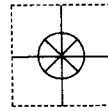
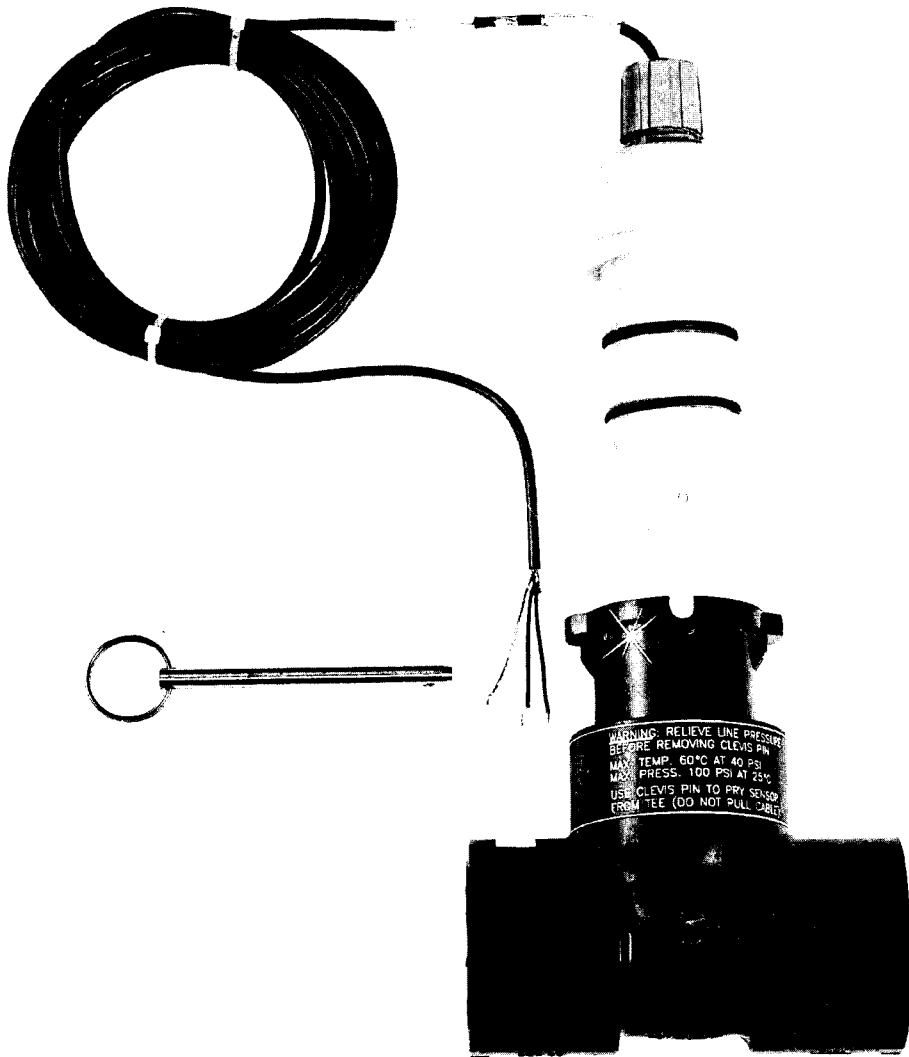


**.2 YEAR
WARRANTY**

MADE IN
USA



User's Guide



Shop online at

omega.com[®]

Ω OMEGA[®]

www.omega.com

e-mail: info@omega.com

ISO 9001
CERTIFIED
CORPORATE QUALITY

STAMFORD, CT

ISO 9002
CERTIFIED
CORPORATE QUALITY

MANCHESTER, UK

FP8000 SERIES Paddlewheel Flow Sensors



OMEGAnet® Online Service
www.omega.com

Internet e-mail
info@omega.com

Servicing North America:

USA:
ISO 9001 Certified

One Omega Drive, P.O. Box 4047
Stamford CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:

976 Bergar
Laval (Quebec) H7L 5A1, Canada
TEL: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico:

En Español: (001) 203-359-7803 e-mail: espanol@omega.com
FAX: (001) 203-359-7807 info@omega.com.mx

Servicing Europe:

Benelux:

Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic:

Frystatska 184/46, 733 01 Karviná, Czech Republic
TEL: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:

11, rue Jacques Cartier, 78280 Guyancourt, France
TEL: +33 (0)1 61 37 29 00 FAX: +33 (0)1 30 57 54 27
Toll Free in France: 0800 466 342
e-mail: sales@omega.fr

Germany/Austria:

Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom:

ISO 9002 Certified

One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
TEL: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

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, human applications.

TABLE OF CONTENTS

PART ONE - INTRODUCTION

SECTION 1	GENERAL INFORMATION	
	1.1 Description	3
	1.2 Operating Precautions	3
SECTION 2	SPECIFICATIONS	4

PART TWO - INSTALLATION

SECTION 1	UNPACKING	5
SECTION 2	LOCATION REQUIREMENTS	
	2.1 Along The Pipe	5
	2.2 Radially On the Pipe	5-6
	For Horizontal Pipe Runs	
	For Vertical Pipe Runs	
SECTION 3	MOUNTING	6-7
SECTION 4	ELECTRICAL CONNECTIONS	7-8
SECTION 5	SCALING THE READOUT DEVICE	8-9

PART THREE - PRINCIPLE OF OPERATION

	10
--	-----------	----

PART FOUR - SERVICE AND MAINTENANCE

SECTION 1	RECOMMENDED CLEANING PROCEDURE	10
SECTION 2	REPLACING THE IMPELLER	10-11
SECTION 3	TROUBLESHOOTING	12

PART FIVE - SPARE PARTS AND ACCESSORIES

	13
--	-----------	----

ILLUSTRATIONS:	Figure 2-1	Mounting Details	6
	Figure 2-2	Wiring Diagram	8
	Figure 4-1	Sensor Impeller Replacement Details	11

NOTES

PART ONE - INTRODUCTION

SECTION 1 - GENERAL INFORMATION

1.1 Description

The OMEGA® FP8000 Series paddlewheel flow sensors are ideal for applications in which the solutions have low viscosity (are water-like) and are low in suspended solids. These sensors have encapsulated electronics and are used with special installation fittings. A locking pin/retaining ring fastening system secures the sensor in the tee and facilitates removal/replacement.

Please read this manual carefully; it provides the necessary information to install and operate these flow sensors. If further assistance is required, please contact OMEGA.

1.2 Operating Precautions

1. The arrow label on the sensor's side indicates the direction of flow. On the locking pin style sensors, the word "OUTLET" molded into the upper round edge of the sensor also indicates flow direction. When installing the sensor, orient these indicators so that they point in the same direction as the actual flow in the pipe.
2. These sensors are designed for full pipe flow applications. Partially filled pipes and trapped air bubbles will cause erroneous readings.

SECTION 2 - SPECIFICATIONS

FP8001 (Polypropylene)	FP8002 (PVDF)
Wetted MaterialsPolypropylene body and impeller, TTZ (transformation toughened zirconia) ceramic shaft and EPR O-rings.	Pure polyvinylidene fluoride (PVDF) body and impeller, TTZ (transformation toughened zirconia) ceramic shaft and Viton O-rings.
Maximum Temperature: In PVC Tee60°C (140°F) at 40 psi In Cast Bronze Tee80°C (176°F) at 400 psi In PVDF Tee60°C (140°F) at 40 psi	60°C (140°F) at 40 psi 105°C (221°F) at 400 psi 80°C (176°F) at 100 psi
Maximum Pressure: In PVC Tee100 psi at 25°C (77°F) In Cast Bronze Tee400 psi at 80°C (176°F) In PVDF Tee100 psi at 25°C (77°F)	100 psi at 25°C (77°F) 400 psi at 105°C (221°F) 230 psi at 20°C (68°F)
Measuring RangeUp to 30 ft./sec. (limited to 20ft./sec. in cast bronze tee and 20 GPM in 1/2", 3/4" and 1" PVC tees).	Up to 30 ft./sec. (limited to 20 ft./sec. in cast bronze tee and 20 GPM in 1/2", 3/4" and 1" PVC tees).
Repeatability: In PVC Tee±0.5% of full scale In Cast Bronze Tee±0.5% of full scale In PVDF Tee±0.5% of full scale	±0.5% of full scale ±0.5% of full scale ±0.5% of full scale
Linearity: In PVC Tee±1% of full scale In Cast Bronze Tee±1% of full scale In PVDF Tee±1% of full scale	±1% of full scale ±1% of full scale ±1% of full scale
Accuracy[▲]: In PVC Tee±1% of full scale from 1 to 30 ft./sec. In Cast Bronze Tee±1% of full scale from 1 to 20 ft./sec. In PVDF Tee±1% of full scale from 1 to 30 ft./sec.	±1% of full scale from 1 to 30 ft./sec. ±1% of full scale from 1 to 20 ft./sec. ±1% of full scale from 1 to 30 ft./sec.
Sensor Cable2 conductor (plus shield), 20 ft. (6 m)	2 conductor (plus shield), 20 ft. (6 m)

▲Attained with at least 10 diameters of straight pipe upstream of sensor and 5 diameters of straight pipe downstream from sensor.

PART TWO - INSTALLATION

SECTION 1 - UNPACKING

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the OMEGA Customer Service Department at 1-800-622-2378 or (203) 359-1660. When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE: *The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material in event reshipment is necessary.*

SECTION 2 - LOCATION REQUIREMENTS

Flow measurement accuracy is highly dependent on proper location of the sensor in the piping system. A sensor located in a pipe where it can be affected by air bubbles, sediment or floating debris (especially stringy or fibrous material) may not achieve full accuracy and could become damaged. The flow sensor is designed to operate reliably under adverse conditions, but the recommendations contained in this section must be followed to assure full measurement accuracy.

2.1 Along The Pipe

Install the sensor in a straight section of the pipe where there is **at least 10 diameters of pipe length upstream** of the sensor (5 diameters when using a 1", 1-1/4", or 1-1/2" cast bronze tee) and **at least 5 diameters of pipe length downstream** from the sensor (3 diameters when using a 1", 1-1/4" or 1-1/2" cast bronze tee).

NOTE: *Pipe bends, valves, other fittings, pipe enlargements and pipe reductions should not be present in this straight length of pipe.*

2.2 Radially On The Pipe

For Horizontal
Pipe Runs

The preferred sensor location around the circumference of a horizontal pipe is on top. If the sensor must be mounted at an angle, it should be at least 15° above the horizontal plane. Never mount the sensor sideways or below the pipe as sediment (sand, rust, etc.) could collect or excessive

wear could occur.

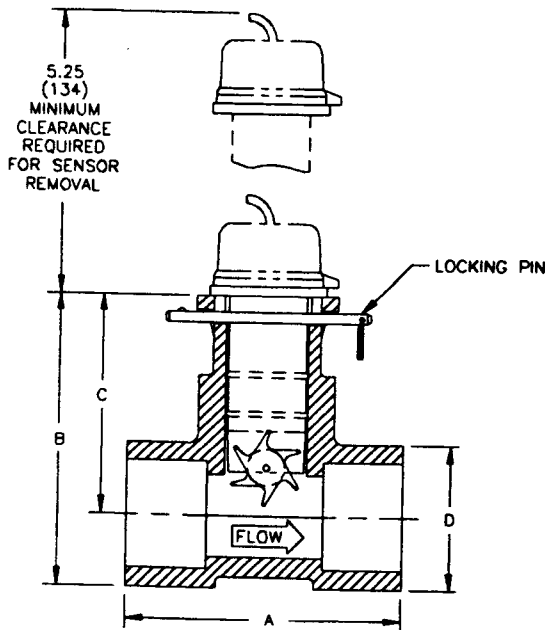
NOTE: Radial sensor locations other than at the top of the pipe can slightly increase impeller friction which may affect sensor performance at flow rates below 1 ft. per second.

For Vertical Pipe Runs

Any sensor location around the circumference of a vertical pipe is acceptable. It is recommended to mount the sensor in a pipe which has an upward flow direction to avoid "spiraling" turbulence. If this is not possible, a straightening vane can be used to eliminate this turbulence effect.

SECTION 3 - MOUNTING

These sensors require a special mounting tee for installation. The tee may be PVC (for 1/2", 3/4", 1", 1-1/2", 2", 3" or 4" pipe sizes), cast bronze (for 1", 1-1/4" or 1-1/2" pipe sizes) or PVDF (for 1-1/2", 2", 3" or 4" pipe sizes). Refer to Figure 2-1 for mounting details.



Mounting Tee		For Pipe With	Dimensions [♦]			
Material	Pipe Size		A	B	C	D
PVC	1/2 in [°]	0.840 O.D.	5.30	5.10	3.86	2.50
		(21.34) O.D.	(135)	(130)	(98)	(64)
	3/4 in [°]	1.050 O.D.	5.30	5.10	3.86	2.50
		(26.67) O.D.	(135)	(130)	(98)	(64)
	1 in [°]	1.315 O.D.	5.30	5.10	3.86	2.50
		(33.40) O.D.	(135)	(130)	(98)	(64)
	1-1/2 in	1.900 O.D.	4.94	5.10	3.86	2.50
		(48.26) O.D.	(125)	(130)	(98)	(64)
2 in	2.375 O.D.	5.50	5.60	4.07	3.06	
	(60.32) O.D.	(140)	(142)	(103)	(78)	
3 in	3.500 O.D.	6.50	6.82	4.69	4.25	
	(88.90) O.D.	(165)	(173)	(119)	(108)	
4 in	4.500 O.D.	7.35	7.93	5.18	5.50	
	(114.30) O.D.	(187)	(201)	(132)	(140)	
Cast Bronze	1 in	1" NPT	5.50	4.50	3.50	2.00
			(140)	(114)	(89)	(51)
	1-1/4 in	1-1/4" NPT	6.25	4.75	3.63	2.25
1-1/2 in	1-1/2 NPT		(159)	(121)	(92)	(57)
			6.50	5.00	3.75	2.50
PVDF	1-1/2 in	1.969 O.D.	4.00	5.08	3.79	2.59
		(50) O.D.	(102)	(129)	(96)	(66)
	2 in	2.480 O.D.	4.83	5.65	4.06	3.20
		(63) O.D.	(123)	(144)	(103)	(81)
	3 in	3.543 O.D.	6.90	5.69	3.46	4.45
		(90) O.D.	(175)	(145)	(88)	(113)
	4 in	4.331 O.D.	8.30	6.90	4.25	5.32
(110) O.D.		(211)	(175)	(108)	(135)	

♦ Dimensions listed in inches and (mm).

° This tee has integral reducer bushings for listed pipe size.

FIGURE 2-1 Mounting Details

1. Make sure sensor is removed from tee before installing the tee. Position tee in pipe line so that flow designation on tee corresponds with actual direction of flow in pipe. Solder or weld tee into pipe line.

NOTE: *If tee is to be installed in copper tubing, it is recommended to install threaded pipe lead-in and exit sections of appropriate length before using copper tubing adapters. This will keep flow disturbances away from the sensor.*

2. Before inserting sensor into tee, apply a small amount of silicone grease from the provided packet onto sensor O-rings and the chamfer on inside lip of tee. Clean off any excess grease that could get onto impeller or shaft. Align flow arrow on sensor with flow arrow on tee and carefully press sensor straight into tee.

CAUTION: When using a cast bronze tee or a 1/2", 3/4" or 1" PVC tee, the impeller may strike the venturi cavity sides inside the tee if sensor and tee are misaligned. This could damage the sensor impeller or shaft.

3. Insert locking pin through tee and sensor.

SECTION 4 - ELECTRICAL CONNECTIONS

Electrically connect the sensor directly to the instrument.

1. Route sensor cable to instrument. Use a watertight connector, such as a cable feed-thru fitting, in the instrument's cable entry hole.
2. Connect sensor cable wires to instrument in accordance with instrument hook-up instructions.

NOTE: *The sensor has provisions to allow connection of a standard 1/2" flexible, electrical conduit if desired.*

The FP8000 cable terminates in a red, a black, and a shield wire. The shield wire can be attached to any convenient earth ground. When used with the FLSC-80 4-20 mA signal conditioner, attach the proper wires to the corresponding RED, BLACK, and SHIELD terminals of the FLSC-80. When the FP8000 is wired to frequency input meters, such as the DPF700 meter, a nominal 3.3k Ω pull-up resistor is required between the RED pulse output HI wire and the + side of the 12-24 VDC power supply (with a minimum of 2 mA current draw). The black wire is connected to BOTH the - side of the DC power supply and LO (or RETURN) side of the pulse

output. The amplitude of the pulse output = DC power input; the square wave output is offset from zero VDC by approximately +1VDC. The pulse goes LO for 5 milliseconds, regardless of frequency.

For connecting to the DPF700 meter, attach the RED wire to Pin 2 on TB2, "SIG IN". The black wire goes to Pin 3 on TB2, "SIG GND". Set the S1 switches for 12.4 VDC OUT. No connection is made to "EXCITATION OUT"; the red wire is pulled up to the 12.4 VDC excitation inside of the DPF700.

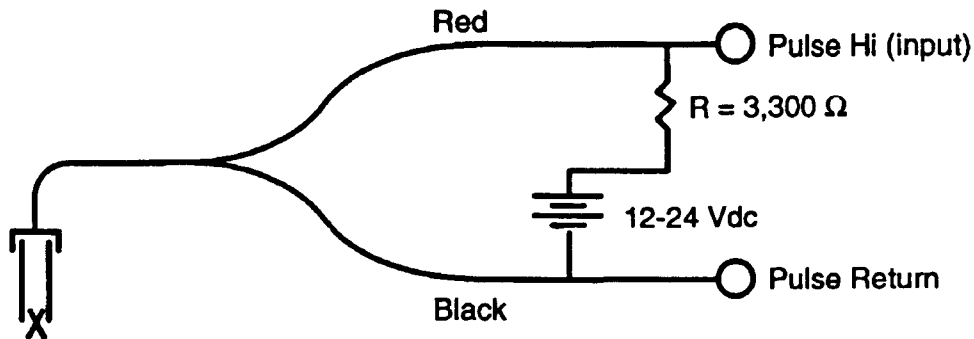


FIGURE 2-2 Wiring Diagram

SECTION 5 - SCALING THE READOUT DEVICE

The FP8000 outputs a specific number of pulses/gallon based upon the installation fitting into which it has been installed. In addition, there is a zero OFFSET to the output due to the minimum flow required to get the paddlewheel rotation started. For the DPF700 meter, this offset can be programmed into the unit for highest accuracy. In readouts that do not have offset adjustment, such as the DPF70 meter, the OFFSET value must be added to the 1% FS accuracy to arrive at the readout's flowrate accuracy. The OFFSET value is a positive OFFSET value; it must be added to the reading (when no offset value is programmed) to indicate the "true" GPM flowrate. (GPM reading = [slope x input frequency] + offset). For LPM indication, use the corresponding values for K-factor (in pulses/liter) and offset (in LPM).

NOTE: For totalizing applications, use the DPF401 ratemeter/totalizer batcher; the DPF70 and the DPF700 do NOT allow the end user to enter in the OFFSET into

**CALIBRATION VALUES FOR DIRECT PIPE-MOUNTED PADDLEWHEEL FLOW SENSORS
SCHEDULE 40 PIPE**

NOMINAL PIPE SIZE	PIPE I.D. (INCHES)	LINEAR GPM RANGE		MINIMUM FULL SCALE GPM	CALIBRATION VALUES		
		MIN.	MAX.		SLOPE (GPM/Hz.)	OFFSET (GMP)	UOL/PLS** (GAL/Pulse)
3 INCH	3.068	14	503	40	4.0249	0.0135	0.0671
4 INCH	4.026	29	1008	81	8.0604	0.4821	0.1343
5 INCH	5.047	50	1725	140	13.7867	1.7158	0.2298
6 INCH	6.065	77	2624	213	20.9605	3.7002	0.3493
8 INCH	7.981	144	4813	394	38.4283	9.4779	0.6405
10 INCH	10.020	238	7857	646	62.7066	18.5571	1.0451
12 INCH	11.938	348	11392	939	90.8984	29.8556	1.5150
14 INCH	13.124	431	13982	1156	111.5293	40.9880	1.8588
16 INCH	15.000	583	18644	1549	148.6492	62.7173	2.4775
18 INCH	16.876	759	23996	2002	191.2493	89.4100	3.1875
20 INCH	18.812	966	30242	2532	240.9578	122.1605	4.0160
24 INCH	22.624	1448	44689	3761	355.8937	202.0972	5.9316

* Sensor is mounted using insertion hardware, weldolet, etc., but not a pipe tee

** For U.S. Gallons

CALIBRATION VALUES FOR DIRECT PIPE-MOUNTED* PADDLEWHEEL FLOW SENSORS SCHEDULE 80 PIPE

NOMINAL PIPE SIZE	PIPE I.D. (INCHES)	LINEAR GPM RANGE		MINIMUM FULL SCALE GPM	CALIBRATION VALUES		
		MIN.	MAX.		SLOPE (GPM/Hz.)	OFFSET (GMP)	UOL/PLS** (GAL/Pulse)
3 INCH	2.900	12	431	35	3.4506	0.0001	0.0575
4 INCH	3.826	25	889	71	7.1109	0.3292	0.1185
5 INCH	4.813	45	1544	125	12.3444	1.3662	0.2057
6 INCH	5.761	68	2336	190	18.6651	3.0287	0.3111
8 INCH	7.625	130	4357	356	34.7910	8.2026	0.5798
10 INCH	9.562	215	7109	584	56.7424	16.2546	0.9457
12 INCH	11.374	313	10285	847	82.0697	26.2557	1.3678
14 INCH	12.500	386	12584	1039	100.3969	34.8603	1.6733
16 INCH	14.312	525	16854	1398	134.3996	54.1720	2.2400
18 INCH	16.124	685	21767	1813	173.5148	78.1141	2.8919
20 INCH	17.938	869	27331	2285	217.7944	106.7209	3.6299
24 INCH	21.562	1303	40378	3394	321.5994	177.7680	5.3600

* Sensor is mounted using insertion hardware, weldolet, etc., but not a pipe tee.

** For U.S. Gallons

CALIBRATION VALUES FOR TEE-MOUNTED PADDLEWHEEL FLOW SENSORS

SENSOR MODEL	MOUNTING TEE BEING USED			LINEAR GPM RANGE		MIN. FULL-SCALE GPM	CALIBRATION VALUES		
	SIZE	MODEL NO.	MATERIAL	MIN.	MAX.		SLOPE (GPM/HZ.)	OFFSET (GPM)	UOL/PLS** (GAL/PULS)
FP8001 (Polypropylene)	1/2"	FP8005	PVC	1	35	3	0.2658	0.0222	0.0044
	3/4"	FP8007	PVC	1	35	3	0.2749	0.0194	0.0046
	1"	FP8010	PVC	1	35	3	0.2731	0.0000	0.0046
	1 1/2"	FP8015	PVC	6	190	16	1.5290	0.8864	0.0255
	2"	FP8020	PVC	12	380	32	3.0330	1.5598	0.0506
	3"	FP8030	PVC	25	870	70	6.9724	0.3937	0.1162
	4"	FP8040	PVC	47	1635	132	13.0538	1.2252	0.2176
	FP8002 (PVDF)	1"	FP8010BR	CAST BRONZE	2	65	6	0.6471	0.0000
1 1/4"		FP8012BR	CAST BRONZE	3	90	7	0.7118	0.1743	0.0119
1 1/2"		FP8015BR	CAST BRONZE	4	125	10	1.0147	0.0093	0.0169
1 1/2"		FP8115	PVDF	11	380	30	3.0306	0.0000	0.0505
2"		FP8120	PVDF	13	410	34	3.2523	1.3985	0.0542
3"		FP8130	PVDF	29	950	78	7.5742	2.2779	0.1263
4"		FP8140	PVDF	51	1585	133	12.6257	6.6730	0.2104

** For U.S. Gallons

PART THREE - PRINCIPLE OF OPERATION

These flow sensors feature a six-bladed impeller that turns at a rate proportional to the velocity of the fluid. The sensor's RF (Radio Frequency) circuit detects the rotating conductive element in the impeller and converts the signal to a digital pulse-train proportional to fluid velocity. Knowing the pipe size, the pulses can be converted to flow rate in, for example, gallons per minute.

PART FOUR - SERVICE AND MAINTENANCE

SECTION 1 - RECOMMENDED CLEANING PROCEDURE

The sensor must be kept reasonably clean to maintain measurement accuracy. The time period between cleanings (weeks, months, etc.) is affected by the characteristics of the process solution and can only be determined by operating experience. For example, a sensor operating in waste water that contains stringy or fibrous material may require more frequent cleaning.

1. Rinse the sensor with clean, warm water.
2. Inspect the impeller and shaft. Remove any stringy or fibrous material. Spin the impeller to verify that it turns freely.
3. Check O-rings and replace if necessary. The appropriate repair kit is listed in Part Five.
4. Lightly lubricate O-rings with silicone grease (provided in sensor accessory kit) before reinstalling sensor. Clean off any excess grease that could get onto impeller or shaft.

SECTION 2 - REPLACING THE IMPELLER

The impeller assembly of the flow sensor is designed to be easily removed and replaced for servicing or replacement of worn parts. Refer to Figure 4-1 for replacement details.

1. After removing the sensor from its mounting, note the direction of the impeller blades so that the new impeller will be installed in the same direction of rotation.
2. Hold small diameter metal pin (provided in repair kit)

against end of old shaft and strike pin lightly with a hammer. When approximately 1 inch of old shaft is extended out, use pliers to carefully pull shaft completely out. Discard old shaft and impeller.

3. Place new impeller in slotted end of sensor with direction of rotation as noted in step 1. Push chamfered end of new shaft into sensor body on the side indicated in Figure 4-1. Lightly strike new shaft until it is flush with sensor body. Be careful not to damage new ceramic shaft.
4. Replace sensor into its mounting hardware:
 - a. Before reinstalling sensor, remove the two O-rings on the sensor body and replace with new O-rings from repair kit. Lightly lubricate O-rings with silicone grease (provided in repair kit).
 - b. Align flow arrow on sensor with flow arrow on tee and carefully press sensor straight into tee.

CAUTION: When using a cast bronze tee or 1/2", 3/4" or 1" PVC tee, the impeller may strike the venturi cavity sides inside the tee if sensor and tee are misaligned. This could damage the sensor impeller or shaft.

- c. Insert locking pin through tee and sensor.

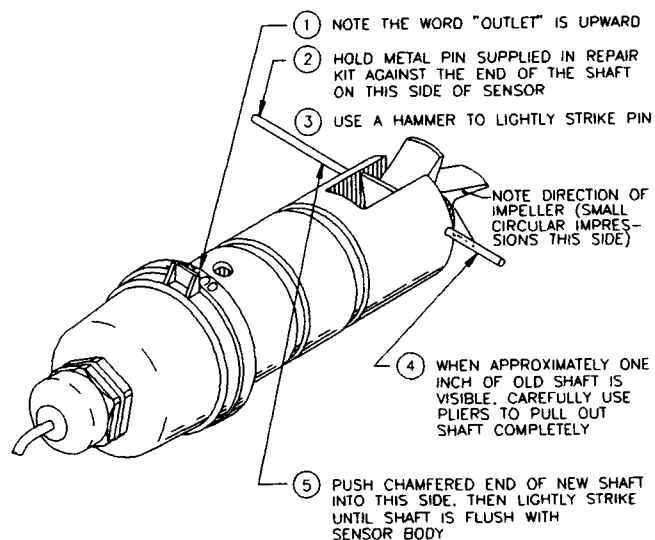


FIGURE 4-1
Sensor Impeller Replacement Details

SECTION 3 - TROUBLESHOOTING

A simple check can determine if the sensor is defective when the transmitter and/or indicating instrument are known to be operational:

1. Depressurize and drain process pipe before attempting to remove sensor.

WARNING: FAILURE TO COMPLETELY DEPRESSURIZE THE SYSTEM CAN CAUSE SERIOUS INJURY TO THE SERVICE PERSON.

2. Remove sensor from its mounting hardware. Extract pin from mounting tee. Carefully extract sensor straight out of tee.
3. Remove any debris which may be entangled with the sensor impeller and shaft, especially stringy or fibrous material. Inspect impeller blades and shaft for excessive wear. A repair kit is available from OMEGA if replacement is necessary. Refer to Part Four, Section 2 for impeller replacement procedure and Part Five for appropriate repair kit part number.
4. Spin impeller in the proper direction to simulate flow. The flow indicating instrument should respond with a reading. If not, the electronics in the flow sensor may be defective.

PART FIVE - SPARE PARTS AND ACCESSORIES

Description	Part Number
Repair Kit* For FP8001 Polypropylene Sensor	F1-1001-101
Repair Kit* For FP8002 PVDF Sensor . . .	F1-1001-102

*Each repair kit includes impeller, shaft, two O-rings and packet of silicone grease.

NOTES

NOTES

NOTES



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.

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. 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.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2003 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control?

OMEGA...Of Course!

Shop online at www.omega.com

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments