

Test and Balance Stand-alone Tool

Airflow Test and Balance is a tool for:

- Calibrating airflow sensors in ZN341v+ control modules and ZN line control modules with USF or UDF airflow sensors
- Commissioning VAV boxes
- Overriding reheat and VAV box fans when testing and balancing related systems

To access the control module (also known as the controller) on the Rnet, you connect a laptop running Airflow Test and Balance to the Rnet port of the control module or an RS room sensor.

Any changes you make in Airflow Test and Balance are saved directly to the control module and take effect immediately. When calibration is complete, you will need to notify your Automated Logic Corporation SSP if you made changes so he can upload them to WebCTRL.

Multiple operators connected to different Rnet networks can use Airflow Test and Balance simultaneously. If operators issue different commands for the same equipment, the last command received overrides previous commands.

Airflow Test and Balance controls microblocks associated with an air source, but does not control:

- The air source itself
NOTE Airflow Test and Balance provides static pressure information for the air source if configured by the Automated Logic Corporation SSP.
- Equipment associated with heating and cooling such as chillers and boilers
- U line controls

Contact your Automated Logic Corporation SSP to see if Airflow Test and Balance works with your system.

▼ To connect to the Rnet

You can connect to the Local Access port of an RS Room Sensor or an control module to perform test and balance or to make changes to any device on the network.

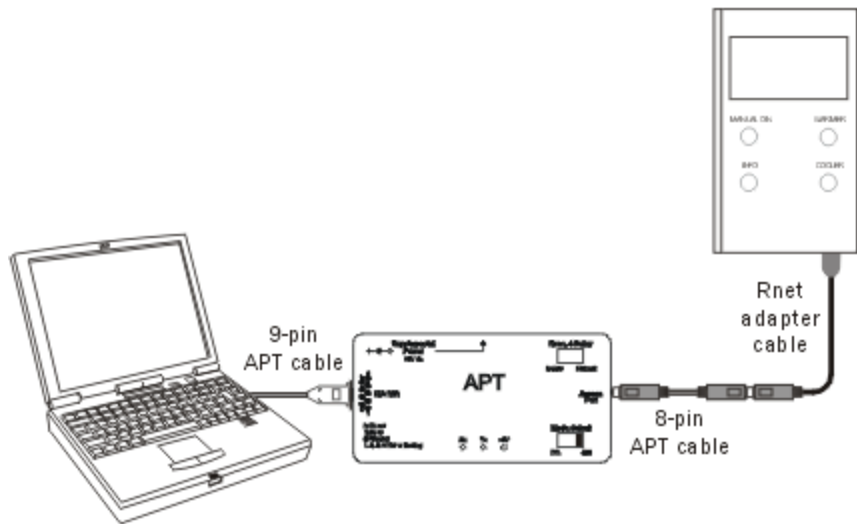
PREREQUISITES

- A computer with an EIA-232 port
- An APT with cables. See the [APT Technical Instructions](#).

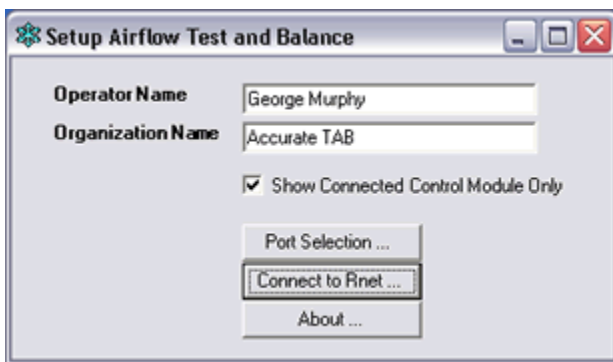
NOTE Contact your Automated Logic Corporation dealer for details and availability of the APT and cables.

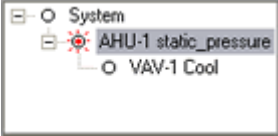
1. Connect the computer to the sensor's **Local Access** port.

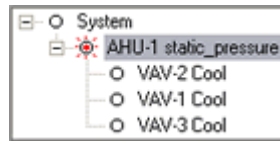
NOTE To insert the cable connector into the sensor's **Local Access** port, first insert the connector's prongs into the port, then tilt the connector downward to insert the rest of the connector into the port.



2. Set the APT's **Mode Select** switch to **485**.
3. Set the APT's **Exec. 4 Relay** switch to **Network**. Double-click the Airflow Test and Balance desktop shortcut.
4. Enter information or use each button as described in the table below.



Field or Button	Notes
Operator Name and Organization Name	The test and balance or commissioning technician's name and company name. NOTE Operator Name and Organization Name are required. This information will be saved to the airflow microblock for reporting.
Show Connected Control Module Only	Select this checkbox to access and show only the VAV box for the control module or sensor that you are connected to. 
	Clear this checkbox to access and show all VAV boxes for the same air source as the control module or sensor that you are connected to.



NOTE If you connect the laptop to another control module or sensor, Airflow Test and Balance adds the equipment it detects to the existing tree.

Port Selection

Click to:

- Select the laptop's serial communications port.
- Select the speed of the Rnet connection. For all ZN, SE, and ME line control modules, use 115.2 K baud.

Connect to Rnet

Click to initiate communications with the Rnet. The next window shows the connection status in the lower left corner.

▼ Calibrating an airflow sensor

To calibrate an airflow sensor, you issue damper commands to move the damper to a desired state, then enter field measurements and associated airflow sensor readings into a calibration table.

▼ To calibrate an airflow sensor

1. Select the VAV box in the tree.
2. Select the **Test and Balance** tab.

Test and Balance		Locks and Status	Design Setpoints
Damper Position (% open)		0	Flow Setpoint 0 cfm
Current Damper Command		Automatic	Current Flow 2 cfm
* non-optional	Damper Command	Measured Flow	Sensor Reading
1 *	Zero Flow	0	0
Auto-zero complete			
2	Damper Open	0	0
3 *	Cool Max Flow	0	0
4	Occ Min Flow	0	0
5	Automatic		
	Damper Close		
	Heat Max Flow		
<p>Calibrate at least the two non-optional damper positions using table above. More calibrations may be used for greater accuracy. Perform steps in numeric order for best result.</p> <p>Select Damper Command to begin calibration. Wait for "Damper ready..." before measuring.</p>			
Last calibration date: 7/27/2004 1:58:10 PM			
Write to Control Module		Refresh from Control Module	

NOTE If "Lock active..." is shown above the blue text, select the **Locks and Status** tab to check for locks that may affect calibration.


3. Verify that the air moving equipment is off and that flow is zero.
4. Click **Zero Flow**.

NOTE To control multiple VAV boxes simultaneously, see "To issue a damper command for multiple VAV boxes" below.

5. Wait for "Damper ready..." to indicate the auto-zero routine is complete.
6. Click the Damper Command for the next calibration step you want to do.
NOTE 1 and 3 are required (*). Optional steps improve system accuracy. Do these steps in numeric order for best results.
7. Wait for "Damper ready..." to indicate that the VAV is controlling to setpoint.
8. Use a flow measuring hood or other instrument to obtain the total measured flow for the VAV box.
9. Type the total measured flow value into the **Measured Flow** field.

Measured Flow	Sensor Reading
0	0
0	0
0	0
0	0

Current Sensor Reading: 26.85

10. The **Current Sensor Reading** appears. Click  to copy this reading to the **Sensor Reading** field or type a value in the field.
11. Click **Write to Control Module**. Your changes take effect immediately. This action updates the **Last Calibration Date** field.
12. Repeat steps 6 through 11 to perform additional calibration steps.

NOTES

- The third Damper Command for maximum occupied flow shows **Cool Max Flow** for cooling control or **Heat Max Flow** for heating control.
- For **Heat Max Flow**, **Cool Max Flow**, and **Occ Min Flow**, when the setpoint is reached and stable you can select the **Hold damper at current position** field on the Locks and Status page to prevent damper movement while you take flow readings.
- You can repeat a calibration step to further calibrate the airflow sensor.
- Select **Refresh from Control Module** to cancel your changes and reload data from the control module.
- **Damper Position**, **Current Damper Command**, **Flow Setpoint**, **Current Flow**, and **Zero Flow Sensor Reading** refresh every 5 seconds.
- Dual-duct applications show two air sources and two airflow microblocks in a single control module. Because the air sources operate independently and the dual-duct airflow microblocks in the control module operate independently, you must send commands to each microblock. To calibrate the cool-duct airflow sensor for maximum occupied cooling flow, set the cool-duct microblock to control to **Cool Max Flow** and the heat-duct microblock to **Damper Close**. To calibrate the heat-duct airflow sensor for maximum occupied heating flow, set the heat-duct microblock to control to **Heat Max Flow** and the cool-duct microblock to **Damper Close**.
- An airflow sensor only reports air delivered from the air source. To adjust the CFM of variable speed fans in parallel VAV reheat, close the primary air damper.

▼ Damper commands

Damper Command	Action
Zero Flow	Closes the damper, takes a number of flow samples, then sets the zero calibration and enters values in the calibration table. NOTE This process may require an upload to WebCTRL.

Damper Open	Opens damper fully and enables the Damper Open calibration fields.
Cool Max Flow	Moves the damper to achieve maximum cooling flow setpoint. Calibration fields apply only if the primary use of this damper is cooling.
Occ Min Flow	Moves the damper to achieve minimum occupied flow setpoint and enables the Occ Min Flow calibration fields.
Automatic	Returns control of the damper to the control program. Use this command when you have completed test and balance.
Damper Close	Closes the damper. There is no calibration associated with this mode. A number of dampers may be closed to account for diversity designed into the system.
Heat Max Flow	Moves the damper to achieve maximum heating flow setpoint. Calibration fields apply only if the primary use of the damper is heating.

▼ **To issue a damper command for multiple VAV boxes**

1. Select the air source in the tree.

The screenshot shows a software interface for issuing damper commands. The title is 'AHU-1 static_pressure_1' with a value of '1.19 in. WC'. Below the title, there is a checkbox labeled 'Apply damper command to selected microblocks.' and a 'Select all' button. A table lists microblocks and their current damper modes. Below the table are several buttons for issuing commands: Zero Flow, Damper Open, Damper Close, Cool Max Flow, Occ Min Flow, Heat Max Flow, and Automatic.

Microblock	Damper Mode	Status
VAV-2 Cool	Automatic	
VAV-1 Cool	Automatic	
VAV-3 Cool	Automatic	

The right pane lists the microblocks for all the VAV boxes served by the air source.

The Damper Mode column shows the previous damper command issued to each microblock. The Status column either shows the current damper status or is blank to indicate the damper is in Automatic mode.

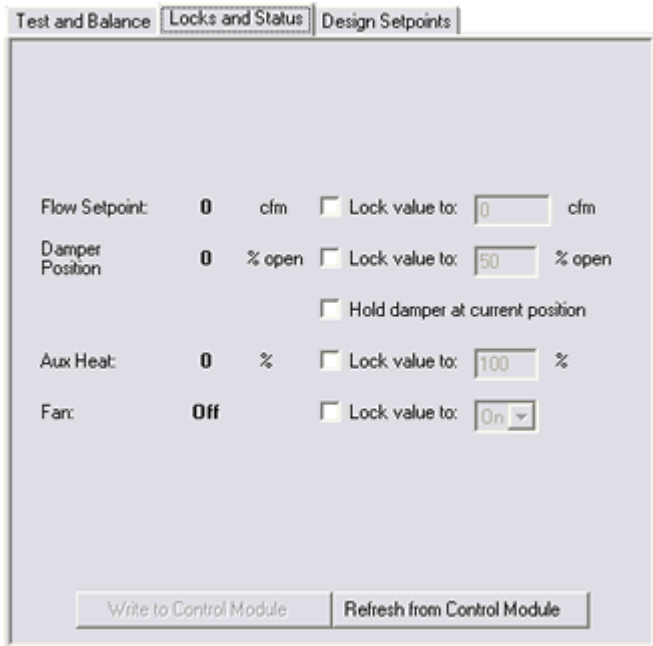
2. Select the microblocks you want to issue a damper command for. Use Shift-click, Ctrl-click or **Select All** to select multiple microblocks.
3. Click a damper command button. The Status Column shows "Damper moving...", then "Damper ready...".

NOTE The Status column and present value of the air source update approximately every 15 seconds.

▼ **To view, lock, or unlock a microblock's property values**

Locks are the highest priority test and balance control, so they override damper commands or damper holds. Use locks to simulate system operation for test sequences outside normal test and balance procedures.

1. Select a VAV box in the tree.
2. Select the **Locks and Status** tab to see the microblock's current values. These values refresh every five seconds.



3. To lock a property to a specific value, select the property's checkbox. See table below.

NOTE To unlock a property value, clear its checkbox.

4. Enter the desired value in the field after **Lock Value to**.
5. Click **Write to Control Module** to send lock data to an airflow microblock.

NOTE Select **Refresh from Control Module** to cancel your changes and reload data from the control module.

Property	Notes
Flow Setpoint	This lock applies only if the damper is attempting to control flow.
Damper Position	This lock overrides the flow setpoint lock.
Hold damper at current position	Locks the damper at its current position.
Aux Heat	Use to position reheat valves while balancing hydronic systems.
Fan	May be used to simulate series VAV operation.

▼ **To view or change setpoints**

1. Select a VAV box in the tree.
2. Select the **Design Setpoints** tab to see hardware information and the current setpoints. See table below.

Test and Balance
Locks and Status
Design Setpoints

Primary Use	cool	
Flow Sensor Type	internal	
Damper Actuator Type	internal	

Cooling Maximum Airflow	<input type="text" value="125"/>	cfm
Heating Maximum Airflow	<input type="text" value="125"/>	cfm
Occupied Minimum Airflow	<input type="text" value="75"/>	cfm
Unoccupied Minimum Airflow	<input type="text" value="0"/>	cfm
Aux Heat Minimum Airflow	<input type="text" value="0"/>	cfm
Flow at 1"WC	<input type="text" value="450"/>	cfm

Write to Control Module
Refresh from Control Module

3. Type in new values as needed.
4. Click **Write to Control Module** to send setpoint changes to the airflow microblock.

NOTE Select **Refresh from Control Module** to cancel your changes and reload data from the control module.

Setpoints	Description
Cooling Maximum Airflow	Maximum airflow allowed for cooling
Heating Maximum Airflow	Maximum airflow allowed for heating
Occupied Minimum Airflow	Minimum airflow while system is operating in occupied mode
Unoccupied Minimum Airflow	Minimum airflow while system is operating in unoccupied mode
Aux Heat Minimum Airflow	Minimum airflow while auxiliary heat is active. This provides some protection against damage to heating equipment resulting from insufficient airflow.
Flow at 1"WC	From VAV manufacturer's performance data, this value provides default control while the sensor is not calibrated.

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