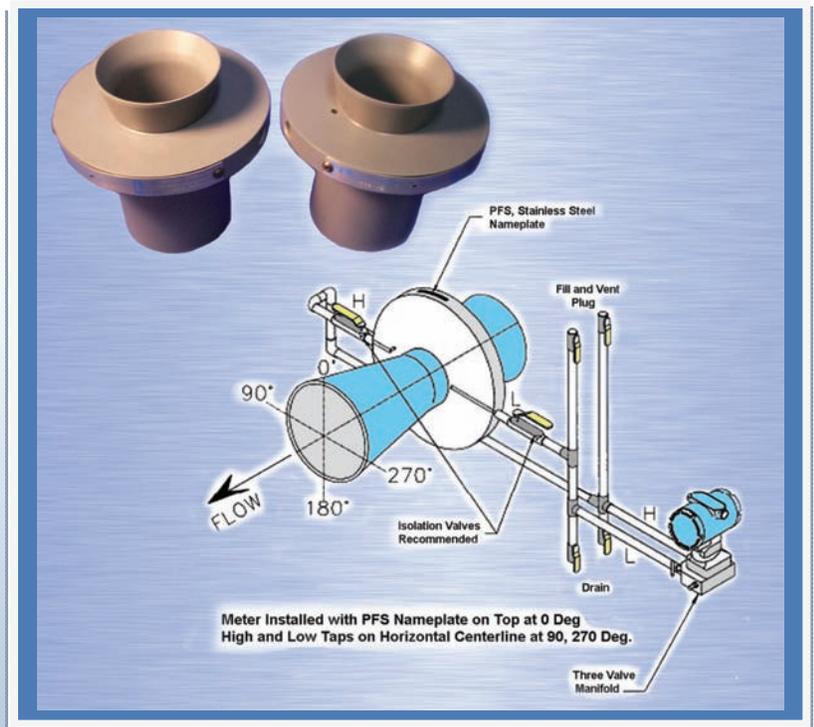


PFS Insert Venturi Meters

Primary Flow Signal, Inc. has a wide variety of insert venturi meter models designed to provide predictable and reliable accuracy and headloss performance at low cost. There are several major advantages to the PFS insert venturi meter such as:

- No line size limit: PFS has supplied inserts in line sizes from 0.50 to 120.0 inches.
- Short laying length with the thickness of the center flange effectively becoming the meter length in the piping with the inlet cone, throat and recovery cone inside the pipe.
- No downstream straight pipe requirement for standard $\pm 0.50\%$ accuracy.



PFS Model HVT-PI showing standard high and low pressure tap locations and DP transmitter connections.



HVT-PS insert meter with manual tap cleanout rods installed during field calibration of DP transmitter with manometer and hand-held programmer.

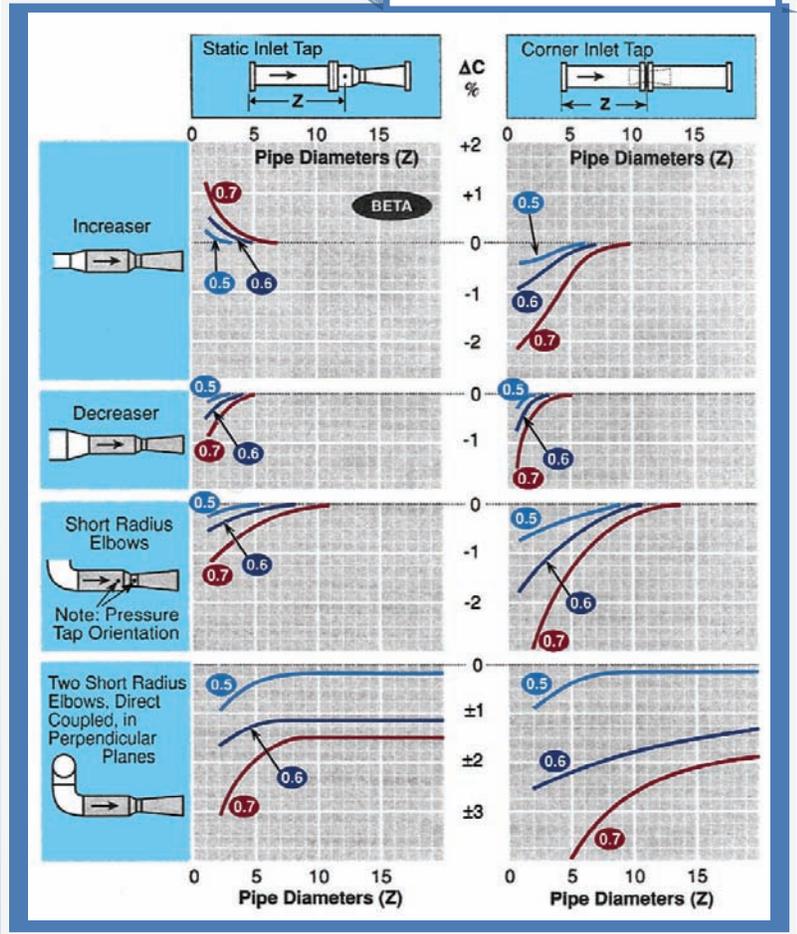


Note the thickness of the Meter Center Flange is the only part of the meter that adds to the overall pipe length.

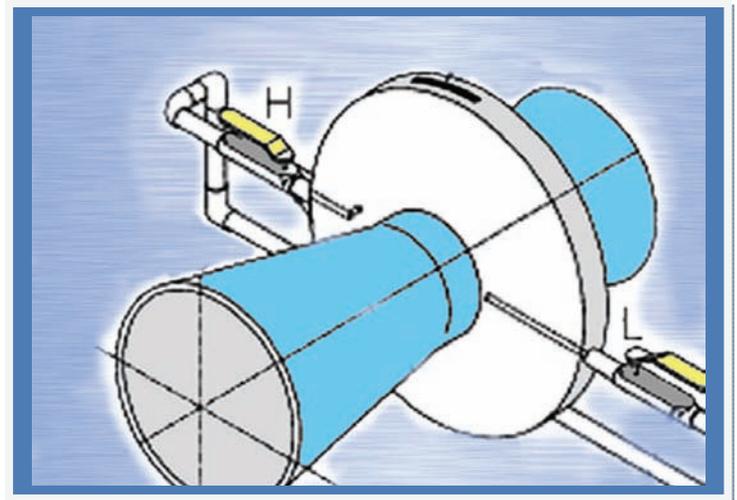
PFS Insert Venturi Meters (continued)

- Upstream straight pipe required for standard accuracy of +/-0.5% is a function of three criteria:
 - a. Beta ratio of the meter (beta ratio is the throat size divided by the line size). Example: 24.0" line size with 12.0" throat is a 0.5000 beta meter. The lower the beta ratio, the less upstream straight pipe, from a given disturber, is required.
 - b. Each type of upstream disturber has its own straight pipe requirement (elbow, tee, isolation valve, etc).
 - c. How much space is available between the discharge of the first upstream disturber and the center flange of the insert venturi meter?

- For installations that have short upstream straight pipe availability and also for those installations where the ability to clean out the high pressure tap is required, PFS offers the HVT-PS insert meter configuration. This design consists of the HVT-PI with low pressure tap in the meter center flange but with a stainless steel machined high pressure tap that is installed in the upstream spool at the proper static high pressure location. This results in shorter upstream straight pipe required for +/-0.5% accuracy because:
 - a. The standard insert venturi (Model HVT-PI) that has a corner high pressure tap located on the center flange of the meter which is effectively "looking at the approach flow profile" from any given disturber. In this position, longer straight pipe is required so as to allow the flow pattern from the disturber to attenuate before the pressure is sensed by the venturi meter.



As can be seen from the PFS installation effect test data, the beta ratio, type of disturber and how much straight pipe is available are key elements in determining the installed accuracy of the meter.



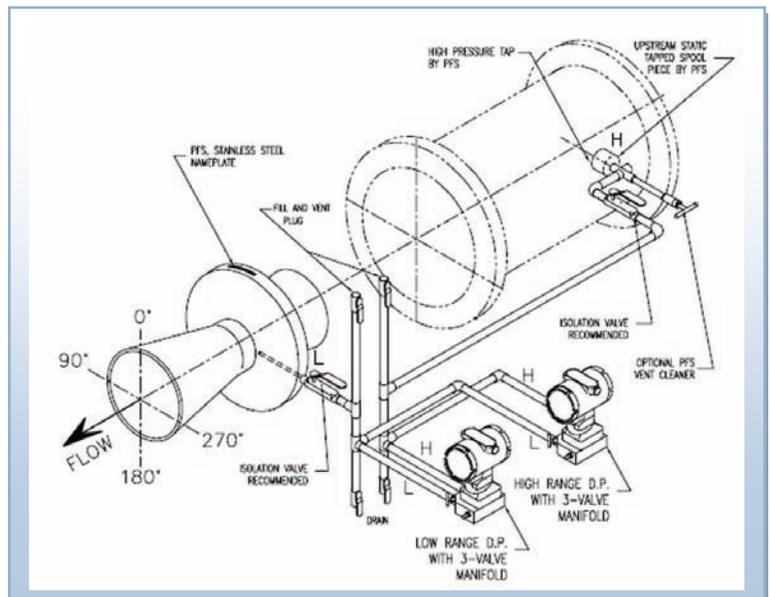
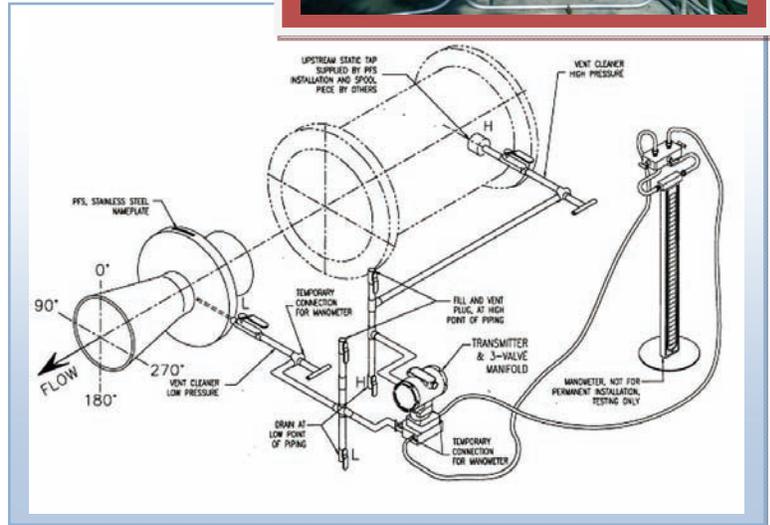
Note position of high pressure tap

- b. The HVT-PS option has the high pressure installed in the upstream spool piece (either by PFS or the contractor under PFS direction). Since the high pressure is now sensed in the static position (looking at the pressure across the flow profile as opposed to looking at the on-coming flow), the upstream straight pipe requirement is considerably less.

For Wide Range Flow Meter Applications, the HVT-PS (as well as any other PFS Insert Venturi Meter Model) is available with multi-range DP transmitter configuration. Flow Ranges of up to 200:1 can be easily designed.

- A third option if the PFS model HVT-IS which is a drop in flow metering section with both the up and downstream spool pieces integral to the insert venturi meter which is installed inside it with the static upstream high pressure tap included. This is a very popular model, particularly on larger line size installations where simplicity of installation is desired.

36 inch HVT-PI with DP transmitter connection and manual tap cleanout rods installed.



HVT-PS Split Range Tubing

- All three models are extremely useful in a wide variety of water and wastewater applications such as:
 - a. Process and finished water lines in a water plant or distribution system.
 - b. Air scour applications in any type of water plant application.
 - c. Header and drop leg aeration systems in wastewater applications.
 - d. Blower control systems in wastewater applications.
 - e. Digester and bio-gas applications.

Note that insert venturi meters can be designed for very low available head or pressure applications and, when coupled with multi-variable differential pressure transmitters, provide a mass flow solution to any gas flow application.

- All PFS insert venturi meter designs are available in our bi-directional configuration.

