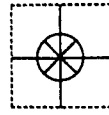
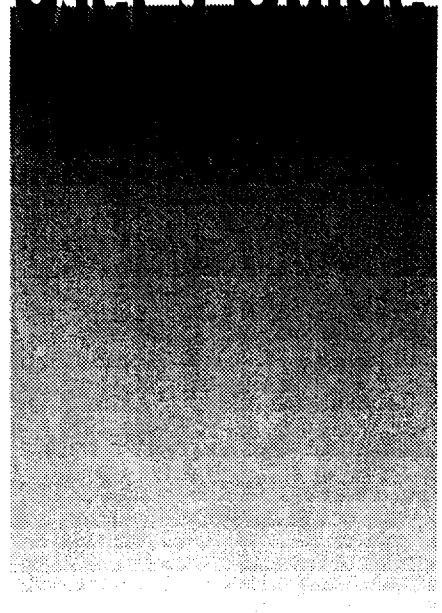


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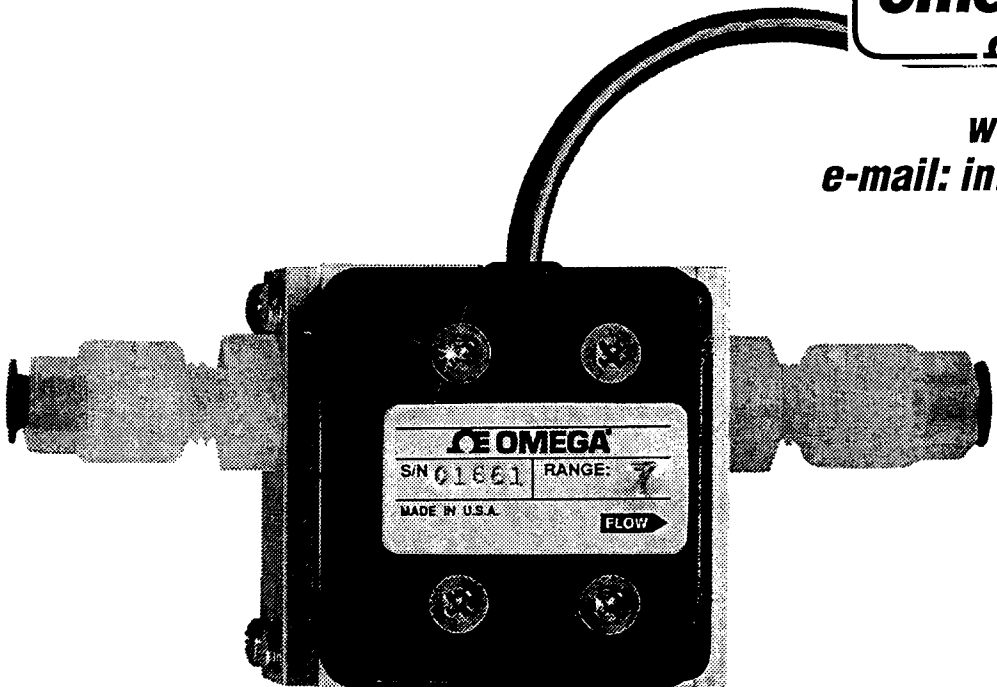


# User's Guide



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# FPR1500 SERIES TEFLON LIQUID FLOW SENSOR

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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.

## ***Installation and Operating Instructions***

Caution: It is recommended that this publication be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment.

### ***General Description***

The FPR-1500 Series liquid service flow sensors are capable of measuring low flow rates (Model FPR-1501) up to medium and higher flow rates (Model FPR-1506). These sensors are suitable for a wide variety of industrial, commercial, and laboratory flow measurement applications.

Flow rate is unidirectional, and proper direction is indicated on the serial number nameplate.

The FPR1500 Series is similar to the FPR1000 Series but has additional flexibility to handle low viscosity corrosive fluids compatible with the FPR1500 wetted materials: Teflon<sup>®</sup>, sapphire, and Kalrez<sup>®</sup> (gasket).

The FPR1500 Series use a Pelton-type turbine wheel to determine flow rate of the liquid. Rotation of the wheel is linear over a wide range of flow. Electro-optical signals proportional to the turbine wheel speed are converted to 0-5 VDC analog signal and also to a buffered square wave pulse output.

### ***Installation Details***

All units are calibrated with water. Do not exceed the flow rate specified for long periods of time and DO NOT USE GASES for flushing out sensor. Bearing life may be shortened by such abuse. The flow must be in the direction indicated on the serial number nameplate. Preferred mounting orientation is with the serial number nameplate facing upward. PFA Teflon<sup>®</sup> fittings are provided. Be careful to install tubing to these carefully to avoid damage or leaking. Hand tighten! DO NOT overtighten fittings. See Figure 1.

<sup>®</sup>Teflon and Kalrez are registered trademarks of E.I. DuPont de Nemours & Co.

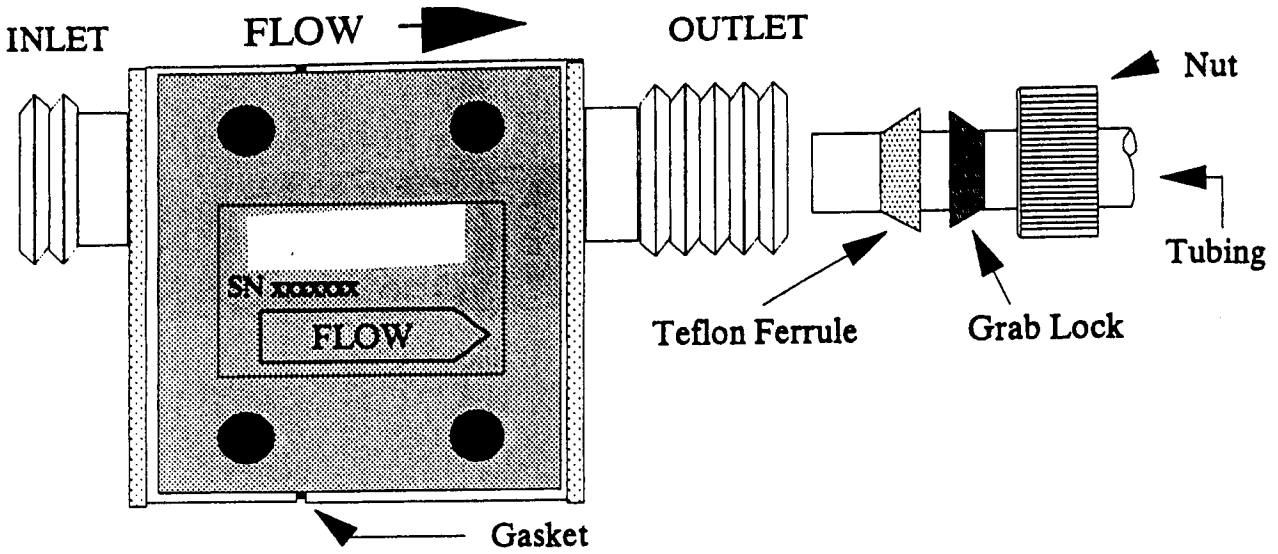


Figure 1.

### Electrical Connection Details

Caution: DO NOT LET WIRES touch each other - tape all connections!

Power (+12 VDC)	RED
Power Ground	BLACK
Pulse Output	GREEN
Filtered 0-5VDC Out	YELLOW
Standard 0-5VDC Out	ORANGE
Signal Ground	BROWN

Notes: Power is from RED (+) to BLACK (-).  
Standard 0-5VDC OUT is from ORANGE (+) to BROWN (-).

The +12 VDC Power Supply should be regulated. The FPR1500-PW power supply is recommended for use.

### Installation Details

Two 4-40 threaded holes are provided on the lower side of the FPR1500 Series for mounting (see Figure 2).

There are approximately 2.13 inches between mounting hole centers. Compression forces **MUST BE MAINTAINED** between mounting brackets, or leakage may occur.

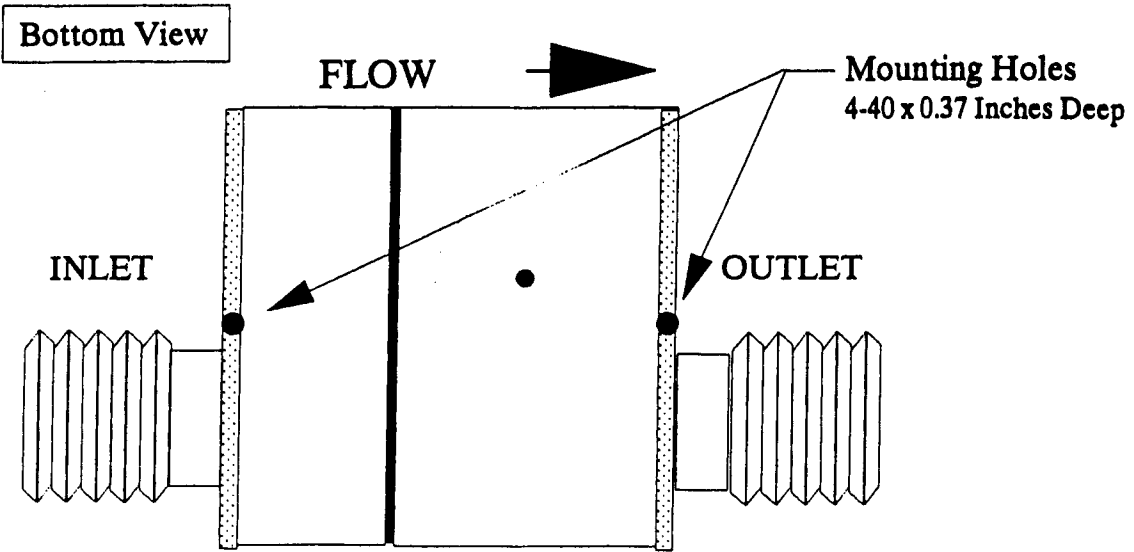


Figure 2.

### ***Flow Ranges***

<i>Model Number</i>	<i>Flow Range</i>	<i>Max <math>\Delta P</math></i>
FPR1501	15-100 mL/minute	10-15
FPR1502	25-200 mL/minute	8-10
FPR1503	50-500 mL/minute	8-10
FPR1504	60-1000 mL/minute	5-7
FPR1505	100-2000 mL/minute	7
FPR1506	500-5000 mL/minute	10

Flow ranges specified for an equivalent flow of water at 23°C. Maximum differential pressure ( $\Delta P$ ) occurs at maximum rated flow using water at 23°C. At 50% of rated flow  $\Delta P$  is 0.25 times above value, and at 20% of rated flow  $\Delta P$  is 0.04 times value.

### ***More Installation Details***

Be sure fluid lines are clean before connection the flow sensor. A 7 micron filter placed BEFORE the flow sensor is recommended for protection.

Do not exceed the maximum rated pressure of the unit (see specifications). Do not disassemble the flow sensor - damage and improper operation may occur. Avoid dropping the flow sensor to insure longest life of sapphire bearings. Entrapped air (or other gases) in the liquid lines will cause measurement errors. Be sure all gas is purged from the measurement lines.

## ***Specifications***

*Output signals:* a. 0-5 VDC (orange is regular response, yellow is filtered 0-5 VDC for less noise). Load resistance should be 2.5K ohms or higher.

b. Pulse - square wave pulses typically 7.5 VDC peak  
Green wire to ground - typical pulses as follows:

FPR1501: 230 Hz	FPR1502: 250 Hz
FPR1503: 325 Hz	FPR1504: 370 Hz
FPR1505: 375 Hz	FPR1506: 500 Hz

*Power required:* 12.5 VDC +/- 2 volts regulated, at less than 15 mA

*Pressure rating:* 60 psig maximum operation

*Dimensions:* 2.16"x2.32"x1.87", not including fittings

*Electrical cable:* 6-wire flexible color coded - approx. 30" long, stripped wire ends

*Fittings:* PFA Teflon<sup>®</sup> included. All 1/4" OD connections except for:  
FPR1501 (1/8" OD), FPR1506 (3/8" OD)

*Temperature rating:* 0-50°C

*Temperature sensitivity:* +/- 0.2% per °C

*Accuracy/Linearity:* +/-3.0% Full scale

*Repeatability:* +/-0.2% Full scale (from 20% to 100% of rated flow)

*Wetted materials:* Teflon<sup>®</sup>, Sapphire, and Kalrez<sup>®</sup>

*Applicable liquids:* Any low viscosity liquid compatible with wetted materials

## ***Maintenance***

Do not open or tamper with flow sensor. Evidence of tampering may void warranty. If problems arise with operation of the Flo-Sensor the complete unit should be returned to the factory for servicing.

## ***Options***

*Regulated 12VDC Power Supply*

FPR1500-PW for 115VAC operation

FPR1500-230PW for 230VAC operation

<sup>®</sup>Teflon and Kalrez are registered trademarks of E.I. DuPont de Nemours & Co.



## 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's 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 malfunctions, 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 having been 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, EXPRESS 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.**

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## 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. Purchase Order 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. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the 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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