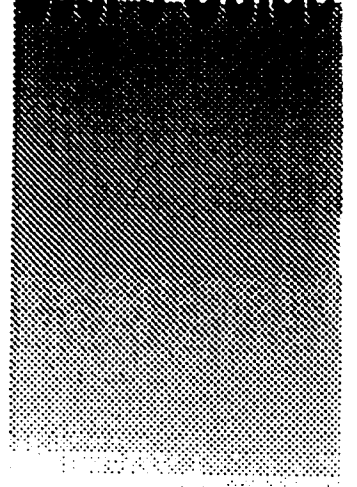


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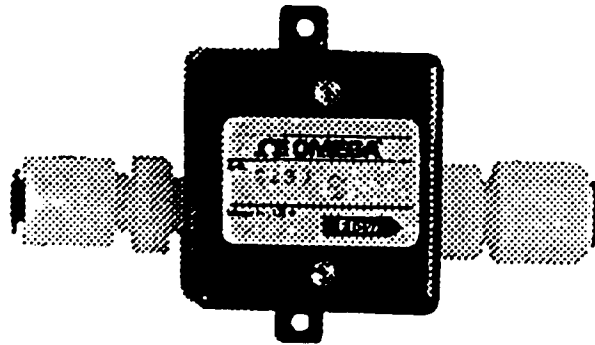
User's Guide



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FLR 1000 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 polyphenylene 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)

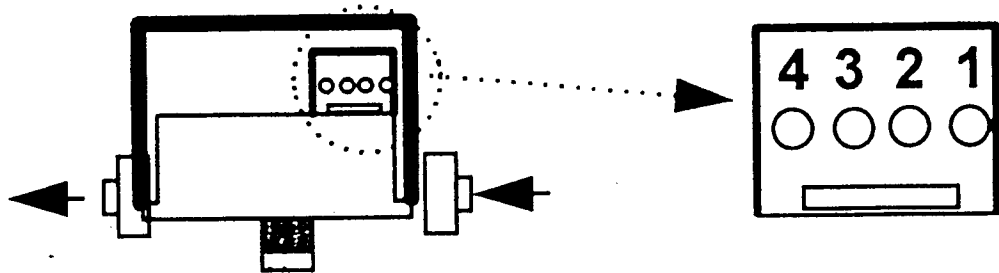
Approximately 2.35" x 1.65" x 1.50" high

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:

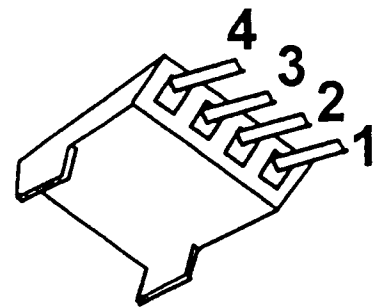
Carefully attach tubing to flow sensor fittings (See SAFETY PRECAUTIONS). **BE SURE flow is connected per FLOW DIRECTION on serial number label.** Two mounting holes for #4 screw are provided. Factory calibration is done with Serial number label on top - a recommended mounting position. Attach proper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



CAUTION:

OBSERVE POWER INPUT POLARITY

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



STANDARD FLOW RANGES:

Gas Model(s)	Flow Range	Tubing ID
FLR1001	20 ml/min - 100 ml/min	.062"
FLR1002	40 ml/min - 200 ml/min	.062"
FLR1003	100 ml/min - 500 ml/min	.062"
FLR1004	200 ml/min - 1000 ml/min	.08"
FLR1005	400 ml/min - 2000 ml/min	.125"
FLR1006	1000 ml/min - 5000 ml/min	.125"

Liquid Model(s)	Flow Range	Typical Maximum ΔP (PSI)
FLR1007, FLR1007BR	13 ml/min - 100 ml/min	10
FLR1008, FLR1008BR	20 mL/min - 200 mL/min	10
FLR1009, FLR1009BR	50 ml/min - 500 ml/min	10
FLR1010, FLR1010BR	60 mL/min - 1000 mL/min	6
FLR1011, FLR1011BR	100 ml/min - 2000 ml/min	6
FLR1012, FLR1012BR	200 mL/min - 5000 mL/min	6

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.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGASM
Customer Service: 1-800-622-2378 / 1-800-622-BESTSM
Engineering Service: 1-800-872-9436 / 1-800-USA-WHENSM
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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

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