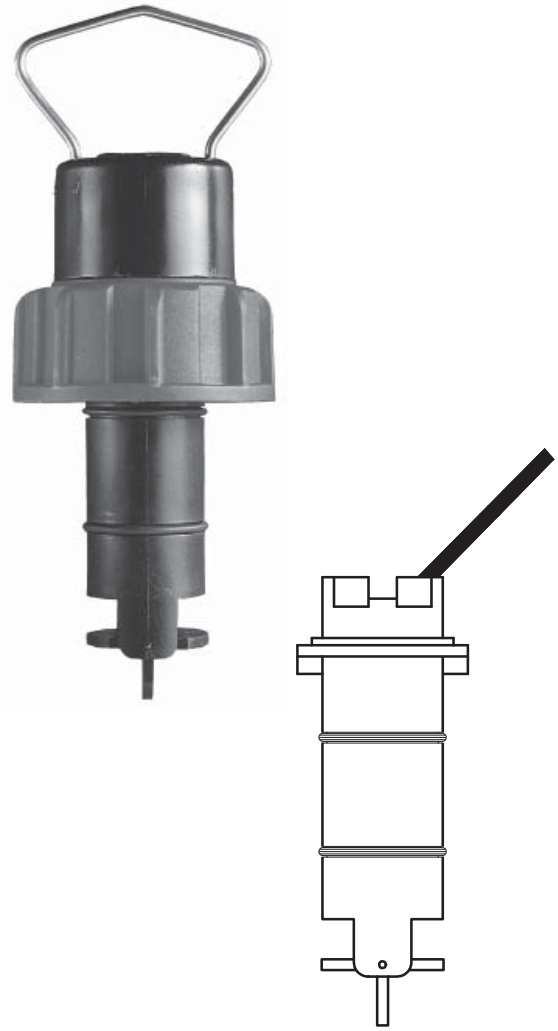
1 YEAR
WARRANTY

OMEGA®

User's Guide



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SERIES: FMK-2536, FP-5100, FP-5300,FP-5600, FP-8500, FP-8500A

Paddlewheel Flow Sensors

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OMEGA Paddlewheel Flow Sensors

Instructions for all versions of: Self-Powered Sensors (FP-5100, FP-5300 and FP-8500 Series) and Low-Flow Sensors (FP-5600 and 8500A Series)

SAFETY INSTRUCTIONS

1. Depressurize and vent system prior to installation or removal.
2. Confirm chemical compatibility before use.
3. DO NOT exceed maximum temperature/pressure specifications.
4. ALWAYS wear safety goggles or faceshield during installation/service.
5. DO NOT alter product construction.

1. Specifications

General Data

Flow Rate Range:	Self-powered:	0.3 to 6 m/s (1 to 20 ft/s)
	Low-flow:	0.1 to 6 m/s (0.3 to 20 ft/s)
Pipe Size Range:	DN15 to DN900 (½ in. to 36 in.)	
Linearity:	±1% of maximum range @ 25 °C (77 °F)	
Repeatability:	±0.5% maximum range @ 25 °C (77 °F)	
Cable Length:	7.6 m (25 ft) standard	
	Self-powered:	60 m (200 ft) maximum
	Low-flow:	305 m (1000 ft) maximum
Cable Type:	2-conductor twisted pair w/shield (22 AWG)	
Minimum Reynolds	Number Required: 4500	
Cap Material:	Glass Filled Polypropylene	
	Self-powered:	Red
	Low-flow:	Blue

Wetted Materials

• Sensor Body:	Glass filled Polypropylene (black) or PVDF
• O-Rings:	FPM (Std), EPR (EPDM) or FFKM optional
• Pin:	Titanium, Hastelloy-C or PVDF; other material options available
• Rotor:	Black or natural PVDF; optional ETFE with or w/o Fluoroloy G® sleeve for rotor pin

Shipping Weight:	-X0	0.454 kg (1 lb)
	-X1	0.476 kg (1.04 lbs)
	-X2	0.680 kg (1.50 lbs)
	-X3	0.794 kg (1.75 lbs)
	-X4	0.850 kg (1.87 lbs)
	-X5	1.0 kg (2.20 lbs)
	FP-319	1.3 kg (2.86 lbs)

Self-Powered Sensors

Frequency:	19.7 Hz per m/s nominal (6 Hz per ft/s)
Amplitude:	3.3 V p/p per m/s nominal (1 V p/p per ft/s)
Source Impedance:	8 kΩ

Low-Flow Sensors

Frequency:	49 Hz per m/s nominal (15 Hz per ft/s nominal)
Supply voltage:	5 to 24 VDC ±10% regulated
Supply current:	<1.5 mA @ 3.3 to 6 VDC
	<20 mA @ 6 to 24 VDC
Output Type:	Open collector, sinking
Output current:	10 mA max.

Pressure/Temperature Ratings

Polypropylene Body:

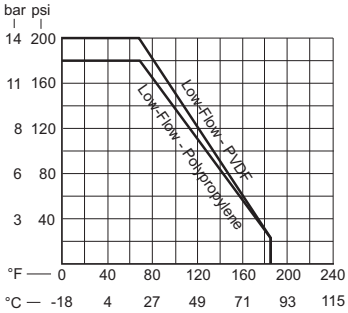
- 12.5 bar (180 psi) max. @ 20 °C (68 °F)
- Self-powered: 1.7 bar (25 psi) max. @ 90 °C (194 °F)
- Low-flow: 1.7 bar (25 psi) max. @ 85 °C (185 °F)

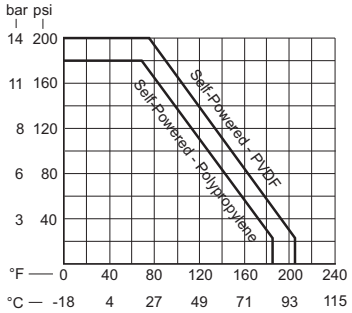
Operating Temperature: -18 to 66 °C (0 to 150 °F)

PVDF Body:

- 14 bar (200 psi) max @ 20 °C (68 °F)
- Self-powered: 1.7 bar (25 psi) max @ 100 °C (212 °F)
- Low-flow: 1.7 bar (25 psi) max @ 85 °C (185 °F)

Operating Temperature: -18 to 100 °C (0 to 212 °F)



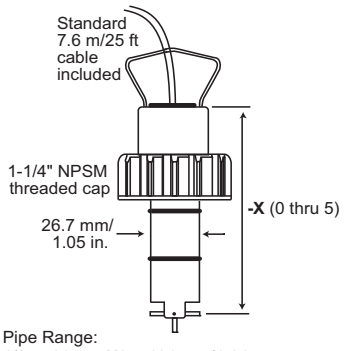


Standards & Approvals

- Manufactured under ISO 9001 and ISO 14001
- CE

Dimensions

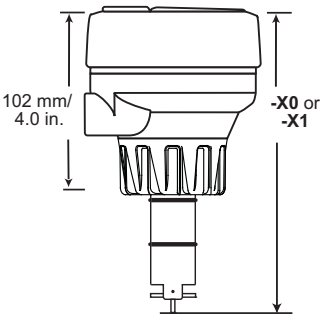
Self-Powered Sensor



Pipe Range:

1/2 to 4 in.	-X0 = 104 mm/4.1 in.	
5 to 8 in.	-X1 = 137 mm/5.4 in.	
10" and up	-X2 = 213 mm/8.4 in.	
1/2 to 4 in.	-X3 = 297 mm/11.7 in.	Wet-tap Lengths
5 to 8 in.	-X4 = 332 mm/13.1 in.	
10" and up	-X5 = 408 mm/16.1 in.	

Low-Flow Integral Sensor shown with Transmitter and Integral Adapter Kit (sold separately)



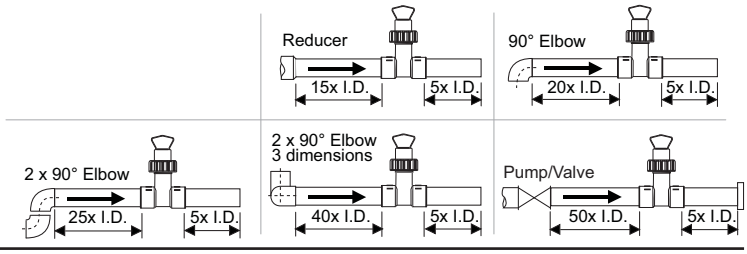
-X0 = 152 mm/6.0 in.
-X1 = 185 mm/7.3 in.

WARNING!

The retaining nuts of paddlewheel sensors are not designed for prolonged contact with aggressive substances. Strong acids, caustic substances and solvents or their vapor may lead to failure of the retaining nut, ejection of the sensor and loss of the process fluid with possibly serious consequences, such as damage to equipment and serious personal injury. Retaining nuts that may have been in contact with such substances, e.g. due to leakage or spilling, must be replaced.

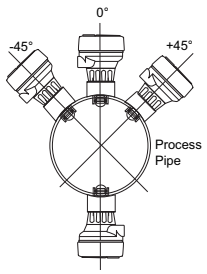
2. Location of Fitting

Recommended sensor upstream/downstream mounting requirements



3. Sensor Mounting Position

- Horizontal pipe runs: Mount the sensor in the 45° position for best performance. Mounting in the 0° position may encounter problems with air bubbles (pipe must be full). Do not mount on the bottom of the pipe when sediments are present.
- Vertical pipe runs: Mount sensor in any orientation. Upward flow is preferred to ensure full pipe.



4. Standard Sensor Installation

- Lubricate O-rings with a non-petroleum based, viscous lubricant (grease) compatible with the system.
- 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.
- 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

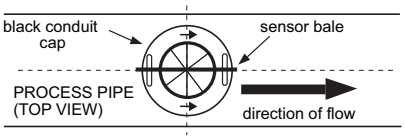
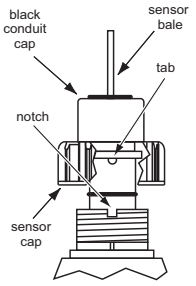


Figure B

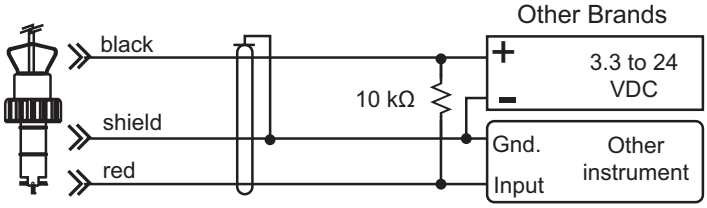


5. Sensor Wiring

Technical Notes

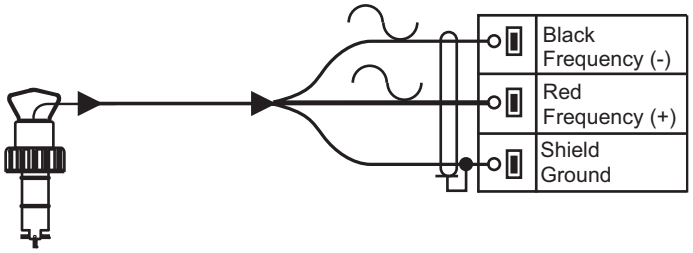
- Use 2-conductor shielded cable for cable extensions.
- Cable shield must be maintained through cable splice.
- Refer to your instrument manual for specific wiring details.

Low-Flow Sensor Connections to Other Brand Instruments

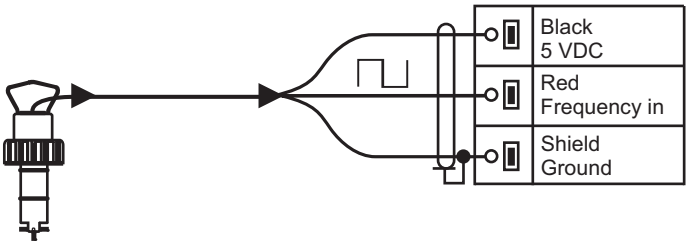


● DC sensor power supplied from OMEGA instrument.
10 kΩ Pull-up resistor may be required for non-OMEGA brand instrument.

Self-Powered Sensor Connections to OMEGA Instruments

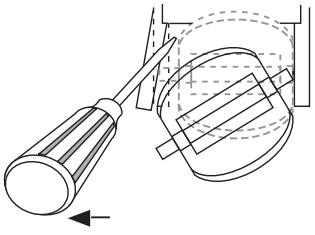


Low-Flow Sensor Connections to OMEGA Instruments



6. 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 tip of the pin into the hole, then flex the opposite ear back enough to slip rotor into place.



7. K-Factors

A **K-Factor** is the number of pulses a sensor will generate for each engineering unit of fluid which passes the sensor. K-factors for water are listed below in liters and U.S. gallons. For example, in a 1-inch PVC pipe, the self-powered paddlewheel generates 172.07 pulses per gallon of water passing the rotor. K-factors are listed for pipes up to 12 inches. For pipes over 12 inches, consult OMEGA.

PIPE SIZE (IN.)	FITTING TYPE	FP-51XX, 53XX SELF-POWERED		FP-56XX LOW FLOW	
		LITERS	U.S. GAL	LITERS	U.S. GAL
SCH 80 PVC TEES FOR SCH 80 PVC PIPE					
1/2	FP-5305M	137.42	520.12	271.37	1027.1
3/4	FP-5307M	78.61	297.52	154.08	583.19
1	FP-5310M	45.46	172.07	88.65	335.53
1-1/4	FP-5312M	24.19	91.54	47.24	178.79
1-1/2	FP-5315M	16.44	62.22	32.08	121.42
2	FP-5320M	9.60	36.32	18.87	71.44
2-1/2	PV8T025	5.7683	21.833	11.359	42.994
3	PV8T030	3.5775	13.541	7.0414	26.652
4	PV8T040	2.0147	7.6258	3.9645	15.006
SCH 80 CPVC TEES FOR SCH 80 CPVC PIPE					
1/2	FP-5305CM	137.42	520.12	271.37	1027.1
3/4	FP-5307CM	78.61	297.52	154.08	583.19
1	FP-5310CM	45.46	172.07	88.65	335.53
1-1/4	FP-5312CM	24.19	91.54	47.24	178.79
1-1/2	FP-5315CM	16.44	62.22	32.08	121.42
2	FP-5320CM	9.60	36.32	18.87	71.44
SCH 80 PVC SADDLES FOR SCH 80 PVC PIPE					
2	FP-5320S	8.5812	32.480	17.633	66.739
2-1/2	FP-5325S	5.7683	21.833	11.359	42.994
3	FP-5330S	3.5775	13.541	7.0414	26.652
4	FP-5340S	2.0147	7.6258	3.9645	15.006
6	FP-5360S	1.0997	4.1623	2.1994	8.3246
8	FP-5380S	0.6263	2.3705	1.3253	5.0164
10	FP-5381S	0.4042	1.5300	0.808	3.0600
12	FP-5382S	0.2801	1.0600	0.571	2.1600
SCH 80 PVC SADDLE ON SCH 40 PVC PIPE					
2	FP-5320S	7.2259	27.350	14.452	54.700
2-1/2	FP-5325S	4.9866	18.874	9.8175	37.159
3	FP-5330S	3.3389	12.638	6.2608	23.697
4	FP-5340S	1.7776	6.7282	3.5552	13.456
6	FP-5360S	0.9854	3.7297	1.9708	7.4594
8	FP-5380S	0.5688	2.1527	1.1966	4.5292
10	FP-5381S	0.3567	1.3500	0.740	2.8000
12	FP-5382S	0.2536	0.9600	0.523	1.9800

PIPE SIZE (IN.)	FITTING TYPE	FP-51XX, 53XX SELF-POWERED		FP-56XX LOW FLOW	
		LITERS	U.S. GAL	LITERS	U.S. GAL
CARBON STEEL TEES ON SCH 40 PIPE					
1/2	FP-5305CS	97.808	370.20	199.74	756.00
3/4	FP-5307CS	56.027	212.06	115.90	438.69
1	FP-5310CS	37.289	141.14	75.768	286.78
1-1/4	FP-5312CS	16.025	60.655	32.026	121.22
1-1/2	FP-5315CS	11.982	45.350	24.079	91.139
2	FP-5320CS	7.0717	26.767	14.391	54.468
STAINLESS STEEL TEES ON SCH 40 PIPE					
1/2	FMG-5305	94.838	358.96	193.98	734.20
3/4	FMG-5307	53.530	202.61	108.88	412.10
1	FMG-5310	33.590	127.14	66.764	252.70
1-1/4	FMG-5312	16.357	61.910	33.849	128.12
1-1/2	FMG-5315	10.676	40.410	20.428	77.320
2	FMG-5320	5.8917	22.300	12.095	45.780
GALVANIZED IRON TEES ON SCH 40 PIPE					
1	FP-5310GI	27.619	104.54	56.277	213.01
1-1/4	FP-5312GI	16.639	62.979	33.751	127.75
1 1/2	FP-5315GI	12.335	46.688	24.941	94.401
2	FP-5320GI	7.7832	29.459	15.699	59.420
BRONZE TEES ON SCH 40 PIPE					
1	FP-5310BR	27.619	104.54	56.277	213.01
1-1/4	FP-5312BR	16.639	62.979	33.751	127.75
1-1/2	FP-5315BR	12.335	46.688	24.941	94.401
2	FP-5320BR	7.7832	29.459	15.699	59.420
COPPER TEE FITTINGS ON COPPER PIPE SCH K					
1/2	FP-5305CU	117.10	443.21	242.50	917.84
3/4	FP-5307CU	56.052	212.16	113.15	428.27
1	FP-5310CU	33.600	127.18	67.749	256.43
1-1/4	FP-5312CU	23.307	88.218	46.615	176.44
1-1/2	FP-5315CU	15.049	56.962	30.565	115.69
2	FP-5320CU	7.7595	29.370	16.746	63.385
COPPER TEE FITTINGS ON COPPER PIPE SCH L					
1/2	FP-5305CU	109.49	414.41	226.74	858.22
3/4	FP-5307CU	50.485	191.09	101.91	385.74
1	FP-5310CU	31.662	119.84	63.841	241.64
1-1/4	FP-5312CU	22.576	85.451	45.152	170.90
1-1/2	FP-5315CU	14.573	55.160	29.598	112.03
2	FP-5320CU	7.5575	28.605	16.310	61.74

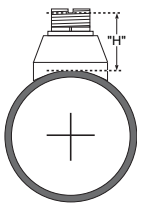
PIPE SIZE (IN.)	FITTING TYPE	FP-51XX, 53XX SELF-POWERED		FP-56XX LOW FLOW	
		LITERS	U.S. GAL	LITERS	U.S. GAL
STAINLESS STEEL WELDOLETS ON SCH 40 PIPE					
2-1/2	FMG-5325	4.9670	18.800	9.9339	37.600
3	FMG-5330	3.2153	12.170	6.4306	24.340
4	FMG-5340	1.8388	6.9600	3.6777	13.920
5	FMG-5350	1.3897	5.2600	2.8692	10.860
6	FMG-5360	0.9749	3.6900	1.9868	7.5200
8	FMG-5380	0.5627	2.1300	1.1466	4.3400
10	FMG-5381	0.3567	1.3500	0.7292	2.7600
12	FMG-5382	0.2536	0.9600	0.5125	1.9400
CARBON STEEL WELDOLETS ON SCH 40 PIPE					
2-1/2	FP-5325CS	4.9670	18.800	9.9339	37.600
3	FP-5330CS	3.2153	12.170	6.4306	24.340
4	FP-5340CS	1.8388	6.9600	3.6777	13.920
5	FP-5350CS	1.3897	5.2600	2.8692	10.860
6	FP-5360CS	0.9749	3.6900	1.9868	7.5200
8	FP-5380CS	0.5627	2.1300	1.1466	4.3400
10	FP-5381CS	0.3567	1.3500	0.7292	2.7600
12	FP-5382CS	0.2536	0.9600	0.5125	1.9400
COPPER/BRONZE BRAZOLETS ON SCH 40 PIPE					
2-1/2	FP-5325BR	4.9670	18.800	9.934	37.600
3	FP-5330BR	3.2153	12.170	6.431	24.340
4	FP-5340BR	1.8388	6.9600	3.678	13.920
5	FP-5350BR	1.3897	5.2600	2.869	10.860
6	FP-5360BR	0.9749	3.6900	1.987	7.5200
8	FP-5380BR	0.5627	2.1300	1.147	4.3400
10	FP-5381BR	0.3567	1.3500	0.729	2.7600
12	FP-5382BR	0.2536	0.9600	0.513	1.9400
SCH 80 IRON SADDLES ON SCH 80 PIPE					
2	FP-5320GIS	8.5495	32.360	17.099	64.720
2-1/2	FP-5325GI	5.8705	22.220	11.223	42.480
3	FP-5330GI	3.5456	13.420	6.980	26.420
4	FP-5340GI	2.0238	7.6600	3.884	14.700
5	FP-5350GI	1.5482	5.8600	3.218	12.180
6	FP-5360GI	1.0806	4.0900	2.230	8.4400
8	FP-5380GI	0.6156	2.3300	1.295	4.9000
10	FP-5381GI	0.4042	1.5300	0.808	3.0600
12	FP-5382GI	0.2801	1.0600	0.571	2.1600
SCH 80 IRON SADDLE ON SCH 40 PIPE					
2	FP-5320GIS	7.0859	26.820	14.172	53.640
2-1/2	FP-5325GI	4.9670	18.800	9.934	37.600
3	FP-5330GI	3.1678	11.990	6.135	23.220
4	FP-5340GI	1.8098	6.8500	3.503	13.260
5	FP-5350GI	1.4082	5.3300	2.917	11.040
6	FP-5360GI	0.9934	3.7600	1.913	7.2400
8	FP-5380GI	0.5627	2.1300	1.162	4.4000
10	FP-5381GI	0.3567	1.3500	0.740	2.8000
12	FP-5382GI	0.2536	0.9600	0.523	1.9800

K-Factors DIN Pipes

PIPE SIZE (IN.)	FITTING TYPE	FP-51XX, 53XX SELF-POWERED		FP-56XX LOW FLOW	
		LITERS	U.S. GAL	LITERS	U.S. GAL
POLYPROPYLENE FITTINGS (DIN/ISO AND BS AND ANSI)					
DN 15	FP-5105PO	127.23	481.55	251.75	952.87
DN 20	FP-5107PO	73.207	277.09	148.77	563.10
DN 25	FP-5110PO	37.300	141.18	77.042	291.60
DN 32	FP-5112PO	22.071	83.540	44.709	169.22
DN 40	FP-5115PO	13.544	51.265	27.450	103.90
DN 50	FP-5120PO	7.8193	29.596	16.060	60.789
PVDF FITTINGS (DIN/ISO AND BS AND ANSI)					
DN 15	FP-5105	111.19	420.87	218.56	827.26
DN 20	FP-5107	60.277	228.15	129.42	489.87
DN 25	FP-5110	36.116	136.70	74.915	283.55
DN 32	FP-5112	20.950	79.294	41.899	158.59
DN 40	FP-5115	11.490	43.490	22.980	86.980
DN 50	FP-5120	6.8450	25.908	13.312	50.385

8. 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).



Carbon Steel Part Number	Stainless Steel Part Number	Copper/Bronze Part Number	"H" dimension	
			mm	inches
FP-5325CS	FMG-5325	FP-5325BR	60.45	2.38
FP-5330CS	FMG-5330	FP-5330BR	59.18	2.33
FP-5340CS	FMG-5340	FP-5340BR	58.92	2.32
FP-5350CS	FMG-5350	FP-5350BR	58.42	2.30
FP-5360CS	FMG-5360	FP-5360BR	78.48	3.09
FP-5360CS	FMG-5360	FP-5360BR	75.18	2.96
FP-5380CS	FMG-5380	FP-5380BR	69.34	2.73
FP-5381CS	FMG-5381	FP-5381BR	139.19	5.48
FP-5382CS	FMG-5382	FP-5382BR	133.35	5.25

9. OMEGA Fittings

Type	Description
Plastic tees 	• 0.5 to 2 inch versions • MPVC or CPVC
PVC Glue-on Saddles 	• Available in 10 and 12 inch sizes only • Cut 2-1/2 inch hole in pipe • Weld in place using solvent cement
PVC Saddles 	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • 6 to 8 inch, cut 2-1/8 inch hole in pipe
Iron Strap-on saddles 	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe • Special order 14 in. to 36 in.

Type	Description
Iron, Carbon Steel, 316 SS Threaded tees 	• 0.5 to 2 in. versions • Mounts on threaded pipe ends
Carbon steel & stainless steel Weld-on Weldolets 	• 2 to 4 inch, cut 1-7/16 inch hole in pipe • Over 4 inch, cut 2-1/8 inch hole in pipe
Fiberglass tees  FPT	• 1.5 in. to 2 in. PVDF insert
Metric Union Fitting 	• For pipes from DN 15 to 50 mm • PP or PVDF

10. Ordering Information

Self-Powered Part No.	Low-Flow Part No.	Description
FP-5300	FP-5600	Sensor, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), ½ to 4 Inch Pipe
FP-5301	FP-5601	Sensor, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), 5 to 8 Inch Pipe
FP-5302	FP-5602	Sensor, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black) 10 to 36 Inch Pipe
FP-5100	FP-5603	Sensor, PVDF (natural), Hastelloy-C Rotor Pin, PVDF Rotor (natural), ½ to 4 Inch Pipe
FP-5101	FP-5604	Sensor, PVDF (natural), Hastelloy-C Rotor Pin, PVDF Rotor (natural), 5 to 8 Inch Pipe
FP-5102	N/A	Sensor, PVDF (natural), Hastelloy-C Rotor Pin, PVDF Rotor (natural), 10 to to 36 Inch Pipe
FP-5100-AP	N/A	Sensor, PVDF (natural), PVDF (natural) Rotor Pin, PVDF Rotor (natural), ½ to 4 Inch Pipe
FP-5101-AP	N/A	Sensor, PVDF (natural), PVDF (natural) Rotor Pin, PVDF Rotor (natural), 5 to to 8 Inch Pipe
FP-8501	FP-8501A	Sensor, Integral, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), ½ to 4 Inch Pipe
FP-8502	FP-8502A	Sensor, Integral, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), 5 to 8 Inch Pipe
FP-8503-AP	FP-8503A-AP	Sensor, Integral, PVDF (natural), Hastelloy-C Rotor Pin, PVDF Rotor (natural), ½ to 4 In. Pipe
FP-8503	FP8503A	Sensor, Integral, PVDF (natural), PVDF (natural) Rotor Pin, PVDF Rotor (natural), ½ to 4 In. Pipe
FMK-515-3P3	FMK-2536-3P3	Sensor, Wet-Tap, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), ½ to 4 Inch Pipe
FMK-515-3P5	FMK-2536-3P5	Sensor, Wet-Tap, Polypropylene, Titanium Rotor Pin, PVDF Rotor (black), 10 to 36 Inch Pipe
FP-319	FP-319	Wet-Tap Valve Assembly (Use with Wet-Tap sensors only)
Accessories		
FMK-1538-2	FMK-2536-1	Rotor, PVDF Black
FMK-51545-1	FMK-2536-5	Rotor and Pin, PVDF Natural
FMK-1546-1	FMK-1546-1	Rotor Pin, Titanium
FMK-1546-2	FMK-1546-2	Rotor Pin, Hastelloy-C
FMK-1546-3	FMK-1546-3	Rotor Pin, Tantalum
FMK-1546-4	FMK-1546-4	Rotor Pin, Ceramic
FPP-1220-0021	FPP-1220-0021	O-Ring, FPM-FKM
FPP-1224-0021	FPP-1224-0021	O-Ring, EPDM
FPP-1228-0021	FPP-1228-0021	O-Ring, FFKM-Perfluoroelastomer
FMK-31536-1	FMK-31536-1	Sensor Plug, Polypro
PH-31542-TC	N/A	Sensor Cap, Red (Use with the FP-8501, 8502, 8503-AP)
N/A	FMK-2536-9	Sensor Cap, Blue (Use with the FP-8501A, 8502A, 8503A -AP)
FMK-31934	FMK-31934	Conduit Cap
FP-90-IM	FP-90-IM	Integral Mounting Kit

Chemical Compatibility

OMEGA products are manufactured in a variety of wetted materials to suit various liquids and chemicals.

All plastic materials including typical piping types (PVC, PVDF, PP and PE) are more or less permeable to contained media, such as water or volatile substances, including some acids. This effect is not related to porosity, but purely a matter of gas diffusion through the plastic. If the plastic material is compatible with the medium according to the application guidelines, the permeation will not damage the plastic itself. However, if the plastic encloses other sensitive components, as is the case with OMEGA plastic paddlewheel sensors, these components may be affected or damaged by the media diffusing through the plastic body and rotor.

PVDF paddlewheel sensor failure when used in hot nitric acid applications has been reported. PVDF is known to allow for substantial permeation of nitric acid constituents without being damaged itself. No clear guideline can be given here, since the damaging effect to the sensor is highly dependent on temperature, pressure and concentration. Utilizing sensors in applications with aggressive substances is possible. On special request OMEGA can provide sensors with a different internal resin encapsulation (potting) that will delay the damaging effect of acids to the sensors. For all Special Product inquiries or to place an order, please contact OMEGA.

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.

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 the company 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. 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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