

TECH TALK

TT-28

July 2006



Using a Digital Airflow Meter

by Dave Fetters

There are at least a dozen airflow meters (also called anemometers or velometers) that are now on the market and relatively affordable to an installer or service technician. These are generally small, hand-held, propeller-type digital meters that read air velocity in feet per minute (FPM). Many are capable of measuring temperature and, by entering the area of a register in square feet, calculating cubic feet per minute (CFM). Accuracy is advertised at $\pm 3\%$ within an airflow range of about 150 – 5000 FPM. Most have large digital

LCD readouts, read in US or metric, and have averaging as well as min/max capabilities. For most residential and commercial work, these meters will measure airflow at the face of grilles, registers, and diffusers to aid in balancing and diagnostics. They can also be used to measure air velocity anywhere in a room to study airflows, look for drafts, and determine throws by looking for the terminal velocity of a supply register.



Illustration from
Universal Enterprises, Inc.
www.ueitest.com

We were curious about these instruments, so we tried a few over the years in our laboratory and compared them to our expensive, calibrated, hot-wire anemometers. In a word, they perform well enough for one to get a good idea of the air velocity. Some are more accurate than others, with accuracy declining toward the low velocity readings. A little experience is helpful in the use of these devices, but does not significantly improve the outcome. More important to proper use is to understand a little about airflow and the expected result, at least within the ballpark!

The single biggest shortcoming that we saw on a consistent basis was in the lack of clarity of instruction manuals. Reading face velocity with these instruments is straightforward. One of the keys to obtaining a good face velocity is by averaging many readings covering the entire face. However, when the instructions say how to obtain CFM, some make a glaring error by asking the operator to enter the free area. Not only that, but the instructions may not clearly state whether this area should be in square inches or square feet.

Anyone following Hart & Cooley's *Tech Talk* newsletters should know by now the $CFM = Velocity \times Area$ relationship that I've mentioned in previous issues—Numbers 8, 14 and 16. The units of the quantities on both sides of the equal sign must be the same. Cubic feet per minute appear on the left of the equal sign. Velocity on the right side is in feet per minute. Therefore, the area must also be in square feet—*effective area* in square feet to be accurate.

We provide the effective area (A_k) in square feet in the performance data for all our products. This is what should be entered into these meters, NOT the free area typically given in square inches (if one can find it at all). We did not find any meter that would accept free area in square inches and convert it internally to the square feet that is required.

Beyond the above, which remains very important for good results, we found the meters to be adequate for the job and certainly better than nothing.



Hart & Cooley, Inc. 800.433.6341 *toll-free*
500 East Eighth Street 616.392.7855 *phone*
Holland, MI 49423 800.223.8461 *toll-free, fax*
info@hartcool.com 616.392.7971 *fax*
www.hartandcooley.com