

**1 YEAR**  
WARRANTY

# **Ω OMEGA®** **User's Guide**



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## **FP-5200** **Flow Sensor**



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# OMEGA FP-5200 Flow Sensor Instructions



## SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Pipe fitting must be installed by certified welder only.
4. Do not install/service without following installation instructions (see sensor manual).
5. Wear safety goggles and face shield during installation/service.
6. Do not alter product construction.
7. Failure to follow safety instructions could result in severe personal injury!



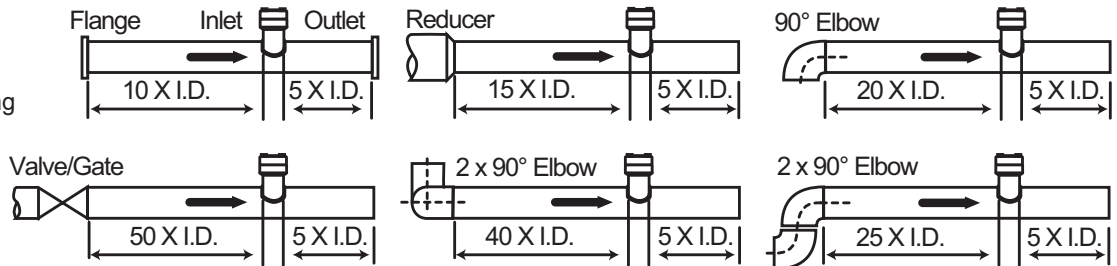
## Maximum Operating Pressure/Temperature:

FP-5200 Series Sensor with:

- FP-5200 Series Tee & Mini-Tap Fittings:  
103 bar (1500 psi) @ 149 °C (300 °F)

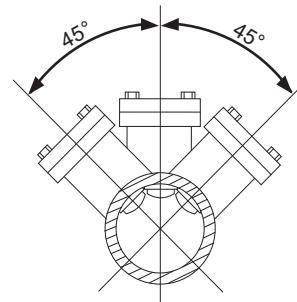
## 1. Location of Fitting

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 pipe when sediments are present.
- Vertical pipe runs: Sensor must be mounted in lines with UPWARD flow only.



## 3. Sensor/Fitting Selection

The FP-5200 Sensor is designed for installation into SCH 40 stainless steel pipes via FP-5200 Series Tee, Mini-Tap or Saddle fittings, see options below:

### FP-5200 Series Tee Fittings

Pipe (in.)	Sensor	Fitting
0.50	FP-5200	FP-5205
0.75	FP-5200	FP-5207
1.00	FP-5200	FP-5210

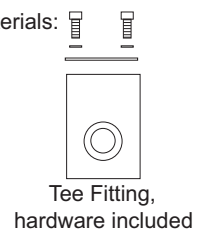
### FP-5200 Series Mini-Tap Fittings

Pipe (in.)	Sensor	Fitting
1.25	FP-5201	FP-5212
1.50	FP-5201	FP-5215
2.00	FP-5201	FP-5220
2.50	FP-5201	FP-5225
3.00	FP-5201	FP-5230
4.00	FP-5201	FP-5240
5.00	FP-5201	FP-5250
6.00	FP-5201	FP-5260
8.00	FP-5201	FP-5280
10.0	FP-5201	FP-5281
12.0	FP-5201	FP-5282

Wetted fitting materials:  
316 SS

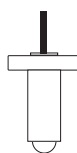


Sensor

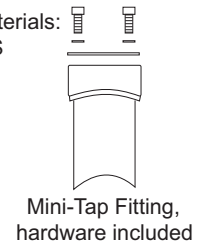


Tee Fitting,  
hardware included

Wetted fitting materials:  
316 SS & 347 SS



Sensor



Mini-Tap Fitting,  
hardware included

## 4. Fitting Installation, Required Hardware

### Tee & Mini-Tap Fittings

- 0.5 to 1 inch pipes, FP-5200 Series fitting required
- 1.25 to 12 inch pipes: FP-5200 Series fitting and 27 mm (1-1/16 in.) diameter drill required
- Mini-Tap fittings are welded onto the pipe and are used with FP-5200 sensors.

### 4.1 Installation, Tee & Mini-Tap Fittings

1. Select an appropriate mounting location as outlined in sections 1 and 2.
2. Depressurize and drain pipe.
3. Use the following welding and installation procedures appropriate for your fitting/pipe size:

#### FP-5200 Series Tee Fittings, 0.5 to 1 inch:

- Insert pipe into fitting socket
- Make sure the pipe is parallel to the bottom of the Mini-Tap fitting.
- Weld pipe into place.

#### FP-5200 Series Mini-Tap Fittings, 1.25 to 12 inch:

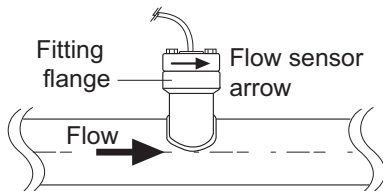
- Drill a 27 mm (1-1/16 in.) diameter hole completely through the ONE surface of the pipe. Thoroughly deburr inner and outer edges of hole.
- Tack weld the Mini-Tap fitting onto the pipe, making sure the hole in the pipe is lined up with the Mini-Tap fitting hole.
- Weld the Mini-Tap fitting onto the pipe.

#### FP-5200 Series Saddle Fitting

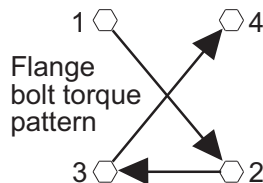
- 27 mm (1-1/16 in.) diameter drill required.

## 5. Sensor Installation

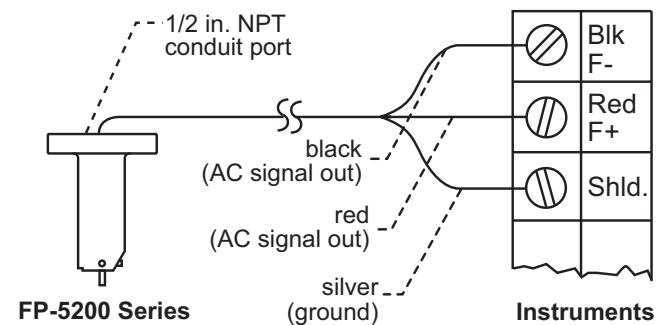
1. Set the gasket supplied with the fitting onto the fitting flange, making sure the holes align.
2. Remove the red rotor protection cap and insert the sensor into the fitting, making sure not to bump the rotor assembly. Make sure the arrow on the side of the sensor is pointing in the direction of flow.



3. Slip two washers onto each bolt and insert the bolt/washer onto each of the four fitting flange holes.
4. Snug all four flange bolts in a criss-cross pattern. Using a torque wrench (when possible), torque the flange nuts in a criss-cross pattern to 52 foot-pounds.



## 6. Sensor Wiring



- Use 2-conductor shielded cable for cable splices up to 60 m (200 ft).
- Maintain cable shield through splice.
- Shield the unjacketed silver (ground) wire using electrical tape to prevent potential noise interference and/or shorting hazards.

## 7. Sensor Removal Procedure

1. Depressurize and drain pipe.
2. Remove the four sensor flange bolts and lockwashers. Pull upward on the sensor flange with an alternating twisting motion.



### WARNING!

Never remove a sensor from a pressurized pipeline. Always wear protective clothing during sensor installation/service.

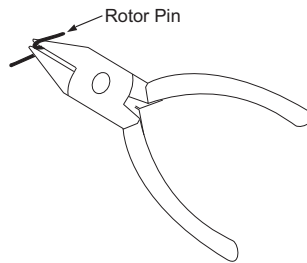


## 8. Maintenance

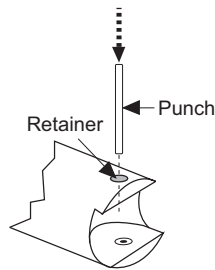
The FP-5200 Series Sensor requires little or no maintenance of any kind, with the exception of occasionally cleaning the sensor/paddlewheel.

## 9. Rotor Replacement Procedure

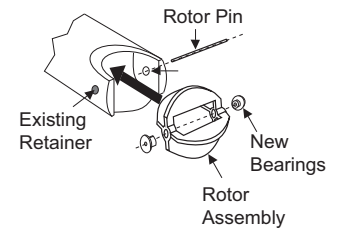
1. With a small pair of needle-nose pliers, firmly grip the center of the rotor pin (axle) and with a twisting motion, bend the rotor pin into an "S" shape. This should pull the ends of the pin out of the retainers and free the rotor assembly.



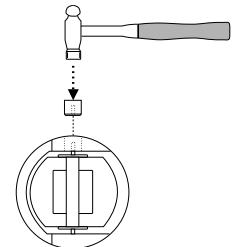
2. Remove retainer from each side by gently tapping it inwards using a punch. Install a new retainer with its rotor pin clearance hole inward. Only install one retainer at this time.



3. Insert the new rotor assembly and bearings into the rotor housing of the sensor and place the new rotor pin (axle) through the open end of the rotor housing, through the rotor and bearings, and into the previously installed retainer.



4. Tap the second retainer (rotor pin clearance hole inwards) into the hole while lining up the rotor pin with the center of the retainer hole.



This completes the rotor replacement procedure.

## 10. 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 SCH 40S stainless steel pipe, the sensor generates 266.17 pulses per gallon of fluid passing the rotor. K-Factors are listed for SCH 40S stainless steel pipes up to 12 inch.

SCH 40S STAINLESS STEEL PIPE PER ANSI B36.19				
PIPE SIZE (in.)	K-FACTOR PULSES/ U.S. GAL	K-FACTOR PULSES/ U.S. LITER	A-FACTOR GPM/Hz	A-FACTOR LPM/Hz
1/2	873.03	230.66	0.0687	0.2601
3/4	515.41	136.17	0.1164	0.4406
1	266.17	70.322	0.2254	0.8532
1-1/4	148.84	39.324	0.4031	1.5258
1-1/2	107.98	28.528	0.5557	2.1032
2	64.808	17.122	0.9258	3.5042
2-1/2	44.685	11.806	1.3427	5.0822
3	28.579	7.5506	2.0994	7.9464
4	16.302	4.3070	3.6805	13.931
5	10.237	2.7046	5.8611	22.184
6	7.0057	1.8509	8.5645	32.416
8	3.9641	1.0473	15.136	57.289
10	2.4690	0.6523	24.301	91.981
12	1.6894	0.4463	35.516	134.43

### Conversion Formulas

1 U.S. gallon = 0.003785 cubic meters  
 0.000003069 Acre feet  
 8.3454 pounds of water

## 11. Specifications

### General Data

Flow velocity range:	0.5 to 6 m/s (1.6 to 20 ft/s)
Frequency output:	29 to 46 Hz per m/s (9 to 14 Hz per ft/s)
Linearity:	±1% of full range
Repeatability:	±0.5% of full range
Pipe size range:	13 to 305 mm (0.5 to 12 in.)
Cable length:	7.6 m (25 ft), can splice up to 60 m (200 ft.) with no significant degradation of signal strength
Cable type:	150 °C 22 AWG, 2-conductor w/shield

### Materials

Sensor body:	ACI type CF-8M (316 cast stainless steel) per ASTM A351
Rotor material:	CD4MCu stainless steel
Rotor pin:	Tungsten Carbide (316 stainless steel, optional)
Retainers (2):	316 stainless steel
Rotor bearings (2):	Fluoroloy B®

### Electrical Data

Voltage output:	Approximate sine wave, 0.005 to 0.008 Vpp per Hz
Coil resistance:	11.6 kΩ @ 25 °C
Coil inductance:	3.5 H @ 25 °C

### Quality Standards

- CE
- Manufactured under ISO 9001

### Ambient Conditions

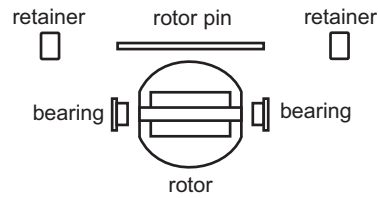
- Maximum Pressure/Temperature Limitations:
- FP-5200 Series Sensor with FP-5200 Series Tee or Mini-Tap Fitting: 103 bar (1500 psi) max. @ 149 °C (300 °F)

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## 12. Accessories

Refer to section 3 for a list of available sensors and fittings.

<u>Part no.</u>	<u>Description</u>
FP-52648	Fitting cap kit, cap and gasket
FP-52509	Rotor kit, 316 SS pin
FP-52509-2	Rotor kit, Tungsten pin
M2489	Instruction manual



FP-52509/FP-52509-2 Rotor kit



### Chemical Compatibility Warning

The retaining nuts of paddlewheel sensors, pH and ORP sensors as well as Magmeters 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.

## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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## RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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