



A BTR Metering Systems Company

## Introduction

Equimeter Turbo-Meters are designed for the measurement of gas. Proper application and routine maintenance will result in many years of active service life.

The following instructions are in general conformance with the recommendations contained in American Gas Association, Gas Measurement Committee Report #7, "Measurement of Fuel Gas by Turbine Meters," (AGA Catalog No. XQ0580).

Please note that the Mark-II-E refers to 2 & 3" end-entry models.

## On Receipt

Carefully examine the shipping container for any external damage prior to unpacking. Any evident damage should be reported to the carrier.

After unpacking the meter, examine it for compliance with your ordering specifications. Report any deviations to your Equimeter representative.

RETAIN ALL DOCUMENTS SHIPPED WITH THE METER SINCE THESE ARE REQUIRED FOR METER RECORDS.

## Product Specifications

Equimeter Mark-II, Mark-II-E, PTB and Auto-Adjust Turbo-Meters all use the same meter bodies, with flange dimensions conforming to ANSI B16.42 and B16.5 standards.

All Turbo-Meter bodies are hydrostatically tested at a minimum of 1.5 times the maximum rated working pressure indicated on the meter body badge. This maximum rated working pressure stamped on the meter body badge *must not* be exceeded in service.

Standard construction Equimeter aluminum, ductile iron and steel bodied Turbo-Meters will operate over a flowing gas temperature range of -20°F to +165°F (-28.9°C to +74°C). Special construction is available for lower and higher operating temperatures.

## Installation

Turbo-Meters are basically velocity sensing devices which derive volume by sensing the flow rate through the known cross-sectional area of the measuring module. Accurate velocity sensing is essential in deriving accurate volume measurement.

Accessory devices in close proximity to the Turbo-Meter set can cause a jetting or swirling condition, upsetting the normal velocity profile of the gas stream. Extensive tests of Turbo-Meters at various flow rates and pressures have defined the recommended piping installations which should result in optimal volume measurement accuracy.

The most common installations are as follows:

**1. Inline** – A minimum run of ten (10) pipe diameters (DN) of straight pipe must be used between any flow-altering device (other than flow throttling) and the inlet flange of the Turbo-Meter (Figure 1).

Note: A total of eighteen (18) pipe diameters must be used between any throttling device (regulator, control valve, etc.) installed upstream of the meter and the meter inlet flange. This inlet pipe should be nominally the same interior diameter as the meter body. Minor variations in the piping ID due to use of piping with

# Installation and Maintenance Instructions Turbo-Meter

Mark-II, Mark-II-E, PTB and Auto-Adjust®

different wall thickness will not affect the meter accuracy. Inline straightening vanes located five pipe diameters upstream of the meter inlet are optional. Extensive testing in lines with and without straightening vanes mounted in the inlet piping demonstrates no differences in accuracies when using Turbo-Meters with built in straightening vanes (since Oct. 1974).

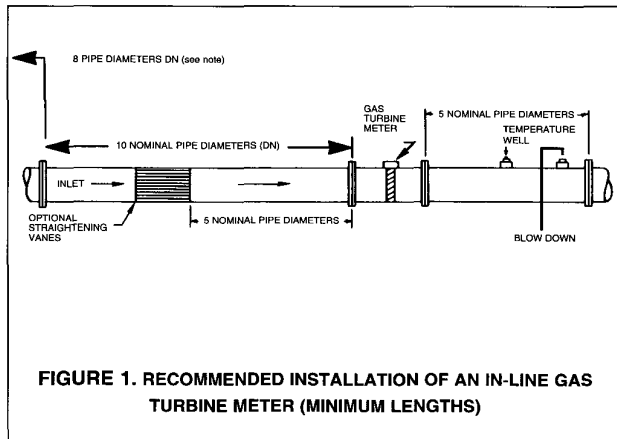


FIGURE 1. RECOMMENDED INSTALLATION OF AN IN-LINE GAS TURBINE METER (MINIMUM LENGTHS)

Note: A throttling device (regulator control valve, etc.) upstream of the meter run requires a minimum of eight (8) pipe diameters (DN) between such device and the meter run.

**2. Off-Set, Short Coupled** – Turbo-Meters may be installed in short-coupled sets as illustrated in Figure 2. Note that the flow-restricting devices must be installed in the vertical riser and that a 90° fitting must be used at the inlet to the meter run. This fitting may be an elbow or a tee. A straight run of pipe, equal in ID to the meter size and four diameters long, as well as equipped with straightening vanes at the inlet end, is attached to the inlet side of the meter.

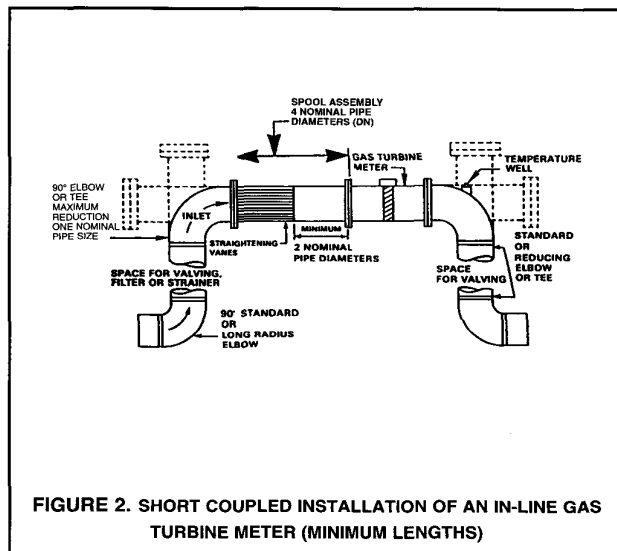
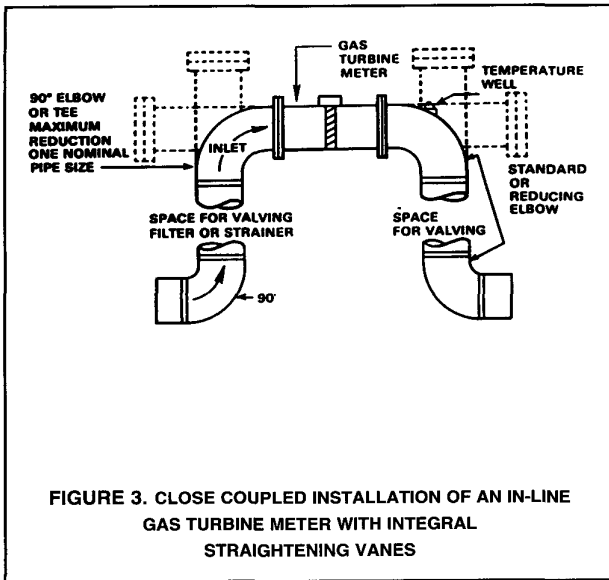


FIGURE 2. SHORT COUPLED INSTALLATION OF AN IN-LINE GAS TURBINE METER (MINIMUM LENGTHS)

**3. Offset, Close Coupled** Equimeter Turbo-Meters manufactured since October, 1974 incorporate integral straightening vanes. This design eliminates the need for long inlet runs and enables Turbo-Meters to be close-coupled as illustrated in Figure 3.



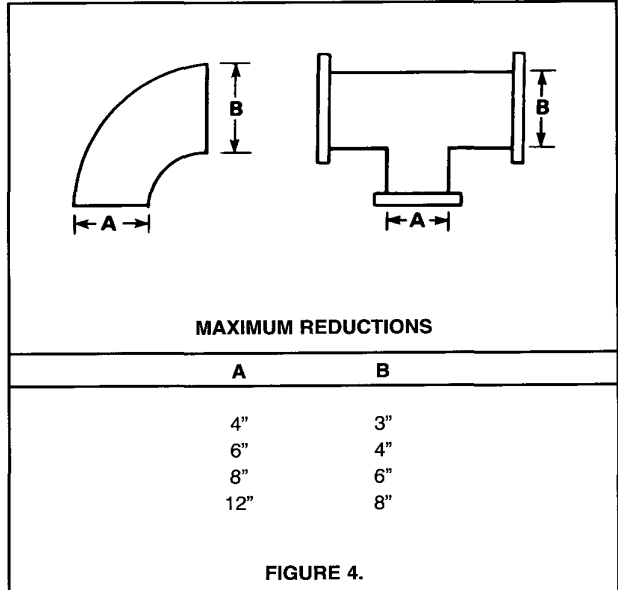
**FIGURE 3. CLOSE COUPLED INSTALLATION OF AN IN-LINE GAS TURBINE METER WITH INTEGRAL STRAIGHTENING VANES**

The two 90° turns into the inlet end of the short or close coupled meter runs must be in the same plane to ensure an even velocity profile at the meter inlet. The 90° turn can be accomplished with either elbows or tees. Reducing fittings can be used. However, the maximum reductions at the inlet end are as shown in figure 4. The fittings used on the piping downstream of the meter are not critical except that the connection to the meter outlet flange must be equal in ID to the meter ID.

In-line dimensions for Equimeter Turbo-Meters are as follows:

Meter	Meter Size	Max. Pressure Rating (PSIG)*	In-Line Dimension (Inches)
Mark IIE	2"	All	5 <sup>29</sup> / <sub>32</sub>
	3"	All	9 <sup>29</sup> / <sub>64</sub>
Mark II and Auto-Adjust	4"	175	14
	4"	HP	15 <sup>1</sup> / <sub>2</sub>
	6"	175	16
	6"	HP	22 <sup>1</sup> / <sub>2</sub>
	8"	175	21
	8"	HP	27 <sup>1</sup> / <sub>4</sub>
	12"	220	30
	12"	HP	32 <sup>1</sup> / <sub>2</sub>

\*NOTE: "HP" includes 275, 720 and 1440 psig meters (ANSI 150, 300 and 600 respectively)



**FIGURE 4.**

### Installation Notes:

- A.** Piping fabrication, welding, purging and hydrostatic testing must be completed prior to installation of the Turbo-Meter in the line.
- B.** An installation of a by-pass line around the meter is recommended for all piping configurations (refer to figure 5).
- C.** Companion pipe flanges at the meter inlet and outlet should be concentrically aligned with no gasket protrusion into the flow pattern.
- D.** Pipe interior should be of commercial roughness with no protruding welds.

### Vertical Installation

Turbo-Meters may be installed in the vertical position with the meter inlet up or down. To achieve adequate rotor shaft bearing lubrication, the pressurized lubrication procedure must be used. Inlet piping specifications on vertical installations are identical to those detailed for horizontal installations.

### Prover Connections

Where low pressure or critical flow provers or transfer provers will be used to field prove Turbo-Meters, it is important to locate the prover connections so that the normal flow pattern through the meter is duplicated. Tees, located at the meter inlet and outlet equipped with blind flanges and 2" and 3" pipe plugs can be used for this purpose.

Pressure connections for instrumentation are located on the inlet ends of the meter body or the top plate. Please note that some meters may have both a body and top plate tap. Use the top plate tap in these instances. Temperature connections for either corrective or recording instruments should be located downstream within two pipe diameters of the meter flange.