
TOPIC: Is the Output in Volume (CFM) or Velocity (FPM)?

By Glenn Esser

Frequently the question comes up, is the air measurement station's output a volumetric flow rate in Cubic Feet Per Minute (CFM) or a velocity in Feet Per Minute (FPM) and in reality it is neither and both.

A transducer converts a pressure reading into an electrical signal. A transmitter can do the same thing with some additional math or signal processing to condition the signal output. The output can be either a voltage or a current. When interfacing with an air measurement sensing device it is critical to understand that the output is an electrical signal that is used to represent the airflow.

It can be a 0-10V analog signal or a 4-20mA analog signal. The value of the output goes up and down in response to a measured value.

Cubic Feet per Minute, the volume of air measured in CFM, is equal to a velocity in Feet Per Minute (FPM) through an opening measured in Square Feet (SqFt.)

This formula is shown below:

$$CFM = FPM \times SqFt \rightarrow \left[\frac{ft^3}{min} = \frac{ft}{min} \times ft^2 \right]$$

*If the opening is a one square foot area then CFM = FPM x 1 SqFt;
In this example, CFM = FPM*

The only thing that changes from one air measurement station to the next air measurement station is its size. (Because all air measurement stations are not the same size.)

If the measured airflow is increasing or decreasing, is the size changing or is the velocity changing? **Only the velocity is changing.** How does that effect the airflow measurement or the volumetric flow rate (CFM)? The duct area or free area of the opening is a fixed value. When the area in SqFt is multiplied by the measured velocity in FPM, the output value is returned as the CFM

"What is the scale" should be the question. Then given the size of the duct opening or the free area of the air measurement station, the interface can be configured to show FPM or CFM. FPM and CFM will change at the **same rate**. With an airflow of 50%, both the FPM and CFM will be half of the max possible value.

**The output from the air measurement station represents
BOTH FPM and CFM!**