Application Note

USING AN ALNOR EBT721 BALOMETER FOR AIR FLOW MEASUREMENTS

Figure 1. Alnor EBT721 Balometer

INTRODUCTION

This document describes how the Alnor Balometer EBT721 (Figure 1) is deployed for testing air flow volume within an air distribution system.

Commonly referred to as an 'air flow hood', this tool is a quick and accurate way for measuring flow at supply or return registers, exhaust fans and fume hoods. It is primarily used to balance buildings and verify air flow distribution in buildings. Measurements can be taken at supply or return registers located in the ceiling, wall, or floor intake.

The EBT721 balometer is a multifunction meter, which displays simultaneous measurements of flow and temperature. Options to measure velocity, static pressure, differential pressure, and relative humidity are available using accessories within the kit.

The EBT21 is ideal for low air flow measurement, and units of measurement are given in cubic feet per minute (cfm). Cfm describes the rate at which a volume of air moves in a certain period of time. This model has a measurement range of 25–2500 cfm.

A balometer identifies opportunities to improve air flow distribution within a duct system. It can isolate the source of indoor air quality and comfort issues relating to improper ventilation (low flow at registers and uneven heating and cooling). Another benefit is that this tool directly reads the average air flow rate at a register without the need for multi-point traverses and calculations.

KIT COMPONENTS and GETTING STARTED

The **EBT721 Kit** consists of a 2' x 2' Air capture hood-frame-base kit, with a detachable digital micromanometer. The main components include a nylon hood, base, micromanometer, support rods, and screw top handle.

Figure 2. Temperature and back pressure cables connecting into meter

Hood Assembly:

1) Place the base of the hood onto the floor.
2) Insert one end of the support rod onto the spring loaded bracket in the base of the instrument, and the other end into the corner pocket of the frame of the hood. Follow with all the rods. Note that the support rods always cross as pairs at the front and back of the hood.
3) With all 4 support rods in place, pull the framework up over the rods. The hood should now be upright with the sleeve extension facing forward.
4) Screw the handle onto the topside of the meter casing.
5) Attach the temperature probe cable into the right side of the meter by matching the tip of the plug to the detention receptacle on the meter base. (Figure 1)
6) Attach the smaller back pressure flap switch cable into the meter. This is also located on the right side of the meter base (Figure 1). Note that the flap actuator is located on the left of the meter base which is manually lifted up or down.

Now you are ready to configure the meter for the first reading.

CONFIGURING THE METER FOR *SINGLE* and *BACK PRESSURE* MEASUREMENT MODE.

Configuring the balometer is a two-step process, designed to offer greater accuracy in measurement. The first step of this process is in *Single* measurement mode with *Back Pressure Compensation* "Off". The second step is also in *Single measurement* mode but with *Back Pressure Compensation* "On".

Back Pressure refers to pressure opposed to the desired flow of air in a confined place. Air flow is reduced with the EBT721 due to resistance caused by the fabric of the hood as air passes through it. This affects accuracy in measurement and cfm output at an individual register.

By taking two flow measurements in back pressure "Off " and "On" modes, a cfm correction factor caused by the resistance of the flow hood is identified and then applied to compensate for the loss in cfm.

Step 1 : Measurement in *Single* Mode with *Back Pressure Compensation* "OFF"

Figure 3. Ready Prompt

Figure 4. Single Prompt

The EBT721 enables users to conduct either a single, individual flow measurement or monitor continuous, average measurements. For the two-step process described above, the measurements are to be taken in *Single* mode. The following steps show how to configure the meter to *SINGLE* mode.

1. Click the ON switch **(I/0)**, located on the bottom left side of the meter.
2. The meter will run a quick initialization test and briefly flash *INIT*, followed by a constant *READY* digital display (Figure 3)
3. Press the return arrow ← to display CHANGE Test ID.
4. Press the right arrow → until SETUP appears
5. Press the return arrow ← again
6. Press the right arrow → until DS.MODE appears
7. Here, you have the option for *SINGLE* or *RUNAVG* mode. (Note that *RUNAVG* means that the micromanometer will measure continuously, and is not applicable to this process). Press the return arrow ← and the current setting will be displayed and briefly flash. Press the up arrow ↑ until *SINGLE* is displayed and flashing (Figure 4).
8. Press the back arrow ←again which will return to DS.MODE and then the **ESC** button on the upper left of the meter to return to SETUP.
9. Press **ESC** which will bring you to the *READY* prompt.

With *READY* on the display panel, the meter is primed for the first measurement.

Taking the First Measurement

Safety Message: When using a balometer to check air flow at a ceiling, make certain that you can safely raise and hold the unit while making the measurement. This is especially important when working on a ladder.

Bring the balometer into contact with the perimeter of the register to be measured. Ensure that the foam lining on the hood frame acts like a gasket to seal the hood's rim to the area around the register (Figure 5).

1. Start with the flap actuator in the "down" position .
2. Initiate the measurement by pressing the red trigger button on the left side of the base (Figure 6) with your

Figure 5. EBT721 in contact with register

Figure 6. Red trigger button location

opposite hand. This trigger has the same function as the **READ** button on the meter, and locks the reading into place so that you can document it.

   a. (Note that it is easier to use the trigger button on the left rather than the **READ** button on the face of the meter, as you must maintain contact against the diffuser while holding the balometer in one hand. Loss of contact will cause measurement error.)

3. Open the flap actuator by lifting the handle up when the *Open The Flap* message appears (Figure 7 next page).
4. Press the trigger or **READ** button again.
5. Listen for a series of up to 8 "clicks" while the unit is taking measurements. Depending on the flow rate, this can take less time, but as a rule low flow readings take longer.

The reading stops automatically when the measurement is completed. Note that it will NOT automatically store measurements into memory without additional steps (refer to manual).

See Figure 8 (next page) for an example of how flow rate and temperature appear on the meter. You can proceed to take a back pressure measurement to identify the correction factor or simply compare this measurement to other register outputs.

Step 2 : Measurement with *Back Pressure Compensation* "ON"

As the rate of air flow is increased, back pressure increases, and cfm is reduced. With high velocity measurements, back pressure errors are more pronounced, particularly when the measurements are greater than 500 cfm. To minimize error in measurement, activate the back pressure compensation by following these steps:

1. Press return arrow ← to display Change Test ID.
2. Press → until Setup appears.
3. Press return arrow ← again.
4. Press → until BP.COMP appears.
5. Press return arrow ← which will show if back pressure compensation is "On" or "Off."
6. Press ↑ to select option "On."

Figure 7. Open the Flap prompt

7. Press return arrow ← to set option "On."
8. Press **ESC** which will bring you to the *READY* prompt.

With *Ready* on the display panel, the meter is primed for the second measurement.

Taking the Second Measurement

1. Follow steps 1-4 as if taking the first reading in *Single* mode with *Back Pressure Compensation* "Off."
2. Close the flap so that it is in the downward position when the *CLOSE THE FLAP* prompt appears.
3. Press the trigger or **READ** button again and wait for the initialization process with the final readout.

With this final step, you have successfully taken a Back Pressure measurement. To identify the cfm correction factor, simply take the difference in cfm values between the two measurements.

Figure 8. CFM and temperature display

Notes On Accuracy:

When measuring same sized supply registers within the same zone, it is necessary to take only one back pressure measurement to compensate for loss in accuracy.

Factors other than back pressure that may affect a balometer's accuracy included environmental conditions at the site; temperature, humidity, atmospheric pressure and even turbulence. These variables should be evaluated at the time of measurement and considered along with back pressure effects for minimizing error.