1 YEAR
WARRANTY

OMEGA®

# User's Guide


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# FP-5070 SERIES
## Flow Sensors

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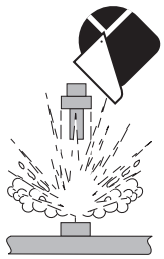
# OMEGA FP-5070 Series Flow Sensors

**WARNING**!

**SAFETY INSTRUCTIONS**

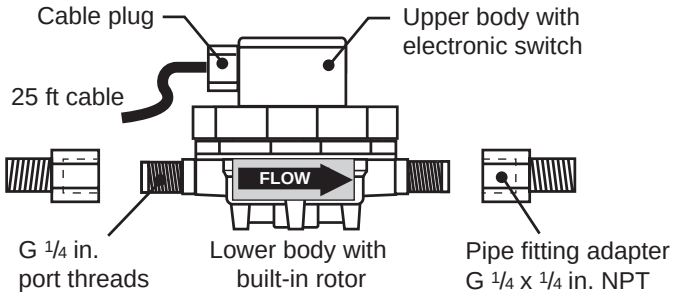
1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Pipe fitting must be installed by certified welder only.
4. Do not install/service without following installation instructions (see sensor manual).
5. Wear safety goggles and face shield during installation/service.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



## 1. Description

The FP-5070 Series Mini Flow Sensors contain a free-running rotor which is driven by the fluid flow. Within the given measurement range, the rotational speed of the rotor is proportional to the fluid flow rate. Permanent magnets built into the rotor actuate an electronic switch in the top of the sensor generating a square-wave output signal proportional to flow rate. Both opaque and transparent fluids can be measured from 0.2 to 20.0 centistokes.

Wetted sensor parts are constructed of PVDF and FPM, making the sensor suitable for use with most process fluids, including most acids, bases, light oils, and solvents.




**WARNING!**
Polar organic solvents (e.g., ketones and chlorinated hydrocarbons) and aromatic hydrocarbons are not compatible with this sensor.

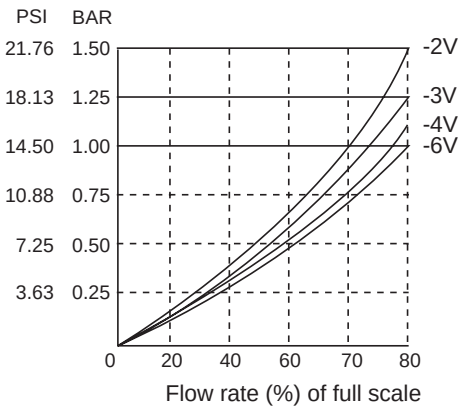
## 2. Specifications

### General

Flow Range:
- -2V sensor:.....400 to 2800 mL/m (0.105 to 0.740 U.S. gpm)
- -4V sensor:.....1300 to 6000 mL/m (0.343 to 1.585 U.S. gpm)
- -6V sensor:.....3200 to 12000 mL/m (0.845 to 3.170 U.S. gpm)

Linearity:.....±0.25% of full range
Repeatability:.....±0.25% of full range
Viscosity range: .....0.2 to 20.0 centistokes
Pipe connections: ...G ¼ in. ports, ¼ in. NPT (male) pipe adapters (2 included)
Cable length: .....Std: 7.6m (25 ft), max.: 300 m (1000 ft)
Cable type: .....2-conductor shielded, twisted-pair, 22 AWG
Shipping Weight: ....0.4 kg (0.8 lb)

Pressure Drop Across Sensor vs. Flow Rate




### Wetted Materials

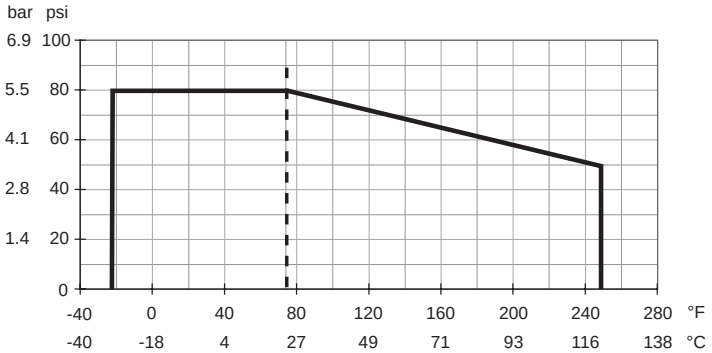
- Housing:.....PVDF
- Flow insert:.....PTFE
- Quad ring seal:.....FPM
- Rotor: .....PVDF
- Pipe thread adapters:..PVDF
- Suitable for clean fluids only

### Electrical

Power: ..... 5 to 24 VDC ±10%, regulated, 10 mA max.
Output Type: ..... Open-collector, sinking, 10 mA max.

### Max. Temperature/Pressure Rating

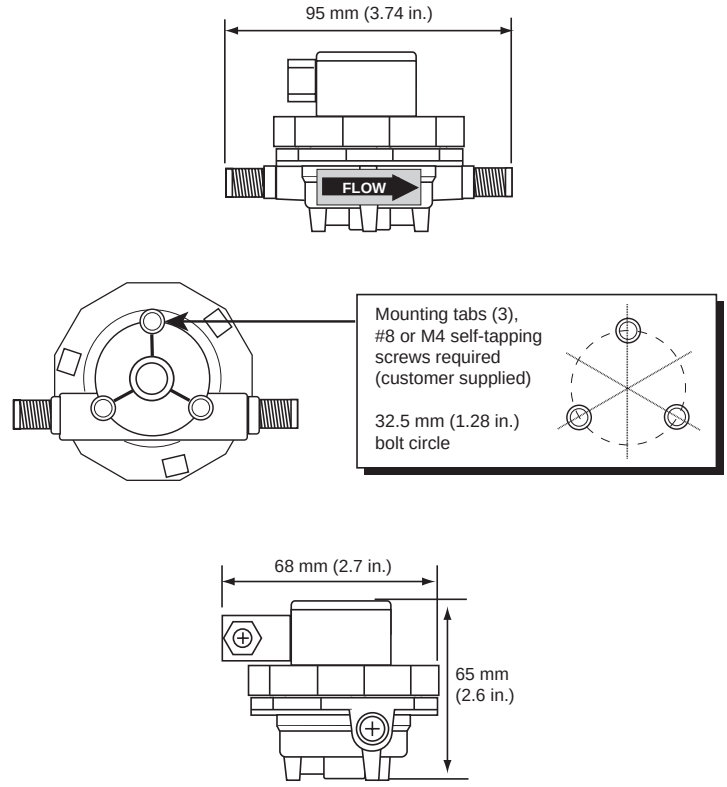
- 5.5 bar @ -30 °C (80 psi @ -22 °F)
- 5.5 bar @ 24 °C (80 psi @ 75 °F)
- 3 bar @ 120 °C (45 psi @ 248 °F)




### Standards and Approvals

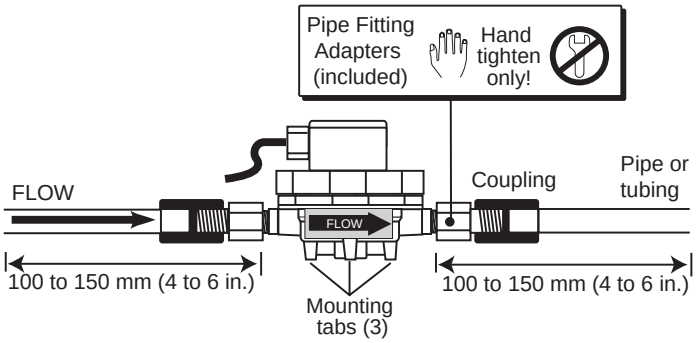
- CE
- Manufactured under ISO 9001

**Dimensions:**

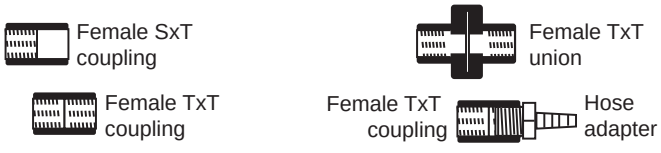



## 3. Installation

- The sensor may be installed in any position, although horizontal flow is recommended (the sensor mounted upright). If the sensor is not installed upright, the linearity error may be greater in the lower part of the sensor's measurement range.
- Mounting tabs are provided using M4 or #8 self-tapping screws (customer supplied). See Dimensions illustration for mounting tab hole pattern specifications.
- Install sensor with the arrow pointing in the direction of flow.
- Always maximize distance between the sensor and pump source. Never install immediately downstream of valves, fittings, etc. For optimum performance, a straight flow run of at least 100 mm to 150 mm (4 to 6 in.) should be provided before and after the sensor.
- Two pipe fitting adapters (included) convert the G 1/4 in. straight threads to 1/4 in. NPT pipe threads. **Hand tighten only!** Apply 1-2 turns of PTFE sealing tape to all threaded connections to prevent leaks.




Compatible pipe/tubing connections (customer supplied):




**Installation Hints**

- Avoid vibrations and shocks.
- Avoid solids in the fluid.
- Install a filter or line strainer upstream to protect sensor.

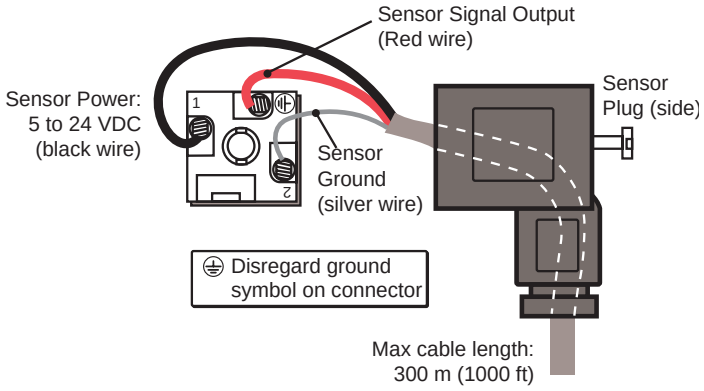
**CAUTION!**
Use an adjustable wrench to prevent the fitting adapters from overtightening while installing mating pipe connectors. Sensor damage will occur if the ports are overtightened.

## 4. Wiring Details

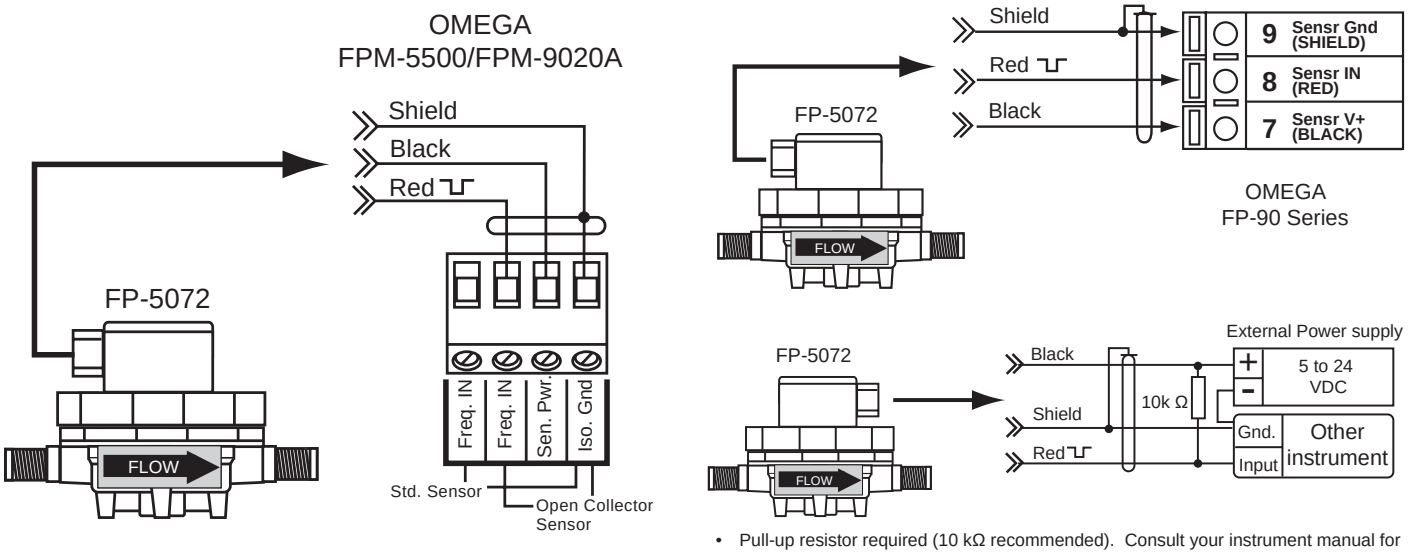
### 4.1 Cable Extensions

The standard 25 foot sensor cable can be extended to 300 m (1000 ft) using 2-conductor shielded twisted-pair cable.

- Always maintain cable shield through cable splice.
- For splice-free cable replacement up to 300 m (1000 ft), refer to the sensor plug connection diagram (below) for connection details.



### 4.2 Instrument Connections




- Pull-up resistor required (10 kΩ recommended). Consult your instrument manual for additional information.

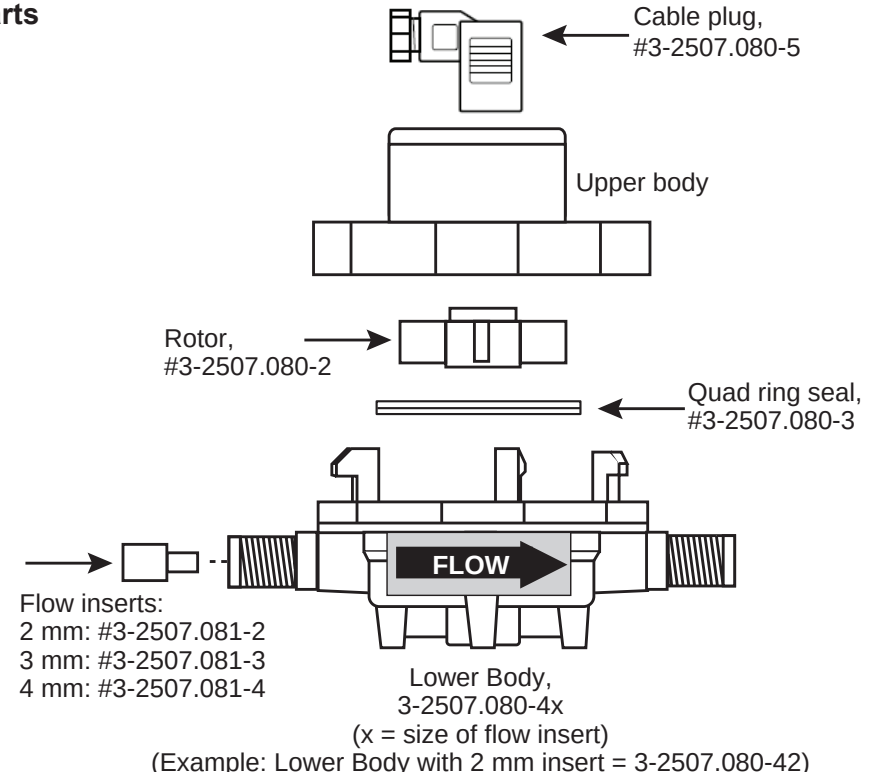
## 5. Calibration

The K-Factors listed here represent the number of pulses the sensor will generate for each measured engineering unit. They are listed in U.S. gallons, liters and milliliters (mL) for each sensor model.

| Sensor Model | Flow Insert | K-FACTORS | | |
|---|---|---|---|---|
| | | Pulses per U.S. GAL | Pulses per LITER | Pulses per mL |
| FP-5072-PV | 2 mm | 5685 | 1502 | 1.502 |
| FP-5074-PV | 4 mm | 2316 | 612 | 0.612 |
| FP-5076-PV | NONE | 1249 | 330 | 0.330 |

**IMPORTANT!**
- K-Factors must be considered as approximate values.
- The number of pulses per volumetric unit may vary depending on the medium and the installation.
- For optimum performance, the system must be calibrated after installation.

## 6. Replacement Parts



## 7. Replacing The Flow Insert

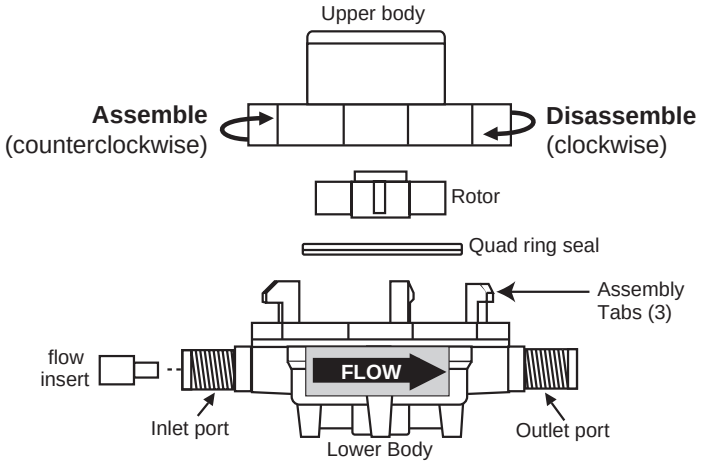
Sensor range can be modified by changing the flow insert. The sensor must be removed from service and disassembled prior to installing the new flow insert. See Specifications (Section 2) for flow range data.

**Flow Insert Replacement Procedure:**

1. Depressurize system and remove sensor.
2. Rotate the upper sensor body clockwise until it releases from the lower half, then lift off.
3. Remove rotor and quad ring seal from lower body.
4. Push the flow insert outward using a small screwdriver.
5. Install the new flow insert (small diameter inward) with the eraser end of a pencil. Apply light pressure until insert seats against the step in the lower body. **Do not force!**
6. Install rotor into lower body. Spin rotor with finger and check for free rotation. If rotor hits flow insert, remove rotor and push insert back until free rotor rotation is established. Use a rounded object such as a pen or pencil body to adjust flow insert depth.
7. Install rotor, quad ring, and upper body. **Hand tighten only!** Do not overtighten upper body or the lower body assembly tabs will break.
8. Reprogram instrument with new K-Factor, see Calibration (Section 5).

**CAUTION!**

Do not use tools of any kind on the sensor body or port connections. Hand tighten only! Excessive force will damage sensor.




| Condition | Recommendation |
|---|---|
| Erratic or missing sensor signal | A. Verify ALL cable and instrument connections (section 4).<br>B. Verify proper sensor installation (section 3). |
| Perform steps A - E. If sensor problems persist, contact OMEGA. | C. Remove power from instrument and disconnect sensor inputs. Apply power to the instrument and check across Black and Shield terminals with a digital voltmeter for 5 VDC. If 5 VDC is not present, the instrument requires service or may be misconfigured.<br>D. Verify the FP-5072 paddlewheel spins freely by blowing into the flow chamber. If the paddlewheel does not spin freely, the following conditions may exist:<br>• The sensor may be dirtty or clogged. Disassemble and clean with hot tap water and a soft brush (see section 7).<br>• The rotor may be hitting the flow insert. Disassemble and adjust flow insert depth (see section 7).<br>E. Test sensor with flow system active and sensor powered. Use an oscilloscope to check the sensor input signal across the Red (Signal IN) and Shield terminals. A square wave signal should appear at these terminals. If no signal is present, replace sensor. |

## 8. Ordering Information

| Mfr. Part No. | Description |
|---|---|
| FP-5072-PV | Mini-Flow Sensor, 2 mm insert |
| FP-5074-PV | Mini-Flow Sensor, 4 mm insert |
| FP-5076-PV | Mini-Flow Sensor, 6 mm inlet, no insert |

# 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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