# Turbine Flow Rate Sensor
# FT-100 Series NSF Approved

**Instruction Bulletin No. 208694 (Rev. C)**

## Operating and Installation Instructions

**Prior to installation:**

- Confirm that the materials of sensor construction are compatible with the application media and the environment it will be used in. Aggressive media and incompatible manufacturing agents can damage the sensor.
- Be sure the cavity that the FT-100 insert will be installed to has a consistent bore in which the turbine will spin. Plastic molded parts, designed to receive the FT-100 insert, should be designed with attention to good molded part design practices, focused on maintaining a minimum amount of variability from part to part. Poor molded part design and, or, poor molding process control can cause part-to-part variation or sinks which if present in the turbine region, will cause turbine speed (output) to be variable for a given flow rate.
- Accuracy of the FT-100 product is the result of close clearances between the bore in which it resides and the turbine vanes. As with any intrusive flow sensing device, media cleanliness is important. Be sure the system has been purged of any fabrication debris prior to FT-100 installation. After system has been checked for debris and cleaned in preparation for liquid flow, the use of 50-micron media filtration will insure long trouble free performance of the turbine insert.
- The Turbine Insert is not designed to sense gaseous flows. A long duration, high-volume pulse of gas across the turbine, as would be typical in a system blow down with air may damage the turbine. 20-PSI air for a short time should not be a problem.

**Installation:**

- The FT-100 Turbine Insert is designed to fit into an OEM designed component, which will have been developed with provision for the insert as detailed in FIG 1. The insert is designed with a ¼ degree per side taper across the long axis to accommodate a slight molded housing draft. (FIG 2) To this end, the assembly of the turbine to the housing is uni-directional. There is a molded arrow on the downstream bearing hub that indicates the direction of insertion. It should point downstream (in the direction of flow) at installation. This end of the insert should come to rest against a dead stop in the housing it is assembled to.
- At the upstream end of the insert, on the top and bottom of the rails of the cage, are a set of molded press fit ribs designed to introduce interference with the cavity they will slide in, to help hold the insert in place. A good fit relationship between the insert and the component it is being assembled to, will allow the installer to slide the insert into the cavity unrestricted up to the compression bumps, and then require force to seat it in place. The leading edges of the grooves the insert fits into should be radiused or chamfered, as a sharp edge may potentially shear off the compression bumps on the rails of the insert at assembly.

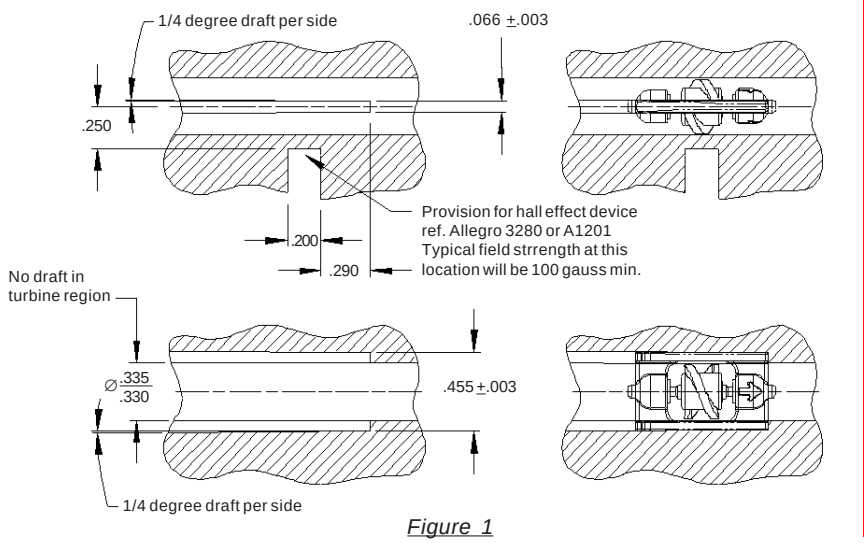


*Figure 1*

*Ref. Geometry, end users component*

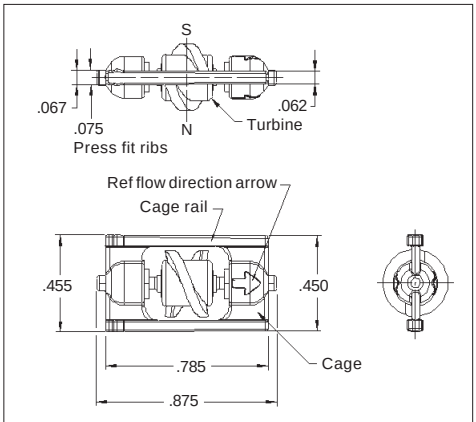


*Figure 2*

**Application:**

- The FT-100 Insert is a low cost, self contained turbine, designed to be integrated by OEM's into a product to sense the flow of liquids. The turbine is produced with a north and south pole magnetic field which when coupled with a Hall effect element will produce a frequency out put that is proportional to flow rate across the specified flow ranges.
- The typical field strength as measured normal to the turbine O.D. at .100 inches away will be a minimum of 100 gauss. A Hall effect device can be specified based on this data. There are many manufacturers of Hall effect devices, which will work with this insert. Allegro Microsystems A1201 or 3280 Hall effect elements will both work and yield 1 pulse per revolution of the turbine. Reference Allegro specifications for correct application and use of their products.
- The FT-100 Flow Turbine Insert has a sense range of from 0.2 to 2.0 GPM. (.75 to 7.5 LPM). The unit will reliably respond to flow rates down as low as 0.10 GPM (.37LPM) however with less unit-to-unit repeatability. The 208800 version has higher temperature materials which may be used at extended flow ranges.
- Different flow rate performance can be achieved by inserting the device into different bore diameters. Generally, a larger diameter bore in place of the specified .335 / .330 I.D. will add the capability to handle more flow, however, at the expense of low end responsiveness. The maximum recommended I. D. in place of the .335 / .330 diameter is .400.

## Specifications

| | P/N 208800 NSF Certified to NSF/ANSI 61 | P/N 215100 NSF Certified to NSF/ANSI 61 |
|---|---|---|
| **Wetted Parts** | | |
| **Turbine Overmold** | PA Composite | PA Composite |
| **Turbine Axle** | 316 SS | 316 SS |
| **Turbine Cage** | PEI | ABS |
| **Bearings** | Glass/PTFE filled PEI | Glass-Filled Nylon 6/12 |
| **Temperature Range** | 0°F to 160°F | 0°F to 100°F |
| **Flow Range** | 0.2 to 2.0 GPM in a ∅ .330/.335 bore | 0.2 to 2.0 GPM in a ∅ .330/.335 bore |
| **Accuracy** | ± 5% of reading (in ∅ .330 bore) | ± 5% of reading (in ∅ .330 bore) |
| **Repeatability** | 2% of reading | 2% of reading |
| **Recommended Filtration** | 50 Micron | 50 Micron |

### Important Points!

Product must be maintained and installed in strict accordance with the National Electrical Code and GEMS technical brochure and instruction bulletin. Failure to observe this warning could result in serious injuries or damages.

Pressure and temperature limitations shown on individual catalog pages and drawings for the specified flow sensors must not be exceeded.

Selection of materials for compatibility with the media is critical to the life and operation of GEMS flow sensors. Take care in the proper selection of materials of construction; particularly wetted materials.

Flow sensors have been designed to resist shock and vibration; however, shock and vibration should be minimized.

Liquid media containing particulate and/or debris should be filtered to ensure proper operation of GEMS products.

Flow sensors must not be field repaired.

Physical damage sustained by the product may render it unserviceable.

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