

Natural Ventilation Control, 12/24 V

The Natural Ventilation Control (NVC) is a fully programmable controller that provides extensive flexibility for your curtain or awning control needs. The NVC automatically controls the temperature in a room by operating a curtain machine and heater according to your programmed settings.



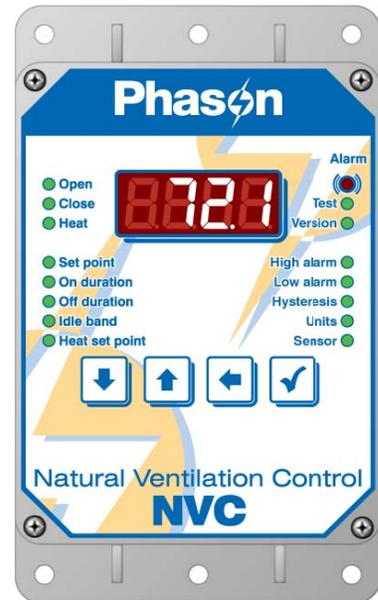
Model **NVC-2-12** is 12 VDC-powered; model **NVC-2-24** is 24 VDC-powered.

Controlling a curtain machine

- ◆ When the temperature is within the **Idle band** of the **Set point**, the NVC maintains the curtain position.
- ◆ When the temperature rises above the **Idle band**, the NVC opens the curtain for the **On duration**, and then pauses for the **Off duration**.
- ◆ After each **Off duration**, the NVC checks the temperature and then either opens or closes the curtain (for the preset duration), depending on the temperature.

Controlling a heater

- ◆ When the temperature is below the **Heat set point**, the NVC switches the heater on.
- ◆ When the temperature is above the **Heat set point**, the NVC switches the heater off.



Quick reference

Accessories and kits21	Features..... 2	Open duration..... 10
Alarm connection.....7	Firmware version 19	Open off (idle) duration 11
Alarm settings overview 13	Heater connection 6	Power connection8
Close duration..... 11	Heater set point 12	Rain sensor 14
Close off (idle) duration 11	High alarm 14	Ratings2
Control layout5	Hysteresis 12	Temperature probe.....7
Control overview3	Idle band..... 11	Temperature test mode 15
Curtain machine connection.6	Low alarm 14	Temperature units..... 14
Curtain set point..... 10	Manual override mode 16	Troubleshooting.....21
Curtain settings overview.....9	Menu..... 4	
Factory defaults 18	Mounting 6	

Features

- ◆ Automatic temperature-based control, with extended temperature range -13 to 125°F (-25 to 51.7°C)
- ◆ Programmable On and Off durations for the open and close relays 1 to 900 seconds (up to 15 minutes)
- ◆ Programmable Idle band 1.0 to 10.0°F (0.6 to 5.5°C)
- ◆ Programmable heater Hysteresis 0.3 to 5.0°F (0.2 to 2.8°C)
- ◆ Programmable High and Low temperature alarms
- ◆ Two curtain relays (one open, one close)
- ◆ Heater control relay
- ◆ Alarm relay (for external alarm system)
- ◆ Four-button keypad
- ◆ Four-character LED display
- ◆ Programming and status LEDs
- ◆ Manual override/test mode
- ◆ Power-failure settings protection
- ◆ Temperature probe, 6 feet extendable to 500 feet
- ◆ Rain Sensor (optional)
- ◆ Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- ◆ Limited warranty (two years)

Electrical ratings

- ◆ **Input power**

Model NVC-2-12	12 VDC, 250 mA
Model NVC-2-24	24 VDC, 125 mA
- ◆ **Open/close/heat relays**

12 A at 30 VDC
15 A at 120/230 VAC, resistive load
1/2 HP at 120 VAC, 1 HP at 230 VAC
- ◆ **Alarm relay**

0.4 A at 125 VAC; 2 A at 30 VDC, resistive load
0.2 A at 125 VAC; 1 A at 30 VDC, inductive load



If you are connecting any equipment that exceeds the ratings of the relays, you must install power contactors. For more information, read **Power contactors** on page 22.

Becoming familiar with the NVC

Status LEDs

- Show the status of the relays
- Show which relay is being controlled

- Open
- Close
- Heat



- Alarm
- Test
- Version

Alarm LED

- Shows when there is an alarm condition

Test LED

- Shows when test mode is active

Version LED

- Shows the firmware version

Programming LEDs

- Show which setting is being displayed or programmed

- Set point
- On duration
- Off duration
- Idle band
- Heat set point

- High alarm
- Low alarm
- Hysteresis
- Units
- Sensor

Programming LEDs

- Show which setting is being displayed or programmed

Down

- Scroll down
- Decrease a value



Select

- Select an option
- Accept a value

Up

- Scroll up
- Increase a value

Back

- Go back
- Cancel changes

Main display

The main display shows the temperature and any alarm messages. The main display is what you see when you are not in a menu or settings display.

Here are some things to know about the main display.

- ◆ When a relay is on, the status LED for that relay is lit.
- ◆ When there is an alarm condition, the display flashes between the alarm message and the current temperature. For more information about alarms, read **Alarm settings and conditions** on page 13.
- ◆ When the control is in manual override mode:
 - ◆ **For the curtain**, the **Open** and **Close** LEDs will blink three times and then stay off for one second.
 - ◆ **For the heater**, if the heater is ON, the **Heat** LED will blink three times and then stay ON for one second; if the heater is OFF, the LED will blink three times and then stay OFF for one second.

For more information, read **Using manual override mode** on page 16

Main menu

When you are in the main menu, the display shows the menu items; the LEDs light up to show you which menu item is selected. Press **Up** or **Down** to move through the menu items.

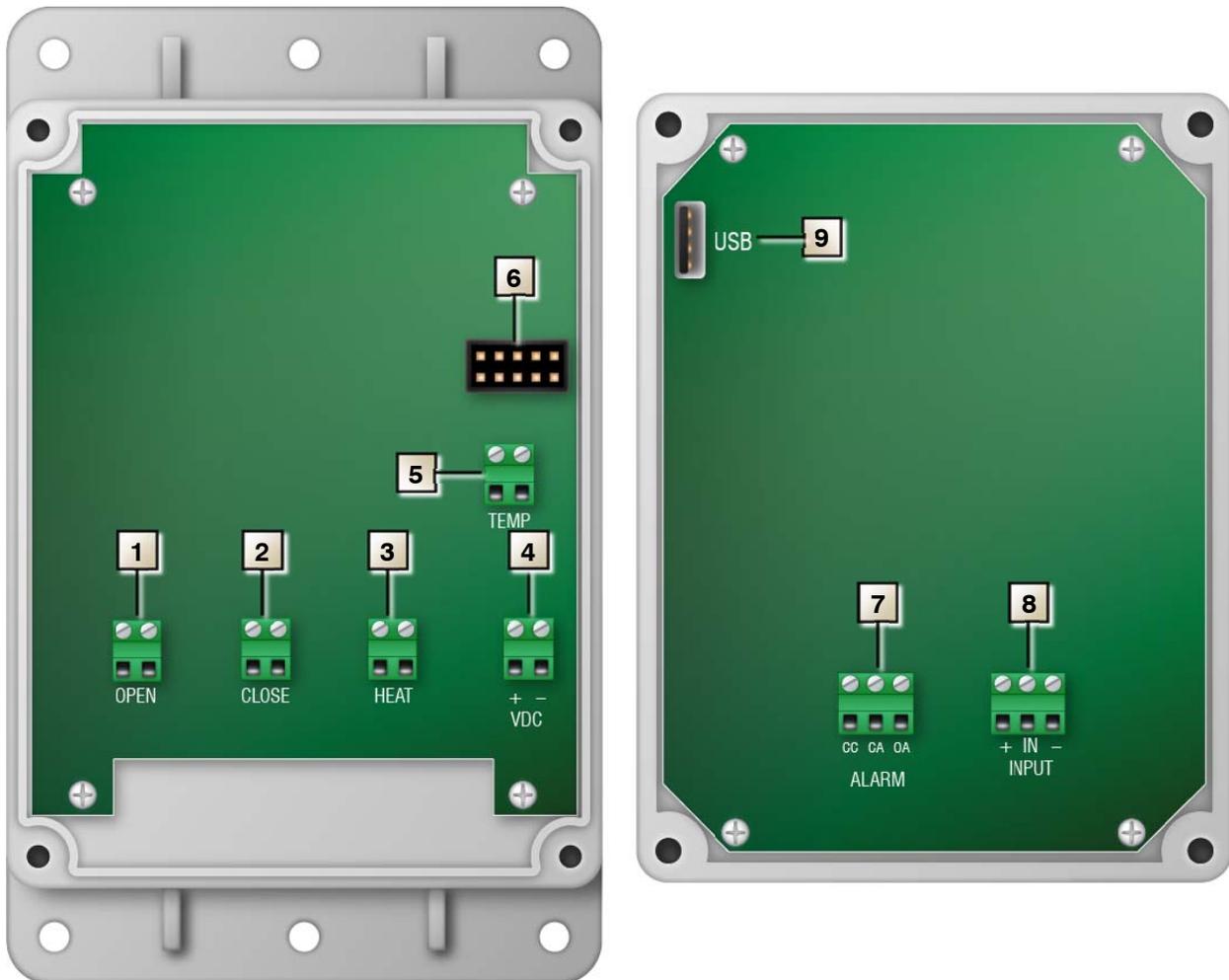
Menu item	Display	Function
Open Close	<i>CURT</i>	Select automatic or manual override (open, close, or idle)
Heat	<i>HEAT</i>	Select automatic or manual override (on or off)
Alarm	<i>ALAR</i>	Switch the alarm relay on or off
Test	<i>TEST</i>	Adjust the test temperature Restore the factory defaults
Version	<i>VER</i>	Display the firmware version Update the firmware version
Set point	<i>SETP</i>	Adjust the curtain set point
Open on duration	<i>ON</i>	Adjust the curtain open duration
Open off duration	<i>OFF</i>	Adjust the open idle duration
Close on duration	<i>CON</i>	Adjust the close duration
Close off duration	<i>COFF</i>	Adjust the close idle duration
Idle band	<i>BAND</i>	Adjust the Idle band
Heat set point	<i>HEAT</i>	Adjust the heater set point
High alarm	<i>HIAL</i>	Adjust the high alarm temperature
Low alarm	<i>LOAL</i>	Adjust the low alarm temperature
Hysteresis	<i>HYS</i>	Adjust the hysteresis for the heater
Units	<i>UNIT</i>	Change between Fahrenheit and Celsius
Sensor	<i>SENS</i>	Enable the optional rain sensor

Installing the NVC



- ◇ Read and follow all instructions when installing the NVC and connecting equipment to it.
- ◇ Read **Electrical ratings** on page 2. Do not exceed the electrical ratings of the control.

NVC layout



- 1** **Open and close relay terminals:** connect a curtain machine to these terminals. For more information, read **Connecting a curtain machine** on page 6.
- 2** **Heater relay terminal:** connect a heater or furnace to this terminal. For more information, read **Connecting a gas-fired furnace or electric heater** on page 6.
- 3** **DC power terminal:** connect the battery cable to this terminal. The terminal label will be 12 or 24 VDC, depending on the model. For more information, read **Connecting the power source** on page 8.
- 4** **Temperature probe terminal:** connect the temperature probe to this terminal. For more information, read **Connecting** on page 7.
- 5** **Display connector:** make sure the ribbon cable from the display is properly connected.
- 6** **Alarm relay terminal:** connect an external alarm system or siren to this terminal. For more information, read **Connecting an alarm system** on page 7.
- 7** **Input terminal:** connect an optional Rain Sensor to this terminal. For more information, read **Phason Rain Sensor** on page 21.
- 8** **USB connection:** connect a USB memory stick to this connector to update the firmware. For more information, read **Updating the firmware** on page 19.

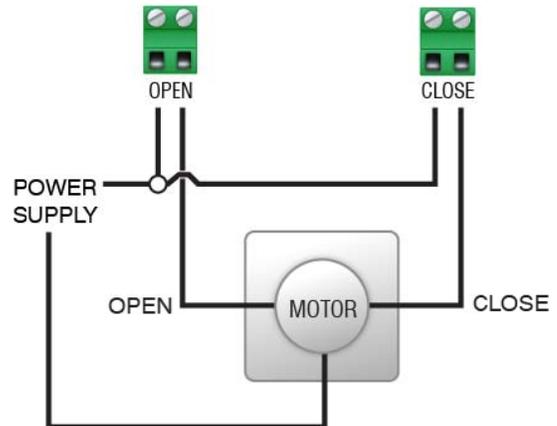
Mounting the NVC

- ◆ Select a location for the NVC. Make sure you have enough cable and wire to reach the equipment you want to control.
- ◆ Remove the screws from the front cover and then gently lift it off.
- ◆ Mount the enclosure to a wall using the four screws provided with the control. Insert the screws into the large holes in each corner of the box and then tighten.

Connecting a curtain machine

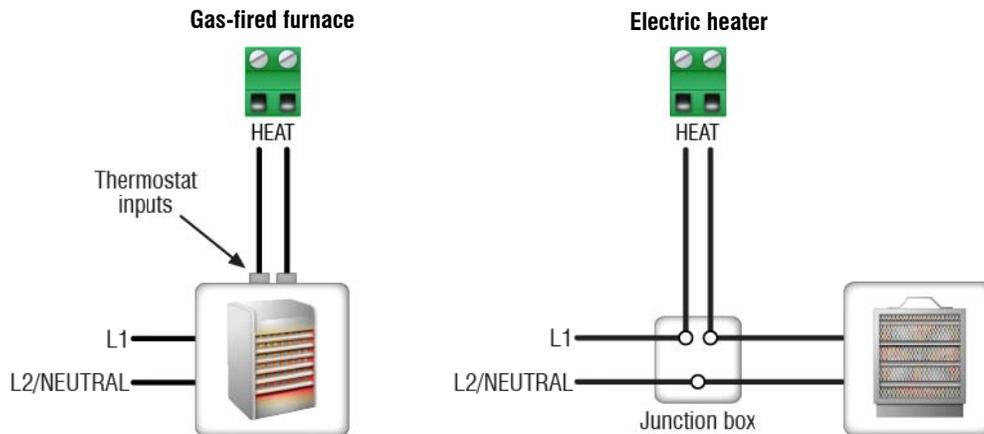
Curtains are usually controlled by equipment called curtain machines, which are sometimes referred to as *winches*.

The NVC opens and closes the curtain to let in more air or less air, the idea being more air cools the building.



Connecting a gas-fired furnace or electric heater

Connect the heater as shown in the following diagram that matches your application.



 Gas furnaces using hot-surface ignition or a glow plug can draw more current than indicated on their nameplate, and require power contactors. For more information, read your furnace manual.

Connecting the temperature probe

Follow the guidelines below when installing and connecting the temperature probe.

- ◆ Do not run the probe cable in the same conduit as AC power cables
- ◆ Do not run the sensor cable beside AC power cables or near electrical equipment.
- ◆ When crossing other cables or power lines, cross them at a 90-degree angle.



Replace damaged probes as soon as possible. If there is no probe present or working properly, the NVC displays either P_d (probe damage) or P_5 (probe short) and switches off the relays.

Connecting an alarm system

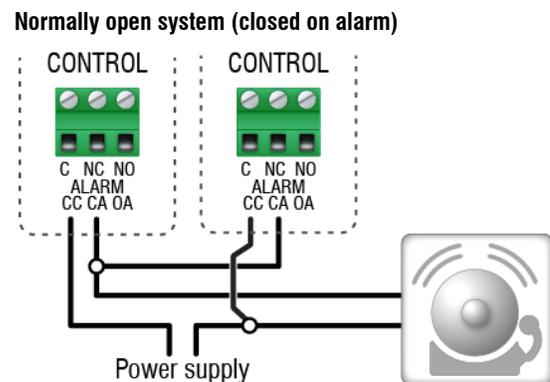
An alarm system can be a siren, an alarm panel, or an auto-dialer. See your alarm siren's installation guide for installation instructions and information about the type of system:

The descriptions for the alarm terminal are as follows: **CC**—common connection, **CA**—closed on alarm, **OA**—open on alarm.

To connect an alarm system

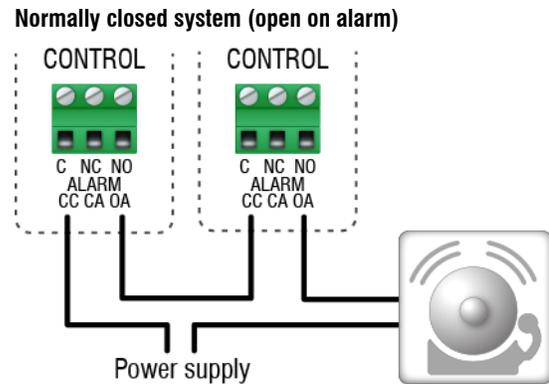
- ◆ If you are connecting the alarm system to a network of controls and your system uses a **normally open** connection (closes on alarm), connect the system as shown in the normally open diagram.

Join all the common (**CC**) connections together and all the closed-on-alarm (**CA**) connections together. The NVC alarm relays must be in parallel with each other so any control can trigger the alarm system when an alarm condition occurs.



- ◆ If you are connecting the alarm system to a network of controls and your system uses a **normally closed** connection (opens on alarm), connect the system as shown in the normally closed diagram.

Join the alarm relays in a continuous loop. The NVC alarm relays must be in series with each other so any control can trigger the alarm system when an alarm condition occurs.

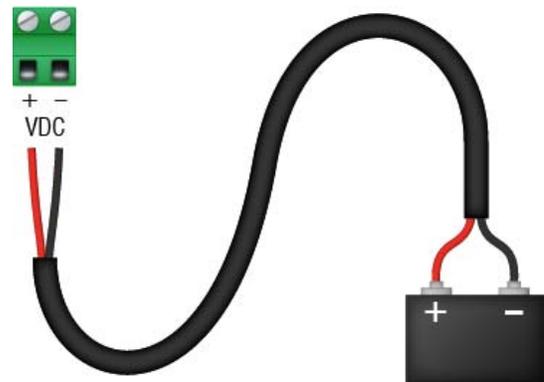


Connecting the power source

DC model NVC-2-12 (12 VDC, 250 mA)

DC model NVC-2-24 (24 VDC, 125 mA)

- 
 - ◇ Before connecting the incoming power, switch OFF the power at the source.
 - ◇ Do not switch ON the power until you have finished all wiring and verified all equipment is properly connected and free of obstructions.



Finishing the installation

1. Make sure all wires are properly connected to the correct terminals.
2. Place the cover on the control.
3. Switch on the power to the NVC; it should display **8888** for three seconds, the version (for example, **v 100**) for three seconds, and then the temperature.
 - ◆ If the display does not light up, go back to step 1.
 - ◆ If the display shows an alarm message, or the LED for Alarm is flashing, press **Select** to acknowledge the alarm. For a list of alarm messages and error codes, read **Alarm messages** on page 13.
4. Test the equipment. For more information, read **Testing and maintaining the NVC** on page 15
5. Fasten the cover to the base.

Programming the NVC

Before you begin programming the NVC, make sure the control has power and you have *properly connected* all equipment to the *correct terminals*.

How the curtain settings work

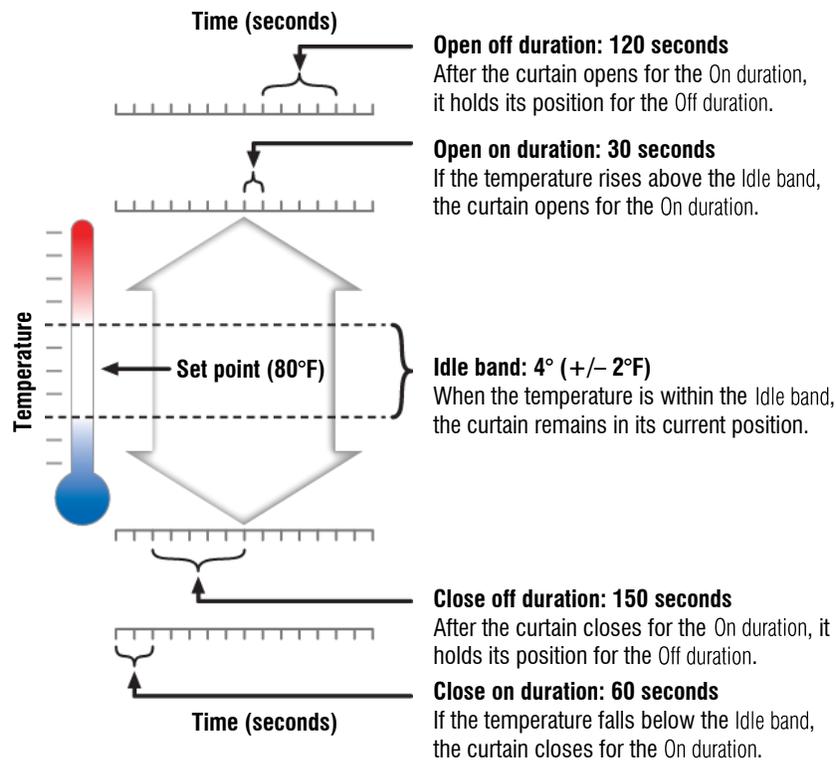
There are six curtain settings.

- ◆ **Set point** – the temperature at which the curtain holds its position.
- ◆ **Idle band** – the buffer around the set point within which the curtain holds its position.
- ◆ **Open on duration** – the duration the curtain opens during the open cycle
- ◆ **Close on duration** – the duration the curtain closes during the close cycle
- ◆ **Open off duration** – the duration the curtain holds its position during the open cycle
- ◆ **Close off duration** – the duration the curtain holds its position during the close cycle

Curtains hold their position while the temperature is within the **Idle band** of the **Set point**. For example, if the **Set point** is 80°F and the **Idle band** is 4°F (+/- 2°), the curtain holds its position when the temperature is between 78°F and 82°F.

If the temperature rises above the **Idle band** (above 82°F in our example), the curtain opens for the **Open on duration**. After opening, the curtain holds its position for the **Open off duration**. If the temperature is still above the **Idle band**, the curtain again opens for the **Open on duration**, and the process repeats.

If the temperature drops below the **Idle band** (below 78°F in our example), the curtain closes for the **Close on duration**. After closing, the curtain holds its position for the **Close off duration**. If the temperature is still below the **Idle band**, the curtain again closes for the **Close on duration**, and the process repeats.



To program the Set point

Default: 70.0°F, range: -13 to 125 (-25 to 51.7°C)

1. Press **Down** until the display shows **SetPt**.
2. Press **Select**.
The current setting (in degrees) displays and the **Set point** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **SetPt**.
4. Press **Down** to move to the **Open on duration**, or **Back** to cancel and return to the main display.

To program the Open on duration

Default: 20 seconds, range: 1 to 900 (up to 15 minutes)

1. Press **Up** or **Down** until the display shows **On**.
2. Press **Select**.
The current setting (in seconds) displays and the **On duration** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **On**.
4. Press **Down** to move to the **Open off duration**, or **Back** to cancel and return to the main display.

To program the Open off duration

Default: 180 seconds, range: 1 to 900 (up to 15 minutes)

1. Press **Up** or **Down** until the display shows **OFF**.
2. Press **Select**.
The current setting (in seconds) displays and the **Off duration** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **OFF**.
4. Press **Down** to move to the **Close on duration**, or **Back** to cancel and return to the main display.

To program the Close on duration

Default: 30 seconds, range: 1 to 900 (up to 15 minutes)

1. Press **Up** or **Down** until the display shows **On**.
2. Press **Select**.
The current setting (in seconds) displays and the **On duration** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **On**.
4. Press **Down** to move to the **Close off duration**, or **Back** to cancel and return to the main display.

To program the Close off duration

Default: 120 seconds, range: 1 to 900 (up to 15 minutes)

1. Press **Up** or **Down** until the display shows **OFF**.
2. Press **Select**.
The current setting (in seconds) displays and the **Off duration** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **OFF**.
4. Press **Down** to move to the **Idle band**, or **Back** to cancel and return to the main display.

To program the Idle band

Default: 2.0°F, range: 1.0 to 10.0°F (0.6 to 5.5°C)

1. Press **Up** or **Down** until the display shows **band**.
2. Press **Select**.
The current setting (in degrees) displays and the **Idle band** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **band**.
4. Press **Down** to move to the **Heat set point**, or **Back** to cancel and return to the main display.

How the heater settings work

When the temperature is below the **Heat set point**, the NVC switches the heater on. When the temperature is above the **Heat set point** plus the **Hysteresis**, the NVC switches the heater off.

For more information about hysteresis and how it affects operation, read **How hysteresis works** below.

To program the Heat set point

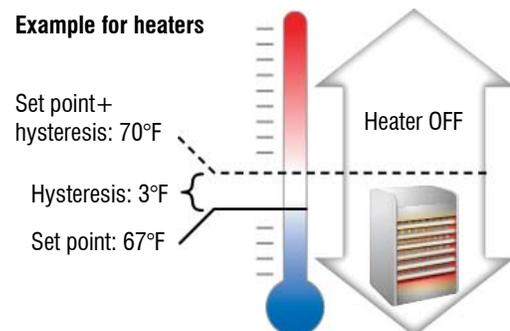
Default: 75.0°F, range: -13 to 124°F (-25 to 51.1°C)

1. Press **Up** or **Down** until the display shows **HEAT**.
2. Press **Select**.
The current setting (in degrees) displays and the **Heat set point** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **HEAT**.
4. Press **Down** to move to the **High alarm**, or **Back** to cancel and return to the main display.

How hysteresis works

Hysteresis is the number of degrees above the set point that a heating stage or relay switches off.

For example, a household thermostat might switch on a furnace at 67°F when the house is cooling down, but switch it off at 70°F when the house is warming up. The difference between these two values is the hysteresis.



To program the Hysteresis

Default: 2.0°F, range: 0.5 to 5°F (0.3 to 2.8°C)

1. Press **Up** or **Down** until the display shows **HYS**.
2. Press **Select**.
The current setting (in degrees) displays and the **Hysteresis** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **HYS**.
4. Press **Down** to move to **Units**, or **Back** to cancel and return to the main display.

Alarm settings and conditions

When there is an alarm condition, the alarm relay activates and the Alarm LED flashes. The display alternates between the ambient temperature and the alarm message.

When the condition goes away, the alarm relay deactivates and the Alarm LED switches off. The display continues to alternate between the temperature and alarm message until you acknowledge the alarm. To acknowledge an alarm, press **Select**.

There are four alarm conditions.

- ◆ **High temperature:** is when the temperature is above the high temperature alarm setting. You can adjust the high temperature alarm from the **Low alarm** value to 125°F (51.7°C).
- ◆ **Low temperature:** is when the temperature is below the low temperature alarm setting. You can adjust the low temperature alarm from -13°F (-25°C) to the **High alarm** value.
- ◆ **Probe short:** is when the temperature probe is shorted (the temperature circuit is closed).
- ◆ **Probe damage:** is when the temperature probe is missing or broken (the temperature circuit is open).



When there is a probe damage or probe short condition, the control switches all relays off.

Alarm messages

Message and description	Possible cause	Possible solution
 High temperature alarm	The ambient temperature is too high. The high temperature alarm setting is too low.	◇ Increase ventilation/cooling. ◇ Increase the high temperature alarm setting. For more information, read To program the High alarm on page 14.
 Low temperature alarm	The ambient temperature is too low. The low temperature alarm setting is too high.	◇ Decrease ventilation/cooling, increase heating. ◇ Decrease the low temperature alarm setting. For more information, read To program the Low alarm on page 14.
 Probe damage alarm	The temperature probe is damaged, missing, or the connecting wire is broken. The temperature probe circuit is open.	◇ Check the wire between the control and the probe. Wire damage can cause the alarm. ◇ Replace or reconnect the temperature probe. The control should recover automatically.
 Probe short alarm	The temperature probe is damaged. The temperature probe circuit is closed.	◇ Check the wire between the control and the probe. Wire damage can cause the alarm. ◇ Replace the temperature probe. The control should recover automatically.

To program the High alarm

Default: 95.0°F, range: **Low alarm** to 125°F (51.7°C), or OFF

1. Press **Up** or **Down** until the display shows **H, RL**.
2. Press **Select**.
The current setting (in degrees) displays and the **High alarm** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **H, RL**.
4. Press **Down** to move to the **Low alarm**, or **Back** to cancel and return to the main display.

To program the Low alarm

Default: 50.0°F, range: -13°F (-25°C) to **High alarm**, or OFF

1. Press **Up** or **Down** until the display shows **LOAL**.
2. Press **Select**.
The current setting (in degrees) displays and the **Low alarm** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **LOAL**.
4. Press **Down** to move to the **Hysteresis**, or **Back** to cancel and return to the main display.

Changing the temperature units

The NVC can display temperatures in Fahrenheit or Celsius. The default is Fahrenheit.

To change the Units

1. Press **Up** or **Down** until the display shows **Units**.
2. Press **Select**.
The current setting (°F or °C) displays and the **Units** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **Units**.
4. Press **Down** to move to **Sensor**, or **Back** to cancel and return to the main display.

Enabling the optional rain sensor

With the optional Phason Rain Sensor installed, the NVC automatically the curtain when rainfall is detected. When the sensor detects rain, it sends a signal to the NVC. When the NVC receives the signal, it completely closes the curtain, bypassing the on and off durations. After 15 minutes with no new rainfall, the NVC returns to normal operation.

For more information, read **Phason Rain Sensor** on page 21.

If you are installing a Phason Rain Sensor, you must enable the sensor input. By default, the input is *not enabled*.

To enable the sensor

1. Press **Up** or **Down** until the display shows **SEN** and the **Sensor** LED is lit.
2. Press **Select**.
The current setting (on or off) displays and the **Sensor** LED flashes.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
The change is saved and the display shows **SEN**.
4. Press **Back** to return to the main display.

Testing and maintaining the NVC

Using temperature test mode

Temperature test mode allows you to test your equipment and settings by simulating the temperature. In temperature test mode, you adjust the “test temperature”.

As you increase or decrease the test temperature, the relays operate according to their settings and the test temperature. This gives you an idea of how your system performs over a full range of temperatures. The relays remain operating according to the test temperature until you exit test mode.



- ◇ When the NVC is in temperature test mode, it operates the equipment according to the test temperature, not according to the measured temperature.
- ◇ The NVC does not exit test mode automatically. When you are finished testing, press **Back** or **Select** to exit test mode.

To use temperature test mode

1. Press **Up** or **Down** until the display shows **TEST**.
2. Press **Select**.
The display shows **TEMP**.
3. Press **Select**.
The **Test** LED flashes and the display shows the test temperature. The NVC is now in temperature test mode.
4. Press **Up** or **Down** to adjust the test temperature.
The NVC operates the equipment according to the test temperature.
5. When finished, press **Back** to return the control to automatic mode. Press **Back** again to return to the main display.

Testing the alarm

You can manually switch the alarm relay on and off so that you can test your alarm system.

To test the alarm

1. Press **Up** or **Down** until the display shows *ALAr*.
2. Press **Select**.
The display shows *OFF* (off) and the **Alarm** LED flashes.
3. Press **Up** or **Down** to change the relay state.
4. When finished, press **Back** to return to the main menu. Press **Back** again to return to the main display.

Using manual override mode

Manual override mode allows you to override the automatic settings and manually control the curtain and/or heater. You can open, close, or pause the curtain, and switch the heater on or off. Manual mode is also useful for testing equipment.

When the main display is showing and the curtain or heater is in override mode:

- ◆ **For the curtain**, the **Open** and **Close** LEDs will blink three times and then stay off for one second.
- ◆ **For the heater**, if the heater is ON, the **Heat** LED will blink three times and then stay ON for one second; if the heater is OFF, the LED will blink three times and then stay OFF for one second.

To override the curtain

1. Press **Up** or **Down** until the display shows *Curt*.
2. Press **Select**.
The *Open* and *Close* LEDs blink rapidly.
 - ◆ If you are in automatic mode, the display shows *Auto*.
 - ◆ If you are in override mode, the display shows *Overd*.
3. Press **Up** or **Down** until *Overd* (override) displays.
4. Press **Select**.
The display shows *IDLE* (idle).
5. Press **Down** to switch between idle/stop and *OPEN* (open), or press **Up** to switch between idle and *CLOSE* (close). Each time you press the button the curtain starts or stops moving.
6. Press **Select**.
The control returns to the main menu and the display shows *Curt*.
7. Press **Up** or **Down** to select a different menu item, or press **Back** to return the main display.



- ◇ There is a three-second delay when switching between Open and Close. This is to allow the motor to stop before switching directions.
- ◇ The NVC remains in override mode until you exit; it does not timeout or exit automatically.

To exit manual mode

1. Press **Up** or **Down** until the display shows the item you want (**Curt** for curtain or **HEAT** for heater).
2. Press **Select**.
The relay LED(s) blink rapidly and the display shows **Overd**.
3. Press **Up** or **Down** until the display shows **Auto**.
4. Press **Select**.
The display shows **Curt** or **HEAT**, depending which item you chose in step 1.
5. Press **Up** or **Down** to select a different menu item, or press **Back** to return the main display.

To override the heater

1. Press **Up** or **Down** until the display shows **HEAT**.
2. Press **Select**.
The **Heat** LED blinks rapidly.
 - ◆ If you are in automatic mode, the display shows **Auto**.
 - ◆ If you are in override mode, the display shows **Overd**.
3. Press **Up** or **Down** until the display shows **Overd**.
4. Press **Select**.
The display shows **on** (on).
5. Press **Up** or **Down** to switch between **on** and **OFF** (off).
6. Press **Select**.
The control returns to the main menu and the display shows **Curt**.
7. Press **Up** or **Down** to select a different menu item, or press **Back** to return the main display.

Restoring the factory default settings

Setting	Default	Range/options
Set point	70.0	-13 to 125°F (-25 to 51.7°C)
Open ON duration	20	1 to 900 seconds
Open OFF duration	180	1 to 900 seconds
Close ON duration	30	1 to 900 seconds
Close OFF duration	120	1 to 900 seconds
Idle band	2.0	1.0 to 10.0°F (0.6 to 5.5°C)
Heat set point	75.0	-13 to 125°F (-25 to 51.7°C)
Low alarm	50.0	-13°F (-25°C) to High alarm
High alarm	95.0	Low alarm to 125°F (51.7°C)
Hysteresis	2.0	0.5 to 5°F (0.3 to 2.8°C)
Units	°F	°F/°C
Sensor	Off	Off/On

You can restore the default settings using one of two methods: the *power on* method or the *power off* method. The *power on* method is the easiest way to restore the factory defaults. If, for some reason, the power on method does not work, use the *power off* method.

To restore the factory defaults using the POWER ON method

1. Press **Up** or **Down** until the display shows **t E S t**.
2. Press **Select**.
The display shows **t E n P**.
3. Press **Up** or **Down** until the display shows **F R C t**.
4. Press **Select**.
The **Test** LED flashes and the display shows **n o**.
5. Press **Up** or **Down** until the display shows **y E S**.
6. Press **Select** to restore the factory defaults.
The control resets, displays the version for a few seconds, and then displays the temperature.

To restore the factory defaults using the POWER OFF method



We recommend having someone assist you if using the power off method.

1. Switch off the power to the control.
2. Switch on the power to the control while holding the **Up** and **Down** buttons. Keep holding the buttons until **d E F** displays.
3. Release the buttons.
The control resets, displays the version for a few seconds, and then displays the temperature.

Displaying the firmware version

Firmware is the internal programming instructions of the NVC. It is much like an operating system or software on a computer. Just like an operating system, the firmware has a version. If you call technical support, the support agent might ask you for the firmware version.

To display the firmware version

1. Press **Up** or **Down** until the display shows *UEr*.
2. Press **Select**.
The display shows *d 15P*.
3. Press **Select**.
The display shows the firmware version and the **Version** LED flashes.
4. Press **Back** twice to return to the main display.

Updating the firmware

At Phason, we constantly improve and add new features to our products. You can the firmware in your NVC as these improvements become available; all you need is a USB memory stick and a firmware update file.

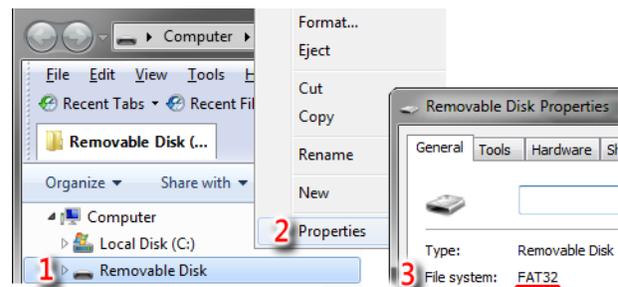
You can update the firmware using one of two methods: the *power on* method or the *power off* method. The *power on* method is the easiest way to update the firmware. If, for some reason, the *power on* method does not work, use the power off method.

Getting a file

You can get a firmware update file from the Phason support forum at www.forum.phason.ca or the Phason website at www.phason.ca.

You need to copy the file to a USB memory stick (USB drive). The USB drive must be formatted as a **FAT32 file system**. To check if the USB drive is the correct format, insert it into your computer and then open Windows Explorer.

1. Right-click the USB drive.
2. Click **Properties**.
3. Make sure the file system is FAT32.
If the file system is not correct, you will need to format the drive as FAT32, or use a different drive that is the correct format.
4. Copy the update file to the root of the USB drive. The *root* of the drive means *not in a folder*.



To update the firmware using the POWER ON method

1. Loosen the four cover screws and gently remove the cover from the control. Make sure not to disconnect the ribbon cable from the base; it must stay properly connected.
2. Insert the USB drive into the connector on the back of the cover.
3. Press **Up** or **Down** until the display shows *U E r*.
4. Press **Select**.
The display shows *d, 5P*.
5. Press **Up** or **Down** until the display shows *UPdt*.
6. Press **Select**.
The display shows *n o* and the **Version** LED blinks.
7. Press **Up** or **Down** until the display shows *Y E S*.
8. Press and hold **Select** until the **Test** LED blinks rapidly.
9. Release the button.
 - ◆ While the **Test** LED is blinking rapidly, the firmware is updating. Updating can take up to 2 minutes.
 - ◆ After updating, the display shows *8888* for a few seconds, followed by the version number, and then the main temperature display.
10. When finished, remove the USB drive, verify the ribbon cable is properly connected, and then fasten the cover to the base.

**To update the firmware using the POWER OFF method**

We recommend having someone assist you if using the power off method.

1. Switch off the power to the control.
2. Loosen the four cover screws and gently remove the cover from the control. Make sure not to disconnect the ribbon cable from the base; it must stay properly connected.
3. Insert the USB drive into the connector on the back of the cover.
4. Switch on the power to the control while holding the **Select** button. Keep holding the button until the **Test** LED blinks rapidly.
5. Release the button.
 - ◆ While the **Test** LED is blinking rapidly, the firmware is updating. Updating can take up to 2 minutes.
 - ◆ After updating, the display shows *8888* for a few seconds, followed by the version number, and then the main temperature display.
6. When finished, remove the USB drive, verify the ribbon cable is properly connected, and then fasten the cover to the base.

Troubleshooting

If you see an error code and are not sure what it means, look it up in **Alarm settings and conditions** on page 13, and then follow the instructions to resolve the condition.

The following table lists some problems, possible causes, and possible solutions. If you are having a problem using the NVC, see if the problem is in the following table and then follow the directions for correcting the problem.

Problem	Possible cause	Possible solution
The power supply components are blown, or there are burn marks on boards and components. Motors and fans slow down or stop.	There has been a power surge, brownout, or power outage.	◇ Avoid the problem in future by providing proper voltage and protection for the control.
There is no power/display.	A circuit breaker at service panel is off or tripped. The incoming power wiring is incorrect.	◇ Reset the circuit breaker. ◇ Correct the wiring.
The display shows unusually high or low temperature.	The probe is not a Phason probe. The extension cable connected to the temperature probe is providing a poor connection The temperature probe is damaged.	◇ Remove the probe and then install a Phason probe. ◇ Check the extension cable connection and re-solder it if necessary. ◇ Replace the probe.
The curtain opens when it should close, or closes when it should open	The wiring is incorrect; the close and open wires are reversed.	◇ Correct the wiring. For more information, read Connecting a curtain machine on page 6.
The alarm relay is not operating the alarm system.	The alarm wiring is incorrect.	◇ Correct the wiring. For more information, read Connecting an alarm system on page 7.

Optional accessories and kits

Phason Rain Sensor

The Phason Rain Sensor (model PRS) connects to the NVC and allows it to close the curtain when rainfall is detected.

When the sensor detects rain, it sends a signal to the NVC. When the NVC receives the signal, it completely closes the curtain, bypassing the on and off durations. After 15 minutes with no rain, the control returns to normal operation.



The advanced optical sensor uses infrared light to detect water hitting its surface. This method of detection is more sensitive and reliable than other methods, is nearly immune to false detection, and is not affected by movement and most environmental conditions.

The Phason Rain Sensor's durable and rugged enclosure is completely sealed, so there are no electronics to corrode, and no openings for debris to collect.

Power contactors

Phason's 240-volt power contactors are heavy-duty relays that increase the load handling capability of control relays. Power contactors are ideal for electric heaters.



- ◆ **Power contactor relay** (model PC-240): includes power contactor relay and mounting hardware for easy mounting in an enclosure.
- ◆ **Power contactor kit** (model 122-1): includes power contactor relay, on-off-auto switch and label, snubber filter (reduces electrical noise), and mounting hardware for easy mounting in an enclosure.
- ◆ **Power contactor unit** (model 129-0): includes two power contactor relays, two on-off-auto switches, and two snubber filters, mounted in a large enclosure. The enclosure has room for two additional contactor relays or kits.

Temperature probes and extension cable

Temperature probes monitor temperatures ranging from -49 to 122°F (-45 to 50°C). The probes are available in 1, 6, 30, 75, or 150-foot cable lengths and can be extended up to 500 feet using extension cable. Extension cable is available in 500-foot lengths.

Features

- ◆ Easy installation
- ◆ Rugged and durable design
- ◆ Weather and UV-resistant cable
- ◆ Limited warranty (90 days)



Parts and kits

If the display fails, you can replace it with a display kit. After replacing the display, you will need to program the control. If the bottom circuit board fails, you can replace it with a control kit.

Model NVC-2-12

- ◆ Display kit model **K331003**
- ◆ Control kit model **KNVC12-CONTROL**

Model NVC-2-24

- ◆ Display kit model **KNVC24-DISPLAY**
- ◆ Control kit model **KNVC24-CONTROL**

Limited warranty

This warranty applies only to the Natural Ventilation Control (NVC). If you need warranty service, return the product and original proof of purchase to your dealer.

Phason Inc. (Phason) warrants the NVC subject to the following terms and conditions.

This warranty is valid only to the original purchaser of the product, for two years from the manufacturing date. The manufacturing date is stated in the first eight digits of the serial number in the form year-month-day.

Phason hereby warrants that should the NVC fail because of improper workmanship, Phason will repair the unit, effecting all necessary parts replacements without charge for either parts or labor.

Conditions

- ◆ Installation must be done according to our enclosed installation instructions.
- ◆ The product must not have been previously altered, modified, or repaired by anyone other than Phason.
- ◆ The product must not have been involved in an accident, misused, abused, or operated or installed contrary to the instructions in our user and/or installation manuals. Phason's opinion about these items is final.
- ◆ The person requesting warranty service must be the original purchaser of the unit, and provide proof of purchase upon request.
- ◆ All transportation charges for products submitted for warranty must be paid by the purchaser.

Except to the extent prohibited by applicable law, no other warranties, whether expressed or implied, including warranties of merchantability and fitness for a particular purpose, shall apply to the NVC. Any implied warranties are excluded.

Phason is not liable for consequential damages caused by the NVC.

Phason does not assume or authorize any representatives, or other people, to assume any obligations or liabilities, other than those specifically stated in this warranty.

Phason reserves the right to improve or alter the NVC without notice.

Phason Inc.

2 Terracon Place
Winnipeg, Manitoba, Canada
R2J 4G7

Phone: 204-233-1400
Fax: 204-233-3252

E-mail: support@phason.ca
Web site: www.phason.ca