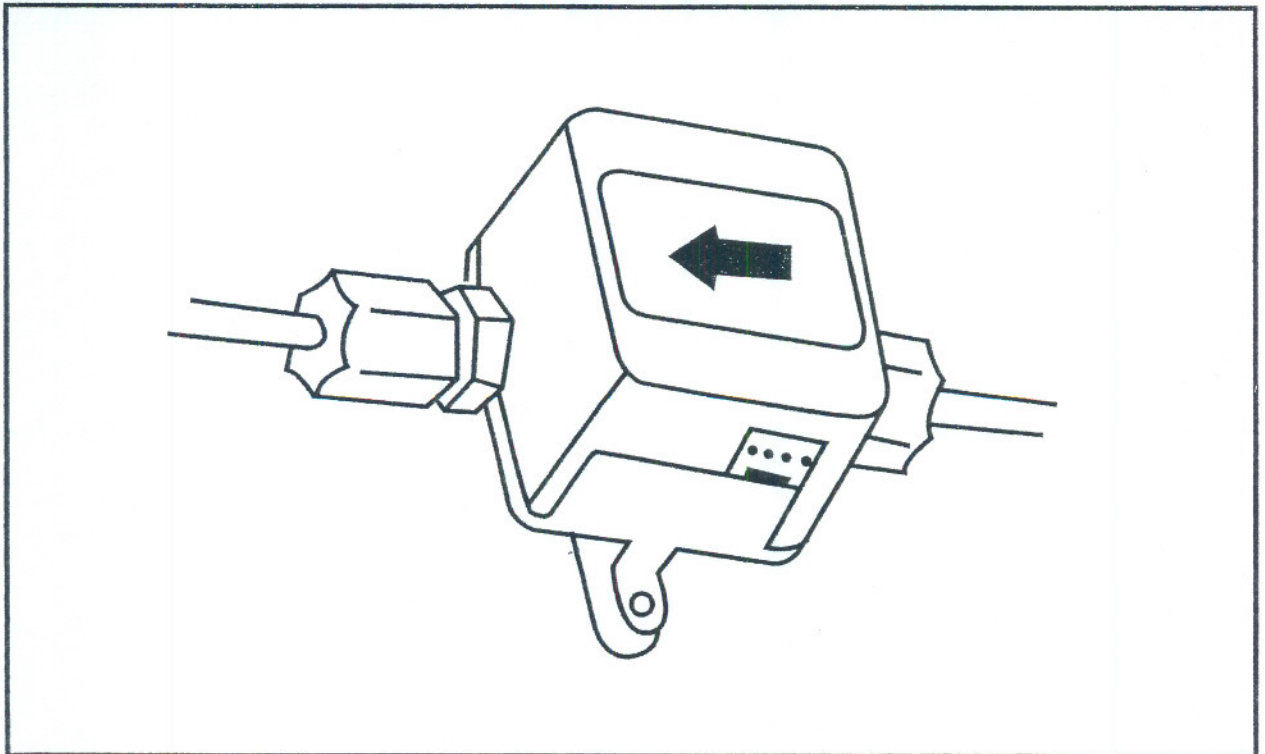


# MCMILLAN COMPANY

**FLO-SENSORS  
MODELS 100, 101, 102  
also OPTION "T"**

## **INSTRUCTION MANUAL IMPORTANT: READ BEFORE USING**

**U.S.A. Patent 4,467,660  
British Patent GB 0163785  
German Patent P 3479336.4-08  
Other Patents Pending**



**Printed in U.S.A.**

Models 100-xx for GAS Flow Measurement  
Models 101-xx, 102-xx for LIQUID Flow Measurement  
OPTIONS: "T" for Pulse Output

### **SAFETY PRECAUTIONS:**

Safe operation depends upon you, the operator. Care **MUST** be taken to avoid damage to the FLO-SENSOR which may cause leaking. **ALWAYS** take care to avoid stressing the device when attaching tubing and when **TIGHTENING** tube fittings. Use a wrench to hold tube fitting body while tightening the fitting nut with another wrench. Avoid damage from dropping or impact - leaking or bearing damage may result. Always use the specified D.C. Power and attach cable. Operating pressure & temperature should **NOT** exceed specified maximums. Verify chemical compatibility of sensor materials **IN YOUR APPLICATION.**

### **SPECIFICATIONS:**

#### **Operating Temperature Range 0-50°C**

**Maximum Operating Pressure** -- Derate 1% per °C above 30°C

Model 100 (for Gas) is 40 PSI (2.76 Bar) at 20°C

Model 101 (for Liquid) is 100 PSI (6.89 Bar) at 20°C

Model 102 (for Liquid) is 500 PSI (34.5 Bar) at 20°C

#### **Sensor Materials**

Models 100, 101

40% Glass filled polyphenylene sulphide, glass window, stainless steel bearing support, sapphire bearing, white epoxy paint, Viton "O" rings (EPDM optional), Acetal tubing fittings standard

Model 102

Brass housing with Parylene coating, Kel-F bearing support, sapphire bearing, white epoxy paint, Viton "O" rings (EPDM optional), glass window, Brass fittings standard



**SPECIFICATIONS: CONTINUED**

**Power Requirements**

All Models (12 Volt): 11.0 to 15.0 VDC at 30 ma. (typical)

Cables Required: For 12 Volt Models use P/N 100-17 Cable

All Models with "T" Option use P/N 100-17T Cable

Cables are approximately 36" Long (0.9m)

**Output Signal(s)**

All Models provide 0 to 5.0 VDC, adjustable (+/-20% typical)

Minimum load 2.5K ohms

"T" Models also provide Pulse Output (7.5 VDC peak), 0-400 pps (typical)

Minimum load 5K ohms

Pulse output varies - calibration data included with sensor

**Applicable (Gases) Model 100**

Standard calibration with air, other gases compatible with Sensor materials may be used

**Applicable (Liquids) Model 101, 102**

Standard calibration with water, other low viscosity liquids may be usable. Check material compatibility. Opaque liquids must be tested for suitability.

**Temperature Sensitivity +/-0.2%/°C**

**Linearity +/-3% of Full Scale - Standard**

Models 101 & 102 "P" Precision option +/-1% available

**Accuracy +/-3% of Full Scale - Standard**

Models 101 & 102 "P" Precision option +/-1% available

**Repeatability (Models 101 & 102) +/-0.2% of Full Scale**

(from 20% to 100% of rated flow)

**Model 100 +/-0.5% of Full Scale**

(from 50% to 100% of rated flow)

**Dimensions (Models 100, 101 & 102 excluding fittings)**

Approximately 2.35" x 1.65" x 1.50" high (ranges thru -8)

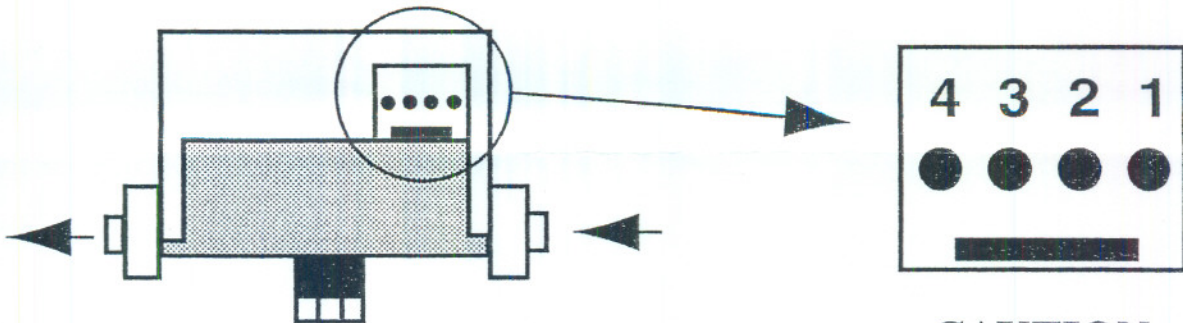
For flow ranges -9 and higher consult factory for dimensions

**GENERAL DESCRIPTION:**

All Flo-Sensors use a Pelton type turbine wheel and electro-optical detection to convert flow rates into a linear 0 to 5 VDC signal. "T" models also produce a square wave pulse output proportional to the flow rate.

**INSTALLATION & OPERATION:**

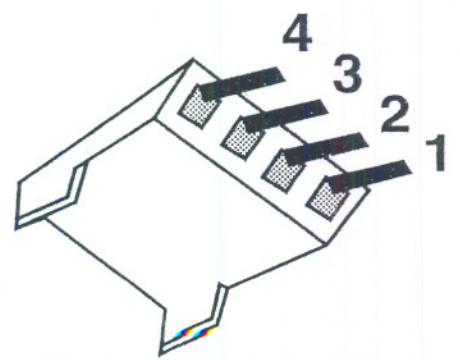
Carefully attach tubing to Flo-Sensor fittings (See SAFETY PRECAUTIONS). BE SURE flow is connected per FLOW DIRECTION on serial number label. Two mounting holes for #4 screw are provided. Factory calibration is done with Serial number label on top - a recommended mounting position. Attach proper power / signal cable to the Flo-Sensor.



**CAUTION:  
OBSERVE POWER  
INPUT POLARITY!**

*12 VDC Power  
Pulse "T" Options*

Power (-)	1	1	BLACK
Signal Ground <i>white</i>	2	2	WHITE
0 - 5 V Output <i>yellow</i>	3	3	RED
+ 12 VDC Power	-	-	RED
+ 5 VDC Power		4	GREEN
Pulse Output			





**STANDARD FLOW RANGES:**

<b>Gas Model(s)</b>	<b>Flow Range</b>	<b>Tubing ID</b>
100-2	10 ml/min - 50 ml/min	.062"
100-3	20 ml/min - 100 ml/min	.062"
100-4	40 ml/min - 200 ml/min	.062"
100-5	100 ml/min - 500 ml/min	.062"
100-6	200 ml/min - 1000 ml/min	.08"
100-7	400 ml/min - 2000 ml/min	.125"
100-8	1000 ml/min - 5000 ml/min	.125"
100-9	2 L/min - 10 L/min	.187"
100-10	4 L/min - 20 L/min	.25"
100-11	10 L/min - 50 L/min	.25"
100-12	20 L/min - 100 L/min	.375"
100-13	40 L/min - 200 L/min	.375"
100-14	100 L/min - 500 L/min	.375"

**NOTE:** Models with a "C" are calibrated in S.C.F.H.  
 Example: 100-8C is 2.0 - 10.0 S.C.F.H.

<b>Liquid Model(s)</b>	<b>Flow Range</b>	<b>Typical Maximum △ P (PSI)</b>
101-3, 102-3 and "T"	13 ml/min - 100 ml/min	10
101-5, 102-5 and "T"	50 ml/min - 500 ml/min	10
101-6, 102-6 and "T"	60 ml/min - 1000 ml/min	6
101-7, 102-7 and "T"	100 ml/min - 2000 ml/min	6
101-8, 102-8 and "T"	200 ml/min - 5000 ml/min	6
101-9, 102-9 and "T"	1.0 L/min - 10.0 L/min	10

**NOTE:** Maximum pressure drop occurs at maximum flow.

**NOTE:** Models with a "G" are calibrated in Gallons/hour.  
 101-5G is 1-10 Gal./hr, 101-8G is 4-100 Gal./hr

**OPERATION (continued):**

Particles which may impair rotation of the turbine wheel must be prevented from entering the FLO-SENSOR. Use a filter to protect the FLO-SENSOR if required (10 micron) recommended).

Liquid FLO-SENSORS may have impaired operation if air (or gas) becomes trapped inside. Avoid exceeding flow rates specified (ALL FLO-SENSORS). Operation at excessive turbine speeds can damage sapphire bearings.

**CALIBRATION Adjustments:**

If a small change in calibration is needed, turn the small 3/4 turn trimpot on side of FLO-SENSOR opposite the power connector. This adjustment will change the 0-5 VDC Output calibration.

Pulse Output is NOT adjustable.

**MAINTENANCE:**

These FLO-SENSORS require no maintenance other than periodic replacement of protective filters. Disassembly is not recommended.

Damage due to dropping, repairs or abuse will void warranty.

If a problem is encountered please contact:

**Customer Service Department  
McMillan Company  
P.O. Box 1340  
Georgetown, Texas 78627 U.S.A.**

**GUARANTEES:**

If at any time within 1 year after shipment, but not thereafter, it is proved that any part of the equipment furnished by us was defective when shipped by us, we will replace or repair the same free of charge, F.O.B. our factory. Notice of this claim must be made to us within one year after delivery. Our liability is limited to replacement of such defective parts or equipment. There are no guarantees or warranty expressed or implied other than those herein specifically mentioned. McMillan Company shall herein not in any event be liable for any consequential damages, secondary charges, expenses for erection or disconnecting, or losses