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User's Guide

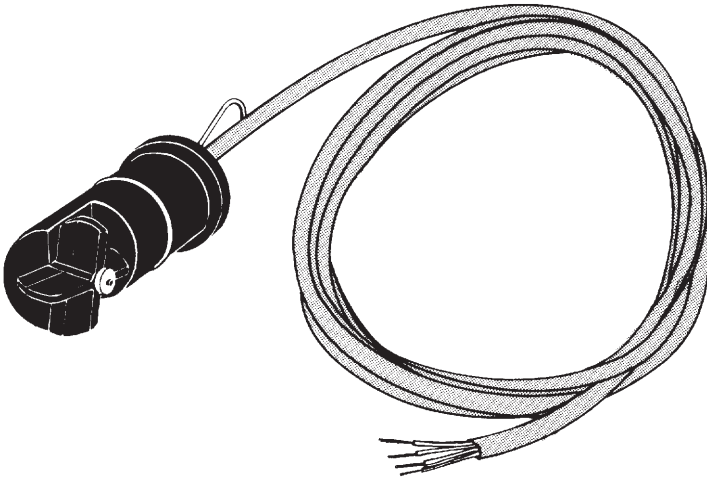
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FP7001A

Paddlewheel Flowsensors



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WARNING: These products are not designed for use in, and should not be used for, human applications.

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FP7001A PADDLEWHEEL FLOWSENSORS

NOTES:

SECTION 1 GENERAL DESCRIPTION

The FP7001A paddlewheel flow sensor is ideal for economical monitoring of typical industrial water flows and temperature, from hard-to-handle corrosive aqueous solutions to high purity fluids. The FP7001A uses a paddlewheel-like rotor whose motion is converted into a high-level square wave pulse output by an open collector Hall Effect sensor. Pulse amplitudes from 5 to 18V are possible, depending on input power. When powered by the FPW-5, 5 Vdc wall socket converter, the FP7001A has a TTL level pulse output which can be used with a variety of pulse input flow indicators, signal conditioners and controllers.

The built-in solid-state temperature sensor provides a 10 mV/°C output over the measurement range of 2° to 150°C. This analog voltage output can be used with a process input meter or controller such as OMEGA's iSeries to measure and control the temperature of the liquid in your flow application.

A complete flow measurement system consists of the flow sensor, the installation fitting and a readout device. The FP7001A has polypropylene, 316SS, and Viton wetted parts. The schedule 40 PVC tee fittings are supplied with a PVC locking nut, and the galvanized iron tee fittings are supplied with a brass locking nut to provide a secure metal to-metal mounting to the threaded brass insert.

SECTION 2 INSTALLATION

2.1 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. On the web you can find us at:
omega.com e-mail: **cservice@omega.com**

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 and carton in the event that reshipment is necessary.

2.2 IMPORTANT CONSIDERATIONS BEFORE INSTALLATION

CAUTION

The FP7001A paddlewheel flowsensor is not explosion-proof, nor is it intrinsically safe. It is not to be used for flammable or hazardous liquids, nor can it be used in hazardous areas.

The FP7001A is intended for use with water and other low viscosity liquids ONLY; it can NOT be used with oils and other viscous materials. They can be used with non-flammable, non-hazardous liquids up to 5 centipoise viscosity, but field calibration is recommended for accurate measurements.

The FP7001A is a bidirectional device; flow in the forward or reverse direction provides the same pulse output. The FP7001A will only measure flowrates down to one fps velocity; this corresponds to the following minimum GPM flowrates: $\frac{3}{4}$ " pipe = 1.5 GPM; 1" = 3 GPM; $1\frac{1}{4}$ " = 4.5 GPM; $1\frac{1}{2}$ " = 6.5 GPM; 2" = 10.5 GPM; $2\frac{1}{2}$ " = 15 GPM; 3" = 23 GPM.

It is Important to note that most process water contains dissolved minerals. If the flowsensor is repeatedly exposed to process water and then the line is allowed to dry, these dissolved minerals will deposit onto the FP7001A and will inhibit the low flowrate operation of the sensor. If this occurs, cleaning of the sensor is recommended.

CAUTION

Water hammer and surges can be damaging to any flowmeter and must always be avoided.

Water hammer occurs when a liquid flow is suddenly stopped as with quick closing and solenoid operated valves. Surges occur when flow is suddenly begun, as when a pump is turned on at full power or a valve is quickly opened.

Liquid surges are particularly damaging to flowmeters if the pipe is originally empty. To avoid damaging surges, fluid lines should remain full (if possible) and pumps should be brought up to power and valves opened slowly. In addition, to avoid both water hammer and surges, a surge chamber should be installed.

2.3 FLOWMETER INSTALLATION

The FP7001A can be mounted in vertical or horizontal pipe runs; however, the pipe must be full of liquid for proper readings. Thus, the sensor should not be mounted in vertical pipe where the liquid flows down, since the pipe may not always be full in this situation. Refer to Figures 2-1 and 2-2.

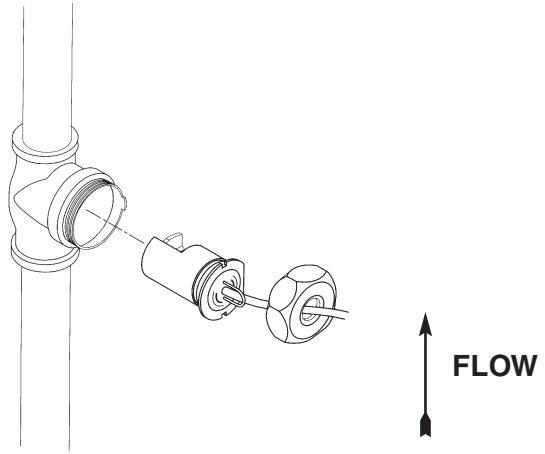


Figure 2-1 Horizontal Mounting Position

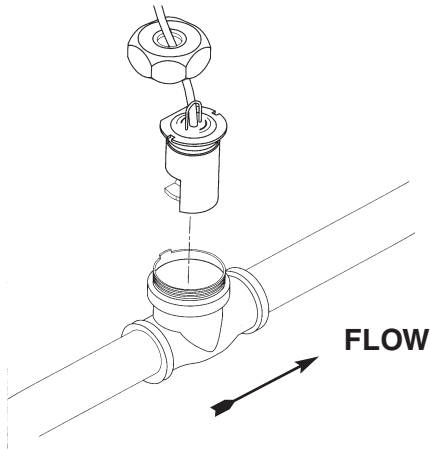


Figure 2-2 Vertical Mounting Position

The FP7001A should not be mounted at the bottom of the pipe (the 6 o'clock position) because this is where sediment in the liquid will tend to accumulate. The best mounting location is at or near the 12 o'clock position, so long as bubbles are not present in the liquid. The 3 o'clock and 9 o'clock positions are also acceptable. In an upward flowing vertical pipe, the flowsensor can be mounted anywhere around the pipe.

As with many flowmeters, the FP7001A requires a fully developed turbulent flow profile in order to provide accurate readings. To insure this, a length of straight pipe run before and after the flowmeter is required. The amount of upstream straight pipe run that is required depends upon the type of obstruction which is immediately upstream of the flowsensor. See Table 2-1 for specific requirements. Downstream of the flowsensor, in all situations, only 5 diameters of straight pipe run is required, regardless of the downstream obstruction.

TABLE 2-1

UPSTREAM OBSTRUCTION	STRAIGHT PIPE RUN REQUIRED UPSTREAM OF PADDLEWHEEL SENSOR
Concentric reducer	15 pipe diameters
One elbow	20 pipe diameters
2 elbows, in same plane	25 pipe diameters
2 elbows, in two planes, or one expansion	40 pipe diameters
Valves, pumps*, same plane	at least 50 pipe diameters, prefer sensor mounted upstream

*Oscillating or reciprocating pumps, which produce flow and pressure pulses in the flowstream, are not recommended for use with the FP7001A flowsensor.

NOTE

If you do not have the proper amount of straight pipe run available at your desired installation location, it is recommended to use flow straighteners to decrease the required straight run.

The paddlewheel must be aligned with the fluid flow; the installation fitting is supplied with an alignment tab which mates with a flat on the base of the paddlewheel sensor to insure proper sensor alignment. When using the PVC installation fitting, it is critical that the cap of the sensor is threaded onto the mating fitting **HAND TIGHT ONLY**; use of pipe wrenches, etc. on the plastic cap can lead to damage to the cap and/or the installation fitting.

The FP7001A has magnets installed in the rotating paddles; these magnets will tend to attract rust from the flowing fluid. Thus, it is NOT recommended to install the FP7001A in pipes which under typical conditions contain rust, such as in cast iron, black iron, carbon steel and other iron pipes (galvanized pipe has been treated to resist rust). In situations where rust can not be avoided, it is recommended to install a fine magnetic filter at least 50 pipe diameters upstream from the FP7001A and to periodically shut down the line and remove the sensor from the installation fitting for cleaning.

2.4 WIRING

NOTE

To insure proper hook-up to your indicating device, the paddles of the FP7001A can be spun in the open air by blowing onto them before the sensor is installed into the installation fitting.

This is particularly important where the pipeline can not be conveniently shut down and the sensor removed after installation.

The FP7001A has the following connections:

BLACK	GROUND (for both pulse output and for DC power input)
RED	5-18 Vdc (power input)
WHITE	FREQUENCY SIGNAL OUTPUT (high)
GREEN	No Connection
BLUE	Vdc
ORANGE	OUT
BROWN	GND

For systems without an internal pull-up resistor (such as the DPF70 series panel meter), a nominal $10,000\Omega$, $\frac{1}{4}$ watt resistor must be installed between the red and white wires. If 5 Vdc power is supplied, the output signal will be TTL level, which is compatible with a wide variety of computer interface equipment that accepts TTL level pulse input.

Up to 300 feet of additional wire can be spliced onto the sensor wires in the field.

SECTION 3 MAINTENANCE

Except for intermittent removal of the sensor from the line for cleaning, there is no routine maintenance for the FP7001A flowsensor.

SECTION 4 CALIBRATION

The K-factor, or pulses per gallon output of your FP7001A sensor varies with the FP7001A installation fitting which was purchased with it. The K-factor is labeled on the fitting.

SECTION 5 SPECIFICATIONS (SUBJECT TO CHANGE)**Flow:****Accuracy:** ±2% of full scale**Repeatability:** ±1% of full scale**Power:** 5 to 18 Vdc @ 10 mA maximum**Wetted** polypropylene body (PVDF optional), PVDF**Materials:** paddle, Viton 0-ring, 316SS shaft. Galvanized**FP7001A sensor:** iron tee includes brass insert and locking nut. PVC tee has PVC insert and locking nut.**Maximum****Recommended****Fluid Viscosity:** 5 centipoise**Fluid****Temperature/** Do not exceed the maximum ratings of your piping.**Pressure** Depending on the material of the fitting the**Range:** operating temperature/pressure may be limited by your piping, and not by the by the sensor. For all PVC tee fittings, do not exceed 150 PSIG @ 80°F (27°C), 100 PSIG @ 100°F (38°C), 60 PSIG @ 120°F (49°C), 30 PSIG @ 140°F (60°C), due to the insert in the tee.

FP7000 sensor: 32° to 80°F (0° to 26°C) up to 150 PSIG; max pressure decreases 1.1 PSIG per each 1°F about 80°F for a max. temperature of 200°F at 18 PSIG max.

Temperature Sensor Specifications:**Range:** 2 to 150°C (36 to 302°F)**Accuracy:** ±1°C**Output:** 10 mV/°C**Power:** 5-18 Vdc**SENSOR**

FP7001A Polypropylene body /316SS shaft

INSTALLATION FITTINGS (includes locking nut)

PVC, SCHED. 40 (PART NUMBER)	GALVANIZED IRON (PART NUMBER)	PIPE SIZE	RANGE (GPM)
FP7007	FP7007-GI	¾"	2-30
FP7010	FP7010-GI	1"	3-50
FP7012	FP7012-GI	1¼"	5-90
FP7015	FP7015-GI	1½"	7-125
FP7020	FP7020-GI	2"	11-205
FP7025	FP7025-GI	2½"	15-285
FP7030	FP7030-GI	3"	25-460

Other fitting materials may be available. Consult the Flow Department at 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.

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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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