



MFE-1000

AIRFLOW MEASUREMENT STATIONS

The **MFE-1000** is a differential pressure (head) device specifically designed to provide continuous, accurate and reliable measurement of ultra-low air/gas volumetric flow rates over a wide operating range. This flow sensing element utilizes a piezoid ring static pressure sensing technique combined with a self-averaging total pressure sensing manifold.

The **MFE-1000** produces a velocity pressure output which is easily converted to velocity/volume using the standard air (scfm) equation of:

$$Q = 4002A\sqrt{P_v}$$

Where:

Q = Air volume, in scfm

A = Area, in square feet

P_v = velocity pressure which is the measured difference between the total and static pressures, in inches of water.

The output of the **MFE-1000** requires no correction (k) factor, and when actual air/gas density is determined the output of this device provides accurate mass flow measurement.

INSTALLATION GUIDELINES

The stations may be installed in any duct configuration. However, the accuracy of the installation is dependent on the flow conditions in the duct. The minimum installation requirements for the stations based upon a uniform velocity profile approaching the duct disturbance for flow rates less than 2,500 fpm are shown in Figure 1.

Add one duct diameter to the installation requirements shown below for each additional flow rate of 1,000 fpm. These are not ideal locations. It is always best to locate the stations as far as possible from all duct disturbances, with upstream disturbances being the most critical consideration.

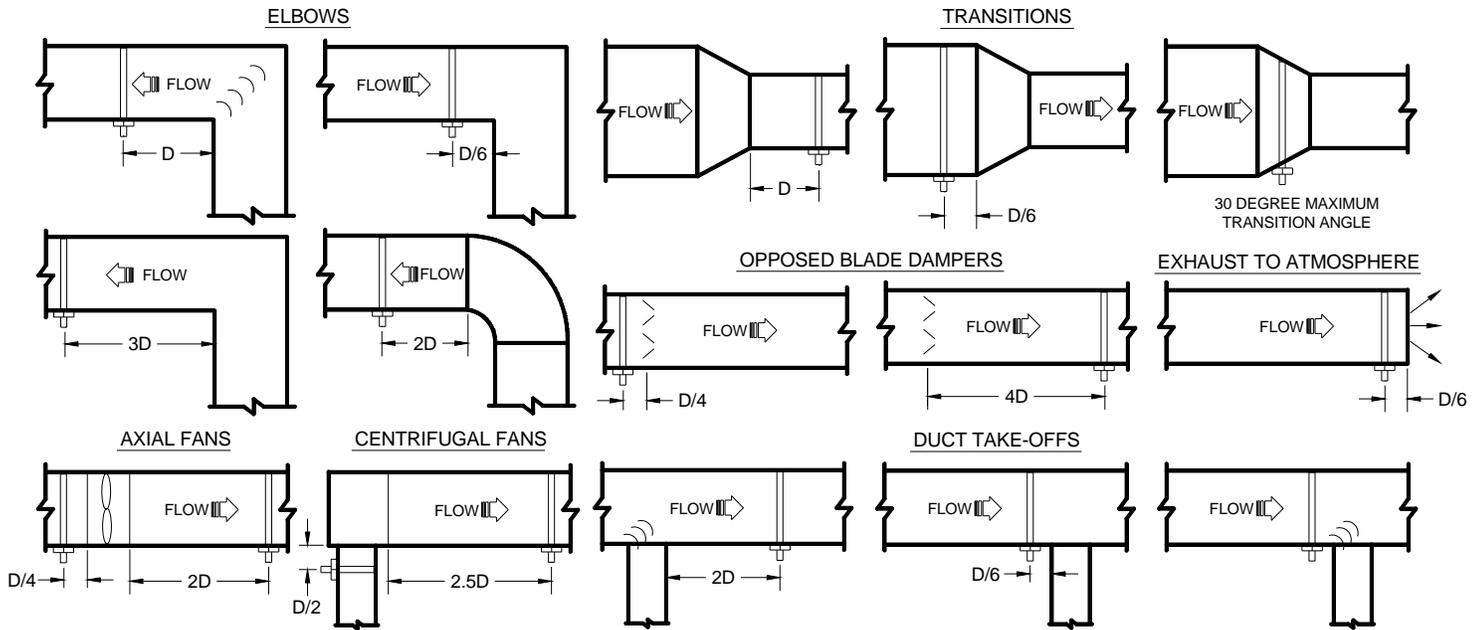


FIGURE 1

Round Ducts:

D = Duct diameter

Rectangular Ducts:

$$D = \sqrt{\frac{4HW}{\pi}}$$

H = Height

W = Width

OPERATION

The MFE-1000 airflow measurement stations produce pneumatic output signals referred to as total (high) and static (low) pressure. These two pressures are piped to a differential pressure sensing device (i.e. magnehelic, transducer, etc.) where the static pressure is subtracted from the total and the result indicated as velocity pressure. This measured differential pressure is equal to the average velocity of the air stream moving through the plane that the flow elements are located in.

This signal can be converted to air volume using the following equations:

$$V = \frac{Q}{A}$$

$$P_v = \left(\frac{V}{C}\right)^2 \times \rho$$

Where:

V = Velocity, in fpm

Q = Flow, in cfm

A = Area, in ft²

C = 1096.7

ρ = Density of air, in lb/ft³

P_v = Velocity pressure, in inches H₂O

MAINTENANCE

Since the MFE-1000 airflow measurement stations have no moving parts, only periodic cleaning may be required. The sensing elements should be inspected for fouling of the sensing holes as part of an annual preventative maintenance program. Installations having viscous airborne particles may require more frequent inspection. If the sensing holes on the elements have become fouled or plugged, the following procedure is recommended.

Caution, all instruments must be isolated (removed) from the sensing lines prior to performing the following cleaning procedure.

Back purging: Connect clean/dry compressed air, set at a maximum pressure of 25 psi, to the output pressure ports (total and/or static) of the sensing element being cleaned. While purging the sensing element, wipe the surface of the cylinder with a cloth or brush to loosen and remove all contaminant buildup.

Cleaning: In applications where the sensing elements are subject to viscous contaminants it is recommended that the surface be washed with a cleaning agent. The cleaning agent used **must** be suitable for use on the type of material the sensing element is constructed of (i.e. aluminum, stainless steel, etc.)

SITE STORAGE, HANDLING, AND SPARE PARTS

The MFE-1000 airflow measurement stations must be stored indoors, in the original shipping package, and in a dry place. Failure to do so may result in internal blockage of averaging chambers due to dust migration and/or insect infestation. Although the airflow measurement stations are not fragile by design, care must be taken not to damage or disfigure the cylinder surface when handling and installing.

Particular attention must be given to the surface areas in which sensing ports are located. The airflow measurement stations come as a complete fabricated assembly. **No spare parts are required.**

