

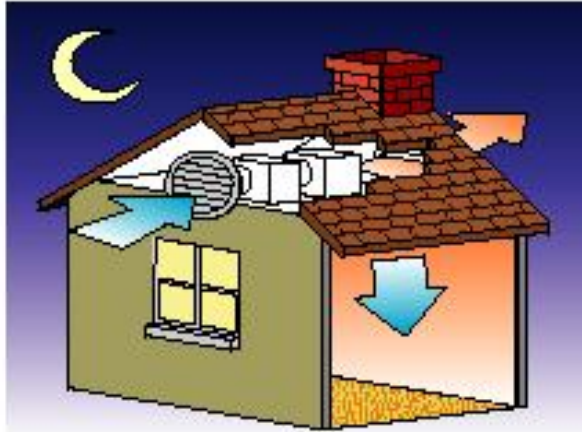


advanced energy products

NightBreeze

Heating, Ventilation, and Cooling System

Owner's Manual



Contents

System Description

How is the NightBreeze System Different?.....	1
How Does Ventilation Cooling Work?	1
What if I Still Need Air Conditioning?	2
How Does the Heating System Work?.....	2

Using the Thermostat

Understanding the Thermostat Buttons and Display.....	2
“Help”	3
Operating Modes.....	3
Operating the Fan Manually	6
Winter Ventilation.....	6
Setting the Clock.....	7

Operating Recommendations

Summer Operation	7
Winter Operation.....	7
Spring and Fall	7

Maintaining Your System

Changing the Filter.....	8
Other Maintenance	8
Advanced Control Settings	8

System Description

What is NightBreeze?

The NightBreeze system was developed by researchers to eliminate the need for air conditioning in mild climates and reduce the size of air conditioners in hotter climates, and to provide improved indoor air quality and comfort. By following these instructions carefully you can insure that you will experience the comfort and energy savings the system was designed to provide.

How is the NightBreeze System Different?

The NightBreeze system heats and cools your house just like any other furnace-air conditioning system, by delivering warm or cool air through ducts to each room. Features that distinguish the NightBreeze from other systems include:

- An automatic damper that allows the house to be ventilated and cooled using filtered outside air, without the necessity to open windows
- A control system that anticipates hot weather and automatically ventilates your house with cool night air to provide optimal comfort while minimizing air conditioner energy use
- A quiet, efficient, variable speed blower that provides just the amount of airflow needed to meet heating and cooling needs
- A furnace that obtains its heat from your water heater instead of from direct gas combustion, thereby improving household safety
- A thermostat that is easy to use and provides built-in “help”

How Does Ventilation Cooling Work?

On summer evenings in many areas of the country people open windows to ventilate their homes with outdoor air, both to obtain natural cooling and to remove stale air. The cool air absorbs heat from warm interior surfaces and furnishings. In the morning windows are closed and the cool surfaces absorb heat during the day, keeping the house cool and comfortable. Houses with more massive walls and floors store this “coolth” more effectively. The lower the temperature the house reaches at night, the more comfortable the house stays during the day.

Managing windows in this manner reduces the need for air conditioning and saves energy, but personal schedules and security concerns may interfere with using windows for ventilation. Also, there may not be sufficient outdoor breezes to adequately flush the house with cool air.

NightBreeze provides ventilation cooling automatically, eliminating the necessity of operating windows (though it is still good practice.) NightBreeze uses the heating/air conditioning system fan to bring in filtered outside air and flush out warm, stale indoor air.

The system also allows you to select the lowest temperature you want the house to reach overnight. As the weather becomes more mild, the system automatically decreases the amount of ventilation to prevent the house from being over-cooled.

What If I Still Need Air Conditioning?

In addition to allowing you to set your lowest acceptable indoor temperature, you can set the highest temperature that you want the house to reach. The air conditioner (if you have one) will operate if the house rises above this high temperature setting. The special thermostat allows you to see whether the air conditioner is likely to operate, given your high and low temperature settings and current weather conditions.

How Does the Heating System Work?

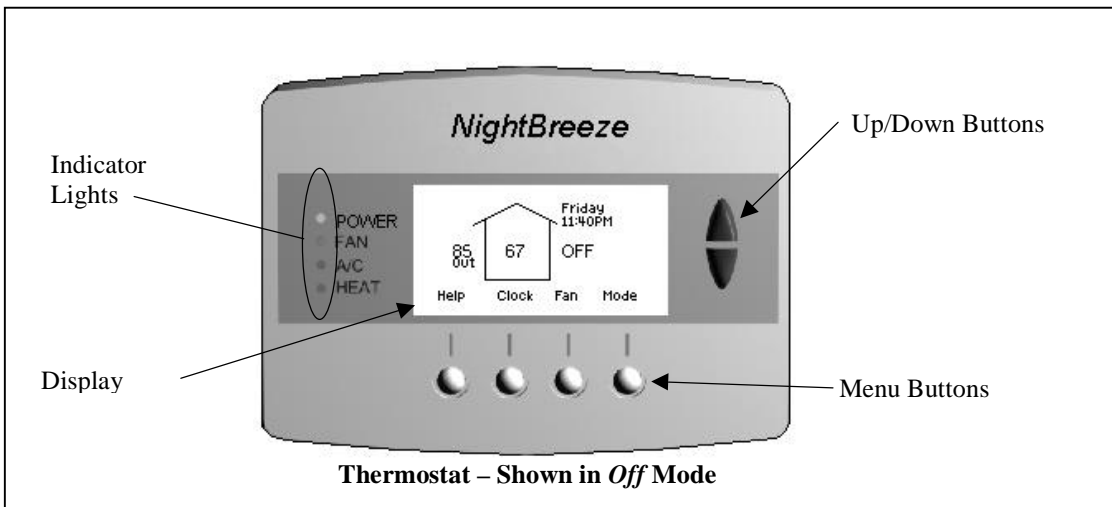
Unlike gas furnaces that obtain heat directly from combusted gas, NightBreeze circulates water from your water heater to a coil that is similar to the radiator in your car. A blower circulates air through the warm coil and into your house. The speed that the blower operates varies with the amount of heating that is needed, and thus it is very quiet. Most of the time you may not even be aware it is running.

Using The Thermostat

Understanding the Thermostat Buttons and Display

There are four buttons along the bottom of the thermostat and two on the right of the display that are used to make temperature and other settings. The functions of these buttons are described by labels on the display. Referring to the picture below, the button on the bottom right sets the operating “mode” (heating, cooling, etc.). These labels may change, depending on what settings are being made. The two up/down buttons on the right side of the display

are primarily used to adjust temperature settings, though they are also used for setting the clock and heating schedule times. The thermostat has four colored lights to the left of the display that indicate what the system is doing. The top (green) light indicates the system is turned on in one of the three modes. The Fan, A/C, and Heat lights tell whether the fan, air conditioner, or furnace are operating, respectively.



The number located inside the house icon on the display screen is the indoor temperature. The temperature to the left of the house is the outdoor temperature. A window in the house icon opens when it is cooler outdoors than indoors, indicating that windows can be opened to ventilate the house in summer. Day of the week and the current time are also shown in the upper right of the display.

Arrows appear on the screen to indicate if the system fan is running. Different arrows are used to indicate whether the fan is recirculating indoor air, or ventilating with outdoor air (see *Operating the Fan Manually* for examples).

“Help”

The left button provides “help” instructions that describe the purpose of each of the other buttons. Help information is accessed by first pressing the “help” button, then the button in question.

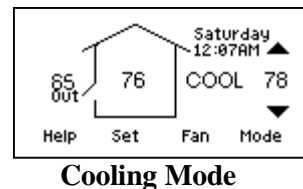
Operating Modes

The NightBreeze thermostat has four operating “modes”: *Off*, *Cool*, *Heat*, and *Vacation*. In *Cool* mode the system will only provide cooling, and in *Heat* mode the system will only provide heating. In *Vacation* mode the system will provide both heating and cooling, if needed. Temperature settings for ongoing daily operation can be changed in *Heating*, *Cooling*, and *Vacation* modes. In either heating or cooling mode you can also override permanent, or “long-term” settings to make temporarily changes to these temperature settings.

OFF mode is used to turn the system off (no heating, cooling, or ventilation), and to access clock settings.

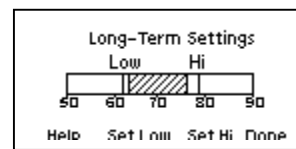
COOL mode is used to maintain summer comfort, either by operating nighttime ventilation cooling only, or using ventilation cooling and air conditioning. To see how to enter *Cool* mode temperature settings, follow the directions below:

- 1) Press the button labeled *Mode* until the following image appears in the thermostat display:



In the above example, the indoor temperature is 76°, the outdoor temperature is 65°, and the number on the right shows that the air conditioner will turn on at 78°. An open window in the house icon indicates it is cooler outside than inside and that windows can be opened for ventilation cooling.

- 2) Press the button marked *Set* to adjust “long-term” temperature settings. The display will appear similar to the figure below.

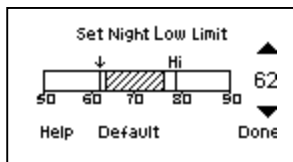


**Cooling Mode
“Long Term” Settings**

The “comfort bar” shows two temperature settings. The “Low” setting is the lowest temperature that the house will be cooled to by ventilation, and the “Hi” setting is your maximum desired temperature, and also the temperature at which the

air conditioner will start (if you have one). The shaded portion of the bar indicates the predicted range of indoor temperatures for the next day.

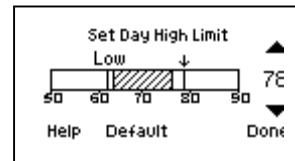
- 3) Press *Set Low*. This allows you to adjust the lowest temperature that you want the house to be cooled to using ventilation. The flashing arrow that appears above the temperature bar in the example below indicates that you can now set the “Low” temperature.



**Cooling Mode
Low Limit Setting**

- 4) Use the two triangular (up/down) buttons to the right of the display to adjust the “low” temperature setting. Note that as this setting is raised (by pressing the “up” button), the predicted temperature range (shaded bar) moves to the right. If the shaded bar crosses the “Hi” setting, the message “AC will run” is displayed, to indicate that your current settings are likely to result in air conditioner operation the following day. As you lower the setting the comfort bar will move to the left and will stop at some point. This is because you cannot cool your house lower than the outdoor air temperature.
- 5) Press *Done* to accept the temperature settings you entered.
- 6) Press *Set High*. This allows you to set the highest temperature you would like the house to attain, which is also the temperature at which the

air conditioner will turn on. Adjust the temperature setting using the up/down arrows. Again, if you lower this “Hi” temperature setting so that it falls within the shaded bar, the message *A/C will run* will be displayed.

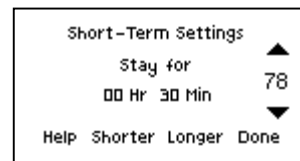


**Cooling Mode
High Limit Setting**

- 7) Press *Done* twice. This returns you to the *Cool* display, and allows the system to operate using the *Long-Term* settings you have made.

The shaded comfort bar will change each day (at midnight) so that it is always predicting the next day’s indoor minimum and maximum temperatures. During cooler weather the comfort bar will shrink, since less nighttime ventilation cooling will be needed to avoid high afternoon indoor temperatures.

Next, try adjusting *Short-Term* cooling settings. This feature is for temporarily raising or lowering the indoor temperature if your *Long-Term* settings are not providing the level of comfort you want at the current time. Press either the up or down button on the right side of the screen - the following screen will appear:



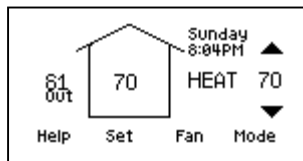
Short-term Settings

Press the up/down buttons again to raise and lower the temperature to the desired setting. The new temperature setting is displayed (78° in the example). Press *Shorter* or *Longer* to decrease or increase the length of time that you want the house to stay at the new temperature (30 minutes in the example). Press *Done* to accept these settings. The displayed temperature setting will blink to indicate that short-term settings are in effect. You may cancel short-term settings by pressing the *Cancel* button once.

HEAT Mode is used to maintain winter comfort. Temperature settings can be entered for each of four different time periods per day. Also, different time and temperature schedules can be set for weekdays and weekends.

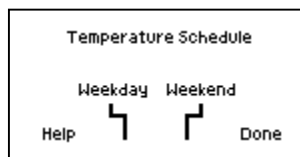
In winter the outside air damper operates only to maintain indoor air quality. The volume of fresh air provided can be adjusted based on the size of the house and/or number of occupants (see *Advanced Settings*).

To select heating mode, press the mode button until *Heat* is displayed. The following screen will appear:



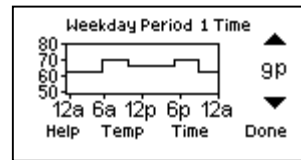
Heat Mode

Press *Set* to change temperatures and time schedules and you will see:



Heating Schedule Options

Press *Weekday* to select the temperature schedule to be used for Monday through Friday. The graph that appears (Weekday Heating Schedule) is a profile of the temperatures at which your house will be maintained, and the times that the temperature will be changed during the day and night.



Weekday Heating Schedule

The temperature for the first time period is indicated by the horizontal line at the far left and right of the graph. In the example above this period is from 10 PM to 6 AM.

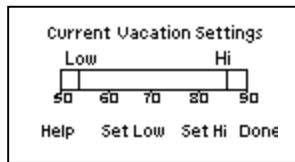
To modify the temperature for the first time period press *Temp*, then press the up/down buttons to adjust the temperature, which is indicated by the graph and also shown to the right of the screen. If you want to increase or decrease the length of time that this temperature is maintained, press *Time*, and adjust the time, also using the up/down buttons. The time will also be displayed both by the graph and by digits to the right of the screen (as shown in the example). Each time you press the *Temp* or *Time* button you will advance to the next time/temperature period. The blinking horizontal or vertical line on the graph shows you which time or temperature you are adjusting. When you have finished setting the temperatures and times for all four periods press *Done* to accept these settings, and *Weekend* to set your heating schedule for weekend days.

You may use the up/down keys, the same as in cooling mode, to temporarily override your usual (long-term) temperature settings. And, as in cooling

mode, you may select the temperature and the length of time you want this temperature maintained.

VACATION Mode is used to set upper and lower temperature limits while you are away for extended periods of time. In this mode the thermostat will use the ventilation system, air conditioner, and heater as needed to maintain indoor temperatures within the selected limits. Wider settings (for example 55° low and 85° high) may completely eliminate furnace and air conditioner use, and will result in lower energy costs.

To use vacation mode, press the mode button until *Vacation* is displayed, then press *Set* and the following screen will appear:



Vacation Settings

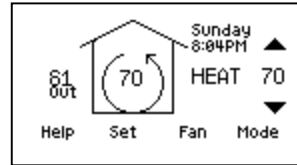
The temperature bar is similar to that used for cooling settings, except that predicted indoor temperatures are not shown.

Press *Set Hi* to set the upper temperature limit and *Set Low* to set the lower temperature limit. Use the up/down keys to adjust the temperature for each setting. To accept your settings and return to the main display, press *Done*.

Operating the Fan Manually

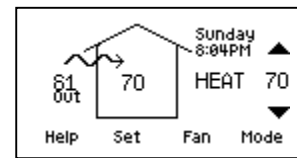
Normally the fan operates automatically, and only while the system is ventilating, heating, or cooling. However, you may manually turn on the fan from any operating mode except *Vacation* by pressing the *Fan* button. If you press the button once, a circular arrow inside the

house icon will blink, indicating that the fan is recirculating indoor air, as shown in the following screen:



Fan On – Recirculating Indoor Air

If you press the fan button a second time, a squiggly arrow will appear, indicating you are ventilating the house with outdoor air, as shown in the screen below.



Fan On – Ventilating with Outside Air

Pressing the fan button a third time will revert to automatic fan operation, or after one hour the fan will return to automatic operation by itself.

Note that these arrow symbols appear any time the fan is operating, but the arrows only blink if the fan has been turned on manually.

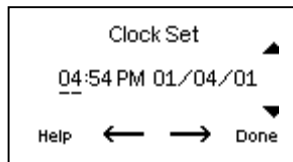
Manual fan operation may be useful if you want to remove indoor odors, or just mix indoor air. The fan consumes energy, so routine manual operation of the fan is not recommended.

Winter Ventilation

To keep indoor air fresh, the fan and damper will operate while the thermostat is set to heating mode to ventilate your house with a small volume of outside air each hour. This volume of air was set by your installer using the Advanced Settings feature of the thermostat. Advanced settings are described in a later section of this manual.

Setting the Clock

The NightBreeze thermostat has a permanent battery that retains clock time through power outages up to several hours. If you want to change the time, for example to adjust for daylight savings time, press the mode button until *Off Mode* is displayed. Then press *Clock*. The following screen will appear:



Setting the Clock

Use the left and right arrow (two middle) buttons to position the cursor (underline) under the hours, minutes, day, month, or year. Use the up/down buttons to the right of the display to modify the time or date. Press *Done* when you have finished, and then press the *Mode* button to return to your preferred operating mode.

Operating Recommendations

Summer Operation

By allowing your house to cool off as much as possible at night you will reduce the amount of air conditioning you will need. The following tips will help you to save energy and stay comfortable:

- Set the low limit temperature to 65° or lower
- Set the high limit temperature to 80°
- Open windows when convenient to assist fan ventilation (but only when the window is open on the thermostat house icon)
- Minimize the use of short-term temperature settings
- Use window coverings to block out the sun during the day

Winter Operation

The following tips will also help you stay warm and comfortable during the winter months:

- Use lower temperature settings for periods when the house is not occupied
- Keep your windows closed and let the system provide fresh air ventilation
- Minimize use of short-term temperature settings
- Use window coverings to keep heat in at night, and open them to allow in heat from the sun during the day

Spring and Fall

Turn off the system and let the house coast, using windows for ventilation when needed.

Maintaining Your System

Changing the Filter

The NightBreeze filter cleans outdoor air that is used to ventilate the house, as well as indoor air that is recirculated. As a result it may require more frequent changing than you are accustomed to. A dirty filter will not appreciably reduce the rate of air delivery to your house, but it will cause the fan to work harder and will increase your energy bill.

For best results, change your filter every 3 months. If you live in an area with a large amount airborne dust or pollens you should inspect the filter monthly and replace it as needed.

The recommended filter for NightBreeze is the 3M Filtrete 1000 or 1250. Filter dimensions are 20" x 30" x 1".

To access the filter, locate your ceiling return air grille. Rotate the two fasteners located on the rim of the grille opposite the hinge (turn counterclockwise), and allow the grille to swing down. Then rotate the two retaining clips holding the

filter cover plate in place and open the cover. Carefully withdraw the filter, install the recommended replacement, and close the filter cover and grille.

Other Maintenance

Besides changing the filter, no other routine maintenance is required. However, you should:

- Keep the outside air intake clear of leaves and other debris
- Take precautions to avoid damage to the outdoor temperature sensor (located near the outside air intake)
- Keep your water heater in good operating condition, since it is the source of heat for the NightBreeze

Advanced Control Settings

Certain control settings were made by your installer to configure the NightBreeze system to the particular conditions under which it was installed.

You may find it useful to access some of these settings to:

- Re-calibrate indoor and outdoor temperature sensors
- Modify the maximum fan speed for ventilation cooling or manual vent.
- Change the fresh air ventilation rate
- Deactivate the air conditioner

To access the *Advanced Settings* menu select *Off* mode, then hold down the up and down buttons at the same time until the menu appears. Refer to the Installation Manual before making any changes to these settings.

