User's Guide

FLR1000 SERIES
Liquid/Gas Flowmeter
Models FLR1001-FLR1006 are for GAS Flow Measurement
Models FLR1007-FLR1012 are for LIQUID Flow Measurement
Option "P" is for pulse output

SAFETY PRECAUTIONS:
Safe operation depends upon you, the operator. Care MUST be taken to avoid damage to the FLR-1000 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
  FLR1001-FLR1006 (for Gas) is 40 PSI (2.76 Bar) at 20°C
  FLR1007-FLR1012 (for Liquid) is 100 PSI (6.89 Bar) at 20°C
  "BR" Liquid Models are rated for 500 PSI (34.5 Bar) at 20°C

Sensor Materials
  FLR10xx
  40% Glass filled polyphenelene sulphide, glass window, stainless steel bearing support, sapphire bearing, white epoxy paint, Viton "O" rings (EPDM optional), Acetal tubing fittings standard
  FLR10xxBR
  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
11.0 to 15.0 VDC at 30 ma. (typical)
Cables are approximately 36" Long (0.9 m)

Output Signal(s)
All Models provide 0 to 5.0 VDC, adjustable (+/- 20% typical)
Minimum load 2.5K ohms
"P" 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) FLR1001-FLR1006
Standard calibration with air. other gases compatible with Sensor
materials may be used

Applicable (Liquids) FLR1007-FLR1012
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

Accuracy +/- 3% of Full Scale - Standard

Repeatability (Liquid Models) +/- 0.2% of Full Scale
(from 20% to 100% of rated flow)
(Gas Models) +/- 0.5% of Full Scale
(from 50% to 100% of rated flow)

Dimensions (excluding fittings)
Approximately 2.35" x 1.65" x 1.50" high
GENERAL DESCRIPTION:
All flow sensors use a Pelton type turbine wheel and electro-optical
detection to convert flow rates into a linear 0 to 5 VDC signal. "P" models
also produce a square wave pulse output proportional to the flow rate.

INSTALLATION & OPERATION:
Carefully attach tubing to flow 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 flow sensor.

| Power (-) | 1 | 1 | BLACK |
| Signal Ground | 2 | 2 | WHITE |
| 0 - 5 V Output | 3 | 3 | RED |
| + 12 VDC Power | 4 | GREEN |
| Pulse Output | | | |

CAUTION:
OBSERVE POWER INPUT POLARITY
### STANDARD FLOW RANGES:

<table>
<thead>
<tr>
<th>Gas Model(s)</th>
<th>Flow Range</th>
<th>Tubing ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLR1001</td>
<td>20 ml/min - 100 ml/min</td>
<td>.062&quot;</td>
</tr>
<tr>
<td>FLR1002</td>
<td>40 ml/min - 200 ml/min</td>
<td>.062&quot;</td>
</tr>
<tr>
<td>FLR1003</td>
<td>100 ml/min - 500 ml/min</td>
<td>.08&quot;</td>
</tr>
<tr>
<td>FLR1004</td>
<td>200 ml/min - 1000 ml/min</td>
<td>.125&quot;</td>
</tr>
<tr>
<td>FLR1005</td>
<td>400 ml/min - 2000 ml/min</td>
<td>.125&quot;</td>
</tr>
<tr>
<td>FLR1006</td>
<td>1000 ml/min - 5000 ml/min</td>
<td>.125&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid Model(s)</th>
<th>Flow Range</th>
<th>ΔP (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLR1007, FLR1007BR</td>
<td>13 ml/min - 100 ml/min</td>
<td>10</td>
</tr>
<tr>
<td>FLR1008, FLR1008BR</td>
<td>20 ml/min - 200 ml/min</td>
<td>10</td>
</tr>
<tr>
<td>FLR1009, FLR1009BR</td>
<td>50 ml/min - 500 ml/min</td>
<td>10</td>
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<tr>
<td>FLR1010, FLR1010BR</td>
<td>60 ml/min - 1000 ml/min</td>
<td>6</td>
</tr>
<tr>
<td>FLR1011, FLR1011BR</td>
<td>100 ml/min - 2000 ml/min</td>
<td>6</td>
</tr>
<tr>
<td>FLR1012, FLR1012BR</td>
<td>200 ml/min - 5000 ml/min</td>
<td>6</td>
</tr>
</tbody>
</table>

**NOTE:** Maximum pressure drop occurs at maximum flow.
OPERATION (continued):
Particles which may impair rotation of the turbine wheel must be prevented from entering the FLR1000 Series. Use a filter to protect the flow sensor if required (10 micron recommended).

Liquid flow sensors may have impaired operation if air (or gas) becomes trapped inside. Avoid exceeding flow rates specified (ALL FLR1000 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 flow sensor opposite the power connector. This adjustment will change the 0 - 5 VDC Output calibration.
Pulse Output is NOT adjustable.

MAINTENANCE:
These flow 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 Omega Customer Service Department.