

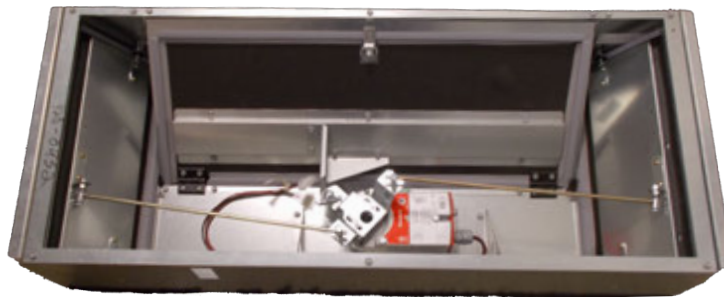
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# INSTALLATION INSTRUCTIONS

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## Full Flow Modulating Economizer/CRV with Exhaust for Building Applications

Model: ECON-WD5V



For Use with Bard Wall Mount  
Variable Speed Heat Pump Models:

W3VHY, W5VHY

**NOTE:** *These instructions are written to cover field-installed economizers, but are also included with factory-installed economizers. For factory-installed economizers, all portions addressing “installation” are for reference only.*

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BMC, Inc.  
Bryan, Ohio 43506

Manual: 2100-802  
Supersedes: **NEW**  
Date: 11-28-23

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## Economizer with Exhaust Model Nomenclature



## Unpacking

Upon receipt of the equipment be sure to compare the model number found on the shipping label with the accessory identification information on the ordering and shipping document to verify that the correct accessory has been shipped.

Inspect the carton housing of each ventilator as it is received, and before signing the freight bill, verify that all items have been received and that there is no visible damage (check parts list below). Note any shortages or damage on all copies of the freight bill. The receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent. Concealed damage not discovered until after loading must be reported to the carrier within 15 days of its receipt.

## General

The economizer should only be installed by a trained heating and air conditioning technician. These instructions serve as a guide to the technician installing the ventilator package. They are not intended as a step-by-step procedure with which the mechanically inclined owner can install the package.

The economizer housing is shipped in one carton which contains the electrical harness, miscellaneous hardware and installation instructions.

Economizer kit includes:

- (1) ECON-WD5V (920-0523) full flow economizer
- (2) 7003-084 mist filters
- (1) 7003-083 exhaust bug screen
- (2) 1913-002-0808 8-1/2" foam strips
- (4) 1913-002-0708 7-1/2" foam strips
- (2) 539-405 intake sealing frames
- (2) 543-223 lower block off plates
- (1) 7950-12 push mount cable tie
- (8) 7950-004 cable tie
- (12) #10-16x1/2 screws
- (4) #8-18x3/8 pan head screws
- (1) 2100-802 installation instructions

## Economizer Features

- One piece construction – easy to install.
- Exhaust air damper – built in with positive closed position. Provides exhaust air capability to prevent pressurization of tight buildings.
- Actuator motor – 24 volt, power open, spring return with built in torque limiting switch.
- Proportioning-type control for maximum “free” cooling economy and comfort with up to 100% outside air. Logic is provided by PLC in unit.
- Enthalpy and temperature sensor to monitor outdoor air conditions.
- Minimum Ventilation Position available for required ventilation of occupants or dilution of pollutants.
- Mixed air sensor to monitor outdoor and return air to automatically modulate damper position.
- Meets 4 cfm per ft<sup>2</sup> blade leakage requirements.

## Description

The economizer used for the Bard variable speed products provides extremely low-cost cooling operation when outdoor conditions are acceptable to bring in outdoor air. Settings to define when outdoor air is acceptable for cooling include outdoor temperature, relative humidity and dewpoint. An outdoor sensor is provided in the lower condenser section of the unit that extends through the unit base to measure outdoor conditions. A return air sensor, mixed air sensor and supply air sensor are also provided in the unit to monitor airflow temperatures during economizer use. Economizers provide maximum energy savings while providing a comfortable indoor environment.

The economizer can also bring in outdoor air for occupants inside the building to meet today's building code standards for indoor air quality. Settings are available in the room controller (Brightstat) that can bring in a set amount of fresh air during occupied times. This option is referred to as the minimum blade position. Another advanced energy saving option is to add a CO<sub>2</sub> expansion card to the room controller for

modulating outdoor air intake based on indoor CO<sub>2</sub> levels. When using CO<sub>2</sub> control, only the amount of outdoor air needed is brought into the room based on user-adjustable minimum and maximum CO<sub>2</sub> levels. The economizer damper modulates to help maintain a v level below the maximum amount without over ventilating the indoor area.

Economizer logic to operate freecooling mode and bring in occupancy air is provided using the PLC main control board in the front unit control panel area. An LCD interface (PLD Pro) is provided in the unit control panel for user settings and damper diagnostics. The PLC control board contains the logic and user settings to adjust when the economizer operates based on outdoor temperature, relative humidity and dewpoint. The minimum blade position can be set using the PLD Pro or the room controller (BrightStat). It also provides a self-test mode to check economizer linkage and a mean to review alarm information. Settings provided in the PLC control board software allow freecooling economizer operation to be disabled if desired while having occupancy fresh air intake available using CO<sub>2</sub> or a minimum blade position.

Side outdoor air intake and front room exhaust paths provide airflow through the unit to bring in cooler outdoor air while removing warmer indoor air with minimal air path recirculation. By design, the economizer uses seals around the perimeter of the intake and exhaust blades to minimize blade leakage when not in operation. Blade leakage rates meet or exceed 4 cfm per square foot of blade area requirements at 1" WC static pressure. The exhaust air path through the economizer provides room pressure relief that results in a slight positive room pressure. These features help provide a comfortable room environment and reduce energy costs.

## Sequence of Operation

If the unit is equipped with an economizer, there are two modes that may be selected. If "economizer" is selected, the economizer will be utilized for economizing (freecooling) and ventilation. If "CRV" mode is selected, the economizer will only be utilized for ventilation. Mode selection can be done in the custom menu of the room controller (Brightstat). The sequence for ventilation is the same for both modes; however, in economizer mode the damper may move to a more open position than ventilation requires to allow for free cooling. There is a minimum position setting in the room controller (Brightstat) and PLD Pro (screen A3). When the space is occupied, the damper will move to the min. position. This setting is intended to be used to set the continuous rate of ventilation anytime the space is occupied. Additionally, CO<sub>2</sub> levels can be used to change the damper position. CO<sub>2</sub> setpoints can be found in the room controller (Brightstat). When the CO<sub>2</sub> increases beyond the target setpoint, the damper will modulate open. The target

setpoint is halfway between the minimum and maximum CO<sub>2</sub> setpoints. As the CO<sub>2</sub> increases, the damper will continue to open. The damper command is scaled between the min. and max. CO<sub>2</sub> setpoints and the damper will be commanded to maximum position (100% by default) if the CO<sub>2</sub> reaches the max. CO<sub>2</sub> setpoint. As the CO<sub>2</sub> falls, the damper will modulate closed until a balance is reached (target setpoint). Ventilation will continue until the CO<sub>2</sub> reaches the minimum setpoint. If a min. position has been set for the damper, the damper will not modulate closed once the min. position is reached to maintain the desired constant ventilation rate. Please consult the airflow graphs on page 15 to determine the ventilation rate at different damper positions.

Minimum position will also have dynamic response when the unit is heating or cooling. As the blower ramps up or down, the damper will close and open to maintain a constant ventilation rate. This rate will be close to the original flow rate, but in some cases will be higher than the original flow rate. The purpose of this feature is to maintain a constant ventilation flow rate and to prevent excessive heating or cooling of the space by over ventilation. This feature will back off the damper position by up to 20% when the blower is running at a higher speed than the nominal ventilation speed. Please consult Graphs 3 and 4 on page 16.

# INSTALLATION OF FIELD-INSTALLED ECON-WD5V

## Basic Installation

### **WARNING**

**Electrical shock hazard.**  
**Disconnect remote electrical power supply or supplies before servicing.**  
**Failure to do so could result in electric shock or death.**

### **WARNING**

**Exposed moving parts.**  
**Disconnect electrical power before servicing.**  
**Failure to do so could result in severe injury or amputation.**

### **CAUTION**

**Cut hazard.**  
**Wear gloves to avoid contact with sharp edges.**  
**Failure to do so could result in personal injury.**

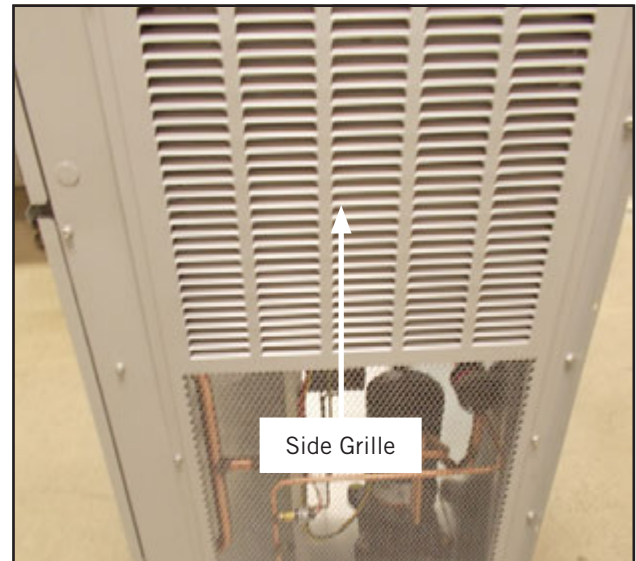
Disconnect all power to unit (see Figure 1).

**FIGURE 1**  
**Disconnect Power**



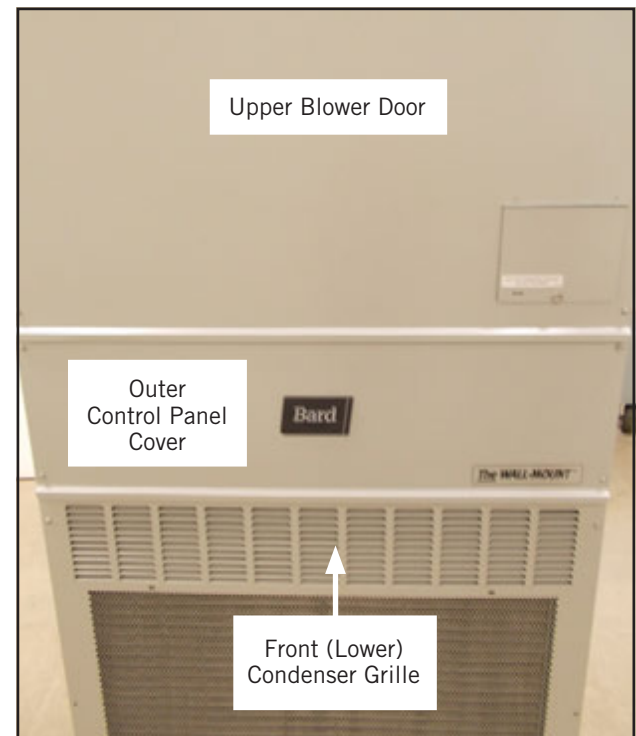
Remove both side grilles (see Figure 2).

**FIGURE 2**  
**Remove Side Grilles**



Remove upper blower door, outer control panel cover and front (lower) condenser grille (see Figure 3).

**FIGURE 3**  
**Remove Blower Door, Outer Control Panel Cover and Condenser Grille**





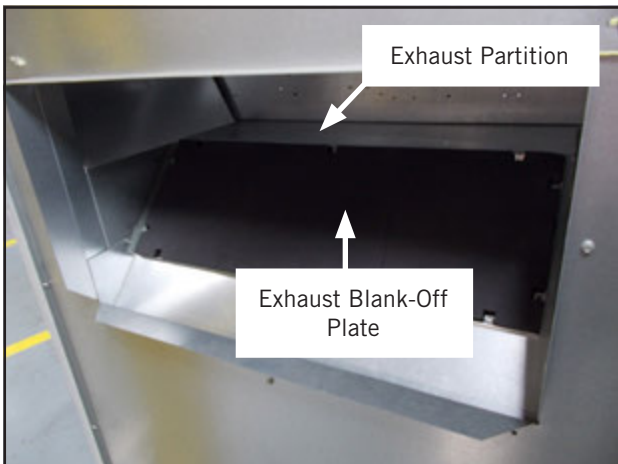
Remove blank-off plates (both sides) and discard (see Figure 4). Retain screws for use with new vent.

**FIGURE 4**  
**Remove Blank-Off Plates (Both Sides)**



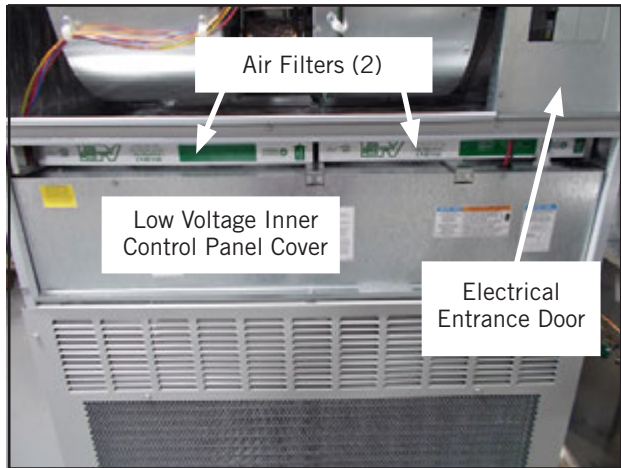
Remove exhaust blank-off plate through return or through side intake openings and discard (see Figure 5).

**FIGURE 5**  
**Remove Exhaust Blank-Off Plate**



Remove both air filters and the low voltage inner control panel cover (see Figure 6).

**FIGURE 6**  
**Remove Air Filters and Low Voltage Control Panel Cover**



Before installing the economizer, remove economizer from packaging and verify there is no damage. Install the economizer as shown in Figure 7.

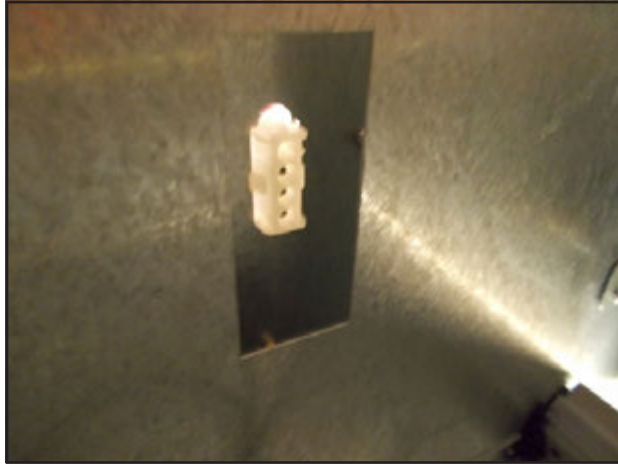
Set economizer on the exhaust partition (see Figure 5) and slide in until flush with the side of the wall mount.

**FIGURE 7**  
**Install Economizer**



When the economizer is fully installed, the control plug should be centered in the plug access opening on the front panel of the economizer as shown in Figure 8.

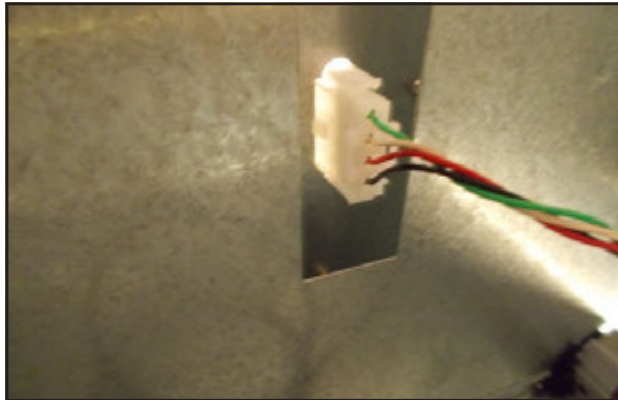
**FIGURE 8**  
**Control Plug Centered in Plug Access Opening**



From the front, through the filter opening, plug the economizer power plug into the control panel plug (see Figure 9).

**IMPORTANT:** Sharp edges—PPE required.

**FIGURE 9**  
**Connect Economizer Power Plug to Control Panel Plug**



The ECON-WD5V exhaust blade is fixed in the shipping position by the latch located on the bottom of the blade (see Figure 10). Access can be made through the return air opening or through the opening under the economizer. Turning the latch 1/4 turn will release the blade.

**FIGURE 10**  
**Release the Exhaust Blade**



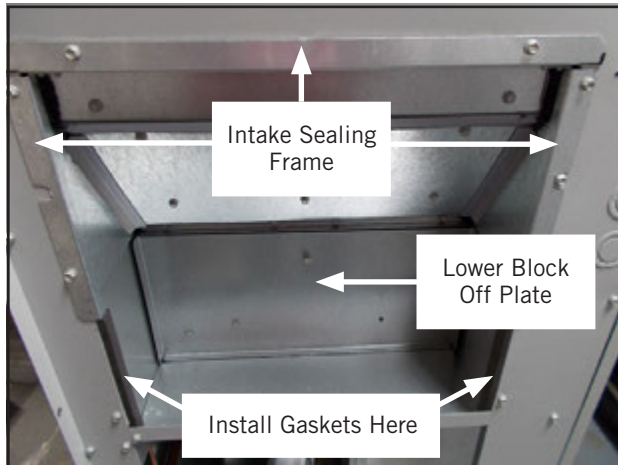
Make sure the blade seats correctly over the exhaust opening and that the latch is as shown in Figure 11.

**FIGURE 11**  
**Exhaust Blade and Latch**



Install the 539-405 intake sealing frame and the 543-223 lower block off plates (both sides) as shown in Figure 12. Install two (2) 1913-002-0708 7-1/2" foam gaskets below the intake sealing frame (both sides).

**FIGURE 12**  
Install Intake Sealing Frame and Lower Block Off Plates



Bend the two (2) sheet metal tabs in the condenser partition up to hold the bottom of the mist eliminator in place.

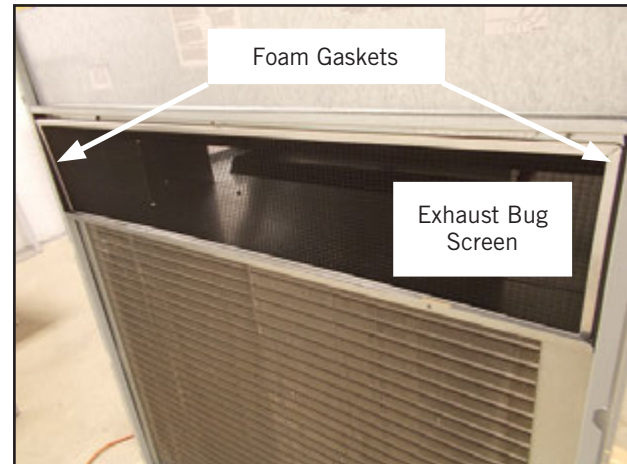
Install 7003-084 mist filters on both sides (see Figure 13). Then re-install the side grilles removed earlier.

**FIGURE 13**  
Install Mist Filters



Bend the two (2) sheet metal tabs in the condenser partition up to hold the bottom of the bug screen in place. Install two (2) 1913-002-0808 8-1/2" foam gaskets to sides of cabinet (see Figure 14). Install the 7003-083 exhaust bug screen. Re-install front lower (condenser) grille.

**FIGURE 14**  
Install Bug Screen and Gaskets



Install both filters, then re-install the inner control panel, outer control panel and upper blower door.

Restore power to unit.

Refer to **Start-Up Procedures** on page 9.

### **Blade Adjustment for Desired Ventilator Air**

The amount of ventilation air supplied by the commercial room ventilator is dependant on four factors.

1. Return air duct static pressure drop.
2. Supply air duct static pressure drop.
3. Indoor blower motor speed.
4. Damper blade open position setting.

Refer to the appropriate graph on page 14 to determine minimum blade position settings.



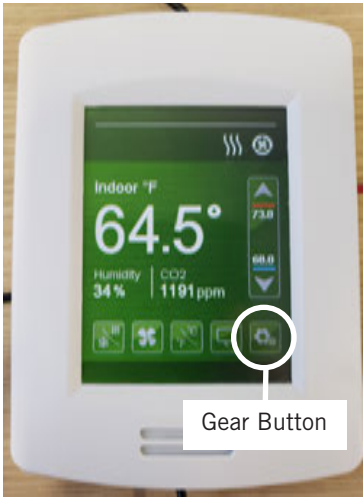
**Economizer/CRV Configuration**

**Indoor Room Controller Set Up**

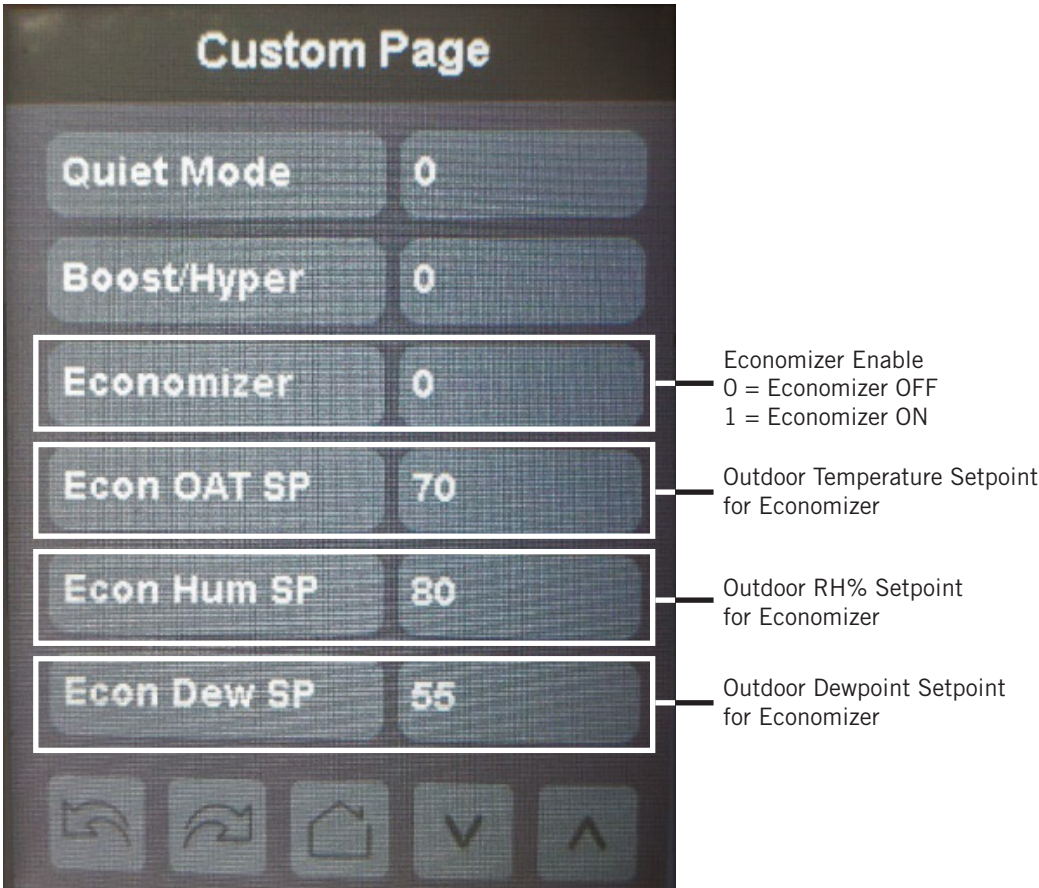
On the home screen of the room controller (BrightStat), press the Gear button to enter the Custom menu (see Figure 15).

In the Custom menu, the third item from the top indicates the type of mode for the damper operation (see Figure 16). This will default to economizer which will allow for the damper to be utilized for cooling and ventilation operation. If CRV mode is selected, the damper will only be used for ventilation operation (see Table 1 on page 10). See latest version of wall-mount unit Service Instructions manual 2100-791 for additional details on operation.

**FIGURE 15**  
**Indoor Room Controller Home Screen**



**FIGURE 16**  
**Gear Button Custom Page Menu**

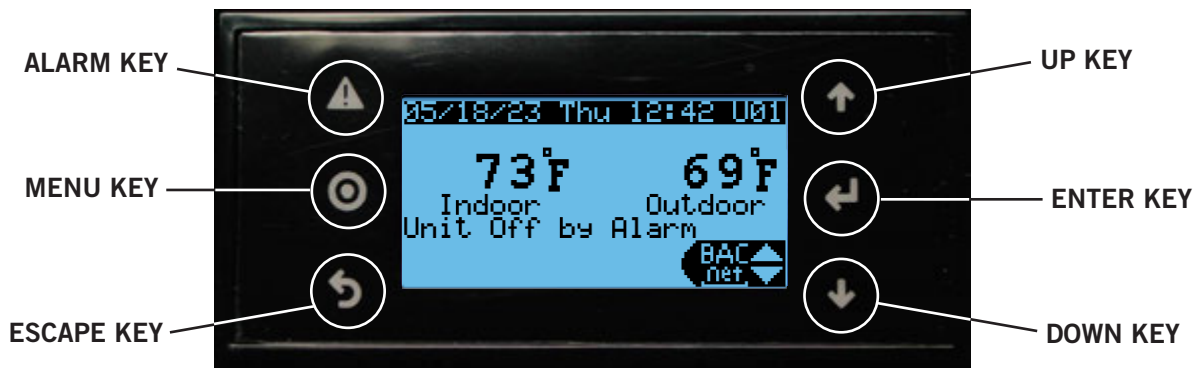


**TABLE 11**  
**Ventilation Settings – Indoor Room Controller (BrightStat)**

The room controller (BrightStat) inside the conditioned room can configure basic economizer and ventilation settings. The following settings are available using the BrightStat controller.

Setting	Menu	Default	Range	Description
Economizer	Custom	0	0 or 1	1 = No freecooling, but occupancy vent (CRV) 0 = Both freecooling and occupancy vent (Econ)
Econ OAT SP	Custom	70	0-75	Economizer outdoor dry bulb temperature setting
Econ Hum SP	Custom	80	0-99	Economizer outdoor humidity RH% setting
Econ Dew SP	Custom	55	0-99	Economizer dewpoint setting
Econo Min Pos	Config 7	15%	0-100%	Limits minimum blade position during operation
Econo Max Pos	Config 7	100%	0-100%	Limits maximum blade position during operation
Min Fresh Air	Config 7	0 cfm	0	Not used
Max Fresh Air	Config 7	0 cfm	0	Not used
Min CO2 PPM	Config 7	800	0-5000	CO <sub>2</sub> PPM where occupied ventilation begins
Max CO2 PPM	Config 7	1200	0-5000	CO <sub>2</sub> PPM where occupied ventilation is at the maximum amount.

**FIGURE 17**  
**PLD Pro Display and Interface**



**ALARM KEY**

Allows viewing of active alarms  
Silences audible alarms  
Resets active alarms

**MENU KEY**

Allows entry to Main Menu

**ESCAPE KEY**

Returns to previous menu level  
Cancels a changed entry

**UP KEY**

Steps to next screen in the display menu  
Changes (increases) the value of a modifiable field

**ENTER KEY**

Accepts current value of a modifiable field  
Advances cursor

**DOWN KEY**

Steps back to previous screen in the display menu  
Changes (decreases) the value of a modifiable field

### Unit PLD Pro Set Up

1. Press MENU key to go to the Main Menu screen (see Figure 17).
2. Press UP or DOWN keys and ENTER key to enter TECHNICIAN password 1313.
3. Press UP or DOWN keys to scroll to **System Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Economizer A2**; press ENTER key.
5. Press ENTER key to scroll and UP or DOWN keys to change the desired value (see Figure 18). Press ENTER key to save the value and scroll to the next parameter.

### Economizer A2 Menu Set Up

Control Type: Freecooling modes include none, dry bulb, temp/humidity and enthalpy. These modes are user selectable. Each mode has a setpoint and a differential, which can be adjusted.

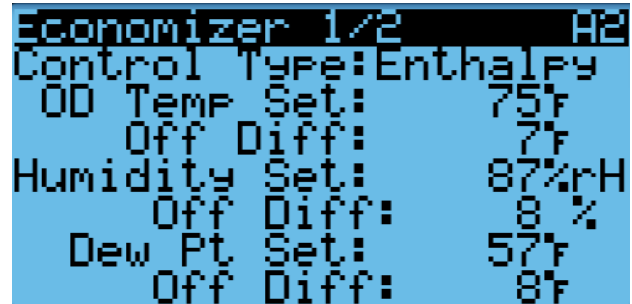
When the mode is set to none, freecooling will be disabled. However, the damper will still be available for ventilation.

When the mode is set to dry bulb, the outdoor air temperature is considered for freecooling availability. If the outdoor air temp is below the OD Temp setpoint, freecooling will be enabled. If the outdoor air temperature is above the OD Temp setpoint plus the off differential, freecooling will be disabled until the outdoor temperature falls below the OD Temp setpoint. Both OD Temp Setpoint and Off Differential are user adjustable.

When the mode is set to temp/humidity, both outdoor temperature and humidity will be considered for freecool availability. If the parameters for dry bulb are met and the outdoor relative humidity is below the humidity setpoint, freecooling will be enabled. If the outdoor air humidity is above the setpoint plus the off differential or if dry bulb parameters are not met, freecooling will be disabled. Both Humidity Setpoint and Off Differential are user adjustable.

When the mode is set to Enthalpy, the program will consider dry bulb and temp/humidity availability as well as dew point for freecooling availability. If parameters for both dry bulb and temp/humidity are met and the dew point is below the Dew Point setpoint, freecooling will be enabled. If the parameters for either dry bulb or temp/humidity are not met or the dew point is above the dew point setpoint plus the off differential, freecooling will be disabled. Both Dew Point setpoint and Off Differential are user adjustable.

FIGURE 18  
Unit PLD Pro Economizer A2 Menu Display



### Economizer A3

Mixed Air Temp: Desired temperature of the MAT. This setpoint is only used during freecooling and is user adjustable.

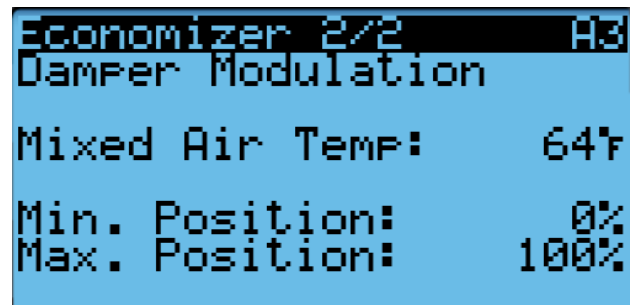
In optimized cooling (compressor and freecooling) the Mixed Air Temp setpoint is adjusted to 65°F (18°C) to prevent the indoor coil from freezing.

The damper also has a user-adjustable minimum and maximum position.

Min. Position: The minimum position prevents the damper blade from adjusting below the minimum setpoint in freecooling and ventilation operation.

Max. Position: The maximum position prevents the damper blade from adjusting above the maximum setpoint in ventilation. This limitation does not apply to freecooling.

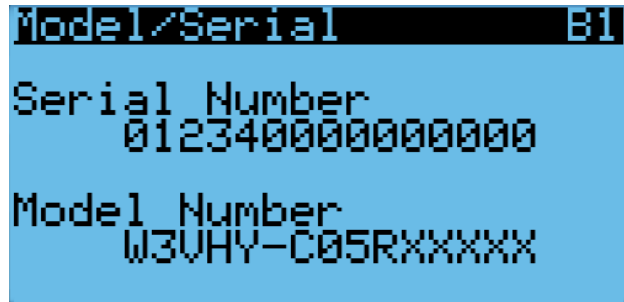
FIGURE 19  
Unit PLD Pro Economizer A3 Menu Display



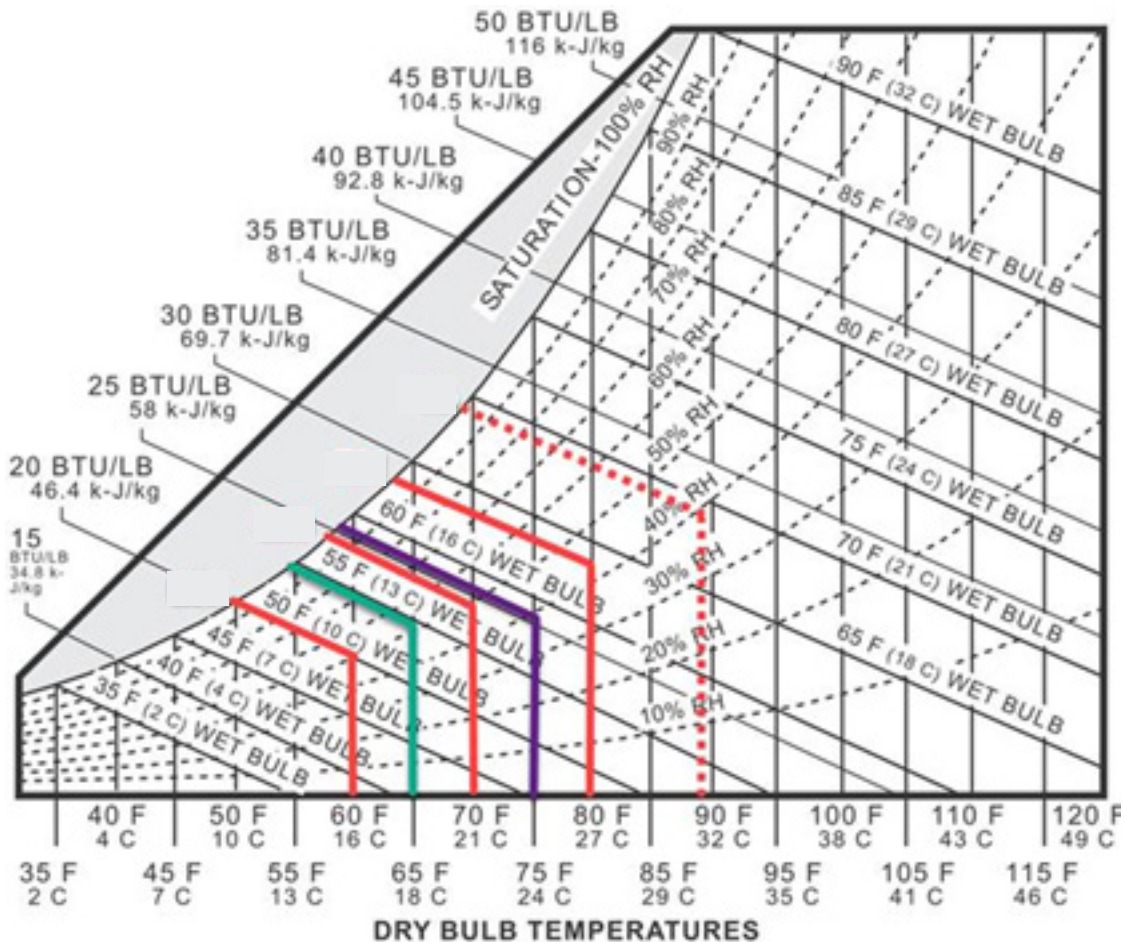
## Model/Serial Number Configuration

1. Press MENU key to go to the Main Menu screen.
2. Press UP or DOWN keys and ENTER key to enter TECHNICIAN password 1313.
3. Press UP or DOWN keys to scroll to **Adv Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Model/Serial B1**; press ENTER key.
5. Press ENTER key to scroll and UP or DOWN keys to change the desired value (see Figure 20). Press ENTER key to save the value and scroll to the next parameter.

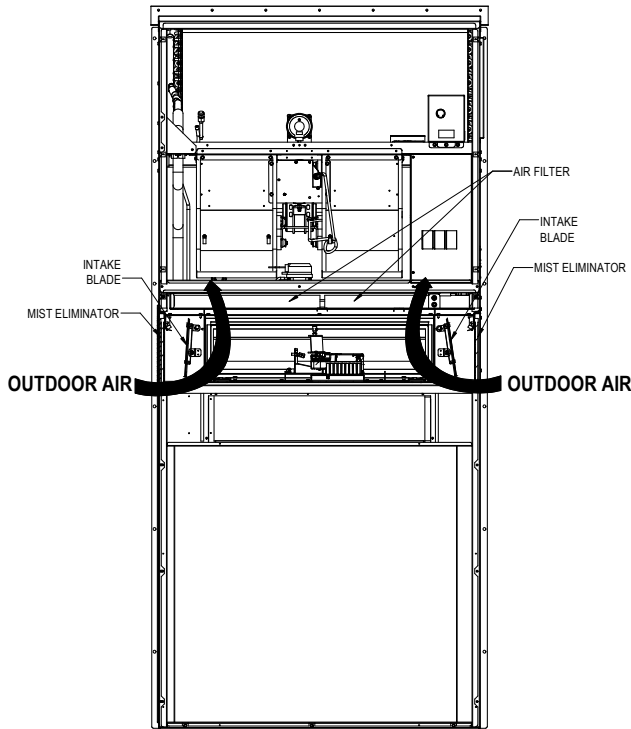
FIGURE 20  
Model/Serial B1



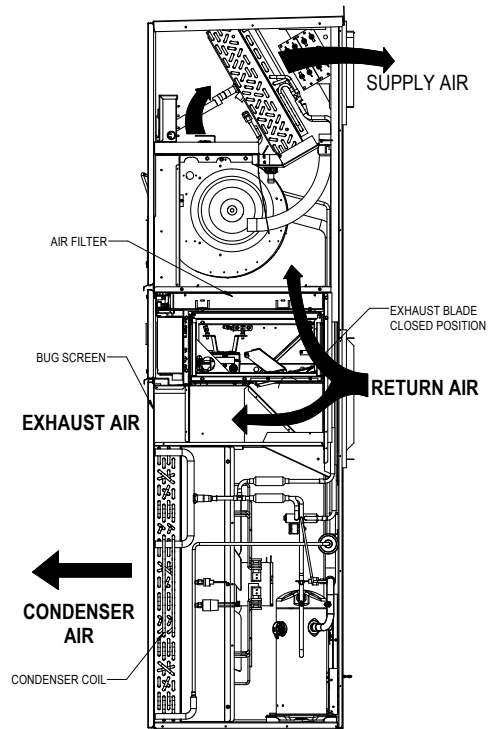
The serial number and model number can be modified as needed on this screen. An Engineer level password must be entered in order to modify this page.



**FIGURE 21**  
100% Airflow

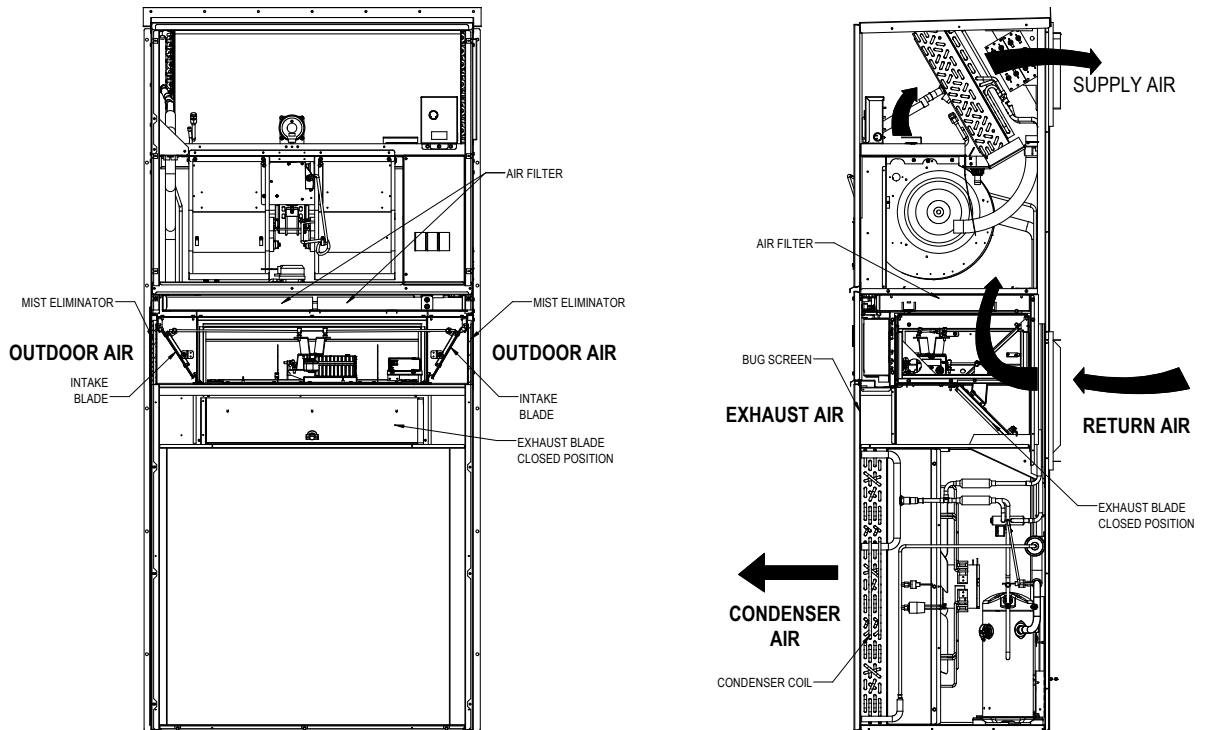


**FIGURE 22**  
Mixed Airflow Path



MIS-4038

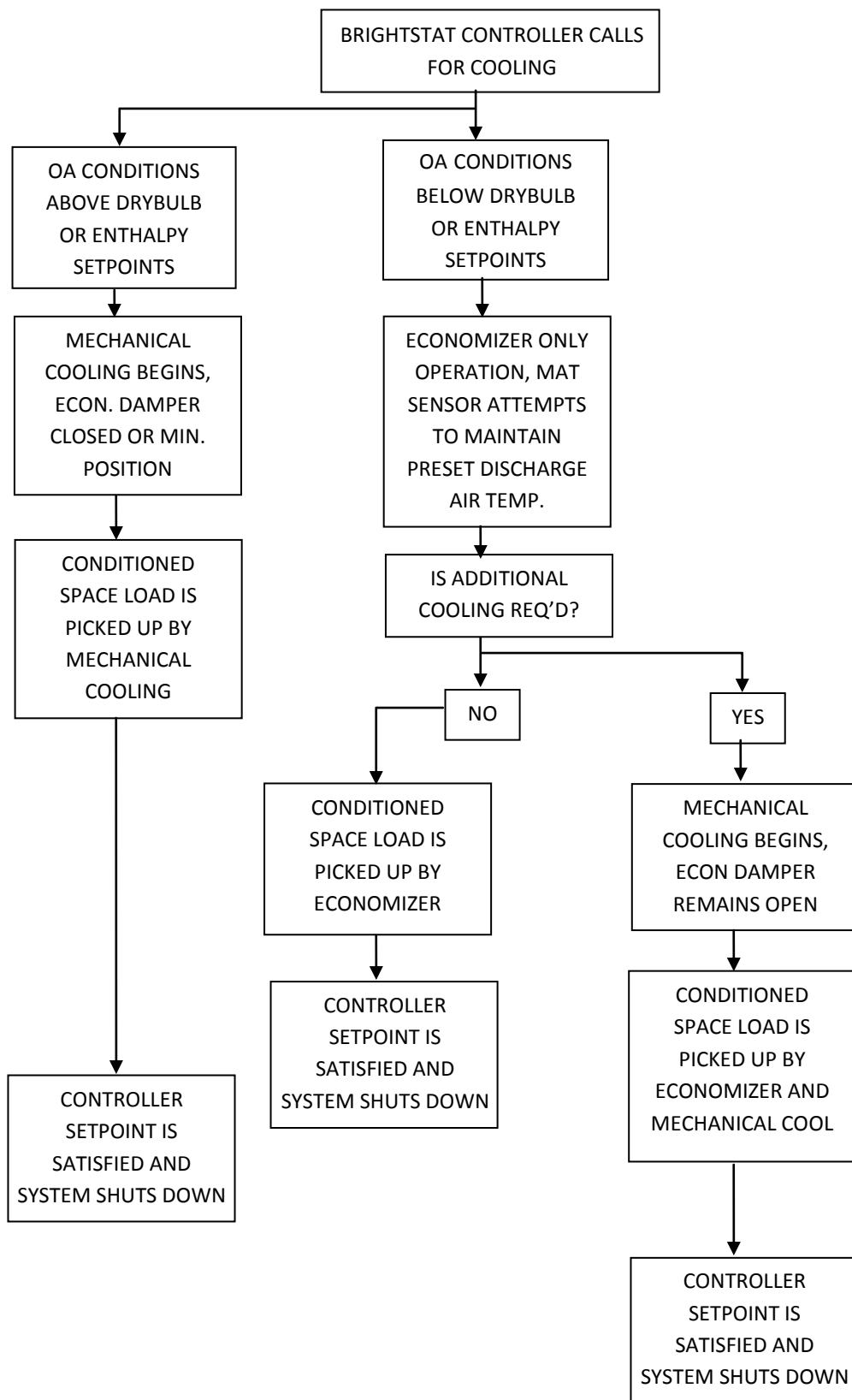
**FIGURE 23**  
Call for Compressor or Fan Only with Ventilation Off



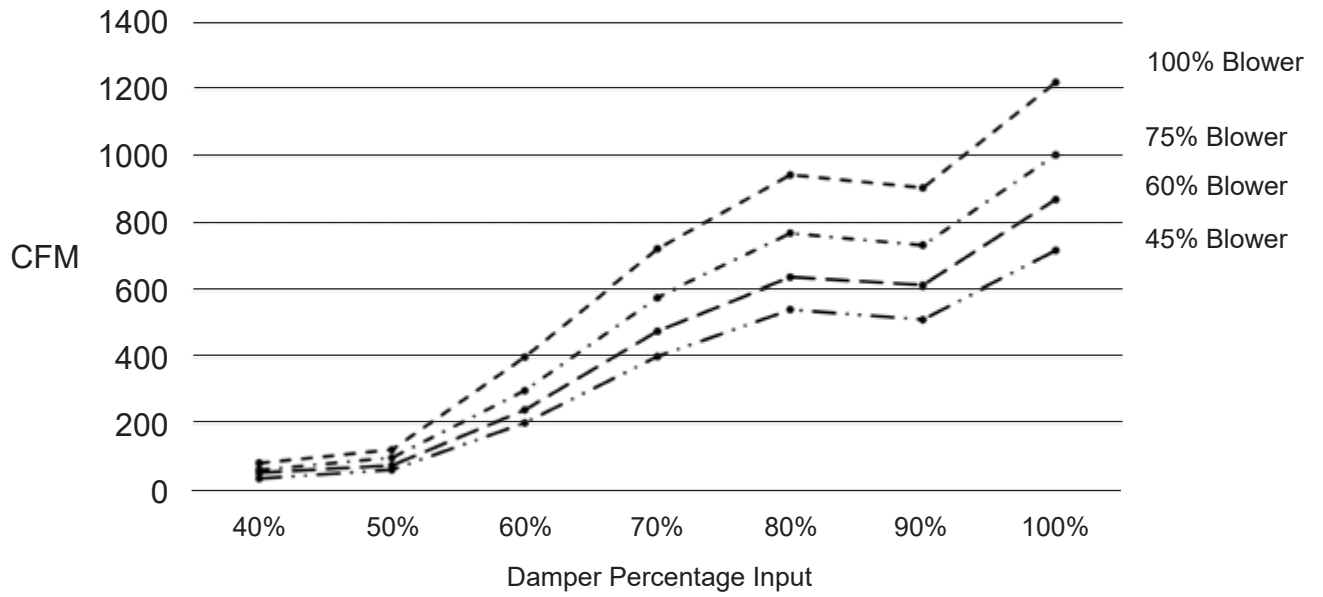
MIS-4037



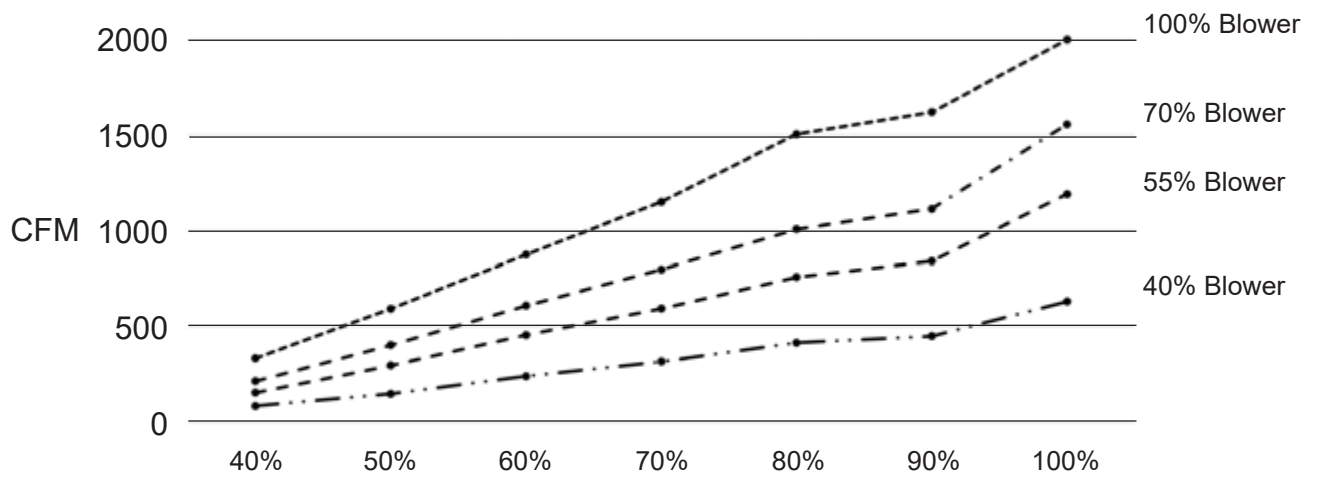
## Economizer Operation for Variable Speed:



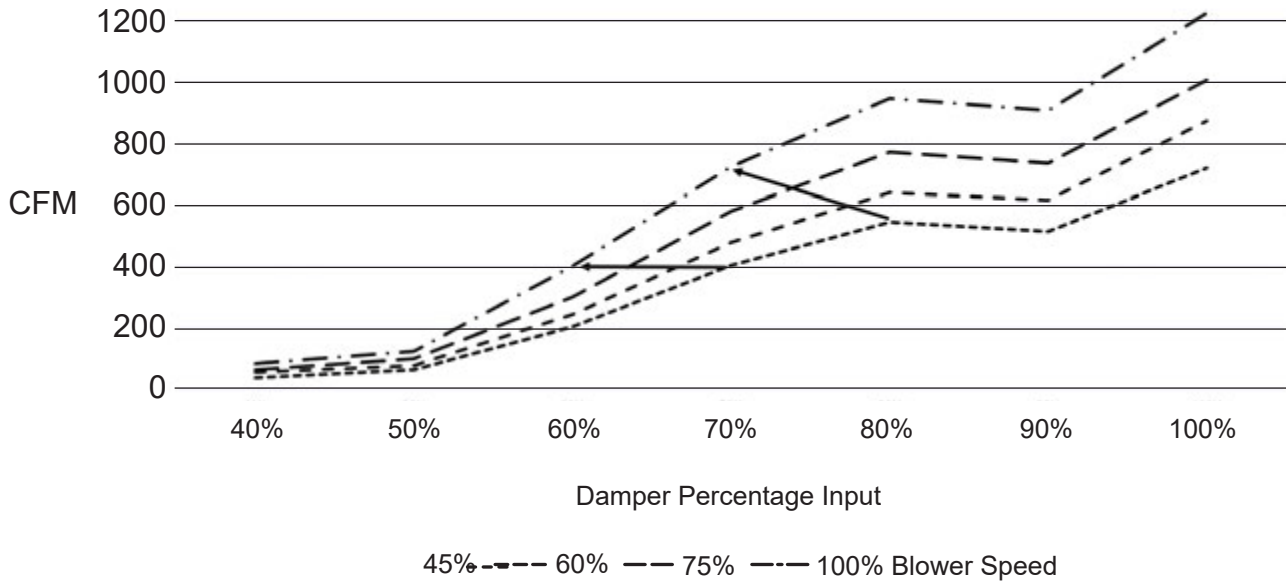
**GRAPH 1**  
**W3VHY ECON-WD/DB Ventilation Airflow**



**GRAPH 2**  
**W5VHY ECON-WD/DB Ventilation Delivery**



**GRAPH 3**  
**W3VHY Ventilation Minimum Position Airflow**



**GRAPH 4**  
**W5VHY Ventilation Minimum Position Airflow**

