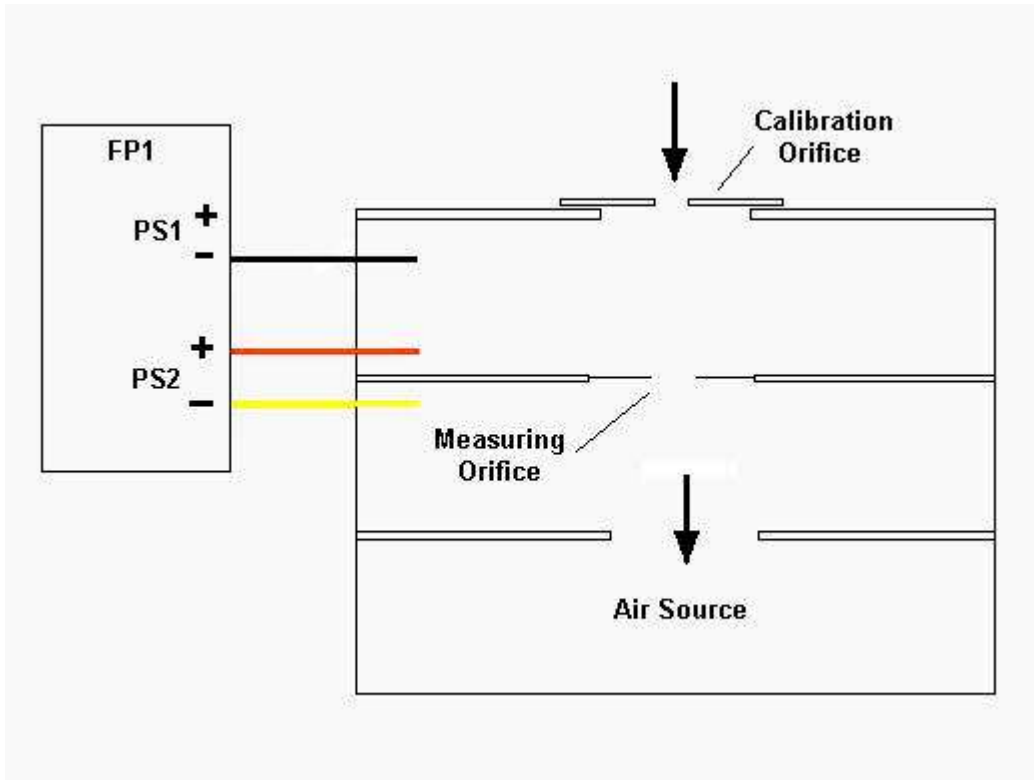
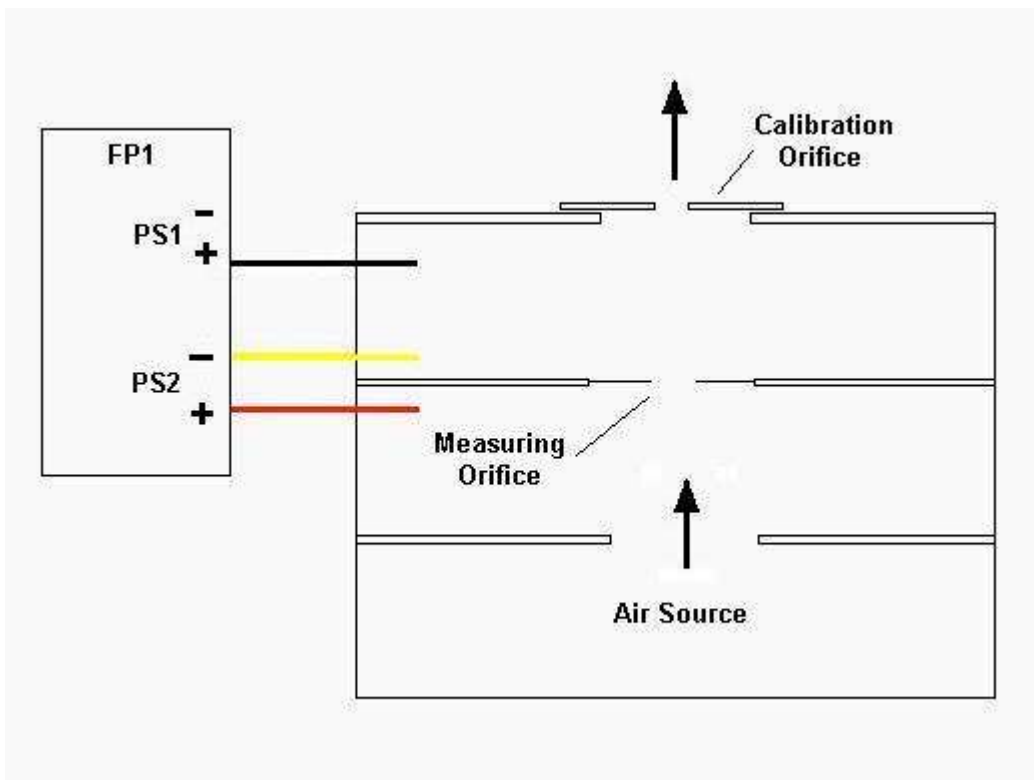


Flow Performance FP1

Orifice Bench Install and Calibration



The above diagram shows how to connect the FP1 to an orifice style bench for intake mode.



The diagram above show how to connect the FP1 to an orifice style bench for exhaust mode.

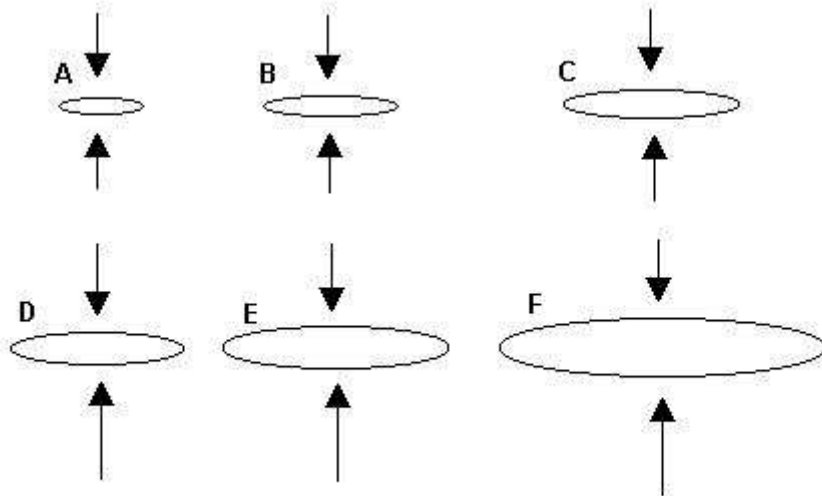
Orifice Bench Install and Calibration

The FP1 allows 6 orifice ranges calibrated to one Cd (Coefficient of Discharge) each, or 3 orifice ranges calibrated for bi-directional use for higher accuracy. You assign the orifices a letter, A - F, and each orifice also has an assigned Cd, G through L.

A Cd (Coefficient of Discharge) is how efficient the orifice is at allowing air to pass through it, and is expressed as a number. A Typical Cd for a sharp edge orifice is between 0.59 and 0.75.

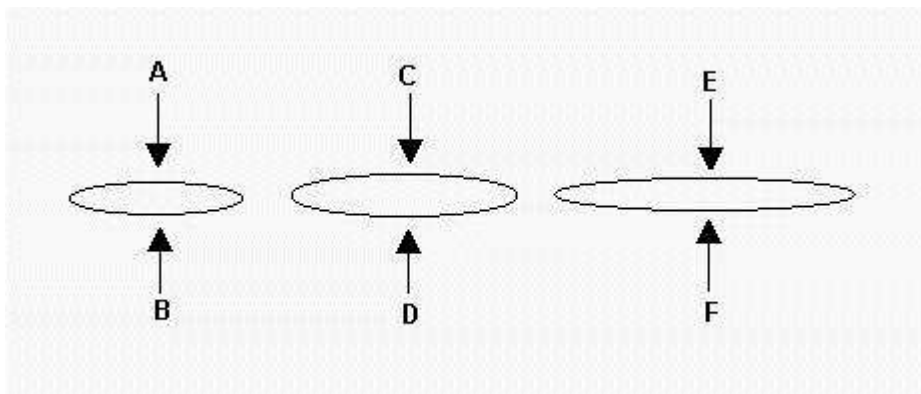
Single Cd Calibration

For 6 ranges using a single Cd for both directions of flow, or for single direction use, you assign each orifice a letter as shown below. Then you determine an average Cd for both directions of flow for each orifice.



Bi-Directional Cd Calibration

For higher accuracy in bi-directional flow, you can assign 3 orifices a Cd for each direction by assigning each orifice 2 letters, as shown below. Then a Cd can be assigned each orifice in each direction of flow.



Orifice Bench Install and Calibration

Orifice	Size	Cd	Cd Value
A		G	
B		H	
C		I	
D		J	
E		K	
F		L	

The chart above is used to record your orifice sizes and their associated Cd values. For instance, orifice A has an associated Cd, G. Orifice B has an associated Cd, H.

Record your orifice sizes, in inches in the chart above. You determine their Cd value by the calibration process.

Calibration Process for Orifice Style Benches

Versions 3.16.32 and later, Make sure that e is set to 0 (zero). This sets the FP1 to orifice measuring mode.

For orifice A intake mode, enter the orifice A size into the FP1 in inches (Enter A [RETURN], enter diameter of orifice [RETURN])

Connect FP1 to bench in intake mode as shown in previous diagram.

Place calibration orifice on test port of bench, sharp edge leading to air entry.

Place FP1 to mode 1, CAL A, (Enter M [RETURN], A [RETURN], m [RETURN], 1 [RETURN]).

Make sure y is set to 0.0 (Enter y [RETURN] enter 0 [RETURN]).

Zero FP1 before applying pressure to bench (z [RETURN]).

Bring test pressure up to recommended test pressure for calibration orifice (Typically 28 inches water).

Adjust the Cd for orifice A (G is the Cd for orifice A) (.62 is a good number to start with) until the SCFM readings on the FP1 match the number on the calibration orifice. Example: G [RETURN] .62 [RETURN]. Enter a lower number to lower the reading of the FP1, increase the Cd number to increase the reading on the FP1. Observe new reading from the FP1 and continue adjustments of Cd until FP1 reports correct reading.

FP1 Versions 3.16.32 and later, you can enter the System-On calibration mode by entering the c command. This places the FP1 into System-On calibration, where you can bump the Cd for the current orifice selection, up or down with the + or - keys. You must press the RETURN key after entering a + or -.

Orifice Bench Install and Calibration

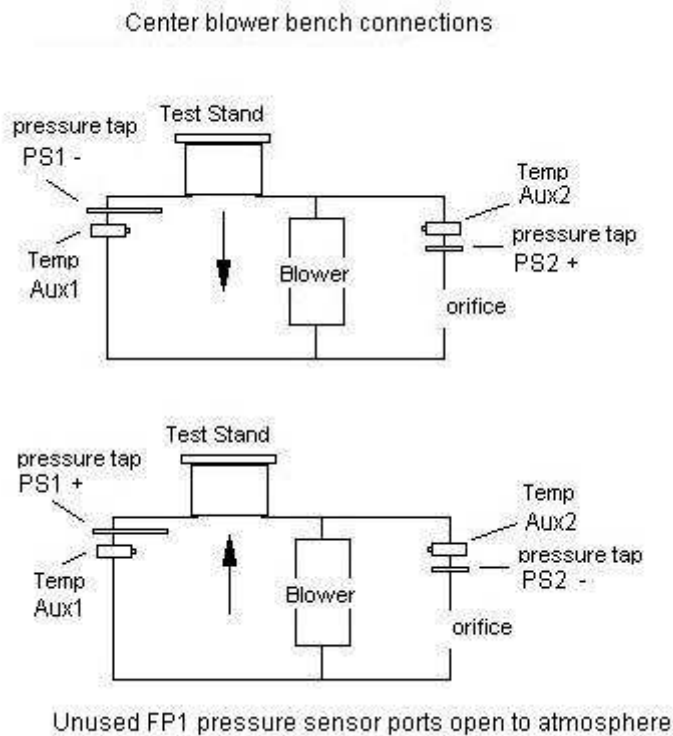
The FP1 will adjust the Cd, take a flow reading and wait for either another adjustment or the RETURN key to return to normal flow rate measuring.

Record the final Cd in the chart above for your future reference.

Repeat process for each orifice (B, C, D....).

Center Blower Bench Connections

If your orifice flow bench has the air source located between the discharge port and the metering orifice, connect the FP1 as shown below.



Multi-orifice Calibration

If your orifice style flow bench uses multiple orifices or combinations of orifices that are used simultaneously, you will need to set up calibrations for these orifice combinations. For instance, if you have 3 orifices open for flow metering, then you will assign a calibration (A – F) for this combination of orifices.

This requires you to calculate the area of each orifice, then add these areas together, then calculate the diameter of this area. This total diameter is then entered for that calibration. To do this, you need to calculate the area of each orifice, then determine the diameter of the sum total area:

$$\text{Area of an orifice} = 3.1416 * (\text{Diameter} * \text{Diameter}) / 4$$

$$\text{Diameter of a round area} = \text{SQRT}((\text{Area} / 3.1416)) * 2$$