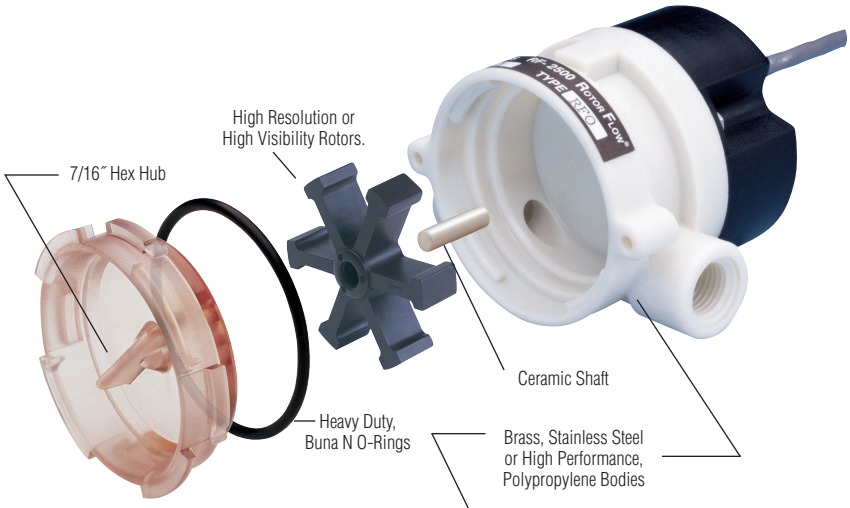
# RotorFlow® Sensors Provide Visual Indication, Continuous Sensing and Accurate Switching

- Bright, visual indication with choice of pulsed DC output, or adjustable 1 amp switched output
- Flow ranges from .1 GPM to 60.0 GPM
- Compact inline housings
- Available in high performance plastic, brass, or stainless steel housings

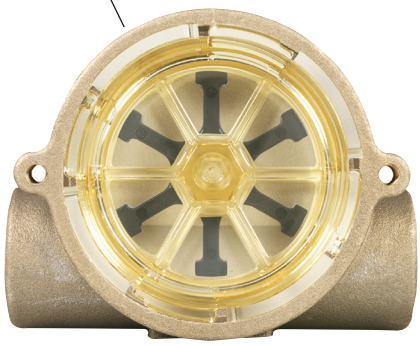
CE c UL us

RotorFlow Series Sensors are U.L. Recognized — File No. E45168.




Determined to provide you with the most versatile line of flow sensors available, we've continued a non-stop refinement process for the entire RotorFlow® Series. GEMS new generation of RotorFlow® sensors, the RF-2500 Series, have been totally re-engineered with a one piece composite rotor, stronger unibody construction, ceramic shaft and better sealing. The results are greater durability with broader chemical, temperature and pressure capabilities.

Today's RotorFlow Series is state-of-the-art and offers more options, better performance and durability than ever before...all at an affordable price geared for high volume, OEM applications.



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Select the RotorFlow sensor that is right for your application by choosing one of our three distinct configurations. You'll find details on each of these configurations inside.

## RotorFlow Switch Types

For specific flow setpoint switching, RotorFlow RFS type switches are one of the most reliable flow switches available. Setpoints are fully adjustable over the specified flow range. The dynamic operation of the rotor guards against jamming and false actuation.

## RotorFlow Output Types

For flow rate monitoring or metering applications. RotorFlow RFO Type sensors provide a pulsed DC voltage output that is proportional to the rate of flow. The operating range of 4.5 to 24 VDC pulsed output is easily integrated into most digital logic units. RFA Type RotorFlow sensors provide a continuous 0-10 VDC analog output.

## RotorFlow Indicator Types

For those who want simple visual confirmation of flow, RotorFlow RFI indicators provide the durable, low-cost answer. A bright, orange spinning rotor provides visual flow confirmation at a glance.

***Now for line sizes up to 1˝!***

New wide-body senses flow up to 60 GPM. 3/4˝ and 1˝ line models.

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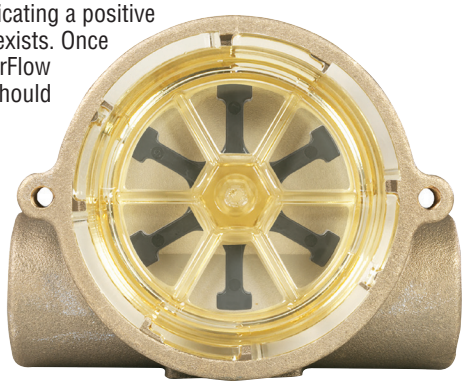
# Flow Set Point Switching – RFS Types

- Combines visual confirmation of flow with dynamic, electronic switch operation
- Easy, adjustable switch point calibration: a local LED signals when set point is reached

RotorFlow® Switches build an extra level of reliability and protection into your equipment. By principle of operation, the rotor cannot be deceived into indicating a positive flow situation when no flow actually exists. Once set to a desired actuation point, RotorFlow will switch to a "no-flow" condition should the rotor stop for any reason.



File No. E45168

## Typical Applications

Protect expensive electronic equipment from coolant flow failure on...

- Semiconductor Processing Equipment
- Lasers • Medical Equipment
- X-Ray and Other High Power Tubes
- Robotic Welding Equipment

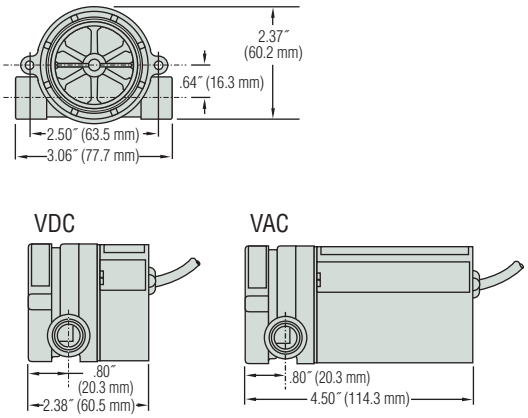
## Specifications

| | | |
|---|---|---|
| **Wetted Materials** | | |
| **Body** | Brass, 316 Stainless Steel or Polypropylene (Hydrolytically Stable, Glass Reinforced) | |
| **Rotor Pin** | Ceramic | |
| **Rotor** | PPS Composite, Black | |
| **Lens** | Polysulfone | |
| **O-Ring** | Viton® (Alloy Bodies); Buna N (Polypropylene Body) | |
| **Low Flow Adaptor** | Glass Reinforced Polypropylene | |
| **Operating Pressure, Maximum** | | |
| **Brass or Stainless Steel Body** | 200 PSIG (13.8 bar) @ 70°F (21°C), 100 PSIG (6.9 bar) Max. @ 212°F (100°C)[1] | |
| **Polypropylene Body** | 100 PSIG (6.9 bar) @ 70°F (21°C), 40 PSI (2.8 bar) Max. @ 180°F (82°C) | |
| **Operating Temperature,** | | |
| **Brass or Stainless Steel Body** | -20°F to 212°F (-29°C to 100°C) | |
| **Polypropylene Body** | -20°F to 180°F (-29°C to 82°C) | |
| **Electronics** | 150°F (65°C) Ambient | |
| **Viscosity, Maximum** | 200 SSU | |
| **Input Power** | 24 VDC or 115 VAC | |
| **Relay Contact Ratings (SPDT)** | 1 Amp, 24 VDC Resistive; 0.3 Amp, 110 VAC | |
| **Current Consumption** | **No Load** | **Load (Relay Energized)** |
| **24 VDC** | 20mA | 35mA |
| **115 VAC** | 45mA | 95mA |
| **Repeatability** | 2% Maximum Deviation | |
| **Set Point Accuracy (Factory Set)** | ± 5% | |
| **Set Point Differential** | 15% Maximum | |
| **Electrical Termination** | 20 AWG PVC-Jacketed, 24″ Cable. Color Codes: Red = +VAC/VDC, Black = Ground, White = N.O. Contact, Brown = N.C. Contact, Green = Common | |

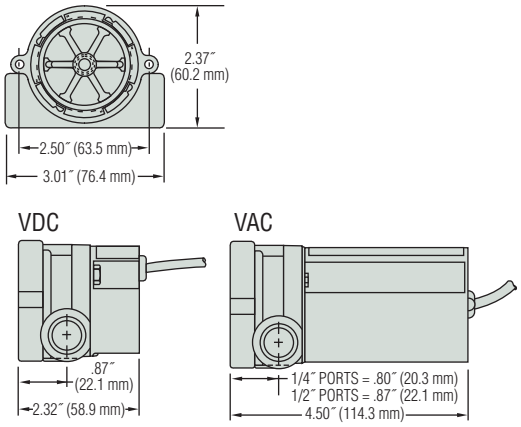
Note:
1. Optional pulsed output available with RFS. Consult factory.

## Dimensions

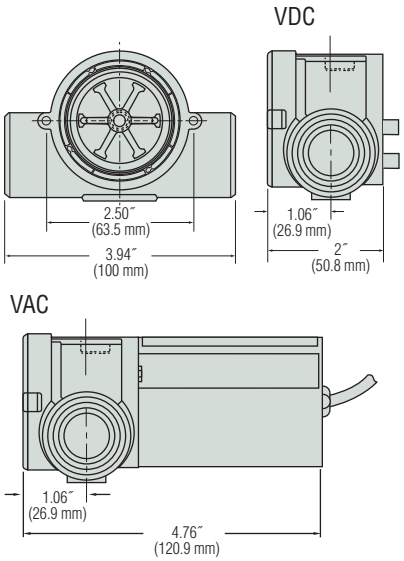
Polypropylene Bodies




Brass and Stainless Steel Bodies - .25″ and .50″ Port



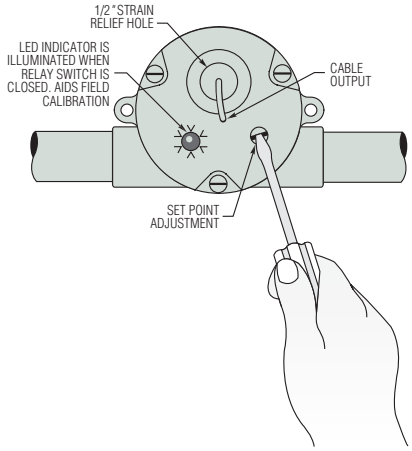

Brass and Stainless Steel Bodies - .75″ and 1.00″ Port



## Switch Set Point Calibration With LED Signal (RFS Type)

With the unit installed in the line and power supplied, complete the following steps to calibrate switch actuation point with proper flow rate. A small flat-blade screwdriver is the only tool required.

1. Adjust liquid flow in the line to the rate at which switch actuation is desired.
2. Insert screwdriver into opening on backside of housing and fit blade into the potentiometer adjustment screw inside.
3. If LED is not illuminated, slowly turn screwdriver counterclockwise and stop as soon as LED illuminates.
4. If LED is illuminated, turn screwdriver clockwise until LED light goes out. Then, slowly turn screwdriver counterclockwise and stop as soon as LED illuminates.




## How To Order

Specify Part Number based on desired body material, port size and input power rating.

| Body Material | Port Size NPT | Flow Ranges – GPM | | Input Power | Part Number |
|---|---|---|---|---|---|
| | | Low Range* | Standard Range | | |
| Polypropylene | .25˝ | 0.1 to 1.0 | 0.5 to 5.0 | 24 VDC | **155425** ⚡ |
| | | | | 115 VAC | **155876** ⚡ |
| | .50˝ | 1.5 to 12.0 | 4.0 to 20.0 | 24 VDC | **155485** ⚡ |
| | | | | 115 VAC | **155886** ⚡ |
| Brass | .25˝ | 0.1 to 1.0 | 0.5 to 5.0 | 24 VDC | **156265** ⚡ |
| | | | | 115 VAC | **156266** ⚡ |
| | .50˝ | 1.5 to 12.0 | 4.0 to 20.0 | 24 VDC | **156268** ⚡ |
| | | | | 115 VAC | **156269** ⚡ |
| | .75˝ | – | 5.0 to 30.0 | 24 VDC | **180395** ⚡ |
| | | | | 115 VAC | **180396** ⚡ |
| | 1.00˝ | – | 8.0 to 60.0 | 24 VDC | **181688** ⚡ |
| | | | | 115 VAC | **181689** ⚡ |
| Stainless Steel | 9/16-18** | 0.1 to 1.0 | 0.5 to 5.0 | 24 VDC | **165073** ⚡ |
| | | | | 115 VAC | **165074** |
| | .50˝ | 1.5 to 12.0 | 4.0 to 20.0 | 24 VDC | **165077** ⚡ |
| | | | | 115 VAC | **165078** ⚡ |
| | .75˝ | – | 5.0 to 30.0 | 24 VDC | **181691** |
| | | | | 115 VAC | **181692** |
| | 1.00˝ | – | 8.0 to 60.0 | 24 VDC | **181693** |
| | | | | 115 VAC | **181694** |

* With use of Low Flow Adapter supplied. See Page F-8 for more information.
** Straight thread with O-ring seal.

⚡ – Stock Items.

## Special Requirements:

GEMS caters to OEM needs with special configurations for potable water and enhanced chemical capabilities. Consult factory for further details.

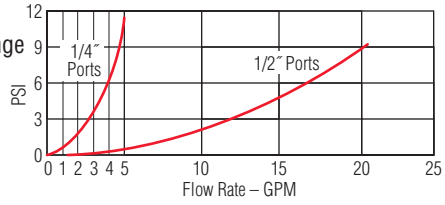
For higher pressure/temperature ratings, stainless face plates are available. Consult factory.

### High Resolution Black Rotor

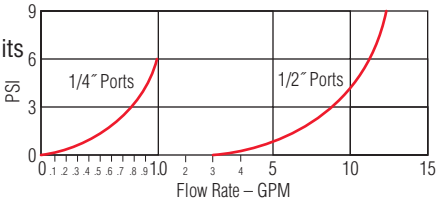
PPS composite. Each of the six rotor arms is magnetized. A PTFE loaded bushing ensures long life.

## Pressure Drop-Typical

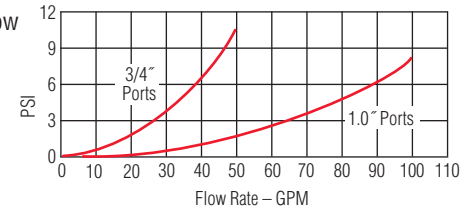
Standard Flow Range Units




Low Flow Range Units




High Flow Units



# Flow Rate Monitoring – RFO Type

## 4.5 to 24 VDC Pulsed Output

GEMS Sensors popularized the RotorFlow's paddlewheel design by combining high visibility rotors with solid-state electronics that are packaged into compact, panel mounting housings. They provide accurate flow rate output with integral visual confirmation...all with an unprecedented price/performance ratio. RFO Types feature a VDC pulsed output.

## Typical Applications

- Water Purification/Dispensing Systems
- Chemical Metering Equipment
- Lasers and Welders
- Water Injection Systems
- Semiconductor Processing Equipment
- Chillers and Heat Exchangers

## Specifications

| | |
|---|---|
| **Wetted Materials** | |
| **Body** | Brass, 316 Stainless Steel or Polypropylene (Hydrolytically Stable, Glass Reinforced) |
| **Rotor Pin** | Ceramic |
| **Rotor** | PPS Composite, Black |
| **Lens** | Polysulfone[1] |
| **O-Ring** | Viton® (Alloy Bodies); Buna N (Polypropylene Body) |
| **Low Flow Adaptor** | Glass Reinforced Polypropylene |
| **Operating Pressure, Maximum** | Optional SS Face Plate 500 PSI |
| **Brass or Stainless Steel Body** | 200 PSIG (13.8 bar) @ 70°F (21°C), 100 PSI (6.9 bar) Max. @ 212°F (100°C)[1] |
| **Polypropylene Body** | 100 PSIG (6.9 bar) @ 70°F (21°C), 40 PSI (2.8 bar) Max. @ 180°F (82°C) |
| **Operating Temperature,** | |
| **Brass or Stainless Steel Body** | -20°F to 212°F (-29°C to 100°C) |
| **Polypropylene Body** | -20°F to 180°F (-29°C to 82°C) |
| **Electronics** | 150°F (65°C) Ambient |
| **Viscosity, Maximum** | 200 SSU |
| **Input Power** | 4.5 VDC to 24 VDC |
| **Output Signal** | 4.5 VDC to 24 VDC Pulse. (Sourcing) Pulse Rate Dependent on Flow Rate, Port Size and Range. |
| **Current Consumption** | 8 mA, No Load |
| **Current Source Output, Max.** | 70 mA |
| **Frequency Output Range** | 15 Hz (Low Flow) to 225 Hz (High Flow) |
| **Accuracy** | See Table Below |
| **Electrical Termination** | 22 AWG PVC-Jacketed, 24″ Cable. Color Coded: Red = +VDC; Black = Ground; White = Signal Output |

Notes:
1. For higher pressure/temperature ratings, stainless face plates are available. Consult factory.

## How To Order

For standard configurations, specify Part Number based on desired body material and port size.

| Body Material | Port Size NPT | Flow Range – GPM | | Part Number |
|---|---|---|---|---|
| | | Low Range* (Accuracy) | Standard Range (Accuracy) | |
| Polypropylene | .25″ | 0.1 to 1.0 (±7.0%) | 0.5 to 5.0 (±7.0%) | **155421** ⚡ |
| | .50″ | 1.5 to 12.0 (±7.0%) | 4.0 to 20.0 (±15.0%) | **155481** ⚡ |
| Brass | .25″ | 0.1 to 1.0 (±7.0%) | 0.5 to 5.0 (±7.0%) | **156261** ⚡ |
| | .50″ | 1.5 to 12.0 (±7.0%) | 4.0 to 20.0 (±15.0%) | **156262** ⚡ |
| | .75″ | — | 5.0 to 30.0 (±15.0%) | **194761** ⚡ |
| | 1.00″ | — | 8.0 to 60.0 (±15.0%) | **194762** ⚡ |
| Stainless Steel | 9/16″-18** | 0.1 to 1.0 (±7.0%) | 0.5 to 5.0 (±7.0%) | **165071** ⚡ |
| | .50″ | 1.5 to 12.0 (±7.0%) | 4.0 to 20.0 (±15.0%) | **165075** ⚡ |
| | .75″ | — | 5.0 to 30.0 (±15.0%) | **194763** |
| | 1.00″ | — | 8.0 to 60.0 (±15.0%) | **194764** |

⚡ – Stock Items.

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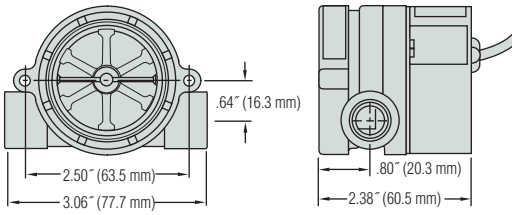
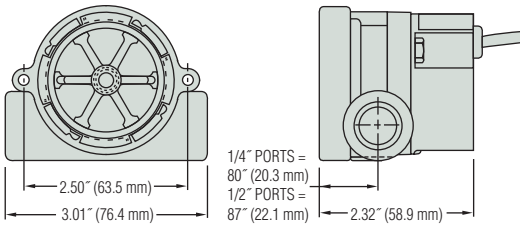
## Dimensions

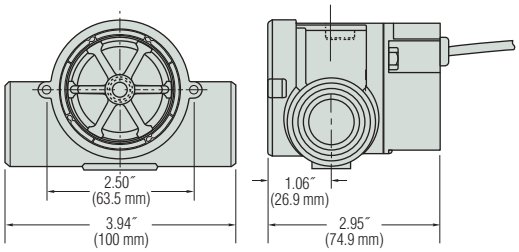
Polypropylene Bodies




Brass and Stainless Steel Bodies - .25″ and .50″ Ports




Brass Bodies – .75″ and 1.00″ NPT Ports



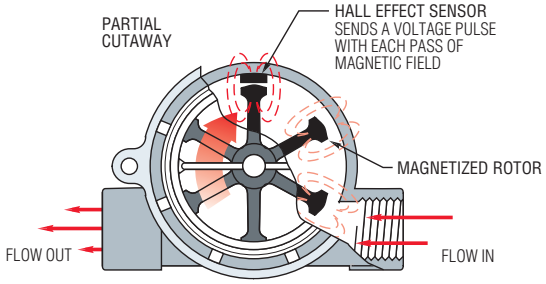

High Resolution Black Rotor

PPS composite. Each of the six rotor arms is magnetized. A PTFE loaded bushing ensures long life.

Note: Improved accuracy can be achieved by calibrating the individual RFO unit.

*With use of Low Flow Adapter supplied. See Page F-8 for more information.
**Straight thread with O-ring seal.

## Operating Principle




1. As liquid passes through the RotorFlow body, the magnetic rotor spins at a rate proportional to flow. This causes a series of magnetic fields (the rotor vanes) to excite the Hall Effect sensor, producing a series of voltage pulses.

2. The output pulses (RFO) are at the same voltage level as the input (4.5 - 24 VDC) with a frequency proportional to the flow rate. The output signal can be utilized by digital rate meters totalizers or other electronic controllers. RFA Type analog sensors condition the output signal to 0-10 VDC.

3. RotorFlow Indicators may be mounted with flow entering either port. Performance is optimized by positioning ports at the top of the unit, in a horizontal plane.

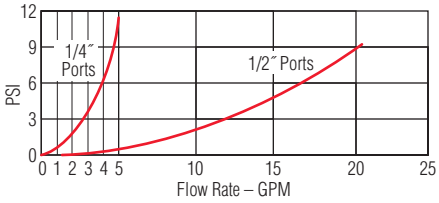
## Frequency vs. Flow Rate-Typical

| | Output Frequency – Hz | | | | | |
|---|---|---|---|---|---|---|
| | RFO Model – Based on Port Size | | | | | |
| **Flow Rate (GPM)** | **.25″** | **.25″ with Adapter*** | **.50″** | **.50″ with Adapter*** | **.75″** | **1″** |
| 0.10 | | 13 | | | | |
| 0.25 | | 41 | | | | |
| 0.50 | 15 | 90 | | | | |
| 0.75 | | 137 | | | | |
| 1.0 | 34 | 186 | | | | |
| 1.5 | 54 | | | 17 | | |
| 2.0 | 73 | | | 25.9 | | |
| 2.5 | 90 | | | 34 | | |
| 3.0 | 110 | | | 43 | | |
| 3.5 | 128 | | | | | |
| 4.0 | 148 | | 34 | 60 | | |
| 4.5 | 168 | | | | | |
| 5.0 | 185 | | 44.8 | 76.7 | 24 | |
| 6.0 | | | 55 | 94 | | |
| 7.0 | | | 65.9 | 111 | | |
| 8.0 | | | 76 | 129 | | 22 |
| 9.0 | | | 87.5 | 147 | | |
| 10 | | | 99 | 165 | 61 | 30 |
| 11 | | | 110 | 185 | | |
| 12 | | | 122 | 204 | | |
| 13 | | | 135 | | | |
| 14 | | | 147 | | | |
| 15 | | | 158 | | 93 | 43 |
| 16 | | | 170 | | | |
| 17 | | | 183 | | | |
| 18 | | | 195 | | | |
| 19 | | | 207 | | | |
| 20 | | | 220 | | 128 | 60 |
| 25 | | | | | 163 | 74 |
| 30 | | | | | 196 | 91 |
| 35 | | | | | | 107 |
| 40 | | | | | | 123 |
| 45 | | | | | | 137 |
| 50 | | | | | | 153 |
| 55 | | | | | | 170 |
| 60 | | | | | | 185 |

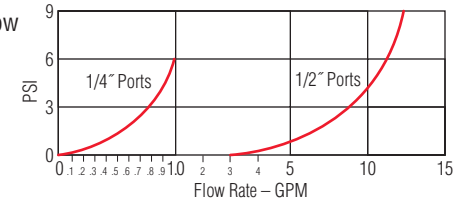
*Low Flow Adapter

## Pressure Drop-Typical

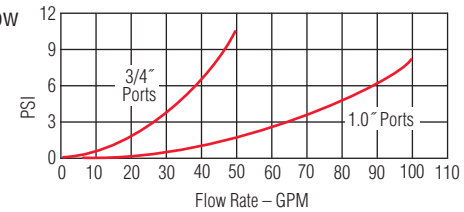
Standard Flow Range Units




Low Flow Range Units



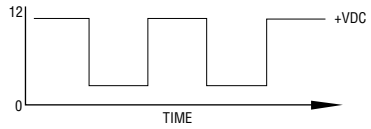

High Flow Units



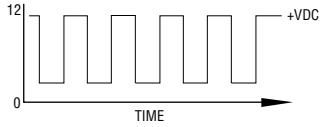

## Signal Output

Output signal for RFO Types is an on/off pulse of the DC voltage supplied to the unit, it is compatible with all digital logic families. Input voltage range is 4.5 to 24 VDC. Frequency of the output pulse is proportional to the flow rate and ranges from approximately 15 Hz at low flow to 225 Hz at high flow.

Example:
**Low Flow**




**High Flow**




Note: Consult factory for flow rate/frequency curves.

# Flow Rate Monitoring – RFA Types

## 0 to 10 VDC Analog Output

GEMS Sensors popularized the RotorFlow's paddlewheel design by combining high visibility rotors with solid-state electronics that are packaged into compact, panel mounting housings. They provide accurate flow rate output with integral visual confirmation...all with an unprecedented price/performance ratio. RFA Types feature a 0 to 10 VDC analog output which is proportional to flow rate.

## Specifications

| | |
|---|---|
| **Wetted Materials** | |
| **Body** | Brass, 316 Stainless Steel or Polypropylene (Hydrolytically Stable, Glass Reinforced) |
| **Rotor Pin** | Ceramic |
| **Rotor** | PPS Composite, Black[1] |
| **Lens** | Polysulfone |
| **O-Ring** | Viton® (Alloy Bodies); Buna N (Polypropylene Body) |
| **Low Flow Adaptor** | Glass Reinforced Polypropylene |
| **Operating Pressure, Maximum** | |
| **Brass or Stainless Steel Body** | 200 PSIG (13.8 bar) @ 70°F (21°C), 100 PSIG (6.9 bar) @ 212°F (100°C)[2] |
| **Polypropylene Body** | 100 PSIG (6.9 bar) @ 70°F (21°C), 40 PSI (2.8 bar) Max. @ 180°F (82°C) |
| **Operating Temperature,** | |
| **Brass or Stainless Steel Body** | -20°F to 212°F (-29°C to 100°C) |
| **Polypropylene Body** | -20°F to 180°F (-29°C to 82°C) |
| **Electronics** | 150°F (65°C) Ambient |
| **Viscosity, Maximum** | 200 SSU |
| **Input Power** | 24 VDC, ±10% |
| **Output Signal** | 0-10 VDC Analog Signal @ 1mA, Max. |
| **Current Consumption** | 25 mA, Max. |
| **Current Source Output, Max.** | 10 mA |
| **Accuracy** | See Table Below |
| **Electrical Termination** | 22 AWG PVC-Jacketed, 24″ Cable. Color Coded: Red = +VDC; Black = Ground; White = Signal Output |

Notes:
1. Standard on Stainless Steel bodies.
2. For higher pressure/temperature ratings stainless steel face plates are available. Consult factory.

## How To Order

For standard configurations, specify Part Number based on desired body material and port size.

| Body Material | Port Size NPT | Flow Ranges – GPM | | | |
|---|---|---|---|---|---|
| | | Low Range (Accuracy) | Part Number | Standard Range (Accuracy) | Part Number |
| Polypropylene | .25″ | 0.1 to 1.0 (±7.0%) | **230206** ⚡ | 0.5 to 5.0 (±7.0%) | **230205** ⚡ |
| | .50″ | 1.5 to 12.0 (±7.0%) | **230207** ⚡ | 4.0 to 20.0 (±15.0%) | **230201** ⚡ |
| Brass | .25″ | 0.1 to 1.0 (±7.0%) | **230209** ⚡ | 0.5 to 5.0 (±7.0%) | **230202** |
| | .50″ | 1.5 to 12.0 (±7.0%) | **230210** | 4.0 to 20.0 (±15.0%) | **230203** |
| | .75″ | — | — | 5.0 to 30.0 (±10.0%) | **230212** |
| | 1.00″ | — | — | 8.0 to 60.0 (±15.0%) | **230214** |
| Stainless Steel | 9/16″-18 | 0.1 to 1.0 (±7.0%) | **230211** | 0.5 to 5.0 (±7.0%) | **230204** |
| | .50″ | 1.5 to 12.0 (±7.0%) | **230216** | 4.0 to 20.0 (±15.0%) | **230208** |
| | .75″ | — | — | 5.0 to 30.0 (±10.0%) | **230213** |
| | 1.00″ | — | — | 8.0 to 60.0 (±15.0%) | **230215** |

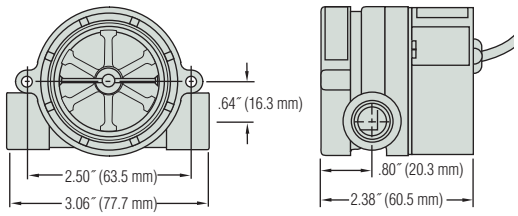
⚡ – Stock Items.

## Typical Applications

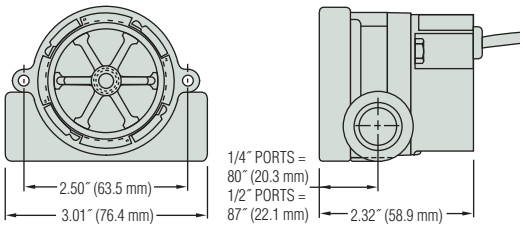
- Water Purification/Dispensing Systems
- Chemical Metering Equipment
- Lasers and Welders
- Water Injection Systems
- Semiconductor Processing Equipment
- Chillers and Heat Exchangers

## Dimensions

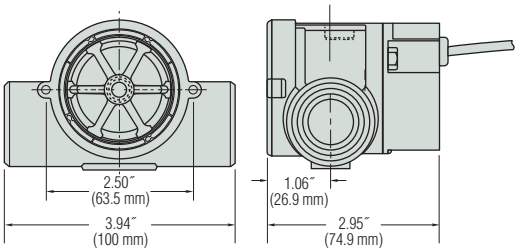
Polypropylene Bodies




Brass and Stainless Steel Bodies - .25″ and .50″ Ports




Brass Bodies – .75″ and 1.00″ NPT Ports




High Resolution Black Rotor

PPS composite. Each of the six rotor arms is magnetized. A PTFE loaded bushing ensures long life.

# Visual Indicators – RFI Types

This is RotorFlow in its most basic form — a bright orange rotor turning with fluid flow. Simple, direct and reliable. Flow rate is estimated, or simply confirmed, by viewing the speed of the turning rotor. Either port may be used for incoming flow, and bayonet mounting lens is easily removed for quick cleanout. RFI Type RotorFlow sensors are easy to see, easy to install and easy to afford.

## Typical Applications

• Visual flow confirmation on heat exchangers • Plastic injection molding equipment

## Specifications

| | |
|---|---|
| **Wetted Materials** | |
| **Body** | Brass, 316 Stainless Steel or Polypropylene (Hydrolytically Stable, Glass Reinforced) |
| **Rotor Pin** | Ceramic |
| **Rotor** | High Visibility Orange, Molded Nylon |
| **Lens** | Polysulfone |
| **O-Ring** | Viton® (Brass Body); Buna N (Polypropylene Body) |
| **Low Flow Adaptor** | Glass Reinforced Polypropylene |
| **Operating Pressure, Brass or Stainless Steel Body** | 100 PSIG (7 bar) @212°F (100°C)<br>200 PSIG (13.8 bar) Max. @ 70°F (21°C) |
| **Polypropylene Body** | 100 PSIG (6.9 bar) at 70°F (21°C),<br>40 PSI (2.8 bar) Max. @ 180°F (82°C) |
| **Operating Temperature, Brass or Stainless Steel Body** | -20°F to 212°F (-29°C to 100°C) |
| **Polypropylene Body** | -20°F to 180°F (-29°C to 82°C) |

## Operating Principle

1. As liquid passes through the RotorFlow body, the rotor spins at a rate proportional to flow.
2. RotorFlow Indicators may be mounted with flow entering either port. At low flow rates, performance is optimized by positioning ports at the top of the unit, in a horizontal plane.

## How To Order

Specify Part Number based on desired body material and port size.

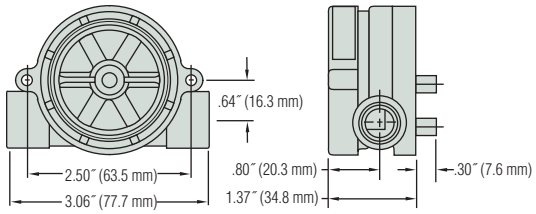
| Body Material | Port Size NPT | Flow Ranges – GPM | | Part Number |
|---|---|---|---|---|
| | | Low* Range | Standard Range | |
| Polypropylene | .25″ | 0.1 to 1.0 | 0.5 to 5.0 | **155420** ⚡ |
| | .50″ | 1.5 to 12.0 | 4.0 to 20.0 | **155480** ⚡ |
| Brass | .25″ | 0.1 to 1.0 | 0.5 to 5.0 | **142541** ⚡ |
| | .50″ | 1.5 to 12.0 | 4.0 to 20.0 | **142542** ⚡ |
| | .75″ | — | 5.0 to 30.0 | **180392** ⚡ |
| | 1.00″ | — | 8.0 to 60.0 | **181681** ⚡ |
| Stainless Steel | 9/16″ - 18** | 0.1 to 1.0 | 0.5 to 5.0 | **174596** |
| | .50″ | 1.5 to 12.0 | 4.0 to 20.0 | **173138** ⚡ |
| | .75″ | — | 5.0 to 30.0 | **181682** |
| | 1.00″ | — | 8.0 to 60.0 | **181683** |

* With use of Low Flow Adapter supplied. See Page F-8 for more information.
** Straight thread with O-ring seal.

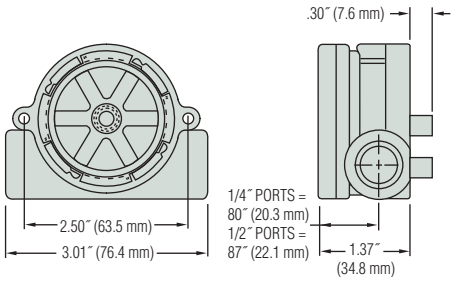
⚡ – Stock Items.

## Dimensions

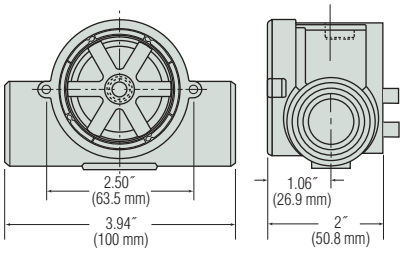
Polypropylene Bodies




Brass and Stainless Steel Bodies - .25″ and .50″ Ports




Brass Body – .75″ and 1.00″ Ports



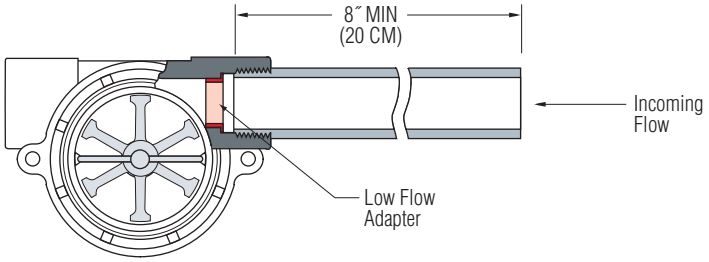

High Visibility Orange Rotor
Constructed of Molded Nylon for good general purpose compatibility with a wide range of fluids. Offers high visibility.

FLOW SENSORS – ELECTRONIC

## Easy Installation and Maintenance

A proper installation will enhance RotorFlow sensor performance. Install using standard pipe fitting tools; horizontal fluid lines are recommended. For further installation and maintenance recommendations, refer to one of the following instruction bulletins: RFO Types–Part Number 157258; RFI Types–Part Number 157259; RFS Types–Part Number 157261.

Since their function is to monitor dynamic fluid flow, naturally the rotor will react to turbulence, pulsation, entrained air, and other flow anomalies induced in the flow stream by other process hardware. For optimum performance, install RotorFlow units where nominal flow conditions exist with ports located at the top. Incoming flow may be placed to either port; a minimum of 8 inches (20 cm) of straight pipe on the inlet side is required. When operating in the low flow range, the supplied Low Flow Adapter must be installed in the incoming port.




Except for straight-thread versions, RotorFlow sensors connect to piping via NPT mating thread forms. The use of an appropriate thread sealant is necessary to assure a leak-tight connection. Permatex "No More Leaks®" or 2 wraps of Teflon® tape are the only sealants recommended for GEMS flow sensors. Straight-thread versions require an O-ring for sealing.

150 micron filtration is recommended. However, should foreign particles enter the RotorFlow sensor, accumulation is easily cleared by removing the lens from the body. The lens is removed by turning its 7/16˝ hex center hub 45° counter-clockwise with a standard socket wrench. To reinstall the lens, simply reverse the process. Pressure must be relieved from the system prior to sensor clean-out. O-rings should be lubricated prior to re-assembly.

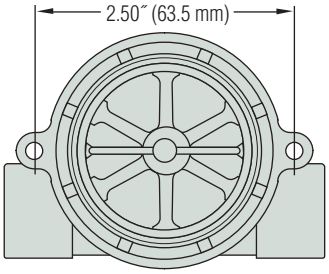
## Low Flow Applications

A low flow adapter is supplied with all Rotorflow units. It is used to produce accurate response at low flow rates. Install the adapter, as shown above, in the port selected for incoming flow.

## Panel Mounting

**Plastic Bodies.** Two (2) mounting ears are provided at the body center line to receive #8 self-tapping screws to accommodate panel mounting of the plastic RotorFlow units. Note: ANSI T type 23 self-tapping screws are recommended. They may be replaced with standard machine screws if re-installation should be required.

**Brass and Stainless Steel Bodies.** Two (2) mounting holes are provided on the body centerline, as shown below. #8-32UNC-2B screws are required for mounting.




### RotorFlow® Maintenance Kits

Rebuild your RotorFlow® Sensors and Switches in less than 5 minutes with one of these kits.

Includes:

- Ceramic Rotor Pin
- 6-Pole Magnetic Rotor with PPS/PTFE Bushing
- Buna N or Viton® O-Ring
- Polysulfone Lens

| Rotorflow® Type | | O-Ring Material in Kit | Part Numbers | |
|---|---|---|---|---|
| Line Size | Body Material | | RFA/RFO/ RFS | RFI |
| 1/4˝ & 1/2˝ | Plastic | Buna-N | **155870** ⚡ | **155872** |
| | Brass/SS | Viton® | **167364** ⚡ | **166267** |
| 3/4˝ & 1˝ | Brass/SS | Viton® | **157186** | **157187** |

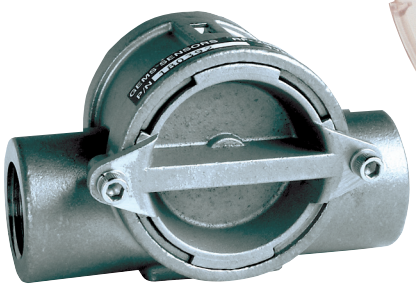
⚡ – Stock Items.

## RotorFlow® Sensor Special Capabilities are Yours for the Asking.

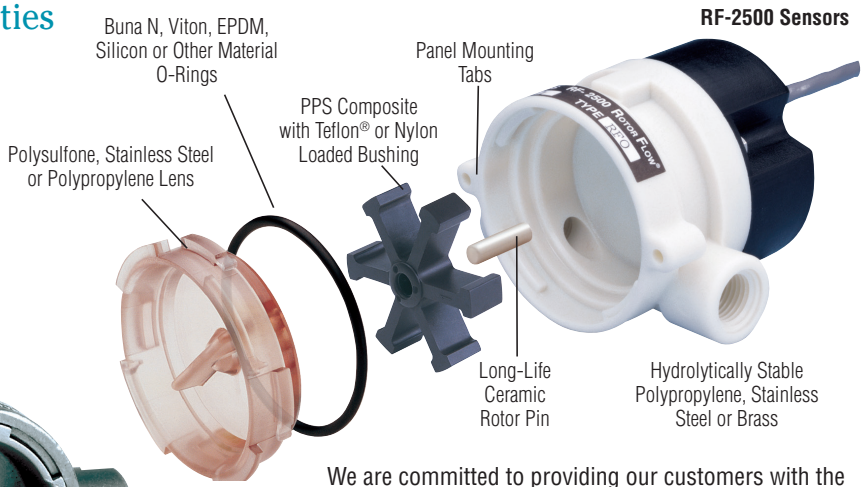
Gems caters to OEM needs with special configurations that go beyond the standards in this catalog. We can provide RotorFlow sensors with enhanced chemical compatibility, higher temperature and pressure capabilities, and alternate electrical terminations.

Other Capabilities Available to OEMs:

- Electrical outputs: Combined switch and frequency; transistor switching; 0-10 VDC analog.
- Custom face plate (cast stainless steel face plate pictured)



**RF-2500 Sensors**



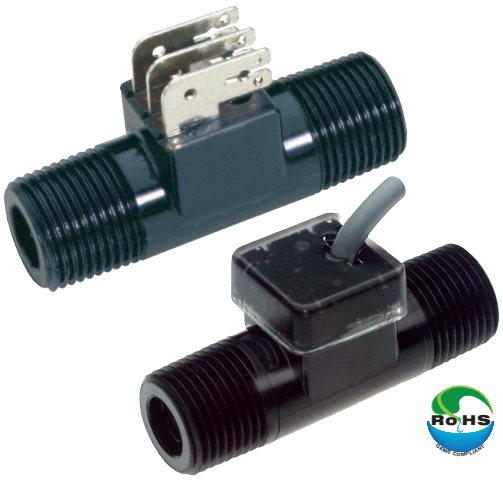

We are committed to providing our customers with the product that best meets the requirements of their applications. Please call us and tell us what you need, and ask us about Swagelok® tube fittings, faceplate options, and 9/16˝ and 3/4˝ straight-thread versions.

## Call 800-378-1600

# FT-110 Series – TurboFlow® Economical Flow-Rate Sensors

- Low Cost Plus High Accuracy ±3% of Reading
- Measures Low Liquid Flow Rates of .1 to 8 GPM
- Lightweight Plastic Design Enables Mounting in any Position

Gems Hall Effect turbine flow rate sensor is ideal for OEM applications involving low flow liquid monitoring. The low cost coupled with 1/2% repeatability makes it an ideal candidate for replacing dispensing timer systems. Unlike existing timing systems, turbine technology is not influenced by changes in system pressure caused by aging filters. The sensor's standard power and output specifications make it easy to retrofit to existing controllers.



## Specifications

| | |
|---|---|
| **Wetted Materials** | |
| **Body** | Nylon 12 |
| **Turbine** | Nylon 12 Composite |
| **Bearings** | PTFE/15% Graphite |
| **Operating Pressure** | 200 PSIG |
| **Burst Pressure** | 2500 PSIG |
| **Operating Temperature** | -4°F to 212°F (-20°C to 100°C) |
| **Viscosity** | 32 to 81 SSU (.8 to 16 Centistokes) |
| **Filter** | <50 Microns |
| **Input Power** | 5 to 24 VDC @ 8mA |
| **Output (Hz)** | NPN Sinking Open Collector @ 20mA Maximum<br>Leakage Current 10µA (Pull-Up Resistor Required) |
| **Accuracy** | ±3% of Reading |
| **Repeatability** | 0.5% of Full Scale |
| **Electrical Connection** | Spade Terminals .110˝/.248˝ x .031˝<br>(2.8/6.3 x .8 mm) or 3 ft. cable |
| **Inlet/Outlet Ports** | 3/8˝ NPT Male (3/8˝ G Male also available) |

## How To Order – Standard Models

Specify Part Number based on flow range.

| Flow Range | | Pulses per | | Frequency Output | 3/8˝ NPT Part Number | |
|---|---|---|---|---|---|---|
| GPM | Liters/m | Gallon | Liter | | Spade | Cable |
| .13-1.3 | .5-5.0 | 26200 | 6900 | 58-575 Hz | **173931** ⚡ | **173931-C** |
| .13-2.0 | .5-7.5 | 17400 | 4600 | 38-575 Hz | **173933** ⚡ | **173933-C** |
| .26-2.7 | 1-10 | 12500 | 3300 | 55-550 Hz | **173932** ⚡ | **173932-C** |
| .26-4.0 | 1-15 | 8300 | 2200 | 37-550 Hz | **173934** ⚡ | **173934-C** |
| .26-6.6 | 1-25 | 3800 | 1000 | 16.7-416 Hz | **173935** ⚡ | **173935-C** |
| .53-9.2 | 2-35 | 2650 | 700 | 23-408 Hz | **234265** ⚡ | **234265-C** |

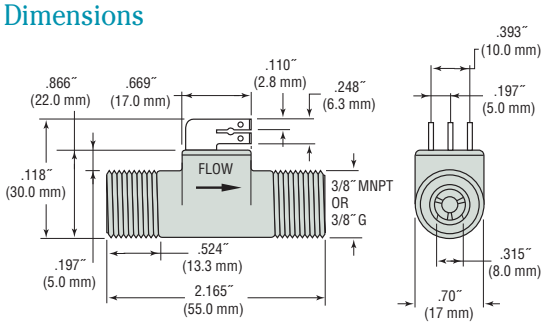
⚡ – Stock Items.

## FT-110 Accessories

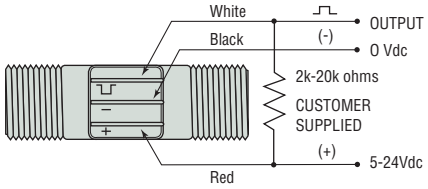
Consult factory for special customized OEM versions.

| Description | Part Number |
|---|---|
| Mating connector w/3 feet, 3 conductor, PVC pigtail cable | **173941** ⚡ |
| Mating connector w/10 feet, 3 conductor, PVC pigtail cable | **173942** ⚡ |

## Dimensions

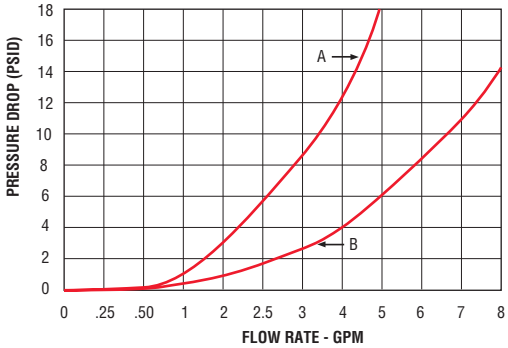



## Wiring




Cable Wire Code: Red = 5 to 24 VDC
Black = Ground
Brown = Signal Output

## Pressure Drop—Typical




Tests conducted with water flow at 68°F (20°C).

A) Part #173931
173932
173933

B) Part #173934
173935

# FT-210 Series – TurboFlow® Low Flow Turbine Sensor

- Low Flow Rates .1 to 2.5 LPM and High Accuracy ±3% of Reading
- Lightweight Turbine Ensures Fast Startup
- Mounts In Any Orientation

Gems FT-210 features proven turbine technology in a small package for low flow applications. The turbine technology provides a highly repeatable sensor ideally suited for measurement of either volume dispensing and/or flow rate applications. The small turbine reacts quickly to on/off dispensing applications. Each sensor is 100% tested, ensuring years of service life.

## Specifications

| | |
|---|---|
| **Wetted Materials** | |
| **Body** | Nylon 12 (Grilamid TR55) |
| **Turbine** | Nylon 12 Composite |
| **Bearings** | PTFE/15% Graphite |
| **Operating Pressure** | 350 PSI (24 bar) |
| **Burst Pressure** | 1400 PSI (97 bar) |
| **Flow Range** | .026-.65 gallons/minute<br>0.1-2.5 liters/minute<br>3.4-84.5 ounces/minute |
| **Pulses** | 83,200 per gallon<br>22,000 per liter<br>650 per ounce |
| **Frequency Output** | 36.6-917 Hz |
| **Operating Temperature** | -4°F to 212°F (-20°C to 100°C) |
| **Viscosity** | 32 to 70 SSU (.8 to 16 Centistokes) |
| **Filter** | <50 Microns |
| **Input Power** | 5 to 24 VDC |
| **Output (Hz)** | NPN Sinking Open Collector @ 20mA Maximum Leakage Current 10µA (3K-30K Pull up resistor required) |
| **Accuracy** | ±3% of Reading |
| **Repeatability** | 0.5% of Full Scale |
| **Electrical Connection** | 9.4mm Spacing 3-pole DIN Connector (1˝ high) |
| **Inlet/Outlet Ports** | 1/4˝ NPT (1/4˝ G Male also available) |

## How To Order

Specify a Part Number for the Port Connection AND a Part Number for the DIN Electrical Connection. Two Part Numbers are required for a complete part assembly.

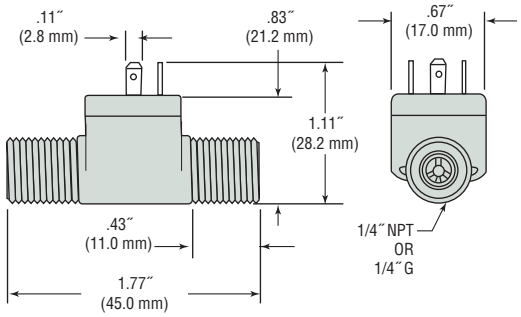
## FT-210 Sensor

| Body Material | Port Size | Part Number |
|---|---|---|
| Nylon 12 | 1/4˝ NPT | **212465** |
| | 1/4˝ G | **212460** |

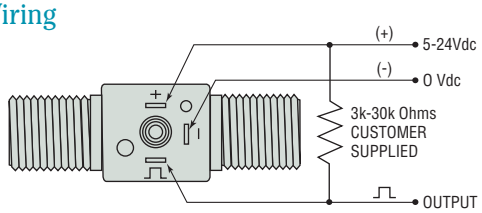
## Electrical Connection

| Description | Part Number |
|---|---|
| 1 meter DIN PVC Cable Assembly with 10K pull-up resistor | **218572** |
| Mating DIN Connector | **212404** |

## Dimensions




## Wiring

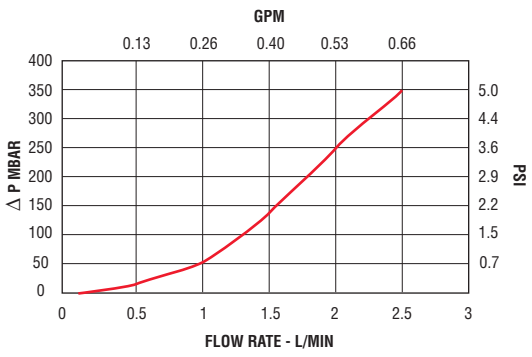



Pin Code: 1 = Output
2 = Supply
4 = Common

For Mating DIN Connector – P/N 212404

| Function | DIN Termination |
|---|---|
| V+ | 1 |
| – | ⏚ |
| Output | 2 |

## Pressure Drop—Typical



# FT-330 Series – NSF Approved Materials

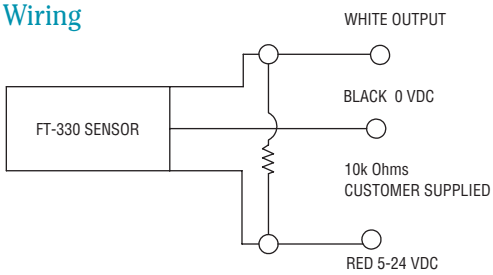
- High Accuracy: ±2% of reading
- High repeatability: ±0.5% of reading
- Overmolded electronics with integral cable strain reinforcement
- Measures flow rates from .2 to 4 GPM
- Lightweight plastic design for multiple mounting positions

The FT-330 is a highly accurate and repeatable, Hall Effect turbine flow sensor designed for low flow OEM applications. This low cost, NSF Std. 61 listed flow sensor is ideal for water or beverage dispensing applications or any application with water based liquids. The 316SS shaft coupled with Delrin® bearings allows for accurate measurements during quick dispensing cycles. The sensor's standard power and output specifications make it easy to retrofit existing controllers.

## Specifications

| | |
|---|---|
| **Materials** | |
| **Body** | Glass Reinforced PPO (Noryl) |
| **Turbine** | PA Composite (Nylon) |
| **Axle** | 316 Stainless Steel |
| **Bearings** | Delrin® (Polyoxymethylyne, POM) |
| **Inlet/Outlet Ports** | 3/8˝ NPT Male |
| **Pressure** | |
| **Operating** | 200 PSIG |
| **Burst** | 1000 PSIG |
| **Operating Temperature** | -4°F to 176°F (-20°C to 80°C) |
| **Viscosity** | 32 to 81 SSU (1.8 to 16 Centistokes) |
| **Recommended Filtration** | < 50 Microns |
| **Input Power** | 5 to 24 VDC @ 8mA |
| **Output (Hz)** | NPN Sinking Open Collector @ 25mA<br>Maximum leakage current 10µA<br>(5k to 30k Pull-Up Resistor Required) |
| **Accuracy** | ±2% of reading |
| **Repeatability** | ±0.5% of reading |
| **Electrical Connection** | 3 ft PVC cable #22 AWG |
| **Approvals** | NSF Std. 61 listed, RoHS |

## Wiring




## How To Order

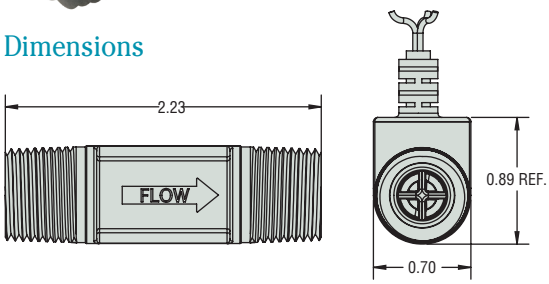
Specify Part Number based on flow rate measuring capability.

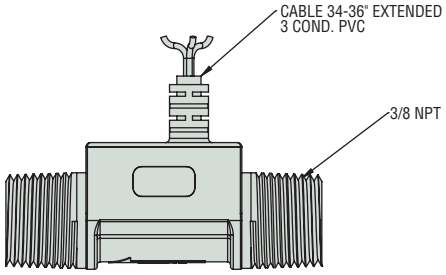
| Flow Range | | Frquency Out | Pulses Per Gallon | Pulses Per Liter | Part Number |
|---|---|---|---|---|---|
| GPM | LPM | | | | |
| 0.2 to 2 | 0.8 to 7.6 | 34 to 343 Hz | 10,313 | 2724 | **226000** ⚡ |
| 0.4 to 4 | 1.5 to 15 | 29 to 343 Hz | 4,994 | 1319 | **226100** ⚡ |

⚡ – Stock Items.

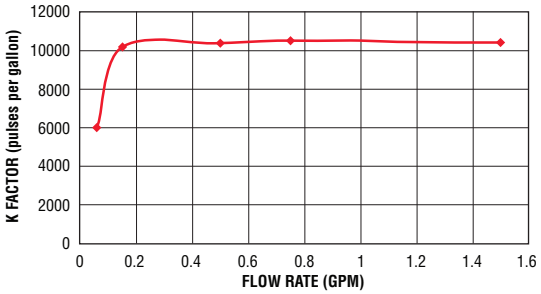

NSF approved

## Dimensions



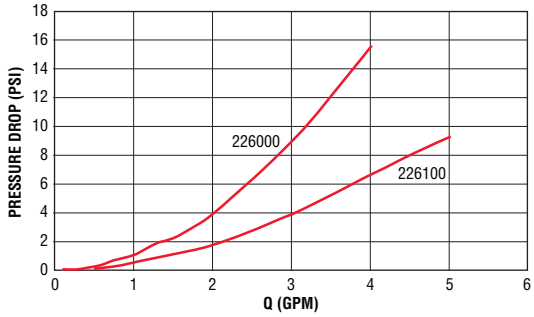




## K-factor Chart* - Part Number 226000




* Consult factory for P/N 226100 K-factor chart

## Pressure Drop—Typical



## NOTES