

# Installation Instructions



FAMILIARIZE YOURSELF WITH THE INSTALLATION INSTRUCTIONS BEFORE STARTING

**ATTENTION INSTALLER:** This product must be installed by a qualified HVAC contractor.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death. Disconnect electrical power to the HVAC system before proceeding.

**⚠ CAUTION**

**CUT HAZARD**

Failure to follow this caution may result in personal injury. Sharp metal edges can cause personal injury from cuts. Use gloves when cutting plenum openings and handling ductwork.

**⚠ CAUTION**

**INSTALLATION HAZARD**

Failure to follow this caution may result in unit component damage.

Do not mount the Ventilation Controller on the supply plenum or duct. The unit will malfunction at heated temperatures and lose its calibration.

When installing the Ventilation Controller on downflow furnaces, ensure that the blower continues to run after the heat call is satisfied to prevent high temperatures from damaging the Controller circuit board.

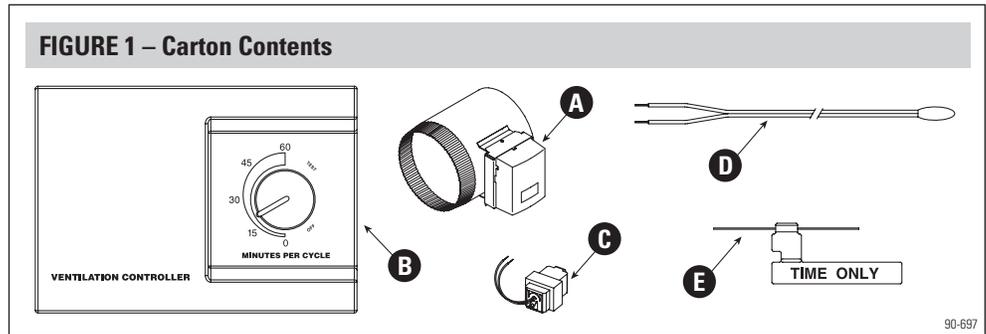
Do not mount the Ventilation Controller downstream from any fresh air intake port, humidifier or bypass outlet. False humidity conditions will cause the Ventilation Controller to operate incorrectly.

# INSTALLATION

## STEP 1: REMOVE ITEMS FROM BOX

See **Figure 1**.

- A. FRESH AIR VENT DAMPER
- B. VENTILATION CONTROLLER
- C. TRANSFORMER
- D. OUTDOOR TEMPERATURE SENSOR
- E. TIME ONLY RESISTOR INSERT



## STEP 2: DETERMINE VENTILATION CONTROLLER LOCATION AND INSTALL

- A. The Controller must be installed in the return duct, at least 6 inches (152 mm) upstream of the fresh air intake opening, the humidifier if present, and/or the humidifier bypass duct opening. See **Figure 2** – Typical Basement Installation.
- B. For systems using flexible duct for return chases a mixing box might be necessary to locate the controller. The mixing box can make it difficult to get the Controller away from the fresh air duct port. Get it as close to the main return as possible, or located remotely from the fresh air opening. See **Figure 2** – Typical Attic Installation.
- C. Then use the template (page 5) to cut the opening and mount the Controller.

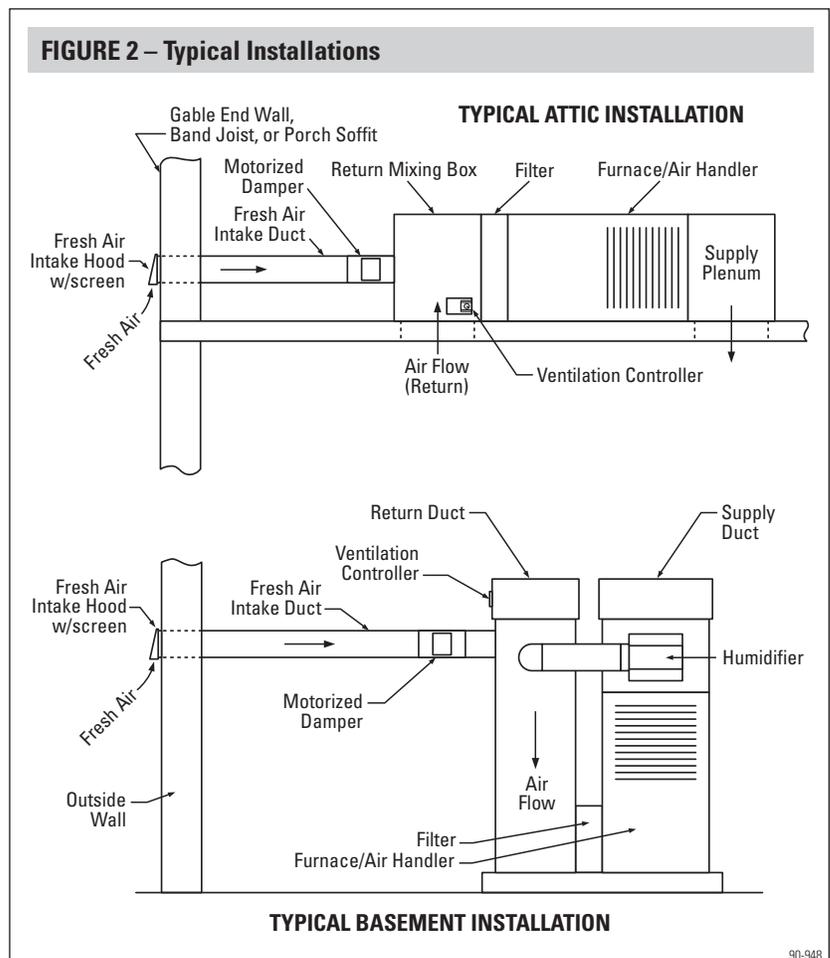
## STEP 3: INSTALL FRESH AIR INTAKE VENT, DUCTING (FLEX OR RIGID) AND DAMPER

- A. All duct work must be **insulated with a vapor barrier**. The damper assembly is heavy and requires support. Install the damper with the crimped end downstream. Slide damper over crimped duct and secure to duct with 1/2" (13 mm) long sheet metal screws (not included). Insulate the damper assembly but leave the motor cover exposed to open air for adjustment access (see **Figure 2**).
- B. If working with sharp metal edges wear gloves. For metal or flexible duct, seal joints with UL181 foil tape. **Note:** support all ductwork in accordance with local codes or SMACNA standards.
- C. Install damper in fresh air duct only, and as close to the return as possible. **Note:** the fresh air intake ductwork and damper must be fully insulated with a vapor barrier and all seams must be sealed to prevent condensation from forming.

### CAUTION

#### EQUIPMENT DAMAGE HAZARD

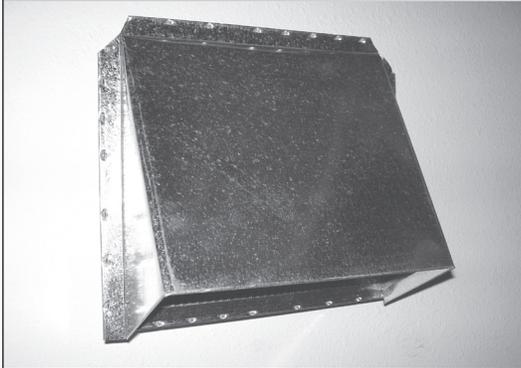
Failure to follow this caution may result in equipment damage. Do not force damper blade by hand, as damage may occur.



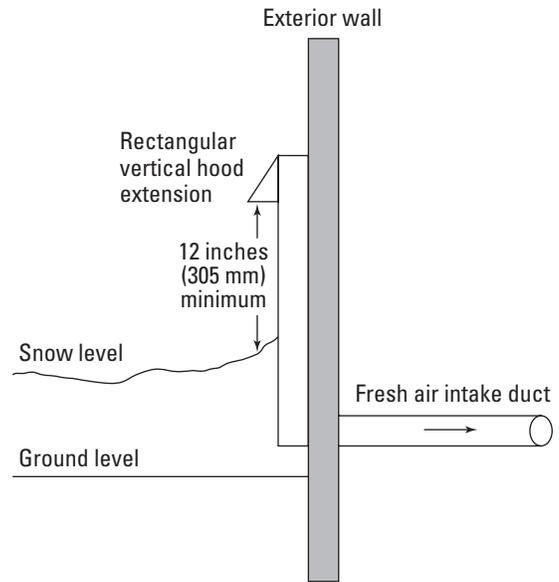
D. Install the vent hood, keeping the inlet away from dryer or furnace vents, power generator exhaust, combustion sources, driveways, trash containers and swimming pools or other sources of fumes. Also the inlet vent should be 12 inches (305 mm) above expected snow accumulation (see **Figure 3**). Provide a water tight seal on the exterior wall. Local codes might apply.

The inlet vent should be a metal open hood model. Make sure the inlet hood has a screen. Metal screen with 1/4 inch (6.35 mm) openings is preferred. Plastic screen will greatly reduce airflow. See **Figure 4**.

**FIGURE 4 – Recommended Inlet Vent**



**FIGURE 3 – Vent Hood Installation**

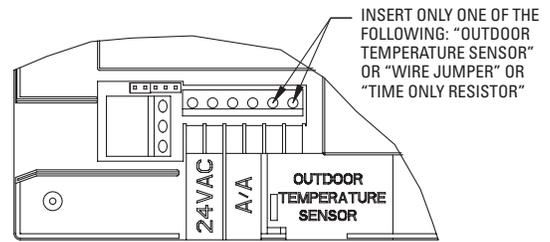


Use of vertical extension to maintain clearance from snow line when wall penetration must be made at ground level.

**STEP 4: CHOOSE MODE OF OPERATION (W/OUTDOOR TEMP SENSOR, W/O TEMP SENSOR, OR TIME ONLY)**

- A. By connecting the outdoor temperature sensor the Ventilation Controller will run according to the timer settings, the indoor RH and the outdoor temperature. See chart below and **Figure 5**.
- B. The outdoor temperature can be bypassed by jumpering the outdoor temp terminals with a wire. The Controller will operate on the timer settings and the indoor RH only.
- C. Connecting the Time Only insert to the outdoor temp terminals will let the vent run on Time Only. In this mode the Controller's operation is not limited by the temperature and humidity limits as shown in Chart below.

**FIGURE 5 – Insert Temp Sensor**



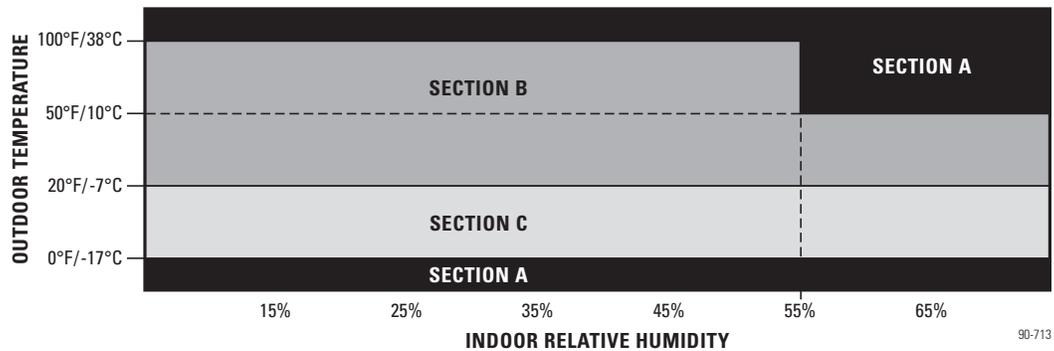
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**VENTILATION CONTROL SCHEME – LIMITS OF TEMPERATURE AND HUMIDITY**

**SECTION A:** Ventilation prevented due to temperature extremes and/or high indoor humidity.

**SECTION B:** Ventilation per the timer settings.

**SECTION C:** Ventilation optional if required.



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**STEP 5: INSTALLING THE OUTDOOR TEMPERATURE SENSOR (IF OPTION A USED IN STEP 4)**

The outdoor temperature sensor can be located in the fresh air duct or the vent inlet. The sensor must not be exposed to the heat of direct sunlight. The lead lengths won't affect operation but don't route alongside 120 volt wires. Insert the stripped lead ends into the Outdoor Temperature Sensor terminals (see **Figures 5, 6 and 7**).

## STEP 6: WIRE THE VENTILATION CONTROLLER TO THE HVAC SYSTEM

### ⚠ CAUTION

#### EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in unit damage. Improper wiring to the HVAC equipment can damage it or the Ventilation Controller!

### ⚠ WARNING

#### ELECTRICAL SHOCK HAZARD

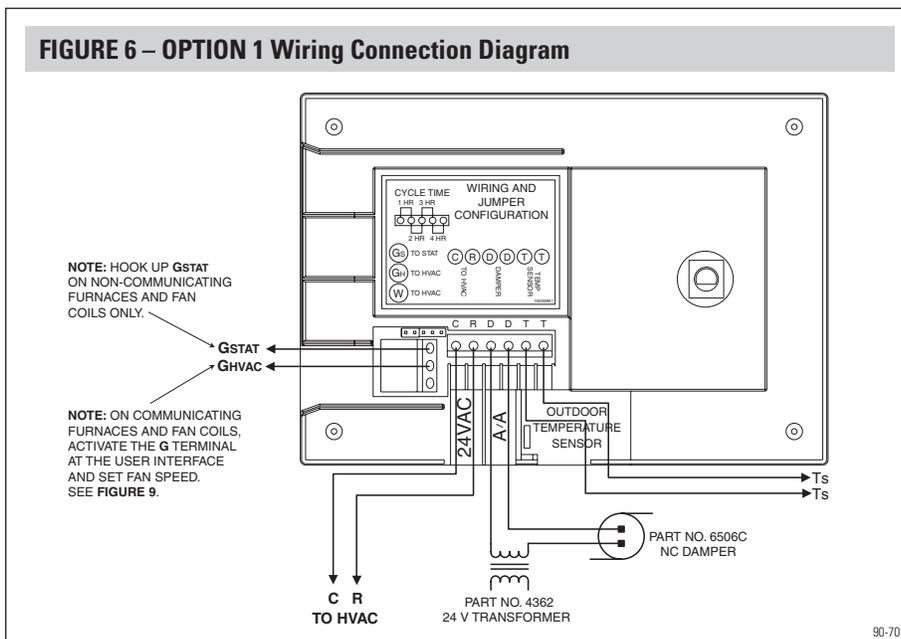
Failure to follow this warning could result in personal injury or death. Disconnect electrical power before proceeding!

### OPTION 1 (Recommended)

Figure 6 is the recommended wiring for avoiding cold air discharge temperatures and also meeting furnace application requirements.

- Disconnect the thermostat lead from the furnace or fan coil terminal G (non-communicating furnaces only) and connect to the Ventilation Controller  $G_{STAT}$  terminal. Connect a lead from the Ventilation Controller terminal  $G_{HVAC}$  to the furnace or fan coil terminal G. The only wire connected to furnace or fan coil terminal G will be from the Ventilation Controller  $G_{HVAC}$  terminal.
- Route leads from the R and C terminals on the Ventilation Controller to the corresponding terminals on the HVAC control board (see Figure 6). Leave any existing R and C leads in place.
- Install the 24 volt transformer (Totaline Part No. 4362). The transformer should be continuously energized, do not wire to the HVAC blower circuit. The transformer, damper and the Ventilation Controller DD terminals will be wired in series. Refer to Figure 6.

FIGURE 6 – OPTION 1 Wiring Connection Diagram



### OPTION 2

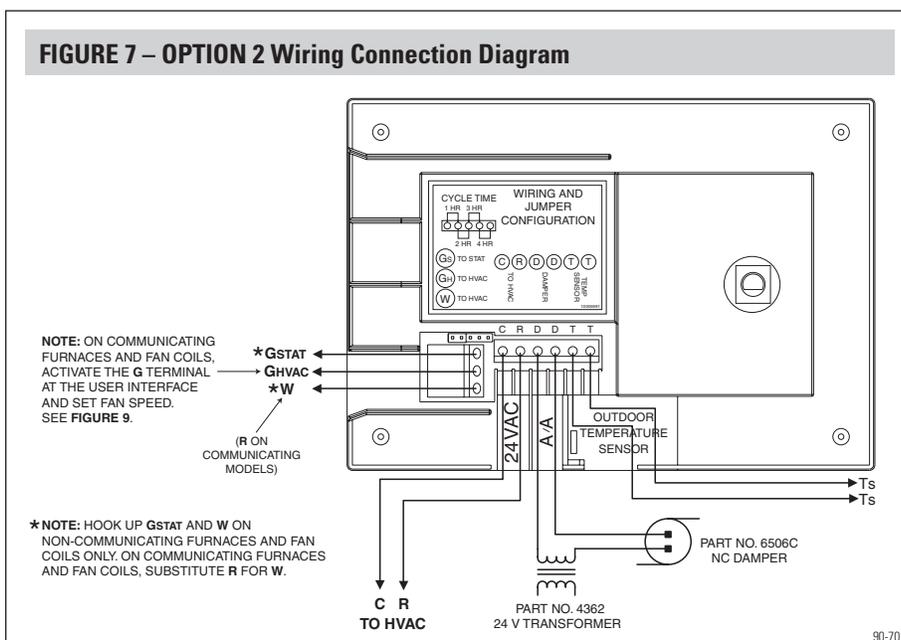
If fresh air ventilation is required at temperatures below 20°F db (-7°C) outside, wire the Ventilation Controller as shown in Figure 7.

**NOTE:** In order to meet furnace application requirements, the mixture temperature of fresh and return air entering the furnace blower must not fall below 60°F db (16°C) (or intermittent operation down to 55°F db (13°C) such as when used with a night setback thermostat).

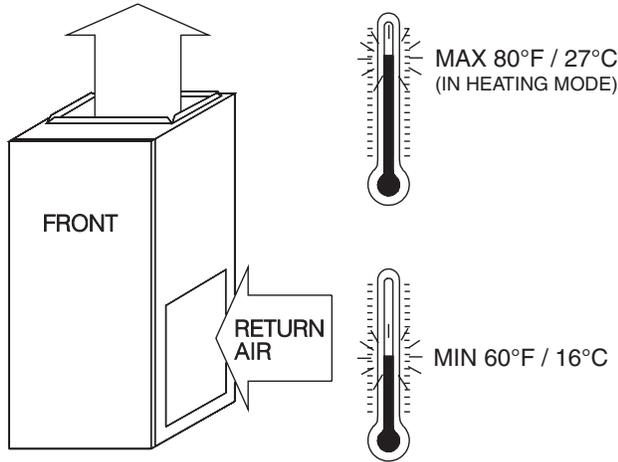
When calculating the mixture temperature, use of this ventilation damper when outdoor temperatures fall to local design conditions such as 0°F db (-17°C) must be considered if appropriate along with the settings of night setback thermostats. **Failure to follow this mixture of fresh and return air temperature limit may affect reliability of heat exchangers, motors and controls.** See Figure 8 – Return Air Temperature Requirement for Furnaces.

**NOTE:** Use the damper stop adjustment described in Step 8 to set table airflows as required to meet the 60°F (16°C) minimum mixed air temperature requirement.

FIGURE 7 – OPTION 2 Wiring Connection Diagram



**FIGURE 8 – Return Air Temperature Requirement for Furnaces**

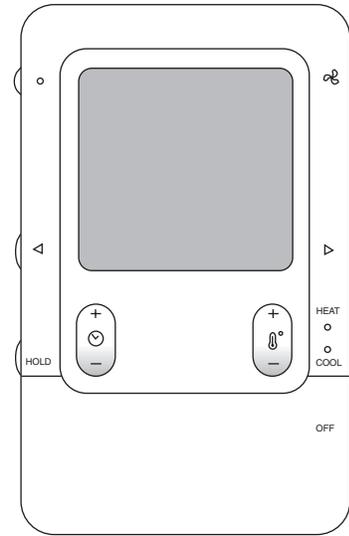


The furnace is designed for minimum continuous return-air temperature of 60°F db/16°C db or intermittent operation down to 55°F db/13°C db such as when used with a night setback thermostat. Return-air temperature must not exceed 80°F db/27°C db in the heating mode. Failure to follow these return-air temperature limits may affect reliability of heat exchangers, motors, and controls.

For accessory installation details, refer to the applicable instruction literature.

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**FIGURE 9 – Using Fresh Air with Infinity/Evolution Control**



Enter the Install/Service menus by pressing and holding the “ADVANCED” button for at least 10 seconds.

Enter the “SETUP” menu and select “Furnace” or “Fan Coil”. Then select “G Terminal”.

Then select “Fan” and the desired fan speed.

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**VENTILATION CONTROLLER  
INSTALLATION TEMPLATE**

4-11/16" x 2-15/16"  
(119 mm x 74.6 mm) cutout

**CAUTION**

**CUT HAZARD**

Failure to follow this caution may result in personal injury. Sharp metal edges can cause personal injury from cuts. Use gloves when cutting plenum openings and handling ductwork.

**CAUTION**

**INSTALLATION HAZARD**

Failure to follow this caution may result in unit component damage.

1. Do not mount Ventilation Controller on supply side. The unit will malfunction at heated temperatures.
2. When installing the Ventilation Controller on downflow furnaces make sure blower continues to run after burner shuts off to prevent high heat damage to the Controller.
3. Do not mount the Ventilation Controller downstream of the fresh air intake, or a humidifier or bypass outlet. False humidity levels can cause the Controller to malfunction.

## STEP 7: CALCULATE THE VENTILATION REQUIREMENT

A. The MINIMUM ventilation requirement is calculated using ASHRAE 62.2-2007.

$$\text{ASHRAE Airflow in CFM} = [\text{House Area in Sq Ft} \times 0.01] + [\text{No. Bedrooms} + 1 \times 7.5]$$

or

$$\text{ASHRAE Airflow in L/S} = [\text{House Area in m}^2 \times 0.05] + [\text{No. Bedrooms} + 1 \times 3.5]$$

**Use the Number of Bedrooms (Plus 1) or the Number of Occupants, whichever is larger**

Additional ventilation may be required for pets, hobbies, fireplaces and attached garage, etc. Use your judgement.

The tables below show calculated airflow values at the nearest 5 CFM (2.3 L/S). If more outdoor air is required than the Ventilation Controller can deliver, a 2nd device is advised. Consult with the homeowner. See **Figure 8** – Return Air Temperature Requirements for Furnaces.

B. Indicate the required CFM below.

MINIMUM CFM REQUIREMENT					
HOUSE SQ FT	Number of Bedrooms				
	2	3	4	5	6
1000	35	40	50	---	---
1500	40	45	55	60	70
2000	45	50	60	65	75
2500	50	55	65	70	80
3000	55	60	70	75	85
3500	---	---	75	80	90

MINIMUM L/S REQUIREMENT					
HOUSE m <sup>2</sup>	Number of Bedrooms				
	2	3	4	5	6
92.9	16	19	23	---	---
139.3	19	21	26	28	33
185.8	21	23	28	30	35
232.3	23	26	30	33	37
278.7	26	28	33	35	40
325.2	---	---	35	37	42



### VENTILATION CONTROLLER INSTALLATION TEMPLATE

4-11/16" x 2-15/16"  
(119 mm x 74.6 mm) cutout

## STEP 8: DETERMINE THE VENTILATION CONTROLLER'S FRESH AIR DELIVERY RATE

### AIRFLOW DELIVERY (CFM) VS NEGATIVE STATIC PRESSURE AS MEASURED FOR RETURN DUCT OR PLENUM (IN WC)

DUCT LENGTH	0.05		0.10		0.15		0.20		0.25		0.30	
	FLEX	PIPE										
10 FT/3m	60	65	85	90	105	110	120	125	135	140	150	160
20 FT/6m	55	60	80	85	100	105	115	120	130	135	140	150
30 FT/9m	50	55	75	80	95	100	110	115	125	130	130	140

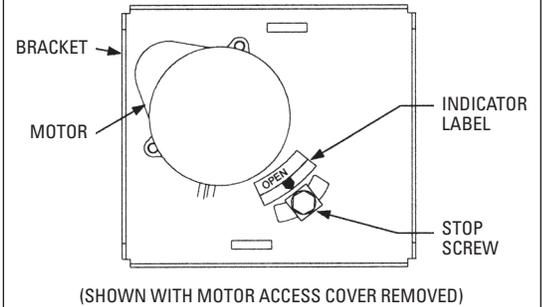
A. Measure the negative static pressure of the return system and consult table above for approximate inlet airflow. But these values are not absolute. An airflow measuring device (Nailor-Hart, etc.) will give the Ventilation Controller's airflow exactly.

For the Table above the flex duct is **laid loose** with **2 wide** 90° bends, and the damper is full open. For the rigid pipe the values are based on two 90° elbows, and the damper is open. For both cases the air intake is through a metal vent hood with a bird screen. Adjust airflow up or down for variations, including one elbow or bend, or if the length of duct you're using isn't listed, etc.

B. Measure the delivered airflow or determine from above chart and record below.

C. Use the damper stop adjustment screw (located under the motor access cover) to deliver appropriate airflow. See **Figure 10**.

**FIGURE 10**



## STEP 9: SET THE CYCLE TIME INTERVAL

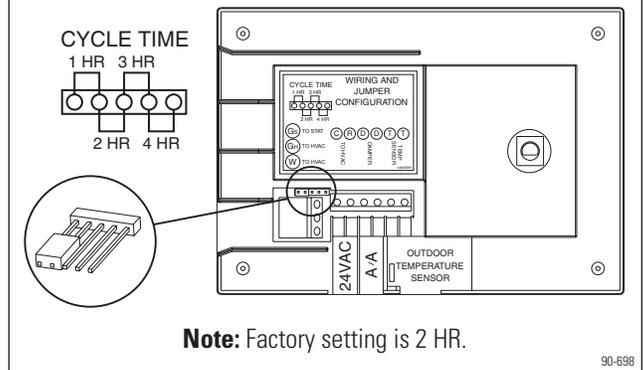
A. The Cycle Time Interval is the time period over which ventilation will occur. This is variable from 1 to 4 hours depending on customer preference. Keep in mind, once the Ventilation requirement is met the Ventilation Controller won't run again until the start of the next cycle. The Cycle Time is the length of the sampling period, while the Ventilation time as set is the actual operating time. **Note:** The 1 hour cycle time setting is not recommended as the life of the vent damper motor will be reduced.

The device is factory set to a 2 hour cycle time. This is recommended for optimum ventilation. The longer Cycle Intervals are more likely to require more than the 60 minutes available on the dial.

B. To adjust the cycle time interval, remove knob by carefully pulling it out from the case. Snap the cover off and refer to **Figure 11** to locate the cycle time setting tab and pins.

The jumper tab on the 5 pin array determines the sampling time interval. Per diagram this can be 1,2,3 or 4 hours. The jumper tab is removed by pulling it straight out from the pins. Take care in replacing, do not bend.

**FIGURE 11 – Cycle Time**



**Note:** Factory setting is 2 HR.

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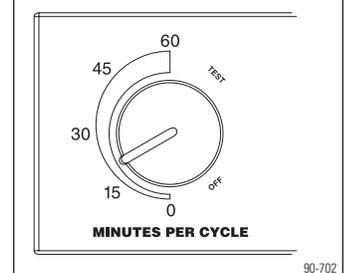
## STEP 10: DETERMINE THE VENTILATION CONTROLLER DIAL SETTING

A. The run time in minutes is set with the dial. The Time 0 setting keeps the circuit live but the vent won't operate. OFF deactivates it completely. **Any setting made is the total running time per 1, 2, 3 or 4 hour cycle.**

B. Record your entries from Steps 7B and 8B in the table on the following page. From this you can determine the correct dial setting. For example, if 50 CFM is required but the vent delivers 120 CFM set the dial to 50 minutes under the 2 hour cycle time column.

C. All values can be set except those in the black area. If the Ventilation Controller dial is clocked out (black area greater than 60 minutes) and if the cycle is set to 2, 3 or 4 hours, reset the jumper tab to get a settable time. For example, if 80 minutes is required at 2 hours, at 1 hour this would be a settable 40 minutes. If you're still clocked out or are already set to a 1 hour cycle consult with the homeowner about installing a second device. See **Figure 8** – Return Air Temperature Requirements for Furnaces.

**FIGURE 12 – Set Vent Time**



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DIAL SETTINGS WITH 1 & 2 HOUR CYCLE TIMES																			
CFM →	CFM REQUIRED (obtained from Step 7)																		
	20 CFM		30 CFM		40 CFM		50 CFM		60 CFM		70 CFM		80 CFM		90 CFM		100 CFM		
Cycle Time →	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	2 hr	1 hr	
CFM DELIVERED (obtained from Step 8)	60	40	20	60	30	80	40	100	50	120	60	140	70	160	80	180	90	200	100
	80	30	15	45	25	60	30	75	40	90	45	105	55	120	60	135	70	150	75
	100	25	15	40	20	50	25	60	30	75	40	85	45	100	50	110	55	120	60
	120	20	10	30	15	40	20	50	25	60	30	70	35	80	40	90	45	100	50
	140	20	10	30	15	35	20	45	25	55	30	60	30	70	35	80	40	90	45
	160	15	10	25	15	30	15	40	20	45	25	55	30	60	30	70	35	75	40

**Note:** The Ventilation Controller is factory set to a 2 hour cycle time. The 1 hour cycle setting is not recommended as the life of the vent damper motor will be reduced. However, some applications may require a 1 hour cycle time.

### STEP 11: SYSTEM CHECK OUT

- For system test be sure that 24 VAC is applied in **series** with the damper (normally closed) and the A/A terminals on the Ventilation Controller. Check the wiring as described in Steps 5 and 6.
- Turn dial on Controller to **TEST** position. If the installation is correct the blower will turn on (independent of heat or cooling operation) and the damper will open. The vent system will operate for 1 minute unless the dial is turned off of **TEST**. If system does not operate in the **TEST** Mode check the Troubleshooting Guide.
- Return dial to the calculated setting. **Do not leave in TEST, the Ventilation Controller won't operate normally.**

## TROUBLESHOOTING

PROBLEM	TROUBLESHOOTING PROCEDURE
<b>HVAC Blower doesn't turn on in Test Mode.</b>	<ol style="list-style-type: none"> <li>Make sure you turned the power back on to the HVAC equipment.</li> <li>Check the wiring diagram for the R, C, W and GSTAT and GHVAC at both the HVAC equipment and the Ventilation Controller.</li> <li>Make sure the Outdoor Sensor Terminals on the Controller are connected with either the Temperature Sensor, the Time Only Insert or a jumper wire. If nothing is connected here the Controller will not function.</li> <li>Check voltage across the Ventilation Controller R&amp;C terminals. Voltage should be in the 22 VAC to 30 VAC range.</li> <li>Remember, once the Test minute is up the system won't operate.</li> </ol>
<b>Damper does not open in Test.</b>	<ol style="list-style-type: none"> <li>Follow above procedure.</li> <li>Check wiring diagram to make sure the damper is wired in series with the circuit board and transformer.</li> </ol>
<b>The Ventilation Controller doesn't turn off after the dial is turned off Test.</b>	<ol style="list-style-type: none"> <li>This might be okay, the thermostat might have activated. Also the blower might be set up for continuous operation. The Ventilation Controller should deactivate once the time setting is reached.</li> <li>If the pins are set to 1 hour and the dial is turned to 60 minutes the Ventilation Controller will not turn off. But for a 2 hour pin setting, if the dial is at 60 minutes, at the end of that 60 minutes the vent will turn off.</li> </ol>
<b>The damper does not open with the blower operating.</b>	<ol style="list-style-type: none"> <li>The damper will not operate once the time interval has been met. If the dial is turned to 5 minutes and 5 minutes has elapsed, the damper will close and it will stay closed until the pin setting interval is met.</li> <li>If the Indoor RH is above 55% and the outdoor temperature is above 50°F (10°C) the damper will not open because of the potential for excess humidity.</li> <li>If the outdoor temperature is below 0°F (-17°C) or above 100°F (38°C) the vent stays off.</li> <li>Verify that the outdoor temperature sensor is located within 3 feet (1 m) of the vent inlet, or if located outside that it's not in direct sunlight at any time.</li> <li>Turbulence in the return duct, plenum or mixing box can give false readings. Make sure the Ventilation Controller is at least 6 inches (152 mm) upstream of the fresh air intake port in the return to minimize this effect.</li> </ol>
<b>Blower turns on unexpectedly.</b>	<ol style="list-style-type: none"> <li>The Ventilation Controller will activate the blower whether or not heat or A/C is on call. This ensures ventilation even if the thermostat is lowered.</li> <li>To verify proper operation see if the blower turns off by turning down the dial. Return to its original setting.</li> </ol>

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