 0-5VDC analog output is standard.

If you require an inexpensive plastic flow meter to measure flow rates, the Model S-111 Flo-Meter is the answer. Including an analog 0-5VDC output and a 3½ digit display of flow rate in engineering units, these flow meters are perfect for any laboratory or test facility.

For higher pressure applications or where metal may be required, the Model S-112 & S-114 may be the solution. Both are rated to 500 psig. The S-112 is made from brass, whereas the S-114 features a stainless flow body. The S-114 also features enhanced ± 1% accuracy for critical applications, and comes standard with an NIST calibration certificate.

**Either a cable assembly or power adapter is required for operation (see below).**

Wetted Parts: S-111: Ryton®, acetal, sapphire, glass, epoxy, Viton® O-rings & acetal fittings standard.  
 S-112: Brass, Ryton®, acetal, sapphire, glass, epoxy, Viton® O-rings & brass fittings standard.  
 S-114: 316L stainless steel, epoxy, glass, Ryton®, sapphire, Viton® O-rings and SS fittings standard.  
 NOTE: EPDM O-rings are available at an added cost to any of the units as a replacement for Viton® - use suffix "Q".

Dimensions (not including fittings): 1.88"x3.00"x1.75"

S-111	S-112	S-114	Flow Range	Max. Pressure Drop	Standard Fittings
S-111-3	S-112-3	S-114-3	13-100 mL/minute	10 psi	1/8" tube
S-111-4	S-112-4	S-114-4	20-200 mL/minute	10 psi	1/4" tube
S-111-5	S-112-5	S-114-5	50-500 mL/minute	10 psi	1/4" tube
S-111-6	S-112-6	S-114-6	100-1000 mL/minute	6 psi	1/4" tube
S-111-7	S-112-7	S-114-7	0.2-2.0 L/minute	10 psi	1/4" tube
S-111-8	S-112-8	S-114-8	0.4-5.0 L/minute	10 psi	3/8" tube
S-111-9	S-112-9	S-114-9	1.0-10.0 L/minute	10 psi	3/8" tube
S-111-5G	S-112-5G	S-114-5G	1-10 GPH	12 psi	1/4" tube
S-111-8G	S-112-8G	S-114-8G	10-100 GPH	12 psi	3/8" tube

**For increased accuracy and a NIST Calibration Certificate, order precision models with the "P" suffix (ex., S-111-8GP) - S-111/S-112 only**  
 See detailed specifications on page 23. All units are calibrated with deionized water.

### Options and Accessories

- 100-17 Cable Assembly** - 30 inch, 3-wire cable with pigtail leads. Connections for 12VDC power and 0-5VDC out.
- S-PS-08 Power Adapter** - 115 VAC(USA) power adapter. Plugs into standard wall outlet, with signal output leads.
- S-PS-18 Power Adapter** - 230 VAC(EUR) power adapter. Plugs into standard wall outlet, with signal output leads.
- 110-00-17 Base (S-111 only)** - Allows the S-111 to stand by itself. Includes mounting hardware.

## Model G101, G102, G111 &amp; G112



Model G112



Model G102

- **Unsurpassed  $\pm 0.5\%$  F.S. accuracy ... for the most precise flow applications**
- **NIST-Traceable Calibration Certificate included**
- **Available in both plastic (Ryton<sup>®</sup>) and brass for almost any application**

The McMillan Company GOLD Series Flo-Sensors and Flo-Meters represent quality and precision. No other flow devices on the market provides  $\pm 0.5\%$  full scale accuracy/linearity combined with these features at an affordable price.

The G101 and G102 Flo-Sensors feature a pulse output combined with a 0-5 VDC analog output standard. Connections are made using the integrated 6-foot cable, terminated with pigtail leads. For applications where accuracy is critical, combine the G101/G102 with the Model 250 display and take advantage of the linearizing capabilities of the 250. The G101 is made from plastic, and the G102 is constructed from brass.

The G111 and G112 Flo-Meters have an integrated 3½ digit display that provides a direct flow rate readout right on the unit. A 0-5VDC output is also provided for external interfacing. The Model G111 has a plastic body with acetal compression fittings, while the rugged G112 is made from brass and features brass compression fittings standard. Either a cable assembly or power adapter is required for operation (see below).

Wetted Parts: Ryton<sup>®</sup>, acetal, stainless steel, sapphire, glass, epoxy, Viton<sup>®</sup> O-rings standard. EPDM O-rings available at an added cost - use suffix "Q". The Model G102 and G112 also contain brass.

G101	G102	G111	G112	Flow Range	Max. Pressure Drop	Standard Fittings
G101-3	G102-3	G111-3	G112-3	13-100 mL/minute	10 psi	1/8" tube
G101-4	G102-4	G111-4	G112-4	20-200 mL/minute	10 psi	1/4" tube
G101-5	G102-5	G111-5	G112-5	50-500 mL/minute	10 psi	1/4" tube
G101-6	G102-6	G111-6	G112-6	100-1000 mL/minute	6 psi	1/4" tube
G101-7	G102-7	G111-7	G112-7	0.2-2.0 L/minute	10 psi	1/4" tube
G101-8	G102-8	G111-8	G112-8	0.4-5.0 L/minute	10 psi	3/8" tube
G101-5G	G102-5G	G111-5G	G112-8G	1-10 GPH	12 psi	1/4" tube
G101-8G	G102-8G	G111-8G	G112-8G	10-100 GPH	12 psi	3/8" tube

See detailed specifications on page 23. All units calibrated with deionized water.

### Options and Accessories

**100-17T Cable Assembly** - 30 inch, 4-wire cable with pigtail leads for G111 & G112. Has red wire for 12 VDC power, black wire for power ground, white wire for 0-5VDC signal out, and green wire for signal ground.

**S-PS-08 Power Adapter** - 115 VAC (USA) power adapter for G111 & G112. Plugs into standard wall outlet, and has white wire for common ground and yellow wire for 0-5VDC signal out.

**S-PS-18 Power Adapter** - 230 VAC (Europe) power adapter for G111 & G112. Plugs into standard wall outlet, and has black wire for common ground and black/white wire for 0-5VDC signal out.

**110-00-17 Base (for G111 only)** - Allows G111 unit to stand on bench or tabletop. Includes screws for mounting.

**Displays** - See page 21-22 for our full line of displays. These displays are compatible with the Model G101/G102:

Model 210R: Flow rate display

Model 220: Rate & total flow display

Model 250: Multi-function; batch, programmable, alarms, etc.

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# Model 400/470 Flo-Controller Package



Model 400 Valve Unit

Model 470 Control Unit

- **Automated flow control for the test lab or benchtop**
- **Includes Flo-Sensor for precision flow measurement & automated needle valve for control**
- **NIST Calibration Certificate included**

The Model 400 is a liquid flow controller designed for water and other non-corrosive fluids. It incorporates a stepper motor-actuated needle valve, a precision liquid Flo-Sensor, and electronics that compare the output of the Flo-Sensor to the setpoint and move the needle accordingly. The Model 470 control unit is a user interface for the Model 400. It provides a digital display, adjustable setpoint potentiometer, and power supply for the Flo-Controller. Using optional cables (below), the user may also remotely send and receive 0-5VDC signals to the Model 400 through the Model 470. A set of jumpers on the Model 470 allow the user to select display settings and whether to use the internal or external setpoint. **Valve unit, control unit, and power adapter are included with package.** For OEM applications, the Model 400 is available by itself. Call for details.

Wetted Parts: Ryton®, Teflon® PTFE brand resin, acetal, stainless steel, sapphire, glass, epoxy, Viton® O-rings standard. EPDM O-rings available at an added cost - use suffix "Q".

Model Number	Flow Range	Desired Differential Pressure	Standard Fittings	Model 400, No Fittings
400/470-3	15-100 mL/minute	15-35 psi	1/8" tube	7.00" x 2.50" x 2.00
400/470-4	20-200 mL/minute	10-30 psi	1/4" tube	7.00" x 2.50" x 2.00
400/470-5	50-500 mL/minute	12-30 psi	1/4" tube	7.00" x 2.50" x 2.00
400/470-6	100-1000 mL/minute	12-30 psi	1/4" tube	7.00" x 2.50" x 2.00
400/470-7	0.2-2.0 L/minute	12-30 psi	1/4" tube	7.00" x 2.50" x 2.00

115 VAC (USA) power adapter standard. For 230 VAC (European) applications, add "E" suffix (ex: 400/470-4E). See detailed specifications on page 23. All units calibrated with deionized water.

## Options and Accessories

**50-C-S Cable Assembly** - Connects to jacks on Model 470 for external 0-5VDC setpoint and 0-5VDC flow out. One 50-C-S is required for setpoint input, and an additional 50-C-S is required for flow output.

**400-00-56 Cable Extension** - 6 foot cable for extending distance between Model 400 and Model 470 control unit.



Model 470 with 50-C-S for 0-5VDC output

# Model I-106 Intrinsically Safe System



- **Designed for use in hazardous areas**
- **FM/CSA Approved: Class I, Division 1, Groups C & D**
- **PTFE construction for use with corrosive or aggressive chemicals**

The I-106 System enables you to continuously measure flow rates in potentially explosive atmospheres. The system is CSA certified and FM approved for Class I, Division 1, Groups C & D hazardous environments. PTFE construction, combined with sapphire and Kal-Rez®, allow for use with even the most corrosive or aggressive fluids.

For more information on the sensing technology or flow sensor specifications, see information on the standard Model 106 or Model 106F (pages 18 & 19, respectively).

I-106F models feature integrated male flare fittings; I-106 models come standard with PFA compression tube fittings. Standard package features pulse output and requires 12 VDC power; use MSB devices to convert pulse output to analog outputs (see MSB devices below).

For semiconductor or other high-purity applications, request McMillan's new UHP Product Catalog (available Winter '02/'03).

Wetted Parts: Teflon® PTFE brand resin, Kal-Rez® and sapphire.

I-106	I-106F	Flow Range	Max. Pressure Drop
I-106-3	I-106F-3	15-100 mL/minute	12 psi
I-106-4	I-106F-4	20-200 mL/minute	10 psi
I-106-5	I-106F-5	50-500 mL/minute	10 psi
I-106-6	I-106F-6	100-1000 mL/minute	6 psi
I-106-7	I-106F-7	0.2-2.0 L/minute	10 psi
I-106-8	I-106F-8	0.5-5.0 L/minute	10 psi
I-106-9	I-106F-9	1.0-10.0 L/minute	10 psi
...	I-106F-20	3-20 L/minute	3 psi
...	I-106F-30	4-30 L/minute	4 psi
...	I-106F-50	7-50 L/minute	10 psi

**A NIST-Traceable Calibration Certificate is optional at an added cost.**

See detailed specifications on page 23. All units calibrated with deionized water.

## Options and Accessories

**MSB-2 Device** - Provides 0-5 VDC analog output for I-106 System. Requires 24 VDC power.

**MSB-3 Device** - Provides 4-20 mA analog output for I-106 System. Requires 24 VDC power.

**MSB-5 Device** - Provides 4-20 mA isolated analog output for I-106 System. Requires 24 VDC power.

**Displays** - See pages 21-22 for our line of displays. Compatible displays (no MSB required):

*Model 220:* Rate & total flow

*Model 251:* Multi-function; batch, programmable, alarms, etc.

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# Model 106 PTFE Flo-Sensor



106-7A-F4

- **Designed for corrosive applications**
- **No zero drift means unsurpassed repeatability ... ±0.2% full scale**
- **Perfect for chemical blending and dosing**
- **Several output options**

The Model 106 Flo-Sensor provides accurate flow measurement of even the most corrosive chemicals. The advanced turbine design provides almost instantaneous response, and if the turbine is not spinning, you don't receive an output -- no zero drift! The combination of Teflon® PTFE brand resin, Kal-Rez®, and sapphire provide wetted surfaces compatible with almost any low viscosity fluid - from solvents to hydrofluoric acid. Many output configurations are available. Standard units come with a 6-foot cable, terminated in pigtail leads. Order a 106 today and see the benefits of precision monitoring of your flow rates today!

For semiconductor or other high-purity applications, request McMillan's new UHP Product Catalog (available Winter '02/'03).

Wetted Parts: Teflon® PTFE brand resin, Kal-Rez®, and sapphire.

Model	Flow Range	Max. Pressure Drop	Standard Fittings
106-3	15-100 mL/minute	12 psi	1/8" tube
106-4	20-200 mL/minute	10 psi	1/4" tube
106-5	50-500 mL/minute	10 psi	1/4" tube
106-6	100-1000 mL/minute	6 psi	1/4" tube
106-7	200-2000 mL/minute	10 psi	1/4" tube
106-8	400-5000 mL/minute	10 psi	3/8" tube
106-9	1.0-10.0 L/minute	10 psi	3/8" tube

See detailed specifications on page 23. All units are calibrated with deionized water.

## Available Power & Output Configurations for Model 106

Suffix/Configuration Code	Power Required	Output
A (or none)	12-15 VDC	Isolated BOSFET pulse (passive)
B	22-25 VDC	0-5 VDC
C	15-25 VDC	4-20 mA (non-isolated)
D	12-15 VDC	0-5 VDC
E	22-25 VDC	Isolated BOSFET pulse (passive)
J	22-25 VDC	0-10 VDC
K	12-15 VDC	0-10 VDC

Example: To order a Model 106 for 100-1000 mL/minute with 0-10 VDC output and 24 VDC power, order a 106-6J.

## Options and Accessories

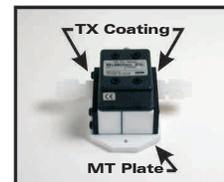
**Displays** - See pages 21-22 for our full line of displays. Use the Model 220 or 251 for units with pulse output (suffix A or E).

**TX Option** - Order this option to receive your 106 with all exterior metal surfaces Teflon® coated. This prevents corrosion due to spillage or environment conditions.

**MT Mounting Plate** - This allows easier mounting of the 106 from the top.

**Flare Fittings** - Tube fittings are standard. Add suffix **F4** for 1/4" flare fitting option; add **F6** for 3/8" flare fitting option.

**MSB Devices** - Order MSB-2 for 0-5 VDC output (non-isolated), MSB-3 for 4-20 mA (non-isolated), or MSB-5 for 4-20 mA (isolated). 24 VDC power required. Use MSB devices with A suffix only.



# Model 106F PTFE Flo-Sensor



- **Advanced microturbine design for repeatable results-with no zero drift**
- **Several output options, including pulse and analog**
- **Extremely compact size**
- **Simple flare connections**

The Model 106F Flo-Sensor will precisely measure flow rates of virtually any low-viscosity fluid, as low as 15 mL/minute or as high as 50 L/minute (13 GPM). Repeatable results are achieved by utilizing a patented\* Pelton-type microturbine wheel. This proven design will not contaminate your processes, but continues to provide precise results even after many years of service.

Machined flare-type fittings provide easy connection and eliminate all threads from the fluid stream. Electrical connections are made via the included 6 foot cable. Several power and signal configurations are available for a wide range of applications.

By limiting the wetted surfaces of the 106F to Teflon® PTFE brand resin, Kal-Rez®, and sapphire, it can be used to measure almost any low-viscosity fluid, including hydrofluoric and other acids, solvents, and alkalines.

For semiconductor or other high-purity applications, request McMillan's new UHP Product Catalog (available Winter '02/'03).

Wetted Parts: Teflon® PTFE brand resin, Kal-Rez®, and sapphire.

Model Number	Flow Range	Max. Pressure Drop	Standard Fittings
106F-3	15-100 mL/minute	12 psi	3/8" male flare
106F-4	20-200 mL/minute	10 psi	3/8" male flare
106F-5	50-500 mL/minute	10 psi	3/8" male flare
106F-6	100-1000 mL/minute	6 psi	3/8" male flare
106F-7	200-2000 mL/minute	10 psi	3/8" male flare
106F-8	400-5000 mL/minute	10 psi	3/8" male flare
106F-9	1.0-10.0 L/minute	10 psi	3/8" male flare
106F-20	3.0-20.0 L/minute	3 psi	3/4" male flare
106F-30	4.0-30.0 L/minute	4 psi	3/4" male flare
106F-50	7.0-50.0 L/minute	10 psi	3/4" male flare
106F-5G	1.0-10.0 GPH	12 psi	3/8" male flare
106F-8G	10-100 GPH	12 psi	3/8" male flare

See detailed specifications on page 23. All units calibrated with deionized water.

## Available Power & Output Configurations for Model 106F

Suffix/Configuration Code	Power Required	Output
A (or none)	12-15 VDC	Isolated BOSFET pulse (passive)
B	22-25 VDC	0-5 VDC
C	15-25 VDC	4-20 mA (non-isolated)
D	12-15 VDC	0-5 VDC
E	22-25 VDC	Isolated BOSFET pulse (passive)
J	22-25 VDC	0-10 VDC
K	12-15 VDC	0-10 VDC

Example: To order a Model 106F for 100-1000 mL/minute with 0-10 VDC output and 24 VDC power, order a 106F-6J.

## Options and Accessories

**Displays** - See pages 21-22 for our full line of displays. Use the Model 220 or 251 for units with pulse output (suffix A or E).

**MSB Devices** - Order MSB-2 for 0-5 VDC output (non-isolated), MSB-3 for 4-20 mA (non-isolated), or MSB-5 for 4-20 mA (isolated). 24 VDC power required. Use with 106F suffix/configuration code "A" only

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# Model 401 PTFE Flo-Controller



Valve Unit



Control Unit

- **The world's first automatic microprocessor-controlled PTFE liquid flow controller**
- **A flow sensor and automatic needle valve combined**
- **Improve processes by maintaining steady flow rates**

The Model 401 sets the standard in flow automation. Imagine a unit, deep in your system, that will control flow rates remotely. No adjusting manual needle valves every few hours. No waste of expensive chemicals. Your interface (maybe hundreds of feet away) can provide the Model 401 with a proportional 4-20 mA signal, and the 401 will do the rest. If your pressure fluctuates, the Model 401 automatically opens and closes its internal valve to maintain a constant flow rate. Only Teflon® PTFE brand resin, Kal-Rez®, and sapphire wetted parts - compatible with solvents, acids like hydrofluoric, or alkalines. Imagine blending chemicals with incredible precision, never wasting a drop. Imagine never again having to make small, abstract adjustments to your valves. Imagine a system so easy to integrate that you'll never look back. The Model 401 Flo-Controller...because smart companies need smart tools.

The Model 401 has two components - the valve unit and the control unit. The valve unit is sealed and all flow connections are made to it. The control unit connects to the valve unit via the standard 10 foot cable. This control unit has a terminal strip where all electrical connections are made. A DIN rail clip is provided for easy mounting of the control unit. An integrated digital display and status LED's inform the user of flow rate, setpoint, error conditions, etc.

Wetted Parts: Teflon® PTFE brand resin, Kal-Rez®, and sapphire.

Model Number	Flow Range	Typical Diff. Pressure Range	Standard Fittings	Valve Unit Dimensions
401-A100	15-100 mL/minute	15-30 psi	1/4" male flare	4.8"x8.3"x3.3"
401-A500	50-500 mL/minute	15-30 psi	3/8" male flare	4.8"x8.3"x3.3"
401-A1000	100-1000 mL/minute	15-30 psi	3/8" male flare	4/8"x8.3"x3.3"
401-A2000	0.2-2.0L/minute	15-30 psi	3/8" male flare	4.8"x8.3"x3.3"
401-A5000	0.4-5.0L/minute	18-30 psi	1/2" male flare	4.8"x8.3"x3.3"
401-A8000	0.6-8.0L/minute	18-30 psi	1/2" male flare	4.8"x8.3"x3.3"
401-A10000	1.0-10.0L/minute	18-30 psi	1/2" male flare	4.8"x8.3"x3.3"

See detailed specifications on page 23. All units calibrated with deionized water.

## Available Signal Configurations for Model 401

Suffix/Configuration Code	Power Required	Input & Output Signal Type
None	24 VDC	4-20 mA
401-Axxxx-5	24 VDC	1-5 VDC
401-Axxxx-10	24 VDC	0-10 VDC

Example: To order a Model 401 for 200-2000 mL/minute with 0-10 VDC inputs and outputs, order a 401-A2000-10.

To order a Model 401 for 15-100 mL/minute with 4-20 mA inputs and outputs, order a 401A100.

## Options and Accessories

**Custom Cable Lengths and Connector Types** - Standard valve units come with 10 feet of cable; order custom lengths (up to 25 feet) to suit your needs. Connector options are also available - call for details.

## Model 210R Flow Rate Display



- **Miniature LCD 3½ digit display accepts 0-5VDC signal**
- **0.4" High Digits for clarity, even from a distance**
- **Will work with any power supply from 5 to 24 VDC**

If you wish to display the output of your McMillan Company Flo-Sensor, the Model 210R is an inexpensive, quality digital flow rate display. DIP switches on the back allow the user to select flow range, and two connectors allow connection for power and signal. Cables are included for connection - simply provide power and 0-5VDC signal and you are ready to go!

Model Number	Inputs Accepted	Power	Mounting Depth	Cutout Dimensions
210R	0-5 VDC Only	5-24 VDC	1.00"	0.915"x1.665"

## Model 220 Flow Rate & Total Flow Display



- **8 digit total flow display, or 4 digit flow rate display (selectable on front panel)**
- **Programming software (Windows based) included**
- **NEMA-4X Rated**
- **Powered by internal battery**

Display flow in any engineering unit. Press a button and see your totalized flow on another screen. The Model 220 is a fully programmable display unit for measuring total flow and flow rate precisely. For security, the front panel reset (total flow) may be disabled. Software included allows user to take calibration from any compatible McMillan Company flow sensor and figure values to program into unit.

Model Number	Inputs Accepted	Power	Mounting Depth	Cutout Dimensions
220	Pulse Only	Internal 3 VDC Lithium Battery <i>Extra Batteries: Order P/N 220-01-01</i>	1.25"	1.299"x2.677"

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# Model 250 & 251 Multi-Function Displays



- **Completely programmable flow rate and total flow display**
- **Program up to 16 calibration points (9 for Model 251) to achieve precise linearization!**
- **Option cards (below) add alarm & analog outputs, more**

The Model 250 & 251 Digital Displays from McMillan Company allow you to use your flow sensor to its fullest potential. Imagine being able to program a 16-point calibration curve into a unit (9 points on the 251), and have it display the corrected values, even retransmitting the linearized signal with the optional analog output card! Imagine programming in alarm setpoints, with actual relay contacts, with hysteresis and startup options. The easy to use, menu-driven interface makes programming a snap, and the bright LED display ensures clarity even under bright-light conditions. *The units even provide a power source for connecting any\* McMillan Company 12VDC flow sensor, saving you money on additional power supplies!* Power cable provided to power unit from wall outlet.

Model Number	Inputs Accepted	Power	Mounting Depth	Cutout Dimensions
250	0-5 VDC, 4-20 mA	115 VAC (USA)	4.25"	1.77" x 3.62"
250E	0-5VDC, 4-20 mA	230 VAC (Europe)	4.25"	1.77" x 3.62"
251	Pulse Only	115 VAC (USA)	4.25"	1.77" x 3.62"
251E	Pulse Only	230 VAC (Europe)	4.25"	1.77" x 3.62"

## Options and Accessories

**250-10** - Analog Output Card for Model 250 or Model 251. Retransmits linearized signal as 0-5VDC, 0-10VDC, or 4-20 mA (user selectable). Card is user-installable, and simply snaps into provided slot inside display unit.

**250-11**- Alarm Output Card for Model 250 or Model 251. Provides 4 relay contacts for high/low setpoints, low flow alarms, etc. Card is user-installable, and simply snaps into provided slot inside display unit.

\*Does not include McMillan Flo-Controllers (the Model 400/470, 401, 80, or 80D)

## ★ Order Your Units Pre-Programmed ★

Save time. Make your life simpler. Order your flow sensors and displays preprogrammed.

When you order your McMillan Company flow sensor and Model 220, 250, or 251 display together, request that we pre-program the units for you for a small additional fee. We will program the calibration information into the units, adjust setpoint or alarm programming you desire, and any other options you request.

When you place your order, simply let the sales assistant know that you want your units pre-programmed. They will inform you of your options and get all the information required. When your units are delivered, just connect them up and go -- no programming or calibrating to worry about. Order your pre-programmed flow package today!

# Detailed Specifications

	Page #	Unit Function	Accuracy/Linearity <sup>1</sup>	Repeatability <sup>1</sup>	Standard Outputs <sup>2</sup>	Power Required <sup>3</sup>	Pressure Rating-Max	Pressure Sens. <sup>4</sup>	Temp. Rating <sup>5</sup>	Temp. Sens. <sup>1</sup>	NIST Cert.	Viscosity (Max)
<b>ALUMINUM (gas)</b>												
<b>50K</b>	9	sensor	±1.5%	±0.5%	5VDC	12VDC,100 mA	150 psi	±.02%/psi	5-50°C	±0.15%/°C	opt.	n/a
<b>50D</b>	9	meter	±1.5%	±0.5%	5VDC	12VDC,100 mA	150 psi	±.02%/psi	5-50°C	±0.15%/°C	✓	n/a
<b>80</b>	10	controller	±1.5%	±0.5%	5VDC	12VDC,250 mA	150 psi <sup>6</sup>	±.02%/psi	5-50°C	±0.15%/°C	opt.	n/a
<b>80D</b>	10	controller	±1.5%	±0.5%	5VDC	12VDC,250 mA	150 psi <sup>6</sup>	±.02%/psi	5-50°C	±0.15%/°C	✓	n/a
<b>BRASS (gas)</b>												
<b>S-113</b>	8	meter	±3.0%	±0.5%	5VDC	12VDC,35 mA	40 psi <sup>7</sup>	±.07%	5-50°C	±0.2%/°C	opt.	n/a
<b>RYTON® (gas)</b>												
<b>100</b>	8	sensor	±3.0%	±0.5%	5VDC	12VDC,30 mA	40 psi <sup>7</sup>	±.07%	5-50°C	±0.2%/°C	opt.	n/a
<b>110</b>	8	meter	±3.0%	±0.5%	5VDC	115/230 VAC	40 psi <sup>7</sup>	±.07%	5-50°C	±0.2%/°C	opt.	n/a
<b>S-110</b>	8	meter	±3.0%	±0.5%	5VDC	12VDC,35 mA	40 psi <sup>7</sup>	±.07%	5-50°C	±0.2%/°C	opt.	n/a
<b>STAINLESS (gas)</b>												
<b>50S</b>	9	sensor	±1.5%	±0.5%	5VDC	12VDC,100 mA	500 psi	±.02%/psi	5-50°C	±0.15%/°C	opt.	n/a
<b>50SD</b>	9	meter	±1.5%	±0.5%	5VDC	12VDC,100 mA	500 psi	±.02%/psi	5-50°C	±0.15%/°C	✓	n/a
<b>80S</b>	10	controller	±1.5%	±0.5%	5VDC	12VDC,250 mA	500 psi <sup>6</sup>	±.02%/psi	5-50°C	±0.15%/°C	opt.	n/a
<b>80SD</b>	10	controller	±1.5%	±0.5%	5VDC	12VDC,250 mA	500 psi <sup>6</sup>	±.02%/psi	5-50°C	±0.15%/°C	✓	n/a
<b>BRASS (liquid)</b>												
<b>102</b>	11	sensor	±3.0%	±0.2%	5VDC	12VDC,30 mA	500 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>102P</b>	11	sensor	±1.0%	±0.2%	5VDC	12VDC,30 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>102T</b>	12	sensor	±3.0%	±0.2%	5VDC,HZ	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>102TP</b>	12	sensor	±1.0%	±0.2%	5VDC,HZ	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>S-112</b>	14	meter	±3.0%	±0.2%	5VDC	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>S-112P</b>	14	meter	±1.0%	±0.2%	5VDC	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>G102</b>	15	sensor	±0.5%	±0.2%	5VDC,HZ	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>G112</b>	15	meter	±0.5%	±0.2%	5VDC	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>RYTON® (liquid)</b>												
<b>101</b>	11	sensor	±3.0%	±0.2%	5VDC	12VDC,30 mA	100 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>101P</b>	11	sensor	±1.0%	±0.2%	5VDC	12VDC,30 mA	100 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>101T</b>	12	sensor	±3.0%	±0.2%	5VDC,HZ	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>101TP</b>	12	sensor	±1.0%	±0.2%	5VDC,HZ	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>S-111</b>	14	meter	±3.0%	±0.2%	5VDC	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>S-111P</b>	14	meter	±1.0%	±0.2%	5VDC	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>G101</b>	15	sensor	±0.5%	±0.2%	5VDC,HZ	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>G111</b>	15	meter	±0.5%	±0.2%	5VDC	12VDC,35 mA	100 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>400/470</b>	16	controller	±2.0%	±0.2%	none	115/230VAC	100 psi <sup>6</sup>	none	5-50°C	±0.2%/°C	✓	10 cs
<b>STAINLESS (liquid)</b>												
<b>104</b>	13	sensor	±1.0%	±0.2%	5VDC,HZ	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>107</b>	13	sensor	±1.0%	±0.2%	4-20	24VDC,50 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>S-114</b>	14	meter	±1.0%	±0.2%	VDC	12VDC,35 mA	500 psi	none	5-50°C	±0.2%/°C	✓	10 cs
<b>PTFE (liquid)</b>												
<b>105</b>	12	sensor	±3.0%	±0.2%	5VDC,HZ	12VDC,40 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>I-106</b>	17	sensor	±3.0%	±0.2%	HZ	24VDC,70 mA	60 psi	none	10-55°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix A</b>	18,19	sensor	±3.0%	±0.2%	HZ	12VDC,50 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix B</b>	18,19	sensor	±1.0%	±0.2%	5VDC	24VDC,50 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix C</b>	18,19	sensor	±1.0%	±0.2%	4-20	24VDC,75 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix D</b>	18,19	sensor	±1.0%	±0.2%	5VDC	12VDC,50 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix E</b>	18,19	sensor	±3.0%	±0.2%	HZ	24VDC,75 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix J</b>	18,19	sensor	±1.0%	±0.2%	10VDC	24VDC,50 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>106, 106F Suffix K</b>	18,19	sensor	±1.0%	±0.2%	10VDC	12VDC,50 mA	60 psi	none	5-50°C	±0.2%/°C	opt.	10 cs
<b>401</b>	20	controller	±2.0%	±0.25%	see page	24VDC,800 mA	60 psi <sup>6</sup>	none	5-50°C	±0.2%/°C	opt.	10 cs

Footnotes:

1 In percent of Full Scale (specification applies from 20-100% of Full Scale)

2 5VDC=0-5VDC linear analog output, 10VDC=0-10VDC linear analog output, HZ= Pulse Output, 4-20=4-20 mA linear analog output

3 Current draw listed is maximum. Typical current draw may be less.

4 Unless indicated, in percent per millimeter of Mercury (mm Hg)

5 Medium (fluid or gas) temperature may exceed these ratings; call for details.

6 Flow controllers have limited differential pressure range for normal performance.

7 Units calibrated for outlet (exit) port venting to atmosphere.

All specifications subject to change without notice.

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