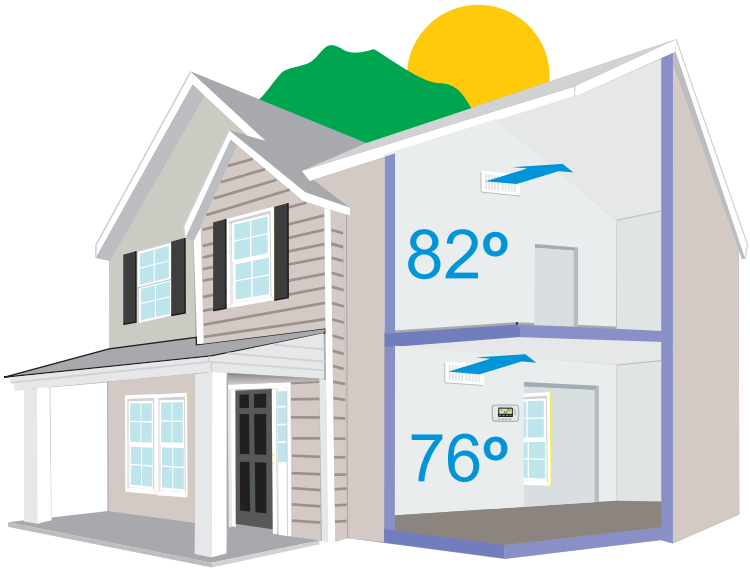
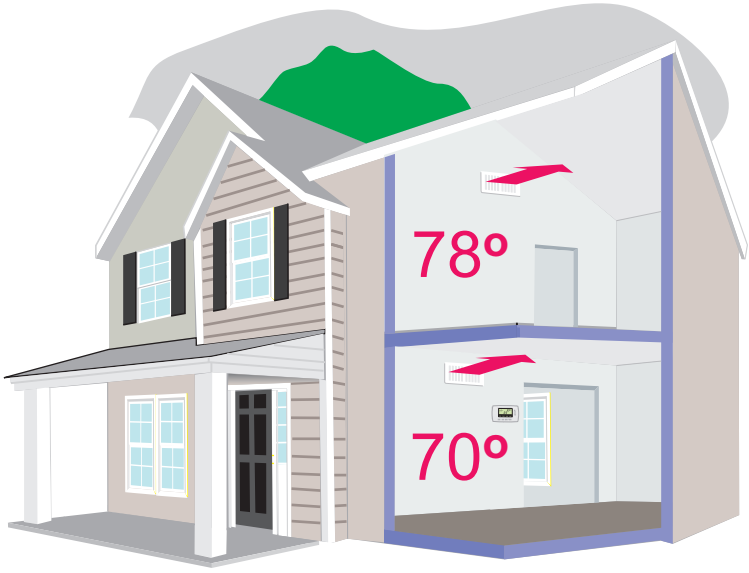
Comfort365 Technical Description

A thermostat in a 2-story home can control the heating and cooling system but cannot control the airflow to the upstairs and downstairs spaces. This is done by the duct sizes and generally a compromise of the heating and cooling loads.

Most often in the cooling season the upstairs is much warmer than the downstairs and in the heating season the downstairs is colder than the upstairs when the loads are high. If the occupant lowers the thermostat in cooling to make the upstairs comfortable, the downstairs is over-cooled, too cold and energy is wasted.



The same thing happens in heating. Raising the heating setting makes the downstairs comfortable but the upstairs is over-heated.



The Comfort365 solves this by controlling the heating and cooling call like any other thermostat and by controlling the airflow to the upstairs and downstairs using modulating dampers and a temperature sensor upstairs.

The Comfort365 constantly adjusts the airflow to maintain uniform temperatures throughout the home. The airflow is adjusted based on the temperature difference between the upstairs and downstairs. The occupant can override the automatic operation at any time and set more or less airflow to the upstairs or downstairs.

The Comfort365 Touch thermostat has a large, easily read LCD with white backlighting and controls the modulating dampers and monitors the upstairs temperature sensor to adjust the airflow upstairs and downstairs. The Comfort365 does not change the airflow or the temperature of the air passing through the equipment and does not require any kind of bypass as used in typical zoning systems. The equipment operates at its design conditions with no effect on the efficiency of the HVAC equipment.

A wired solution is available for RNC with wired dampers. A wireless solution is available for the replacement market. All at a cost 23% - 52% lower than zoning and easier to install.

The non-WiFi model can be easily upgraded to WiFi by unplugging the non-WiFi model from the subbase and plugging in the WiFi model.

Night Setback

The Comfort365 has scheduled operation with night setback to conserve energy. Optionally, the user can elect to have the thermostat use the upstairs temperature sensor, rather than the sensor in the thermostat, to control heating and cooling calls and automatically direct more airflow upstairs saving even more energy by not conditioning the downstairs when it is not being used.

Airflow Limits

The installer can easily determine the maximum allowable airflow upstairs and downstairs in heating and in cooling using the Test Mode. This ensures the airflow stays within an acceptable range and doesn't cause annoying noise levels when airflow is increased to the upstairs or downstairs.

Airflow Control

The Comfort365 operates in either Automatic or Manual airflow control. In Automatic mode the Comfort365 adjusts the airflow based on the downstairs and upstairs temperatures. In Manual mode the user can adjust the airflow and direct more airflow upstairs or downstairs.

The user also has the ability to override the Automatic mode and direct more airflow to where it is needed at the time. After four hours, the thermostat returns to normal operation.

Temperature Offset

The user can select maximum degree difference between the upstairs and downstairs temperatures. The airflow is not adjusted until the difference between the upstairs and downstairs temperatures exceeds the limit.

Comfort365 System

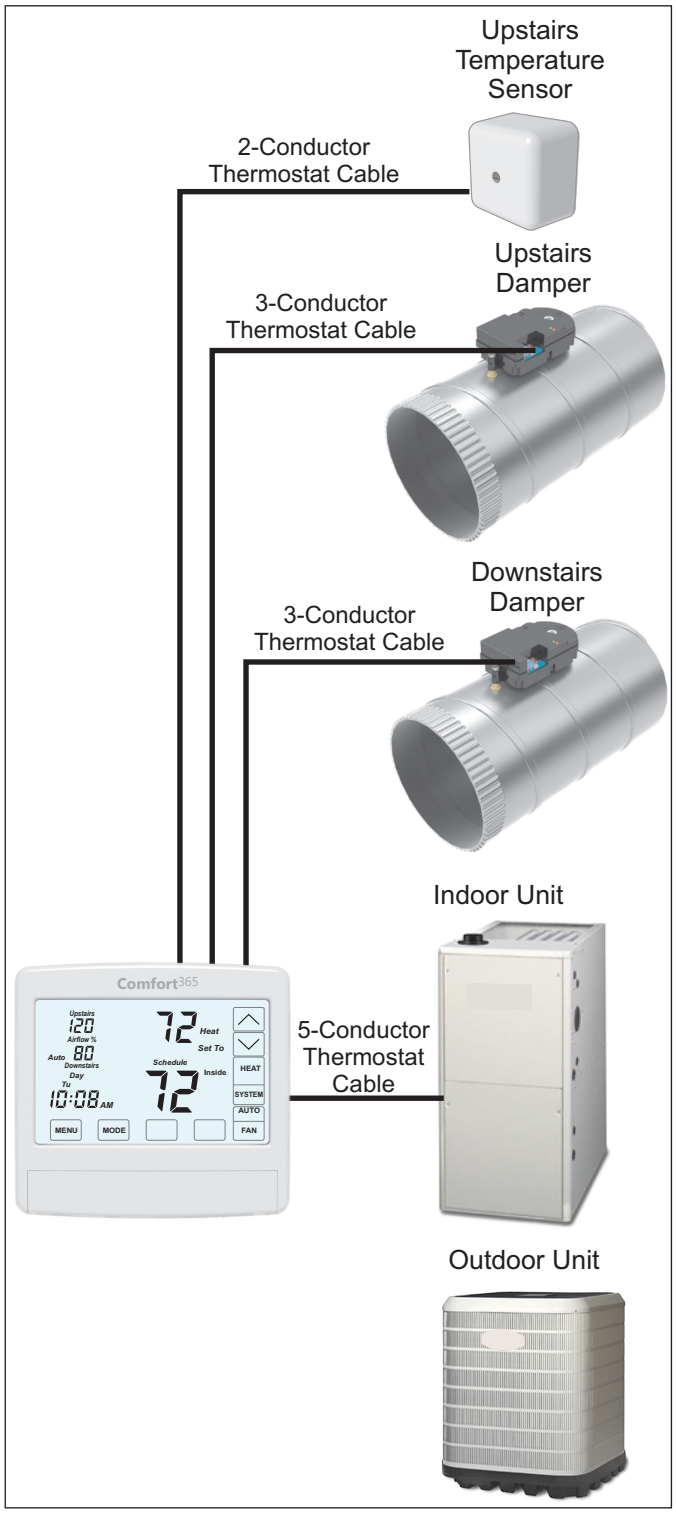
The installation consists of the Comfort365 thermostat installed downstairs using the existing wiring to the equipment, a temperature sensor installed upstairs and two modulating dampers that control the upstairs and downstairs airflow. There is no zoning panel, bypass duct or barometric damper.

The Comfort365 is available in a wired version for RNC and a wireless version for change-out or upgrade installations. Both versions operate the same.

Comfort365 Wired Installation

The wired installation uses a 2-conductor thermostat cable to connect the upstairs temperature sensor to the Comfort365 thermostat. The upstairs and downstairs dampers are connected to the Comfort365 thermostat with 3-conductor thermostat cable.

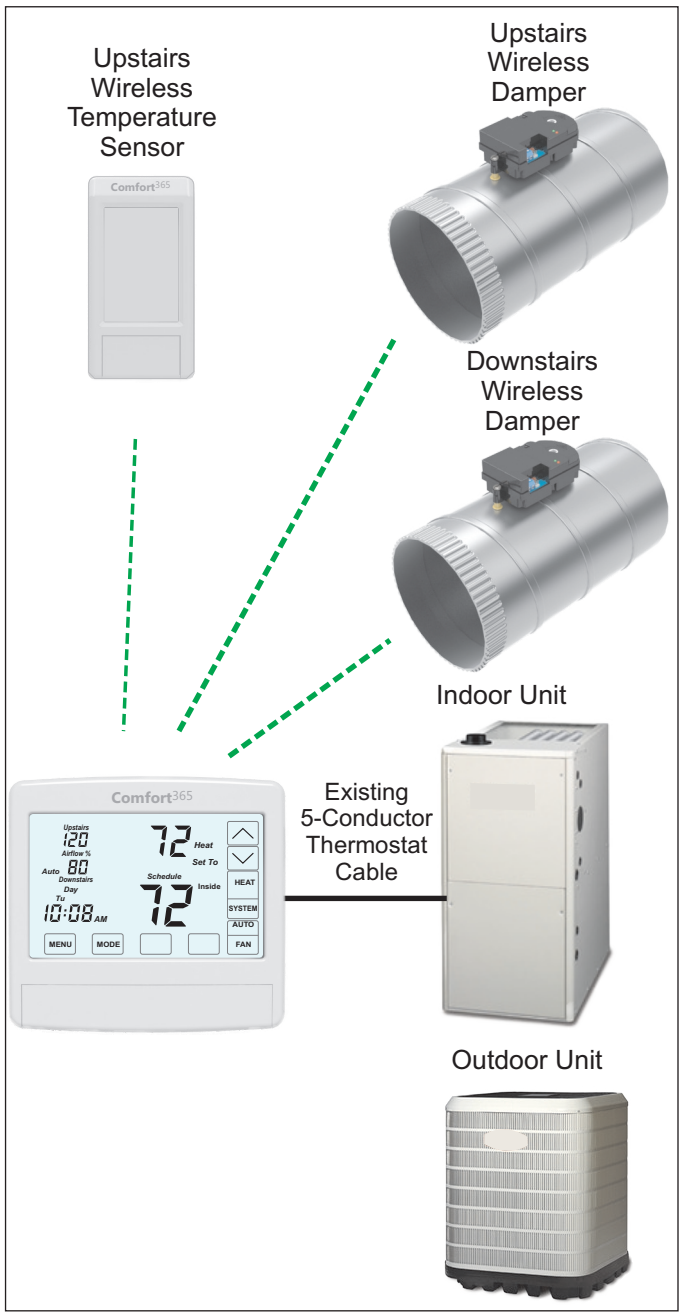
The equipment is connected with 5-conductor thermostat cable. The wired installation is shown below.



Comfort365 Wireless Installation

The wireless installation uses a wireless, battery powered temperature sensor upstairs and wireless damper actuators. This eliminates the difficult problem of installing wires from the Comfort365 to the upstairs sensor and the dampers. The dampers must be powered by 24VAC from the HVAC equipment or a separate transformer.

The equipment is connected with existing 5-conductor thermostat cable. The wireless installation is shown below. The components use the ISM radio 915MHz band and are FCC certified. They have a range of 100-150 feet in a home and use a secure transmission to ensure adjacent Comfort365 systems do not interfere with one another.

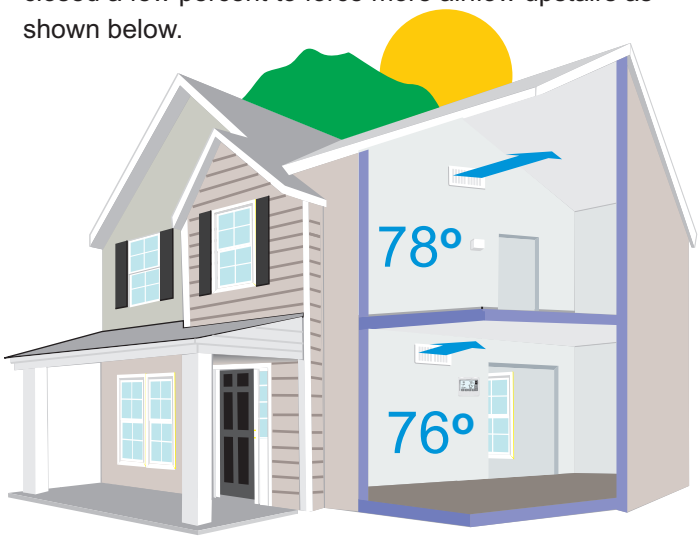


Comfort365 Operation

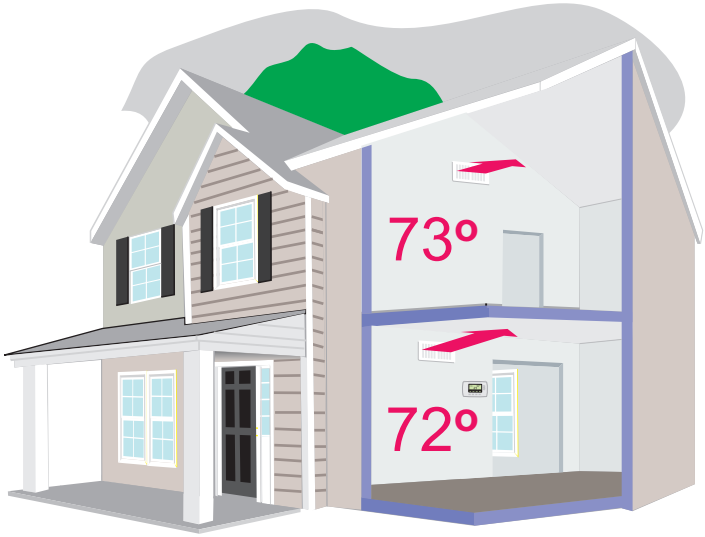
The Comfort365 thermostat monitors the downstairs temperature using the temperature sensor in the thermostat and the upstairs temperature using the upstairs temperature sensor. Heating and cooling calls are based on the setpoint temperatures and the downstairs temperature.

During heating and cooling calls, the thermostat monitors the difference in the downstairs and upstairs temperatures and periodically adjusts the damper positions if the temperature difference exceeds the allowed differential set by the user.

In the cooling season more airflow may be required upstairs and less downstairs. The downstairs damper is closed a few percent to force more airflow upstairs as shown below.



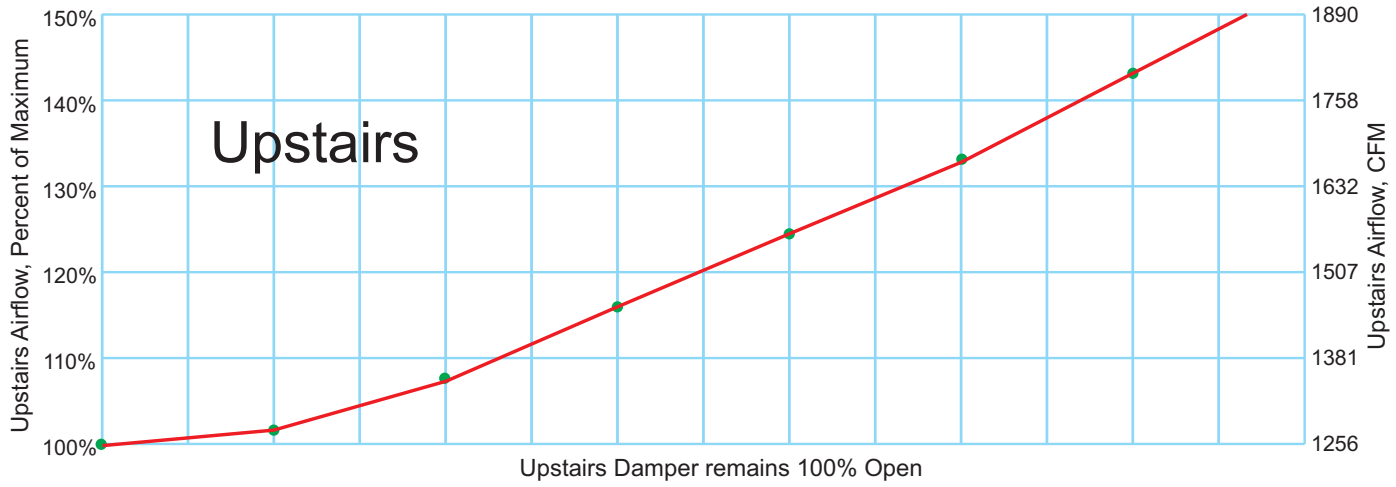
In the heating season more airflow may be required downstairs and less upstairs. The upstairs damper is closed a few percent to force more airflow and heat downstairs as shown below.

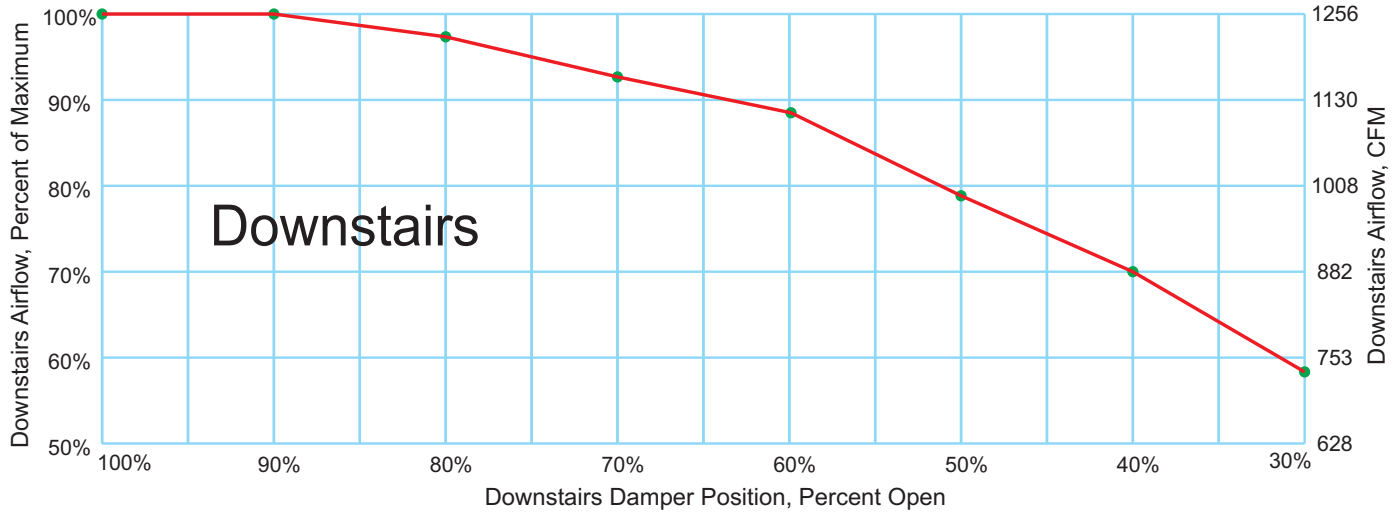


Airflow Test Data

The test data below is from a test on a Carrier 5-ton system with two 16-inch dampers. About 6-feet of duct was used before and after the dampers. Airflow was measured in four places at the ends of the ducts and averaged to compute the CFM. No indoor coil or filter were used. The tests were run at high, medium and low speeds. Test data shows that by modulating one damper, more airflow is directed to the other damper that remains fully open.

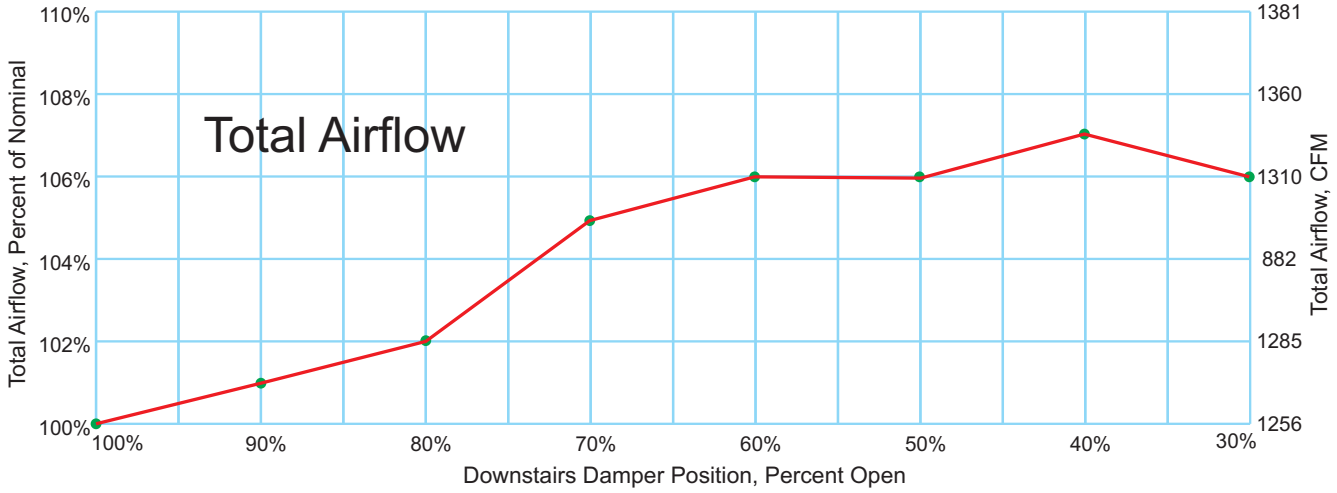
The test data below shows how more cooling air can be forced to the upstairs by modulating the downstairs damper. The same tests were performed using medium and low speeds and the characteristic control was the same although the CFM was different.





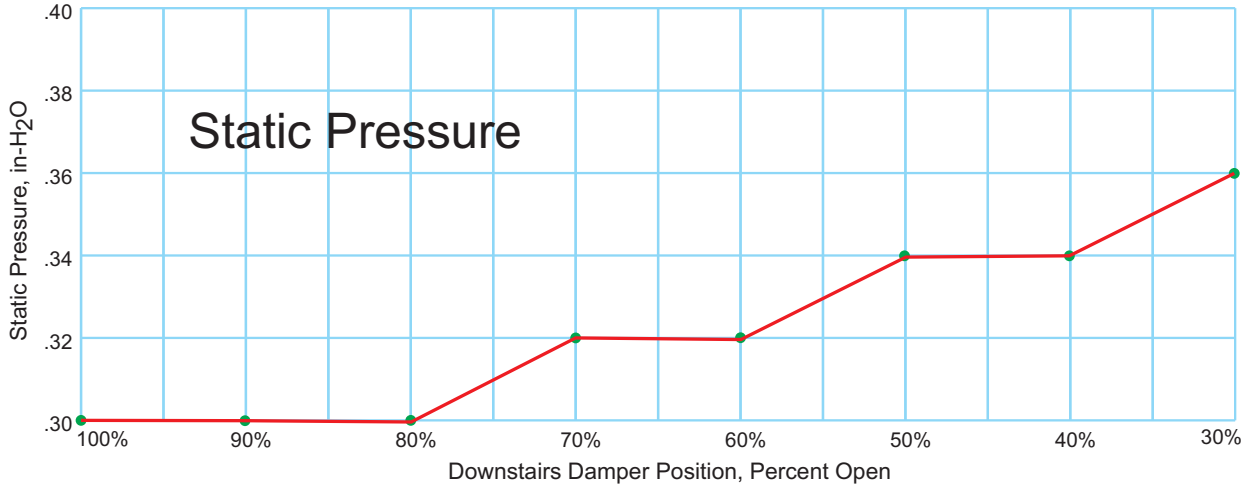
Total Airflow Test Data

The total airflow through the system increased about 7% even though the fan motor speed dropped from 1030 rpm to 1020 rpm as a damper was modulated.



Static Pressure Test Data

The static pressure increased from .30 in-H2O to .36 in-H2O as a damper was modulated.



Comfort365 Thermostat

The Touch thermostat has a large, bright and clear LCD display with two-level backlighting and combines all the features found in high-end thermostats but also includes airflow control using modulating dampers. A temperature sensor is used upstairs to determine the home is being conditioned evenly.

LCD

The FSTN LCD is 9 square inches with high definition characters readable at wide angles.

LED Backlight

Two level backlighting is provided. The high level is on when a key is touched and the low or night level is on in normal operation

Schedules per Day

Four schedules– Morning, Daytime, Evening and Night.

Schedule Format

Weekdays and weekends (5-2) or 7-day format.

Thermostat Modes

Schedule, Hold, temporary Hold and Vacant operation.

System Modes

Off, heat only, cool only or automatic heat-cool operation.

Airflow Modes

Automatic or Manual control.

Airflow Control Range

Up to 150% or the limit set during installation.

Power

Powered by system R and C with two AA batteries for backup to maintain real time clock.

Size

4.67 x 4.27 x 1.07 inches. Color is white.

Thermostat, Wired, Terminals

Model #	Description
C365T11	Gas/Electric Equipment. 1 Stage Heat / 1 Stage Cool.
C365T21	Gas/Electric or Heat Pump Equipment. 2 Stage Heat / 1 Stage Cool.
C365T21WF	Gas/Electric or Heat Pump Equipment. 2 Stage Heat / 1 Stage Cool. WiFi Enabled

Thermostat, Wireless

Model #	Description
C365W21	Gas/Electric or Heat Pump Equipment. 2 Stage Heat / 1 Stage Cool.
C365W21WF	Gas/Electric or Heat Pump Equipment. 2 Stage Heat / 1 Stage Cool. WiFi Enabled.

Wireless communication to sensors and dampers. No wiring from thermostat to sensors and dampers.

Comfort365 Dampers

The dampers use a spiral wrapped shell for strength with an undersized blade for airflow control. Because the dampers never close, they do not have the internal gasket found in many zoning dampers that effectively reduce the damper diameter by 1-inch and restrict airflow when the damper is closed.

Both wired and wireless actuators are available. Wired dampers are available in 3-wire version. Wired dampers use only 2.4VA and are powered from the thermostat. Wireless dampers use 24VAC, 2.8VA and are powered by the equipment R and C or a separate transformer.

Dampers are also available in rectangular configurations, rectangular slide-in and round slide-in configurations.

Round Damper, Wired, Terminals
Compatible with Thermostat C365TXX

Model #	Size
R80CT-10	10” Round Damper
R80CT-12	12” Round Damper
R80CT-14	14” Round Damper
R80CT-16	16” Round Damper
R80CT-18	18” Round Damper
R80CT-20	20” Round Damper

Round Damper, Wireless
Compatible with Thermostat C365WXX

Model #	Size
R80CW-10	10” Round Damper
R80CW-12	12” Round Damper
R80CW-14	14” Round Damper
R80CW-16	16” Round Damper
R80CW-18	18” Round Damper
R80CW-20	20” Round Damper

5-Year Warranty

All products have a 5-year warranty, limited to the repair or replacement of the product due to defective material or workmanship.

Upstairs Wired Temperature Sensor

The sensor is connected to the Comfort365 thermostat with two wires. The sensor is installed directly to the wall using a Euro switch plate or to single gang box.

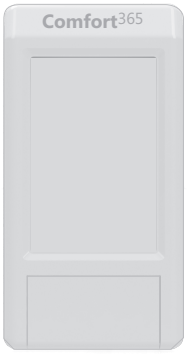
Color is white.

Temperature Sensor, Wired, Terminals
Compatible with Thermostat C365TXX

Model #	Description
TS5-10	For single sensor installations
TS5-20	For dual upstairs sensor installations
TS5-10W	For single sensor installation. Includes wall plate.
TS5-20W	For dual upstairs installations. Includes wall plate.

Upstairs Wireless Temperature Sensor

The wireless sensor is powered by two AA batteries and requires no wiring to the wireless Comfort365 thermostat making installation easy.



Wireless Range
100 to 150 feet in a home.

Wireless Band
915 MHZ, ISM band. FCC certified.

Power
Two AA batteries with 5-year life.

Size
3.00 x 6.10 x 1.10 inches.
Color is white.

Temperature Sensor, Wireless
Compatible with Thermostat C365WXX

Model #	Description
TS5-WL	For single or dual sensor installations

eControls

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