1 YEAR
WARRANTY

OMEGA®

User's Guide

FPR300

FPR310

FPR300/310 SERIES
Low-Flow Meter

omega.com info@omega.com

Servicing North America:

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General Information

Installation & Connections

Repair

Troubleshooting

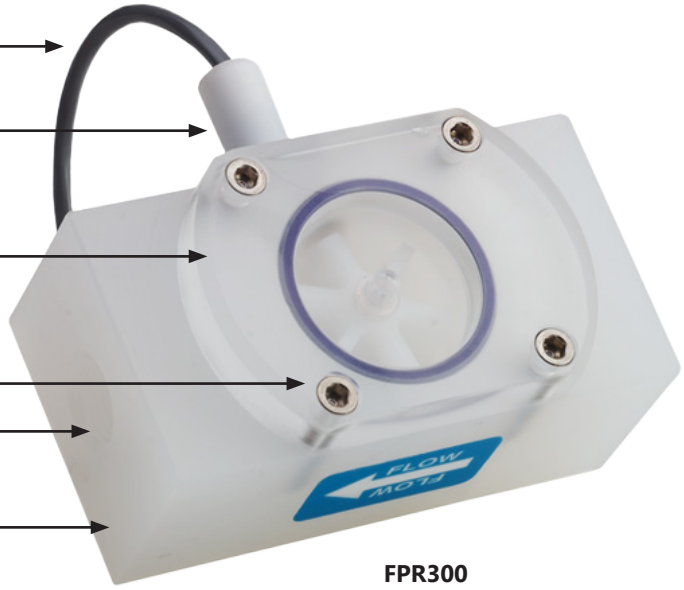
These versatile impeller flowmeters are available in 3/8", 1/2", 3/4", and 1" nominal pipe sizes with female NPT threads. They employ jewel bearings to allow for very low minimum flow rates and superior life.

The **FPR300**, with a body of polypropylene, is an economical choice for metering water or low corrosion fluids. The lens cover is available in a choice of materials: acrylic for visual flow indication of low-corrosion fluids; polypropylene when more corrosion resistance is needed. The standard rotor assembly is PVDF with tungsten carbide shaft. The O-ring is EPDM.

The **FPR310** offers greater chemical resistance with a PTFE body and cover, PTFE-coated FKM O-ring, and standard PVDF/ceramic rotor assembly.

The pulse output of these meters is compatible with many different types of controls, including a full range of Omega rate displays and controls. The Omega DPF-143 and DPF-144 provide flow rate and total flow indication. The DPF-144 also includes 4-20 mA output capability. The FMG-1000-MAW may be used for blind 4-20 mA transmission.

Features



18' Sensor Cable

Thread-in Sensor, Field Replaceable, 6–24 Vdc Pulse

Standard Acrylic Top with Clear Removable Lens Assembly *(optional polypropylene top without clear lens)*

Hex Screws

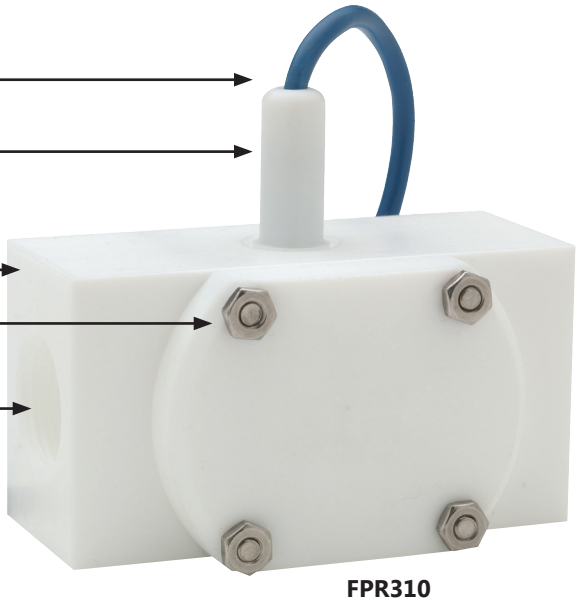
Female NPT Ports

Polyproylene Body

Internal

- Jewel Bearings—Ruby Ring and Ball
- PVDF/Tungsten Carbide Rotor Assembly *(PVDF/Ceramic or PVDF/Silicon Carbide optional)*
- EPDM O-Ring *(FKM or PTFE-coated FKM optional)*

FPR300



18' Sensor Cable

Thread-in Sensor, Field Replaceable, 6–24 Vdc Pulse

PTFE Body and Top

Screws with Hex Nuts

Female NPT Ports

Internal

- Jewel Bearings—Ruby Ring and Ball
- PVDF/Ceramic Rotor Assembly *(PVDF/Silicon Carbide optional)*
- PTFE-coated FKM O-Ring *(FKM or EPDM optional)*

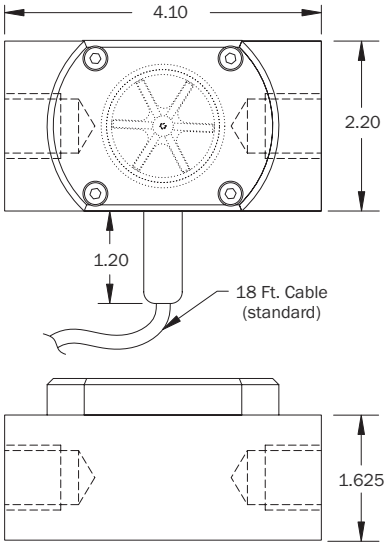
FPR310

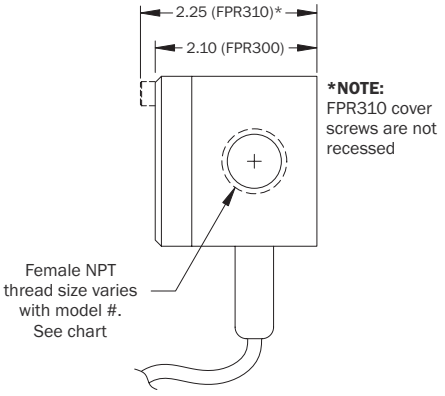
Specifications*

		FPR300	FPR310
Connection Ports		3/8", 1/2", 3/4", 1" —Female NPT thread	3/8", 1/2", 3/4", 1" —Female NPT thread
Sensor Cable		18 ft (6 m) standard—maximum cable run 2000 ft (607 m)	18 ft (6 m) standard—maximum cable run 2000 ft (607 m)
Materials	**Body**	Polypropylene	PTFE
	Rotor	PVDF—2 magnet *(6 magnet high resolution optional)*	PVDF—2 magnet *(6 magnet high resolution optional)*
	Shaft	Nickel tungsten carbide *(ceramic or silicon carbide optional)*	Zirconia ceramic *(silicon carbide optional)*
	O-Ring	EDPM *(FKM or PTFE-coated FKM optional)*	PTFE-coated FKM *(FKM or EDPM optional)*
	Bearings	Ruby ring and ball	Ruby ring and ball
	Cover	Acrylic with clear lens *(polypropylene without clear lens optional)*	PTFE
Maximum Temperature		160˚ F (70˚ C)	180˚ F (82˚ C)
Maximum Pressure		150 psi (10 bar)	150 psi (10 bar)
Accuracy		±1% of full scale	±1% of full scale
Power		6–36 Vdc, 2 mA min.	6–36 Vdc, 2 mA min.
Outputs		Current sinking pulse, 6–24 Vdc	Current sinking pulse, 6–24 Vdc

** Specifications subject to change. Please consult our website for current data (omega.com)*

Dimensions





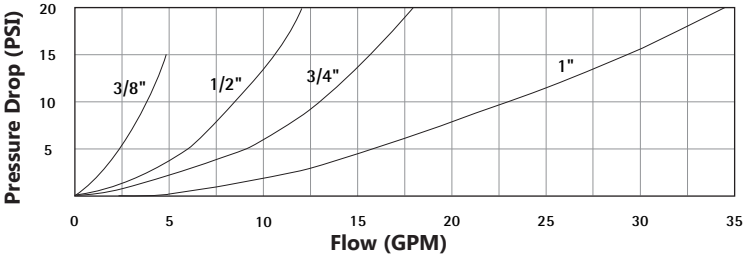
Model #	NPT Thread Size
-038	3/8"
-050	1/2"
-075	3/4"
-100	1"

Flow Range

Model #	K-Factor* (pulses/gal)		Gal/Min	Liter/Min
	FPR310	FPR300		
-038	1394	1417	0.07–5	0.27–18.9
-050	634	658	0.1–10	0.38–37.9
-075	476	468	0.2–20	0.75–75
-100	250	254	0.5–40	1.9–150

**Nominal K-factors (based on averages) for standard 2-magnet FPR310 and FPR300. High resolution (6-magnet) K-factors are approximately tripled.*

Pressure Drop Curves



INSTALLATION

Piping Requirements

Standard fittings are female NPT. If the piping connected to the meter is metallic, care should be taken not to overtighten. Straight pipe of at least five diameters upstream of the meter is recommended. Vertical or horizontal installations are acceptable.

WARNING:
This meter has low-friction bearings. Do not at any time test operation of the meter with compressed air. Doing so will subject it to rotational speeds many times those for which it was designed, and will certainly damage the rotor, shaft, and/or bearings.

K-Factor

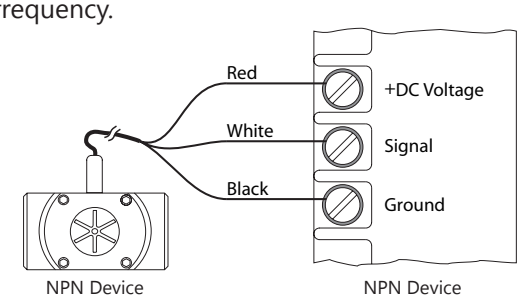
The meter is factory calibrated. The K-factor is found on the label on the meter body and must be input into the control/display for accurate reading.

CONNECTIONS

Connecting to Control Devices

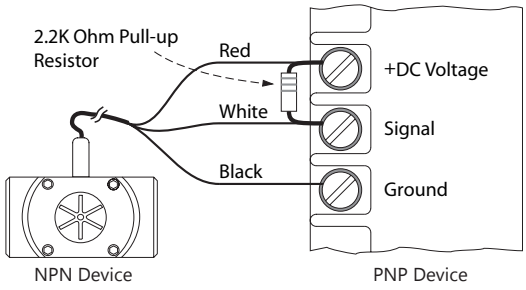
It is often desirable to connect an FPR300/310 flow sensor to a PLC or industrial computer board, and the sensors are well suited for this. Typically it can be connected directly, or with a single resistor added. The pickup sensors are current sinking (NPN) GMR devices that require 6–36 Volts DC and 2 mA current. They can connect directly to a PLC or computer board if:

1. The sensor power supply on the PLC is 6–36 Vdc (24 Vdc is typical).
2. The sensor power supply can provide at least 2 mA (100 mA is typical).
3. The sensor input on the PLC can accept a current sinking device.
4. The PLC frequency response > flow meter output frequency.



Input designed for current sinking devices (NPN)

If the PLC input only accepts current sourcing devices, a pull-up resistor must be added. Typically, on a 24 Vdc input a 2.2 K Ohm resistor will be effective.



Input designed for current sourcing (PNP) devices

Since the three-wire pickup sensors are solid state, they do not exhibit switch bounce and can be used at relatively high frequencies.

If the PLC is equipped with a 4-20 mA analog input module, it is necessary to order the FPR300/310 Series flow sensor with some form of 4-20 mA transmitter. Two options are the FMG-1000-MAW blind transmitter and the DPF144 indicating transmitter. Follow the connection diagrams for these products to connect to the analog input.

Rotor Replacement

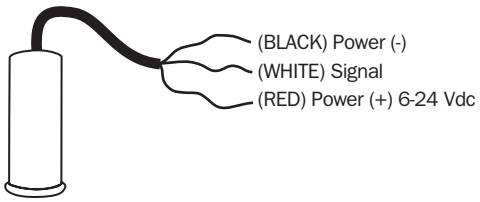
There is only one moving part to this meter. The bearings are made of ruby, which rarely wears out or needs replacement unless they have been physically damaged by severe shock. The shaft is integrally molded into the rotor, and shaft and rotor are replaced as one part. (You may wish to replace the bearings, using the bearing removal tool, while the meter is disassembled for rotor replacement). To replace the rotor, disconnect the meter and remove the four screws that hold the cover in place. Lift the cover and remove the rotor (see parts diagram below).

When putting in the new rotor, be sure that the ends of the shaft are in both bearings before tightening the cover. The rotor can be easily dropped into the bottom bearing. Starting the shaft into the upper bearing requires a bit of care. It is easier if the rotor is spinning, which can be done by lightly blowing into a port. When the upper bearing plate drops into place, hold it down and check for free spinning (by blowing lightly) before replacing the cover. Check that the O-ring is in its seat on the bearing plate before replacing the cover. Replace the cover, insert the four cap screws and tighten.

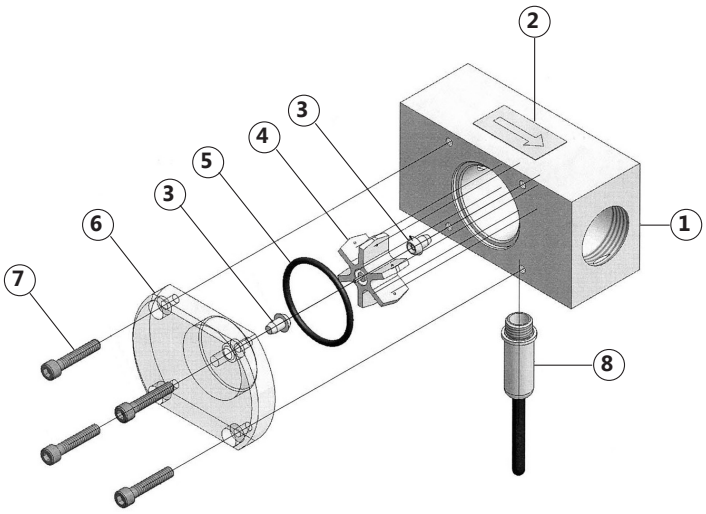
Sensor Replacement

The sensor ordinarily does not need replacement unless it is electrically damaged. If replacement is necessary, unscrew the sensor by hand. Screw the replacement sensor in and tighten by hand.

Reconnect the sensor according to the diagram below.



FPR300/310 Parts List



			FPR300	FPR310
1	**Body**	**-038**	100221	100269
		-050	100222	100268
		-075	100223	100267
		-100	100224	100266
2	**Flow direction Label**		100256	100256
3	**Bearing Assembly** *(includes 2)*		103313	103313
	Bearing Removal Tool *(not shown)*		100372	100372
4	**Rotor with Shaft**			
	PVDF/Ceramic *(2 magnet)*		103930	103930
	PVDF/Carbide *(2 magnet)*		103931	n/a
	PVDF/Silicon Carbide *(2 magnet)*		103933	103933
	PVDF/Ceramic *(6 magnet, high res)*		100453	100453
	PVDF/Carbide *(6 magnet, high res)*		103932	n/a
	PVDF/Silicon Carbide *(6 magnet, high res)*		103934	103934
5	**O- Ring** **EPDM**		100264 (standard)	100264 (optional)
	FKM		100219 (optional)	100219 (optional)
	PTFE-coated FKM		100973 (optional)	100973 (standard)
6	**Cover** *(after 5/2005)*			
	Polypro		100849	Not available
	Acrylic		100848	Not available
	PTFE		Not available	100847
7	**Cover Screws** *(4 required)*			
	Hexscrew		100310	Not applicable
	Screw *(requires hex nut 100025)*		Not applicable	100022
	Hex nut *(requires screw 100022)*		Not applicable	100025
8	**Sensor**		100419	100419

Problem	Probable Cause	Things to Try...
No signal after installation	Insufficient flow	Consult Flow Rate Chart Reduce pipe size or use different sensor
	Bad connections to control electronics	Check connections at control: Red (+), Black (-), White (signal)
	Incompatible control	Use 6–36 Vdc power supply Add pull up resistor, if using current-sourcing device
	Damaged or missing rotor	Remove flow sensor from fitting and check for free spinning; replace rotor
	Failed magnetic sensor	Replace magnetic sensor
Inaccurate metering	Not enough straight pipe between meter and severe flow disturbance	Move meter away from flow disturbance or field calibrate
	Wrong K-Factory entered	Check fitting for K-Factor, check indicator to see if it is entered properly ("Set K" on DPF143/144)
	Magnetic sensor failing to pick up each blade	Remove flow sensor from pipe. If indicator is DPF143/144, set K to 1.00, turn rotor slowly by hand, indicator should count each blade; replace sensor
	Wrong time units on flow indicator	If using DPF143/144, check left side of display (sec, min, hr, day); change to desired unit

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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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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.

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