

GENERAL INSTALLATION PROCEDURE

Upon receipt of the turbine flowmeter a visual inspection should be performed checking for any indications of damage which may have occurred during shipment. Inspect all packing material carefully to prevent the loss of meter parts or auxiliary components which may have been packed with the shipment. Refer to the packing list/invoice for a detailed list of items included in the shipment.

The meter housing is marked by a flow direction arrow and the inlet is marked 'IN' and the outlet is marked 'OUT'. The meter must be installed in the piping in the correct orientation to ensure the most accurate and reliable operation. Care should be taken in the proper selection of the mating fittings. Size, type of material, and pressure rating should be the same as the flowmeter supplied. The correct gaskets and bolts should be utilized.

The flowmeter may be installed horizontally or vertically for liquid service without affecting the meter calibration, however, in gas applications the meter must be installed horizontally for proper operation. When it is expected that flow will be intermittent, the meter should not be mounted at a low point in the piping system. Solids which settle or congeal in the meter may affect meter performance.

In order to achieve optimum electrical signal output from the flowmeter, due consideration must be given to its isolation from ambient electrical interference such as nearby motors, transformers, and solenoids.

GENERAL PIPING CONSIDERATION

As stated in the Principle of Flowmeter Operation, the fluid moving through the flowmeter engages the vaned rotor. Swirl present in the fluid ahead of the meter can change the effective angle of engagement and, therefore, cause a deviation from the supplied calibration (performed under controlled flow conditions). Turbine meters are constructed with flow straighteners to minimize the affects of fluid swirl and non-uniform velocity profiles is adequate for most installations. However, it is good practice to maintain a minimum straight run of pipe approximately 10 pipe diameters ahead of the inlet and 5 pipe diameters following the outlet. Proper installation of the flowmeter minimizes the negative effects of fluid swirl.

A typical flowmeter installation is shown below:

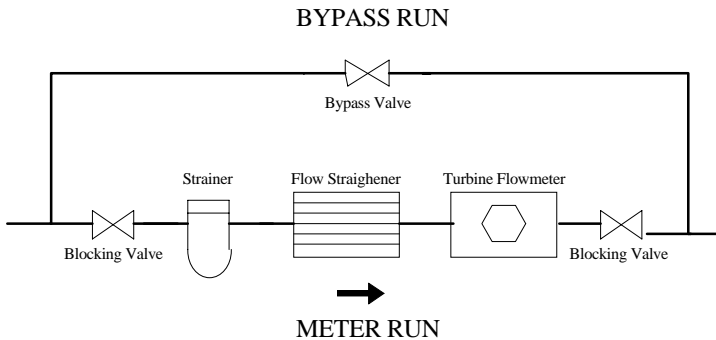


Figure 1 Typical Flowmeter Installation

Blocking and Bypass valves should be installed if it is necessary to do preventive maintenance on the flowmeter without shutting down the flow system. The Bypass valve can be opened before the Blocking valves allowing the flow to continue while removing the turbine flowmeter for service.

IMPORTANT: *All flow lines should be purged prior to installing the meter. To prevent possible damage to the meter, install the meter **ONLY** in flow lines that are clean and free of debris.*

Upon initial start-up of the system a spool piece should be installed in place of the flowmeter so that purging of the system can be performed to remove all particle debris which could cause damage to the meter internals. In applications where meter flushing is required after meter service, care should be taken as to not over-speed the meter, as severe meter damage may occur.

CAUTION: *Avoid over-spinning the meter. Over-spinning the meter may cause damage to the meter internals and lead to needless meter failure.*

To maintain an accurate flow measurement it is necessary to maintain a downstream pressure sufficient to prevent flashing/cavitation. Flashing of the liquid will result in an indication of flow significantly higher than the actual flow. In order to eliminate this condition adequate downstream pressure must be maintained. The minimum required downstream pressure may be calculated using the following equation:

$$\text{Minimum Pressure} = (2 \times \text{Pressure Drop}) + (1.25 \times \text{Vapor Pressure})$$

Downstream pressure may be maintained by a downstream valve that provides the necessary downstream pressure to prevent flashing/cavitation in the metering run.

STRAINERS/FILTERS

Turbine flowmeters are designed for use in a clean fluid service. However, the service fluid may carry some particulate material which would need to be removed before reaching the flowmeter. Under these conditions a strainer/filter may be required to reduce the potential hazard of fouling or damage that may be caused by foreign matter. Strainer/filters are recommended to be used with the Hoffer Mini-Flow Series meters.

METER SIZE	MESH SIZE	PARTICLE SIZE (Maximum)
MF Series	100	.0055
¼" to ½"	100	.0055
⅝" to 1¼"	70	.008
1½" to 3"	40	.015
4" to 12"	24	.028

If a strainer/filter is required in the system, it should be located upstream of the flowmeter taking care that the proper minimum distance is kept between the strainer and flowmeter.

FLOW STRAIGHTENERS and INSTALLATION KITS

FLOW STRAIGHTENING

Proper application of the Hoffer Turbine Flowmeter requires a suitable piping section to achieve optimum accuracy. While an inlet straight pipe run of 10 pipe diameters and an outlet straight pipe run of 5 pipe diameters provide the necessary flow conditioning in general, some applications require an upstream flow straightener. This consists of a section of piping that contains a suitably dimensioned and positioned thin walled tube cluster to eliminate fluid swirl.

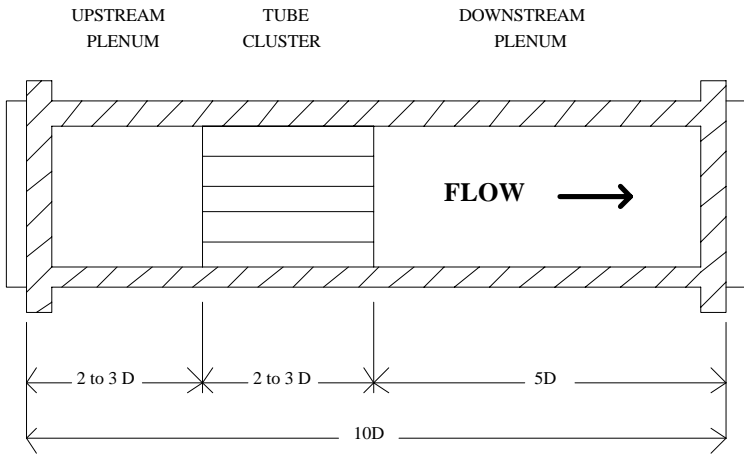


Figure 2 Typical Flow Straightener

A typical application requiring a flow straightener would be custody transfer.

Flanged flow straightening sections are available from ½” to 12” line sizes with mating fittings in pressure ratings from 150# to 2500# ratings. Beveled type end fittings for welding are also available.

MS INSTALLATION KITS

Installation kits for the MS end fittings consist of two lengths of stainless steel tubing cut to a length appropriate for the upstream and downstream straight pipe run and flared at one end. Mating sleeves and nuts are included. The kits may be conveniently butt welded into the user’s piping. Alternately the kits may be provided with NPT or flanged connections to facilitate installation of smaller flowmeters into larger existing lines. This adapted form of the installation kit is recommended for use with the Hoffer Mini Flowmeters since only MS end fittings are offered in the Mini Flow Series.

Flow straightening sections may be provided within the installation kit.

MS installation kits are available in turbine sizes from ¼” to 2”.

SIGNAL CABLES

Two conductor shielded cabling recommended for the Hoffer Turbine Flowmeter is generally available in most industrial settings. However, Hoffer stocks cabling for user convenience. Cabling is available cut to length with dressed end connections. Recommended cable is Beldon 8422 or equal.

SIGNAL CONDITIONERS/CONVERTERS

Consideration should be given to properly interface the turbine flowmeter output to the host electronics. If the system is installed in an electrically noisy area or if the distance from the turbine flowmeter to the host electronics exceeds 500 feet a signal conditioner may be necessary.

Hoffer Signal Conditioners for the turbine flowmeter provide amplification, filtering, and wave shaping of the low level flowmeter pickup signal and generate a high level pulse output signal suitable for transmission to a remote host system through a noisy environment.

Several output forms (i.e., TTL/CMOS, open collector, etc.) are available to suit various interface requirements. The conditioned pulse output signal may be transmitted several thousand feet.

Note: The standard (1) year warranty applies to all coils, signal conditioners/converters and Hoffer electronics.
