Advantage SILVER Series by Ebtron

Model STA104-**F**

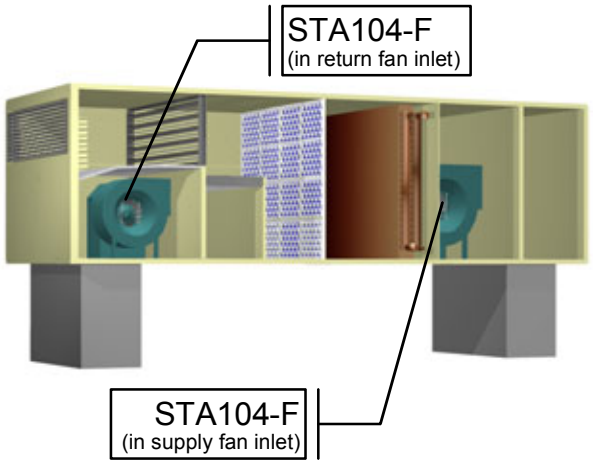
Application Note

STA104F.FANTRACKING.APPNOTE.02

Economy Fan Tracking

Technique

Control building pressure by maintaining the pressurization airflow rate. The pressurization airflow rate is determined by measuring the supply and return airflow rates using STA104-F units in the supply and return fan inlets. The differential is then calculated and maintained by the host control system.



Features

- Mount directly in the fan inlet.
- Adjustable mounting brackets simplifies ordering and installation.
- Infinite turn-down. Measures from 0 to 10,000 FPM.
- Linear output to airflow.

Benefits

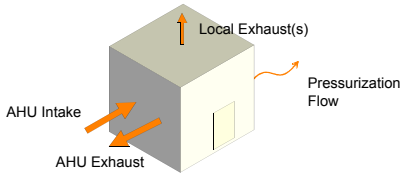
- Limit your IAQ liability by maintaining positive pressure in humid climates, hence minimizing pressure related infiltration and condensation that is a prerequisite to mold growth.
- Reduce energy consumption by properly controlling the return fan speed and building pressure.

Application

Proper building pressure is a prerequisite for IAQ and effective energy management. Building pressure results from generating a pressurization flow through openings in the building envelope (figure 1).

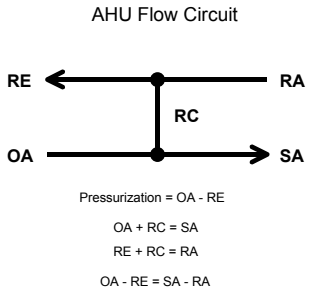
Although the pressurization airflow is equal to the difference between the total building exhaust and intake, the mathematic equivalent (figure 2) is obtained by taking the difference between the supply and return airflow rates and by adding any exhaust that is remote to the air handler (i.e. separate relief fans or local exhausts).

Figure 1



Pressurization Flow =
= AHU Intake - (AHU Exhaust + Local Exhaust)

Figure 2



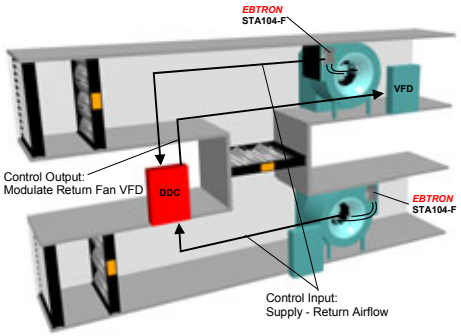
Control Strategy

Modulate the return air fan

Modulate the return fan to maintain the fixed differential between the supply and return airflow measuring stations. When an active control strategy is in place to control the outside air and/or recirculation air damper AND there is no relief at the air handler (i.e. the relief damper is closed during the minimum outside air mode), either use the minimum outside airflow measuring station signal to maintain the fixed differential to avoid a control conflict or set the return fan to a predetermined minimum speed or discharge pressure.

EBTRON
Thermal Dispersion Airflow Measurement
1663 Hwy. 701 S., Loris, SC 29569 USA
Toll Free: 800-2EBTRON (232.8766) Fax: 843.756.1838
Internet: www.ebtron.com e-mail: ebtron@ebtron.com

Control Schematic



Product Selection

Select model **STA104-F** fan inlet probes for the supply and return fans. Fan inlet probes have adjustable mounting brackets and only the nominal inlet diameter is needed to order the device. See the ***STA104-F Technical Data*** sheet for ordering information.

Installation

Remove any inlet vanes or guides in the fan inlet cone prior to installation. Follow the installation instructions provided in the ***STA104-F Technical Data*** Sheet for installation in fan inlets.

Setup & Operation

Set the output scale of the **STA104-F** to a value at least **20% greater** than the actual maximum velocity to be measured in accordance with the ***STA104-F Technical Data*** sheet (Max. FPM = Max. CFM / Free area of inlet where the airflow station is mounted). Setting the output greater than 20% above the actual maximum velocity or using the default setting of 10,000 FPM will not affect overall performance. The airflow rates are determined using one of the following methods.

Method 1: Using *EBTRON* Factory Calibration
The installed accuracy for the **STA104-F** can result in readings between 3% and 10% of reading with no field adjustment. However, obstructions in the fan inlet such as pulleys, belt guards, etc. often degrade the installed accuracy of fan inlet measurement. If the factory calibration is used, select the appropriate full scale (F.S.) reading in FPM and multiply by the free area at the leading edge of the sensor probe to determine the F.S. reading or span in CFM.

Method 2: Calibrate the airflow stations to each other
This is the most practical approach for using fan inlet sensors for fan tracking since repeatability, rather than accuracy, is paramount to a successful fan tracking strategy.

Select the airflow measuring station in either the supply or return fan that has the least obstructions and use it as the reference measuring point. Set the system dampers for 100% recirculation (outside and relief dampers closed, recirculation damper open). Set the supply and return fans to a fixed speed and lock any VAV boxes from modulating. Select the appropriate full scale (F.S.) reading in FPM for each airflow station (both stations should have the same full scale reading). Complete the following worksheet to determine the full scale (span) readings for the host control system.

1. _____ Area of inlet at the leading edge of the reference unit in square feet (subtract the area of obstructions in the fan inlet).
2. _____ Full scale reading of the airflow stations.
3. _____ Multiply line 1 by line 2. **This is the full scale CFM (span) of the reference unit.**
4. _____ Record the output signal of the reference unit.
5. _____ Record the output signal of the unit to be adjusted.

Fill in lines 4a and 5a for 4-20mA Output Only

4a. _____ Subtract 4mA from line 4.

5a. _____ Subtract 4mA from line 5.

6. _____ Divide line 4 by line 5 for 0-10 VDC outputs or line 4a by line 5a for 4-20mA outputs.

7. _____ Multiply line 3 by line 6. **This is the full scale CFM (span) of the unit being adjusted.**

Method 3: Field Setup by a Test and Balance Contractor (TAB)
Determine the airflow rate and **STA104-F** at design conditions in the field for each unit using a certified test and balance contractor. Complete the following worksheet for each unit to determine full scale (span) readings for the host control system.

1. _____ Full scale reading of the STA104-F.
2. _____ Record the output signal of the STA104-F.

Fill in line 2a for 4-20 mA Output Only

2a. _____ Subtract 4mA from line 2.

3. _____ Divide line 2 by 10 for 0-10 VDC output or line 2a by 16 for 4-20mA output
4. _____ Multiply line 3 by line 1.
5. _____ Record the reference CFM determined by a certified test and balance contractor or laboratory test data at design conditions.
6. _____ Divide line 5 by line 4.
7. _____ Multiply line 1 by line 6. **This is the full scale CFM (span) of STA104-F.**

Setup the Host Controller
Use the host control system to calculate the airflow rate using the span calculations above. The output is linear to airflow across the entire range. Maintain setpoint by using the control strategy described in this document.