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CE

User's Guide



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FP-5300, FP-5100, FP8500, and FP-319X Flow Sensors

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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.

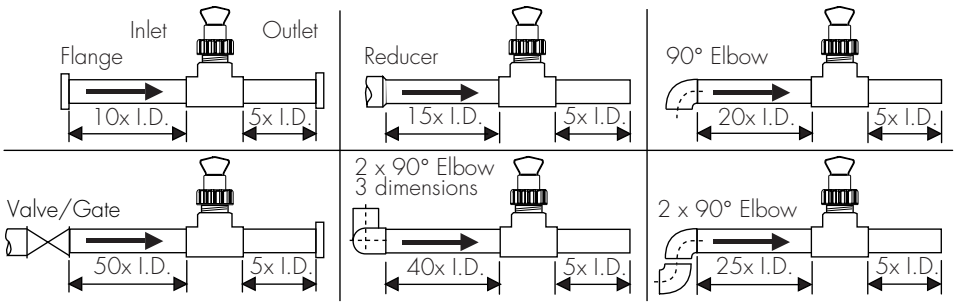
OMEGA FP-5100, FP-5300, FP8500, and FP-319X Paddlewheel Flow Sensors



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

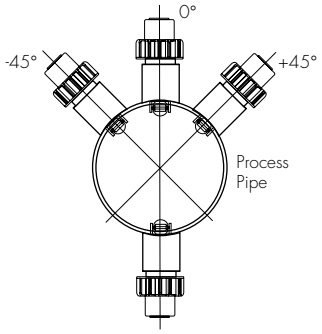
Recommended sensor upstream/downstream mounting requirements



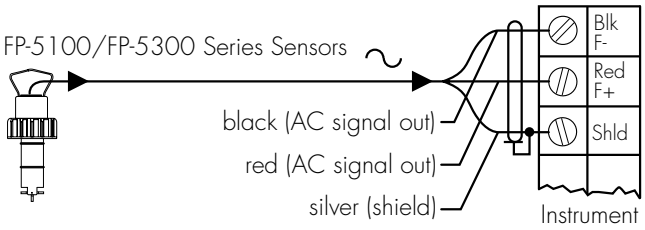
2. Sensor Mounting Position

• 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



Technical Notes
- Use 2-conductor shielded cable for cable extensions up to 60 m (200 ft).
- Cable shield must be maintained through cable splice.
- Refer to your instrument manual for specific wiring details.

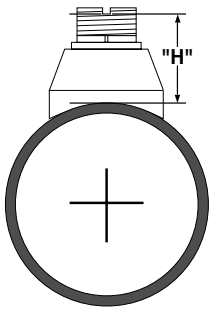
4. OMEGA Fittings

Type	Description
Plastic tees	• 0.5 to 4 in. versions • PVC or CPVC • Mounts via glue-on fittings
PVC glue-on saddles (O-ring not required)	• 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 saddles	• 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 weldolets	• 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.
Carbon steel threaded tees	• 0.5 to 2 in. versions • Mounts on threaded pipe ends

Type	Description
	Metric plastic saddle • 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 • For pipes DN 65 to 200 mm • Follow the recommended installation guidelines
	Metric union fitting • For pipes from DN 15 to 50 mm • PP or PVDF • Follow the recommended 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).



Weldolet part number	"H" dimension inch	mm	Weldolet part number	"H" dimension inch	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

1. Lubricate the sensor O-rings with a silicone lubricant (e.g. GE silicone compound #G632 or equivalent). Do not use any petroleum based lubricant that will attack the O-rings.

2. Using an alternating/twisting motion, lower the sensor into the fitting, making sure the installation arrows on the black cap are pointing in the direction of flow, **see Figure A.**

3. 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 any tools on the sensor cap or the cap threads and/or fitting flange threads will be damaged, **see Figure B.**

Figure A

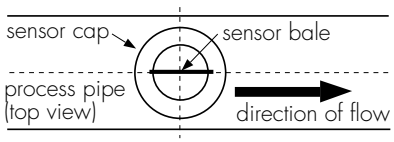
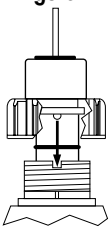


Figure B



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7. Wet-Tap Installation

The OMEGA FP-319X Wet-Tap Assembly attaches directly onto any FP-53XX or FMG-53XX fitting to enable sensor removal without system shutdown. It consists of a flange and support plate which thread onto the pipe fitting insert, and a PVC ball valve through which an extended length sensor is inserted into the pipe.

Procedure

1. Remove six hex nuts and bolts from the Wet-Tap flange. Separate the support plate from the main assembly. Be sure that the Viton O-ring is properly seated in the support plate groove.

2. Apply sealant to the pipe fitting insert threads to prevent leaks.

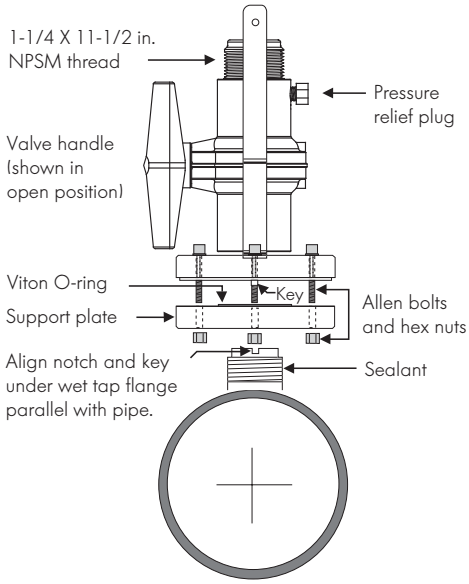
3. Screw support plate onto pipe fitting insert. It must be threaded completely down until the notches at the top of the pipe fitting insert are exposed.

4. Mount the main Wet-Tap Assembly on the support plate. Make certain the alignment keys on the flange mate with the notches on the pipe fitting insert.

5. Replace the six hex nuts and bolts to secure the Wet-Tap Assembly in place. Adjust the support plate position as necessary to align screws.

6. Check the pressure relief plug on Wet-Tap Assembly. It must closed be finger tight to prevent leaks.

7. Close ball valve by turning the orange handle to the fully closed position (parallel with pipe).



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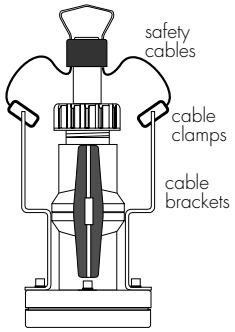
8. Wet-Tap Sensor Installation

The FP-319X Wet-Tap Assembly allows installation into pressurized pipes without system shutdown. **OMEGA recommends reducing flow system pressure to 25 psi or less during sensor installation in a pressurized pipe.**

Non-Pressurized Installation

Open the orange ball valve handle to the full open position. Follow the steps 1-3 outlined in section 6. Attach the cable clamps and safety cables to the cable brackets. Verify the relief valve is closed before system operation, **see Figure C.**

Figure C



Pressurized Installation

1. Lubricate the sensor O-rings with a silicone lubricant (e.g. GE silicone compound #G632 or equivalent). Do not use any petroleum based lubricant that will attack the O-rings.

2. Being careful not to bump the sensor rotor against the closed ball valve orifice, gently insert the extended sensor into the assembly until the first two O-rings seat inside the bore, **see Figure D.**

3. Attach the cable clamps on each of the sensor's safety cables to the assembly cable brackets (Hand tighten only), **see Figure D.**

4. Pull the flow sensor upward to remove slack in the safety cables, **see Figure E**

5. Reduce system pressure to 25 psi or less.

6. **Wearing safety face protection**, slowly open the ball valve to the full open position (perpendicular to pipe).

7. Using an alternating/twisting motion, push the extended sensor into the assembly, making sure the sensor's installation decal is pointing in the direction of flow and the alignment tab seats into the fitting notch, **see Figure F.** Align the tab under the red sensor cap in the notches on the fitting insert. Hand tighten the red sensor cap, **see Figure G.** DO NOT use any tools on the red sensor cap or the cap threads and/or fitting flange threads will be damaged.

CAUTION: Maximum FP-319X Wet-Tap operating pressure: 7 bar (100 psi) @ 20 °C (68 °F) Maximum sensor installation/removal pressure: 1.7 bar (25 psi) @ 22 °C (72 °F)

Figure D

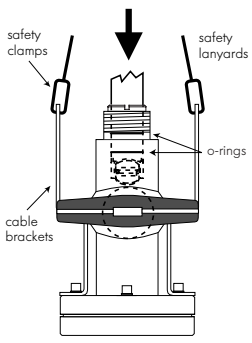
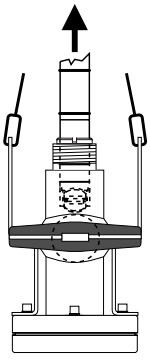


Figure E



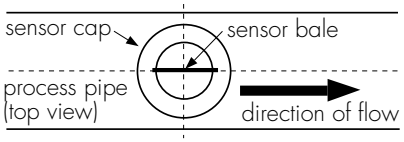


Figure F

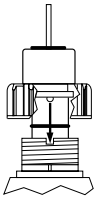


Figure G

9. K-Factors

The **K-Factor** is the number of pulses the sensor will generate for each engineering unit of fluid which passes. They are listed in U.S. gallons and in liters. For example, in a 1 inch PVC pipe, the paddlewheel generates 176.670 pulses per gallon of fluid passing the rotor. K-factors are listed for pipes up to 12 inch. For pipes over 12 inch, please contact OMEGA.

PIPE SIZE	OMEGA FITTING TYPE	----K-FACTOR---- U.S. GAL	LITERS
SCH 80 PVC TEES FOR SCH 80 PVC PIPE			
1/2 IN.	FP-5305	480.190	126.867
3/4 IN.	FP-5307	257.720	68.090
1 IN.	FP-5310	174.670	46.148
1 1/4 IN.	FP-5312	83.390	22.032
1 1/2 IN.	FP-5315	58.580	15.477
2 IN.	FP-5320	32.480	8.581
2 1/2 IN.	FP-5325	21.833	5.768
3 IN.	FP-5330	13.541	3.578
4 IN.	FP-5340	7.626	2.015
SCH 80 CPVC TEES FOR SCH 80 CPVC PIPE			
1/2 IN.	FP-5305C	480.190	126.867
3/4 IN.	FP-5307C	257.720	68.090
1 IN.	FP-5310C	174.670	46.148
1 1/4 IN.	FP-5312C	83.390	22.032
1 1/2 IN.	FP-5315C	58.580	15.477
SCH 80 PVC SADDLES FOR SCH 80 PVC PIPE			
2 IN.	FP-5320S	32.480	8.581
2 1/2 IN.	FP-5325S	21.833	5.768
3 IN.	FP-5330S	13.541	3.578
4 IN.	FP-5340S	7.626	2.015
6 IN.	**FP-5360**	4.162	1.100
8 IN.	**FP-5380**	2.370	0.626
SCH 80 PVC SADDLE ON SCH 40 PVC PIPE			
2 IN.	FP-5320S	27.350	7.226
2 1/2 IN.	FP-5325S	18.874	4.987
3 IN.	FP-5330S	12.638	3.339
4 IN.	FP-5340S	6.728	1.778
6 IN.	**FP-5360**	3.730	0.985
8 IN.	**FP-5380**	2.153	0.569
CARBON STEEL TEES ON SCH 40 PIPE			
1/2 IN.	FP-5305CS	370.202	97.808
3/4 IN.	FP-5307CS	212.063	56.027
1 IN.	FP-5310CS	141.138	37.289
1 1/4 IN.	FP-5312CS	60.655	16.025
1 1/2 IN.	FP-5315CS	45.350	11.982
2 IN.	FP-5320CS	26.767	7.072
STAINLESS STEEL TEES ON SCH 40 PIPE			
1/2 IN.	FMG-5305	358.960	94.838
3/4 IN.	FMG5307	202.610	53.530
1 IN.	FMG5310	127.140	33.590
1 1/4 IN.	FMG-5312	61.910	16.357
1 1/2 IN.	FMG-5315	40.410	10.676
2 IN.	FMG-5320	22.300	5.892

PIPE SIZE	OMEGA FITTING TYPE	----K-FACTOR---- U.S. GAL	LITERS
GALVANIZED IRON TEES ON SCH 40 PIPE			
1 IN.	FP-5310GI	104.538	27.619
1 1/4 IN.	FP-5312GI	62.979	16.639
1 1/2 IN.	FP-5315GI	46.688	12.335
2 IN.	FP-5320GI	29.459	7.783
BRONZE TEES ON SCH 40 PIPE			
1 IN.	FP-5310BR	104.538	27.619
1 1/4 IN.	FP-5312BR	62.979	16.639
1 1/2 IN.	FP-5315BR	46.688	12.335
2 IN.	FP-5320BR	29.459	7.783
COPPER TEE FITTINGS ON COPPER PIPE PIPE			
1/2 IN.SK K	FP-5305CU	443.206	117.095
1/2 IN. SK L		414.413	109.488
3/4 IN.SK K	FP-5307CU	212.156	56.052
3/4 IN. SK L		191.086	50.485
1 IN.SK K	FP-5310CU	127.176	33.600
1 IN. SK L		119.840	31.662
1 1/4 IN.SK K	FP-5312CU	88.218	23.307
1 1/4 IN. SK L		85.451	22.576
1 1/2 IN.SK K	FP-5315CU	56.962	15.049
1 1/2 IN. SK L		55.160	14.573
2 IN.SK K	FP-5320CU	29.370	7.759
2 IN. SK L		28.605	7.558
STAINLESS STEEL WELDOLETS ON SCH 40 PIPE			
2 1/2 IN.	FMG-5325	18.800	4.967
3 IN.	FMG-5330	12.170	3.215
4 IN.	FMG-5340	6.960	1.839
5 IN.	FMG-5350	5.260	1.390
6 IN.	FMG-5360	3.690	0.975
8 IN.	FMG-5380	2.130	0.563
10 IN.	FMG-5381	1.350	0.357
12 IN.	FMG-5382	0.960	0.254
CARBON STEEL WELDOLETS ON SCH 40 PIPE			
2 1/2 IN.	FP-5325CS	18.800	4.967
3 IN.	FP-5330CS	12.170	3.215
4 IN.	FP-5340CS	6.960	1.839
5 IN.	FP-5350CS	5.260	1.390
6 IN.	FP-5360CS	3.690	0.975
8 IN.	FP-5380CS	2.130	0.563
10 IN.	FP-5381CS	1.350	0.357
12 IN.	FP-5382CS	0.960	0.254

PIPE SIZE	OMEGA FITTING TYPE	----K-FACTOR---- U.S. GAL	LITERS
COPPER/BRONZE BRAZOLETS ON SCH 40 PIPE			
2 1/2 IN.	FP-5325BR	18.800	4.967
3 IN.	FP-5330BR	12.170	3.215
4 IN.	FP-5340BR	6.960	1.839
5 IN.	FP-5350BR	5.260	1.390
6 IN.	FP-5360BR	3.690	0.975
8 IN.	FP-5380BR	2.130	0.563
10 IN.	FP-5381BR	1.350	0.357
12 IN.	FP-5382BR	0.960	0.254
SCH 80 IRON SADDLES ON SCH 80 PIPE			
2 IN.	FP-5320GIS	32.360	8.550
2 1/2 IN.	FP-5325GI	22.220	5.871
3 IN.	FP-5330GI	13.420	3.546
4 IN.	FP-5340GI	7.660	2.024
5 IN.	FP-5350GI	5.860	1.548
6 IN.	FP-5360GI	4.090	1.081
8 IN.	FP-5380GI	2.330	0.616
10 IN.	FP5381GI	1.530	0.404
12 IN.	FP-5382GI	1.060	0.280
SCH 80 IRON SADDLE ON SCH 40 PIPE			
2 IN.	FP-5320GIS	26.820	7.086
2 1/2 IN.	FP-5325GI	18.800	4.967
3 IN.	FP-5330GI	11.990	3.168
4 IN.	FP-5340GI	6.850	1.810
5 IN.	FP-5350GI	5.330	1.408
6 IN.	FP-5360GI	3.760	0.993
8 IN.	FP-5380GI	2.130	0.563
10 IN.	FP-5381GI	1.350	0.357
12 IN.	FP-5382GI	0.960	0.254

K-Factors DIN Pipes

PIPE SIZE	OMEGA FITTING TYPE	----K-FACTOR---- U.S. GAL	LITERS
POLYPROPYLENE FITTINGS (DIN/ISO AND BS AND ANSI)			
DN 15	FP-5105PO	481.553	127.227
DN 20	FP-5107PO	277.089	73.207
DN 25	FP-5110PO	141.181	37.300
DN 32	FP-5112PO	83.540	22.071
DN 40	FP-5115PO	51.265	13.544
DN 50	FP-5120PO	29.596	7.819
DN 65	FP-5125PO	20.658	5.458
DN 80	FP-5130PO	13.330	3.522
DN 100	FP-5140PO	8.708	2.301
DN 125	FP-5150PO	5.067	1.339
DN 150	FP-5160PO	3.689	0.975
DN 200	FP-5180PO	2.040	0.539

PIPE SIZE	OMEGA FITTING TYPE	----K-FACTOR---- U.S. GAL	LITERS
PVDF FITTINGS (DIN/ISO AND BS AND ANSI)			
DN 15	FP-5105	420.868	111.194
DN 20	FP-5107	228.149	60.277
DN 25	FP-5110	136.697	36.116
DN 32	FP-5112	79.294	20.950
DN 40	FP-5115	43.490	11.490
DN 50	FP-5120	25.908	6.845
DN 65	FP-5125	18.067	4.773
DN 80	FP-5130	12.357	3.265
DN 100	FP-5140	8.060	2.129
DN 125	FP-5150	4.431	1.171
DN 150	FP-5160	3.227	0.853
DN 200	FP-5180	2.036	0.538

10. Order Information

Standard Paddlewheel Flow Sensors — All O-rings are Viton®

Order No.	Sensor Body	Rotor Pin	Rotor	Pipe Size
FP-5300	Polypro.	Titanium	PVDF (black)	0.5 to 4.0 in.
FP-5301	Polypro.	Titanium	PVDF (black)	5.0 to 8.0 in.
FP-5302	Polypro.	Titanium	PVDF (black)	10 to 36 in.
FP-5100	PVDF (natural)	Hastelloy C	PVDF (natural)	0.5 to 4.0 in.
FP-5101	PVDF (natural)	Hastelloy C	PVDF (natural)	5.0 to 8.0 in.
FP-5102	PVDF (natural)	Hastelloy C	PVDF (natural)	10 to 36 in.
FP-5100-AP	PVDF (natural)	PVDF (natural)	PVDF (natural)	0.5 to 4.0 in.
FP-5101-AP	PVDF (natural)	PVDF (natural)	PVDF (natural)	5.0 to 8.0 in.
FP-5102-AP	PVDF (natural)	PVDF (natural)	PVDF (natural)	10 to 36 in.

FP-319X Wet-Tap Assembly Including Extended Sensor — Rotor pin material is Titanium

Order No.	Valve	Sensor Body	Rotor	Pipe Size
FP-3193	PVC	Polypro.	PVDF (black)	0.5 to 4.0 in.
FP-3194	PVC	Polypro.	PVDF (black)	5.0 to 8.0 in.
FP-3195	PVC	Polypro.	PVDF (black)	10 to 36 in.

FP-319X Wet-Tap Without Sensor

Order No.	Material	Description
FP-319	PVC	319 Wet-Tap

Extended Sensors for FP-319 Wet-Tap — Rotor pin material is Titanium

Order No.	Sensor Body	Rotor Pin	Rotor	Pipe Size
FMK-515-3P3	Polypro.	Titanium	PVDF (black)	0.5 to 4.0 in.
FMK-515-3P4	Polypro.	Titanium	PVDF (black)	5.0 to 8.0 in.
FMK-515-3P5	Polypro.	Titanium	PVDF (black)	10 to 36 in.

Accessories for FP-5300/FP-5100

Order No. Rotors	Material
FMK-1538-2	PVDF (FP-5300)
FMK-51545-1	PVDF (natural) rotor + pin (FP-5100 & FP5100-AP)
FMK-1538-4	Tefzel
3-0515.320-3	Tefzel with Fluoroloy G sleeve
3-0515.320-2	PVDF (natural) with Fluoroloy G sleeve
3-0515.320-1	PVDF (black) with Fluoroloy G sleeve

Order No. Rotor Pin	Material
FMK-1546-1	Titanium
FMK-1546-2	Hastelloy C
FMK-51545-1	PVDF (natural) + rotor
FMK-1546-3	Tantalum
FMK-1546-4	Stainless steel
FMK-51545	Ceramic

Order No. O-Rings	Material
FPP-1220-0021	Viton® (standard)
FPP-1224-0021	EPR
FPP-1228-0021	Kalrez

Order No.	Description
FMK-51542	Sensor cap, PP
FMK-31536-1	Fitting plug, PP
FMK-31536-2	Fitting plug, PVDF (natural) with PP cap

Integral Sensor Accessories for OMEGA FP85-A Flow Transmitter

Order No.	Description
FP85NM	Integral sensor mounting kit with 1/2 in. NPT ports
FP85DM	Integral sensor mounting kit with PG 13.5 ports

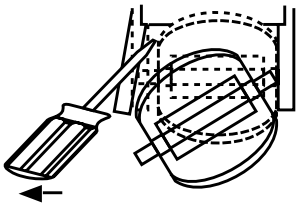
Order No.	Description	Pipe Size
FP8501	Integral sensor, Polypro.	0.5 to 4 inch
FP8502	Integral sensor, Polypro.	5 to 8 inch
FP8503	Integral sensor, PVDF (natural)	0.5 to 4 inch

11. Rotor Replacement Procedure

1. To remove the rotor, insert a small screwdriver between the rotor and the ear of the sensor.

2. 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.

3. Install the new rotor by inserting one ear into the hole, then flex the opposite ear back enough to slip rotor into place.



12. Specifications

General Data

Flow Rate Range: 0.3 to 6 m/s (1 to 20 ft/s)
Linearity: ±1% of maximum range
Repeatability: ±0.5% of maximum range
Pipe Size Range: 15 to 900 mm (0.5 to 36 in.)
Cable Length: 7.6 m (25 ft) can splice up to 60 m (200 ft) without amplification
Cable type: 2-conductor twisted pair with shield

Materials

Sensor Assembly: Various thermoplastics available. Contact your OMEGA dealer for additional information.

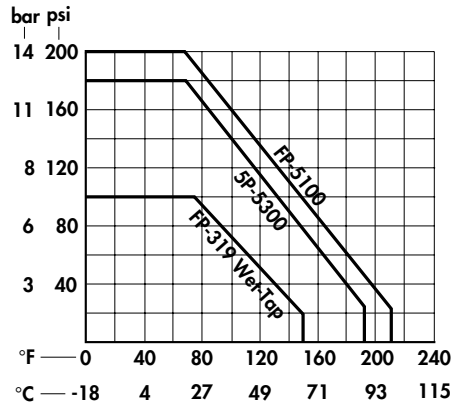
Electrical

Source Impedance: 8 kΩ

Fluid Conditions

Sensor Pressure/Temperature Ratings:
Polypropylene Body:
- 12.5 bar (180 psi) max. @ 20 °C (68 °F)
- 1.7 bar (25 psi) max. @ 90 °C (194 °F)

PVDF Body:
- 14 bar (200 psi) max. @ 20 °C (68 °F)
- 1.7 bar (25 psi) max. @ 100 °C (212 °F)



FP-319X Wet-Tap Assembly
Pressure/Temperature Ratings:
- 7 bar (100 psi) max. @ 25 °C (77 °F)
- 1.4 bar (20 psi) max. @ 66 °C (150 °F)

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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