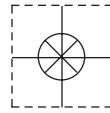
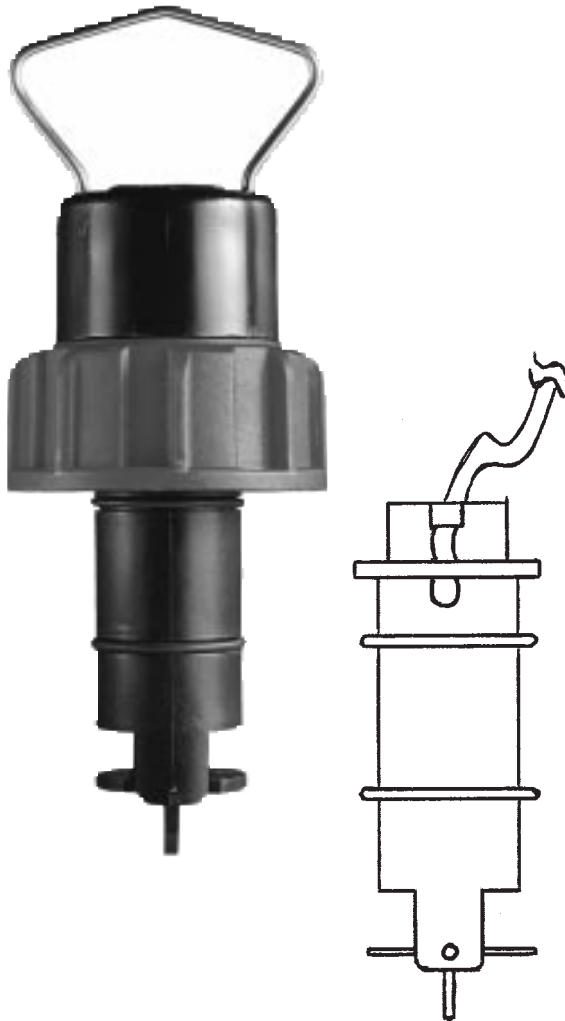


CE



User's Guide



<http://www.omega.com>
e-mail: info@omega.com

FP-8500A/FP5600 Series Flow Sensors



OMEGAnetSM On-Line Service
<http://www.omega.com>

Internet e-mail
info@omega.com

Servicing North America:

USA:
ISO 9001 Certified

One Omega Drive, 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
Tel: (514) 856-6928 FAX: (514) 856-6886
e-mail: canada@omega.com

For immediate technical or application assistance:

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
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

**Mexico and
Latin America:**

Tel: (95) 800-TC-OMEGASM FAX: (95) 203-359-7807
En Español: (203) 359-1660 ext: 2203 e-mail: espanol@omega.com

Servicing Europe:

Benelux:

Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic:

Ostravska 767, 733 01 Karvina
Tel: 420 (69) 6311899 FAX: 420 (69) 6311114
e-mail: czech@omega.com

France:

9, rue Denis Papin, 78190 Trappes
Tel: (33) 130-621-400 FAX: (33) 130-699-120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria:

Daimlerstrasse 26, D-75392 Deckenfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: germany@omega.com

United Kingdom:

ISO 9002 Certified

25 Swannington Road, P.O. Box 7, Omega Drive,
Broughton Astley, Leicestershire, Irlam, Manchester,
LE9 6TU, England M44 5EX, England
Tel: 44 (1455) 285520 Tel: 44 (161) 777-6611
FAX: 44 (1455) 283912 FAX: 44 (161) 777-6622

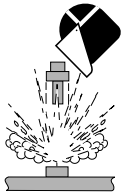
Toll Free in England: 0800-488-488
e-mail: uk@omega.com

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.

OMEGA FP-8500A/FP-5600 Series

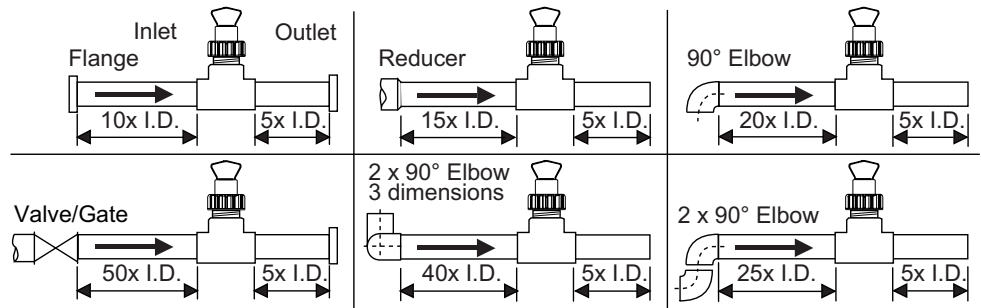


SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Do not install/service without following installation instructions (see sensor manual).
4. Wear safety goggles and faceshield during installation/service.
5. Do not alter product construction.
6. Failure to follow safety instructions could result in severe personal injury!

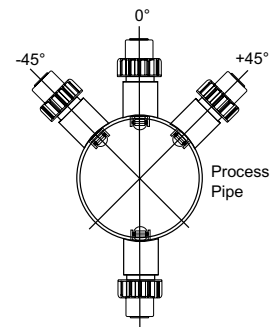
1. Location of Fitting

Recommended sensor upstream/downstream mounting requirements.

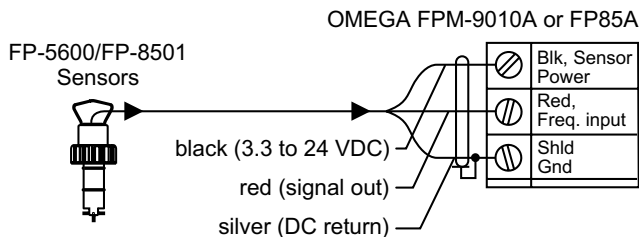


2. Sensor Mounting Position

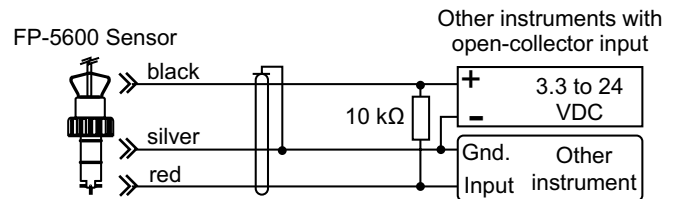
- Horizontal pipe runs: Mount sensor in the upright (0°) position for best overall performance. Mount at a maximum of 45° when air bubbles are present. Do not mount on the bottom of the pipe when sediments are present.
- Vertical pipe runs: Sensor must be mounted in lines with UPWARD flow only.



3. Sensor Wiring (Open-Collector Output)



- Use 2-conductor shielded cable for cable extensions up to 300 m (1000 ft).
- Cable shield must be maintained through cable splice.
- OMEGA FPM-9010A, use 5 VDC power to sensor with pull-up resistor (open-collector configuration)
- Refer to your instrument manual for specific wiring details.



- Pull-up resistor required (10 kΩ recommended).
- Use 2-conductor shielded cable for cable extensions up to 300 m (1000 ft).
- Cable shield must be maintained through cable splice.

4. OMEGA Fittings

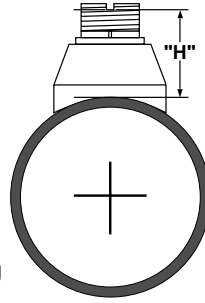
Type	Description
Plastic Tee 	<ul style="list-style-type: none"> • 0.5 to 4 in. versions • PVC or CPVC • Mounts via glue-on fittings
PVC Glue-on Saddle (O-ring not required) 	<ul style="list-style-type: none"> • 2 to 4 in., cut 1-7/16 in. hole in pipe • 6 to 8 in., cut 2-1/4 in. hole in pipe • Align wedge arrows with saddle arrows during assembly. • Pipes over 8 in., use iron saddle
Iron Strap-on Saddle 	<ul style="list-style-type: none"> • 2 to 4 in., cut 1-7/16 in. hole in pipe • Over 4 in., cut 2-1/4 in. hole in pipe • Special order over 12 in.
Carbon Steel Weld-on Weldolet 	<ul style="list-style-type: none"> • 2 to 4 in., cut 1-7/16 in. hole in pipe • Over 4 in., cut 2-1/4 in. hole in pipe • Remove insert before welding • Installed by certified welder only • Special order over 12 in.

Type	Description
Carbon Steel Threaded Tee 	<ul style="list-style-type: none"> • 0.5 to 2 in. versions • Mounts on threaded pipe ends
Metric Plastic Saddle 	<ul style="list-style-type: none"> • For pipes DN 65 to 200 mm • Requires a 30 mm diam. hole in the pipe • Wedge and saddle arrows must match
Metric Wafer Fitting 	<ul style="list-style-type: none"> • For pipes DN 65 to 200 mm • Follow installation guidelines
Metric Union Fitting 	<ul style="list-style-type: none"> • For pipes from DN 15 to 50 mm • PP or PVDF • Follow installation guidelines

5. H-Dimensions

The plastic sensor insert in the Weldolet fitting **MUST** be removed during the welding process. When reinstalled, it is important that the insert be threaded to the proper height ("H" dimension).

OMEGA
Weldolet Fitting



Weldolet part number	"H" dimension		Weldolet part number	"H" dimension	
	inches	mm		inches	mm
FP-5325CS	2.33	59.18	FP-5387CS	4.16	105.66
FP-5330CS	2.32	58.92	FP-5388CS	4.10	104.14
FP-5340CS	2.30	58.42			
FP-5350CS	3.09	78.48			
FP-5360CS	2.96	75.18	FMG-5325, FP-5325BR	2.33	59.18
FP-5380CS	2.73	69.34	FMG-5330, FP-5330BR	2.32	58.92
FP-5381CS	5.48	139.19	FMG-5340, FP-5340BR	2.30	58.42
FP-5382CS	5.25	133.35	FMG-5350, FP-5350BR	3.09	78.48
FP-5383CS	5.10	129.54	FMG-5360, FP-5360BR	2.96	75.18
FP-5384CS	4.85	123.19	FMG-5380, FP-5380BR	2.73	69.34
FP-5385CS	4.60	116.84	FMG-5381, FP-5381BR	5.48	139.19
FP-5386CS	4.38	111.25	FMG-5382, FP-5382BR	5.25	133.35

6. Standard Sensor Installation

- Lubricate sensor O-rings with a silicone lubricant (e.g. GE silicone compound #G632 or equivalent). Do not use petroleum based lubricant that will attack the O-rings.
- Using a twisting motion, lower the sensor into the fitting, with installation arrows on the black cap pointing in the direction of flow (Fig. A)
- Engage one thread of the sensor cap then turn the sensor until the alignment tab is seated in the fitting notch. **Hand tighten the sensor cap. DO NOT** use tools on the sensor cap or the cap threads and/or fitting flange threads will be damaged (Fig. B)

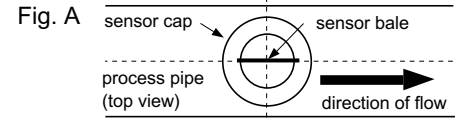
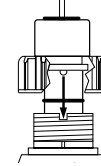


Fig. B



7. K-Factors

The K-Factor is the number of pulses the sensor will generate for each engineering unit of fluid which passes. For example, in a 1 inch PVC pipe, the paddlewheel generates 352.435 pulses per gallon of fluid passing the rotor. For pipes over 12 inch, consult OMEGA.

Pipe Size	OMEGA Fitting Type	K-Factors U.S. Gallon	Liter	Pipe Size	OMEGA Fitting Type	K-Factors U.S. Gallon	Liter	Pipe Size	OMEGA Fitting Type	K-Factors U.S. Gallon	Liter
SCH 80 PVC TEES FOR SCH 80 PVC PIPE				GALVANIZED IRON TEES ON SCH 40 PIPE				COPPER/BRONZE BRAZOLETS ON SCH 40 PIPE			
1/2 IN.	FP-5305	991.706	262.010	1 IN.	FP-5310GI	213.009	56.277	2 1/2 IN.	FP-5325BR	37.600	9.934
3/4 IN.	FP-5307	545.142	144.027	1 1/4 IN.	FP-5312GI	127.746	33.751	3 IN.	FP-5330BR	24.340	6.431
1 IN.	FP-5310	352.435	93.114	1 1/2 IN.	FP-5315GI	94.401	24.941	4 IN.	FP-5340BR	13.920	3.678
1 1/4 IN.	FP-5312	177.184	46.812	2 IN.	FP-5320GI	59.420	15.699	5 IN.	FP-5350BR	10.860	2.869
1 1/2 IN.	FP-5315	117.852	31.137	CARBON STEEL WELDOLETS ON SCH 40 PIPE				6 IN.	FP-5360BR	7.520	1.987
2 IN.	FP-5320	66.739	17.633	2 1/2 IN.	FP-5325CS	37.600	9.934	8 IN.	FP-5380BR	4.340	1.147
2 1/2 IN.	FP-5325	42.994	11.359	3 IN.	FP-5330CS	24.340	6.431	10 IN.	FP-5381BR	2.760	0.729
3 IN.	FP-5330	26.652	7.041	4 IN.	FP-5340CS	13.920	3.678	12 IN.	FP-5382BR	1.940	0.513
4 IN.	FP-5340	15.006	3.964	5 IN.	FP-5350CS	10.860	2.869	BRONZE TEES ON SCH 40 PIPE			
SCH 80 CPVC TEES FOR SCH 80 CPVC PIPE				6 IN.	FP-5360CS	7.520	1.987	1 IN.	FP-5310BR	213.009	56.277
1/2 IN.	FP-5305C	991.706	262.010	8 IN.	FP-5380CS	4.340	1.147	1 1/4 IN.	FP-5312BR	127.746	33.751
3/4 IN.	FP-5307C	545.142	144.027	10 IN.	FP-5381CS	2.760	0.729	1 1/2 IN.	FP-5315BR	94.401	24.941
1 IN.	FP-5310C	352.435	93.114	12 IN.	FP-5382CS	1.940	0.513	2 IN.	FP-5320BR	59.420	15.699
1 1/4 IN.	FP-5312C	177.184	46.812	STAINLESS STEEL WELDOLETS ON SCH 40 PIPE				COPPER PIPE W/COPPER INSTALLATION FITTINGS			
1 1/2 IN.	FP-5315C	117.852	31.137	2 1/2 IN.	FMG-5325	37.600	9.934	1/2 IN. SK K	FP-5305CU	917.844	242.495
SCH 80 PVC SADDLES ON SCH 80 PVC PIPE				3 IN.	FMG-5330	24.340	6.431	1/2 IN. SK L		858.217	226.742
2 IN.	FP-5320S	66.739	17.633	4 IN.	FMG-5340	13.920	3.678	3/4 IN. SK K	FP-5307CU	428.270	113.149
2 1/2 IN.	FP-5325S	42.994	11.359	5 IN.	FMG-5350	10.860	2.869	3/4 IN. SK L		385.737	101.912
3 IN.	FP-5330S	26.652	7.041	6 IN.	FMG-5360	7.520	1.987	1 IN. SK K	FP-5310CU	256.430	67.749
4 IN.	FP-5340S	15.006	3.964	8 IN.	FMG-5380	4.340	1.147	1 IN. SK L		241.639	63.841
6 IN.	FP-5360	8.325	2.199	10 IN.	FMG-5381	2.760	0.729	1 1/4 IN. SK K	FP-5312CU	176.437	46.615
8 IN.	FP-5380	5.016	1.325	12 IN.	FMG-5382	1.940	0.513	1 1/4 IN. SK L		170.902	45.152
SCH 80 PVC SADDLE ON SCH 40 PVC PIPE				SCH 80 IRON SADDLES ON SCH 80 PIPE				1 1/2 IN. SK K	FP-5315CU	115.690	30.565
2 IN.	FP-5320S	54.700	14.452	2 IN.	FP-5320GIS	64.720	17.099	1 1/2 IN. SK L		112.030	29.598
2 1/2 IN.	FP-5325S	37.159	9.817	2 1/2 IN.	FP-5325GI	42.480	11.223	2 IN. SK K	FP-5320CU	63.385	16.746
3 IN.	FP-5330S	23.697	6.261	3 IN.	FP-5330GI	26.420	6.980	2 IN. SK L		61.735	16.310
4 IN.	FP-5340S	13.456	3.555	4 IN.	FP-5340GI	14.700	3.884	Conversion Formulas:			
6 IN.	FP-5360	7.459	1.971	5 IN.	FP-5350GI	12.180	3.218	1 U.S. gallon = 0.003785 cubic meters			
8 IN.	FP-5380	4.529	1.197	6 IN.	FP-5360GI	8.440	2.230	0.000003069 Acre feet			
CARBON STEEL TEES ON SCH 40 PIPE				8 IN.	FP-5380GI	4.900	1.295	8.3454 pounds of water			
1/2 IN.	FP-5305CS	756.000	199.736	10 IN.	FP-5381GI	3.060	0.808				
3/4 IN.	FP-5307CS	438.690	115.902	12 IN.	FP-5382GI	2.160	0.571				
1 IN.	FP-5310CS	286.784	75.768	SCH 80 IRON SADDLE ON SCH 40 PIPE							
1 1/4 IN.	FP-5312CS	121.218	32.026	2 IN.	FP-5320GIS	53.640	14.172				
1 1/2 IN.	FP-5315CS	91.139	24.079	2 1/2 IN.	FP-5325GI	37.600	9.934				
2 IN.	FP-5320CS	54.468	14.391	3 IN.	FP-5330GI	23.220	6.135				
STAINLESS STEEL TEES ON SCH 40 PIPE				4 IN.	FP-5340GI	13.260	3.503				
1/2 IN.	FMG-5305	734.200	193.976	5 IN.	FP-5350GI	11.040	2.917				
3/4 IN.	FMG-5307	412.100	108.877	6 IN.	FP-5360GI	7.240	1.913				
1 IN.	FMG-5310	252.700	66.764	8 IN.	FP-5380GI	4.400	1.162				
1 1/4 IN.	FMG-5312	128.120	33.849	10 IN.	FP-5381GI	2.800	0.740				
1 1/2 IN.	FMG-5315	77.320	20.428	12 IN.	FP-5382GI	1.980	0.523				
2 IN.	FMG-5320	45.780	12.095								

K-Factors DIN Pipes

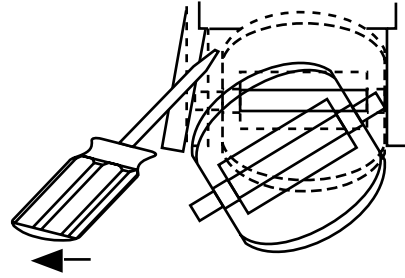
POLYPROPYLENE FITTINGS (DIN/ISO AND BS AND ANSI)				PVDF FITTINGS (DIN/ISO AND BS AND ANSI)			
Pipe Size	OMEGA Fitting Type	K-Factors		Pipe Size	OMEGA Fitting Type	K-Factors	
		U.S. Gallon	Liter			U.S. Gallon	Liter
DN 15	FP-5105PO	952.870	251.749	DN 15	FP-5105	827.257	218.562
DN 20	FP-5107PO	563.100	148.771	DN 20	FP-5107	489.869	129.424
DN 25	FP-5110PO	291.604	77.042	DN 25	FP-5110	283.554	74.915
DN 32	FP-5112PO	169.222	44.709	DN 32	FP-5112	158.588	41.899
DN 40	FP-5115PO	103.897	27.450	DN 40	FP-5115	86.980	22.980
DN 50	FP-5120PO	60.789	16.060	DN 50	FP--5120	50.385	13.312
DN 65	FP-5125PO	41.498	10.964	DN 65	FP-5125	36.133	9.546
DN 80	FP-5130PO	26.786	7.077	DN 80	FP-5130	24.715	6.530
DN 100	FP-5140PO	17.415	4.601	DN 100	FP-5140	16.120	4.259
DN 125	FP-5150PO	10.168	2.686	DN 125	FP-5150	8.862	2.341
DN 150	FP-5160PO	7.312	1.932	DN 150	FP-5160	6.454	1.705
DN 200	FP-5180PO	3.995	1.055	DN 200	FP-5180	4.072	1.076

8. Order Information

Standard FP-5600 Low Flow Sensors					Min/Max GPM Values		
Order No.	Housing	Rotor Pin	Rotor	Pipe Size	Pipe Size	GPM (0.3 fps)	GPM (20 fps)
FP-5600	Polypro.	Titanium	PVDF (black)	0.5 to 4.0 in.	0.5	0.3	19
FP-5601	Polypro.	Titanium	PVDF (black)	5.0 to 8.0 in.	0.75	0.5	34
FP-5602	Polypro.	Titanium	PVDF (black)	10 to 36 in.	1	0.8	54
FP-5603	PVDF (natural)	Hastelloy C	PVDF (natural)	0.5 to 4.0 in.	1.25	1.4	94
FP-5604	PVDF (natural)	Hastelloy C	PVDF (natural)	5.0 to 8.0 in.	1.5	1.9	127
FP-5605	PVDF (natural)	PVDF (natural)	PVDF (natural)	0.5 to 4.0 in.	2	3.2	210
All O-rings are Viton®					2.5	4.5	300
Accessories					3	7	460
Order No.	Description				4	12	794
3-2536.320	Rotor PVDF (black)				5	19	1247
3-2536.321	Rotor PVDF (natural) and shaft				6	27	1800
M1546-1	Rotor Pin/Titanium				8	47	3119
M1546-2	Rotor Pin/Hastelloy C				10	74	4915
M1546-3	Rotor Pin/Tantalum				12	105	6975
M1546-4	Rotor Pin/316SS				14	127	8430
P51545	Rotor Pin/Ceramic				16	166	11000
3-2536.321	Rotor Pin/PVDF (natural) and Rotor				18	210	13940
FPP-1220-0021	O-rings/Viton® (std.)				The values provided in this chart are approximate and are for schedule 40 metal pipe. The min./max. GPM values will vary depending on pipe size, schedule, and pipe material.		
FPP-1224-0021	O-rings/EPR						
FPP 1228-0021	O-ring/Kalrez						
FMK-51542	Sensor cap/PP						
FMK 31536-1	Plug/PP						
FMK 31536-2	Plug/PVDF with std. cap						
FP-8500A Integral Sensor Accessories							
Order No.	Description						
FP85NM	Integral sensor mounting kit with 1/2 in. NPT ports						
FP85DM	Integral sensor mounting kit with PG13.5/DIN ports						
FP-8500A Low Flow Integral Sensors							
Order No.	Housing	Rotor Pin	Rotor	Pipe Size			
FP-8501A	Polypro.	Titanium	PVDF (black)	0.5 to 4.0 in.			
FP-8502A	Polypro.	Titanium	PVDF (black)	5.0 to 8.0 in.			
FP-8503A	PVDF (natural)	Hastelloy C	PVDF (natural)	0.5 to 4.0 in.			
FP-8504A	PVDF (natural)	PVDF (natural)	PVDF (natural)	0.5 to 4.0 in.			
All O-rings are Viton®							
Note: FP85A and Mounting Kit require with FP-8500 Series							

9. Rotor Replacement Procedure

- To remove the rotor, insert a small screwdriver between the rotor and the ear of the sensor.
- Twist the screwdriver blade to flex the ear outward enough to remove one end of the rotor and pin. **DO NOT** flex the ear any more than necessary! If it breaks, the sensor cannot be repaired.
- Install the new rotor by inserting one ear into the hole, then flex the opposite ear back enough to slip rotor into place.



10. Specifications

General Data

Flow rate range:	0.1 to 6 m/s (0.3 to 20 ft/s)
Linearity:	±1% of full range
Repeatability:	±0.5% of full range
Pipe size range:	
FP5600 Series Sensors:	15 to 900 mm (0.5 to 36 in.)
FP-8500A Series Sensors:	15 to 200 mm (0.5 to 8 in.)
Cable length:	7.6 m (25 ft), can splice up to 300 m (1000 ft)
Cable type:	2-conductor twisted-pair with shield

Materials

Sensor assembly: Various thermoplastics available. Refer to section 8 for details.

Electrical

Supply voltage:	3.3 to 24 VDC regulated
Supply current:	<1.5 mA @ 3.3 - 6 VDC, <20 mA @ 6 - 24 VDC
Output type:	Open collector transistor, sinking
Output current:	10 mA max.

Quality Standards

- CE
- Manufactured under ISO 9001

Pressure/Temperature Ratings

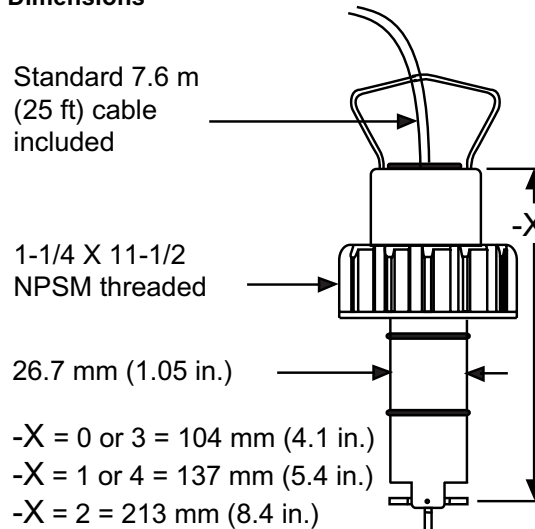
Polypropylene Body:

- 12.5 bar (180 psi) max. @ 20 °C (68 °F)
- 1.7 bar (25 psi) max. @ 85 °C (185 °F)

PVDF Body:

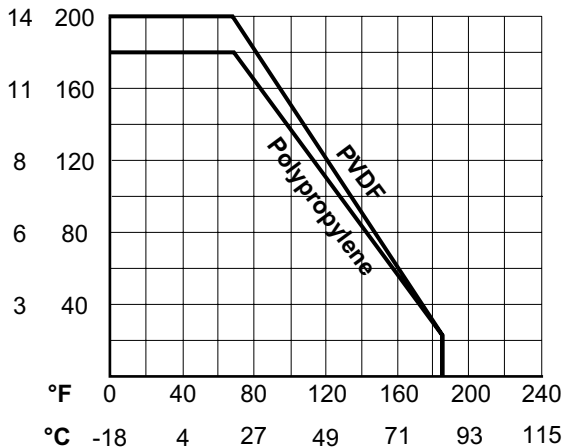
- 14 bar (200 psi) max @ 20 °C (68 °F)
- 1.7 bar (25 psi) max @ 85 °C (185 °F)

Dimensions



The last digit (X) in the sensor part number represents sensor overall length

bar psi





WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 25 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal two (2) 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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