
INSTALLATION INSTRUCTIONS

Full Flow Modulating Low Leakage Commercial Room Ventilator with Pre-Purge and Exhaust

Model: IZ-CRV

For Use with Bard I-TEC Heat Pump Models:
I36Z2, I42Z2, I48Z2, I60Z2



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Manual: 2100-774
Supersedes: **NEW**
Date: 2-27-23

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General Commercial Room Ventilator Information

A commercial room ventilator (CRV) provides a way to bring in outdoor air into a structure. The damper assembly allows outdoor ventilation air to enter both sides of the unit, while exhausting room air out the front of the unit above the condenser coil area. A 24VAC damper motor with linkage operates both the exhaust blade and both intake blades. The indoor blower operates while ventilation occurs. A control board allows for various ventilation options. The following benefits can be attributed to CRV use:

- Air is drawn through the sides of the unit using the indoor blower and enters the indoor area through the supply opening.
- Exhaust air enters the unit through the lower return openings and is exhausted through the rear of the unit with a variable speed exhaust fan controlled by the analog output of the ventilation air actuator.
- Ventilation can be controlled as an on/off 24VAC signal or a 0-10VDC modulating signal to the CRV control board.

The CRV control board provides inputs for multiple blade positions for use with units with multiple indoor airflow amounts. A pre-purge ventilation setting is also available with a 30/60/90 minute timer to allow ventilation to start per a schedule at a specified CFM amount. To use the pre-purge feature, scheduled ventilation would be started before occupants enter the room. A 0-10VDC input allows for modulating control of the ventilation amount. The 0-10VDC signal can be provided by a DDC building management system or a CO₂ sensor with modulating control.

The CRV system consists of the following key features and components:

- Openings on both sides of the unit that allow outdoor air to enter the unit. Once the air enters the unit, it is drawn through the two unit filters and transferred into the building by the indoor blower.
- Two blades located inside the CRV assembly that control the amount of air entering the building.
- A fully modulating spring return damper motor with a control arm, connecting rods and blade linkage that operates the CRV blades.
- A solid-state control board that operates the damper motor.

Overall, this manual is designed to explain functions and discuss CRV setup procedures.

Control System Notes

This ventilation package is capable of being set to meet the current ASHRAE specifications for minimum occupied airflow rates, with extended capability to meet demand ventilation requirements.

Two Switch Application

Energizing the A terminal in the low voltage connection box during occupied conditions will allow the pre-purge and minimum occupied airflow rates to be set to meet ASHRAE requirements. This can be accomplished by adjusting the PP and OCC potentiometers on the CRV control board (see Figure 1 on page 4) by aligning the damper position per the graphs included on pages 8 and 9.

"V" Option CRV Sequence of Operation

The "V" Ventilation option includes a control board with blade positioning potentiometers along with an input for a 2-10V input signal.

Adjustable potentiometers:

"PP" Potentiometer setting: This potentiometer can be used to adjust the blade setting for outdoor air intake during a pre-purge cycle. The pre-purge cycle time is based on the setting of the pre-purge timer.

"OCC" Potentiometer setting: This potentiometer can be used to adjust the blade setting for outdoor air intake when the "A" terminal is energized on the low voltage terminal strip indicating occupancy.

"Y1" Potentiometer setting: This potentiometer can be used to adjust the blade setting for outdoor air intake when the "Y1" terminal is energized on the low voltage terminal strip indicating 1st stage cooling or Balanced Climate operation. When energized, it overrides the "OCC" potentiometer setting.

"Y2" Potentiometer setting: This potentiometer can be used to adjust the blade setting for outdoor air intake when the "Y2" terminal is energized on the low voltage terminal strip indicating 2nd stage cooling operation. When energized, it overrides the "OCC" and "Y1" potentiometer settings.

Pre-Purge Feature

Pre-purge is used to ventilate a specified CFM amount before occupants enter the room or structure. The control board has a built-in pre-purge timer that can be set to 30, 60 and 90 minute intervals by moving the jumper noted in Figure 1 on page 5. This timer will start when the jumper is installed and the A terminal is energized on the low voltage terminal strip. Blade adjustment can be made on the PP potentiometer. Once the timer has timed out, the board will default to the occupied setting and this blade position can

be adjusted on the OCC potentiometer. If the timer is set to 0 (off—shipped position), the occupied setting is instantaneous and the pre-purge setting (PP) is no longer in the sequence.

Occupied Setting

Occupied is used to ventilate a specified CFM amount when occupants enter the room or structure. The control board will energize the occupied setting after the pre-purge cycle, or if pre-purge is disabled immediately when the A terminal is energized on the low voltage strip. Blade adjustment can be made on the OCC potentiometer.

CRV Exhaust Operation

The exhaust assembly is located in the lower vent option section that sits on the floor. The assembly has an on/off actuator that opens the exhaust damper anytime the “A” terminal is energized on the unit low voltage terminal board. The variable speed exhaust fan is controlled by analog feedback from the ventilation air actuator. The exhaust fan draws room air through both lower sides of the unit and exhausts it outside through the back of the unit.

As the ventilation dampers open, the exhaust fan will start and gradually increase speed to maintain an appropriate room static as the dampers proceed to the fully open position.

There is a voltage divider installed in the 6-pin feedback connector that is wired to the outdoor air damper actuator. The voltage divider cuts the feedback voltage in half from the outdoor actuator to the exhaust fan. If the outdoor air damper is 100% open, voltage output from the actuator would be 10 volts dc and the exhaust fan will only see 5 volts dc. The exhaust fan will operate on 2VDC-5VDC inputs during the CRV call for ventilation.

2-10V Operation

A CO₂ sensor or other device sending a 2-10V signal can be used to control the damper motor. Two control methods are available to control the damper motor:

- Method 1: The control board will accept a 2-10VDC signal with a resistive load greater than 5000 ohms. Bard CO₂ sensor part #8403-096 can be used when the 2-10V output is connected to terminal 4 on the unit low voltage terminal strip. The occupied OCC potentiometer setting must be set to the off position for total modulation. The OCC potentiometer can be used to maintain a minimum blade position when A is energized.
- Method 2: The damper motor will accept a 2-10VDC signal with a resistive load less than 5000 ohms. This method involves bypassing the control board and powering the motor directly from the device providing the 2-10VDC modulating signal. The gray wire from pin 4 on the 12 pin

connector (2-10V IN on control board) must be spliced with the white wire ran to the damper motor (2-10V OUT on control board).

During 2-10VDC operation with A energized and pre-purge timed operation active, DC voltage signaling occupancy from a source such as a CO₂ sensor will increase ventilation amounts as needed.

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 pages 8 and 9 to determine the blade setting necessary to achieve the ventilation air required for each operating mode.

All potentiometers are set in the closed position from the factory.

Turning potentiometers counter clockwise will close the blade; clockwise will open the blade.

Adjusting Blade Settings

Blade setting positions are set by reading 0-10VDC voltage output from the CRV control board. Locate the M3 VOUT terminal on the CRV control board and unhook the “white wire” connector. Connect a suitable multimeter set to read dc volts to the M3 VOUT terminal (see Figure 1).

Proceed with blade adjustments below; settings can be made with thermostat disconnected and jumpers added at the unit low voltage terminal board.

1. With the unit powered up, jumper R to A. The OCC potentiometer on the CRV board can be set. Remove jumper.
2. Move the pre-purge jumper on the board to the 30 second setting, then jumper R + A and set the PP potentiometer.
3. Remove jumper from R + A, then move pre-purge jumper back to 0.
4. Move jumper to R + A + Y1. The Y1 potentiometer can now be set.
5. Move jumper to R+A+Y1+Y2. Y2 potentiometer can be set. Remove all jumpers.
6. Remove the multimeter and re-install white wire on the M3VOUT terminal.

FIGURE 1
CRV Control Board Settings

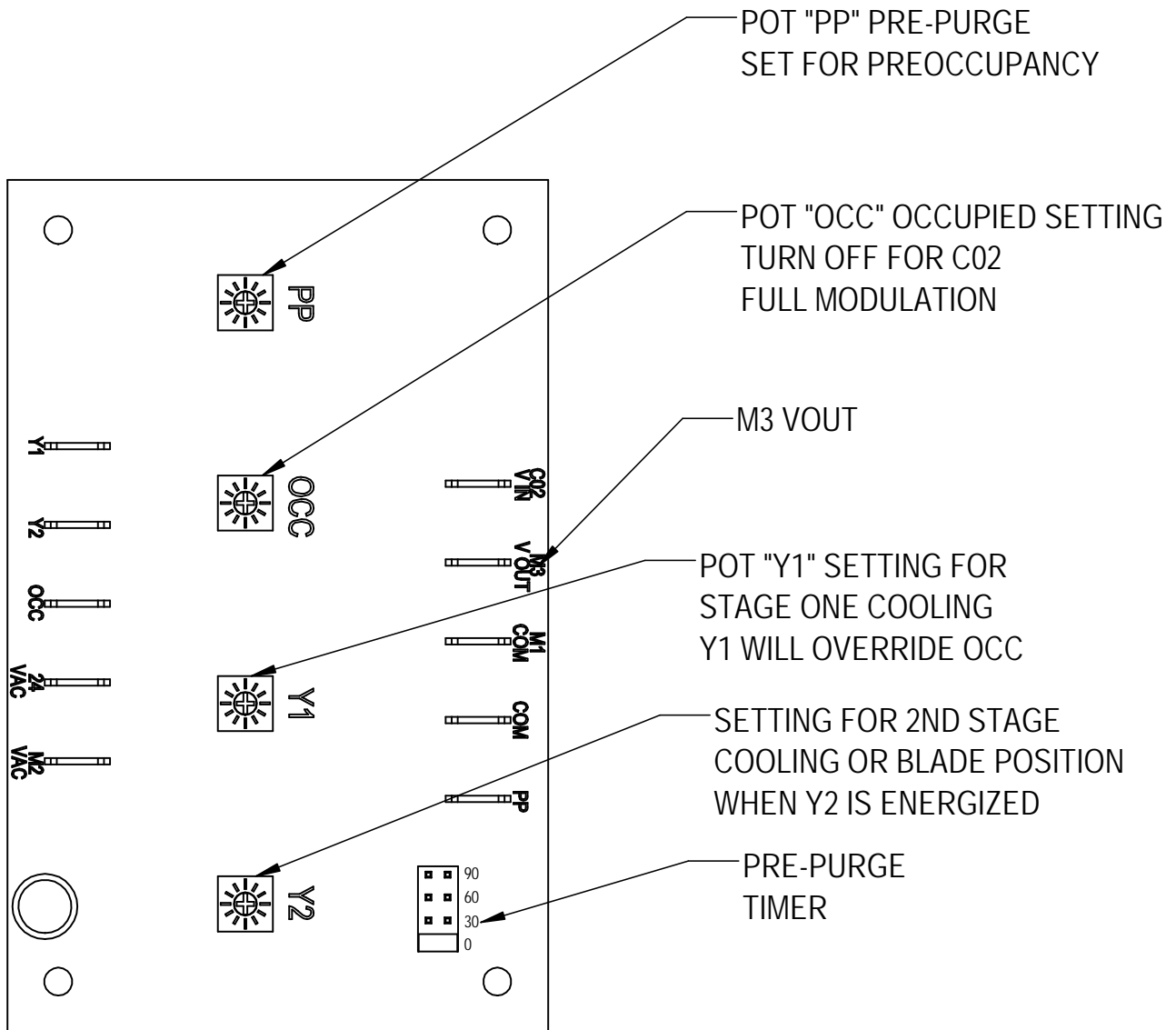
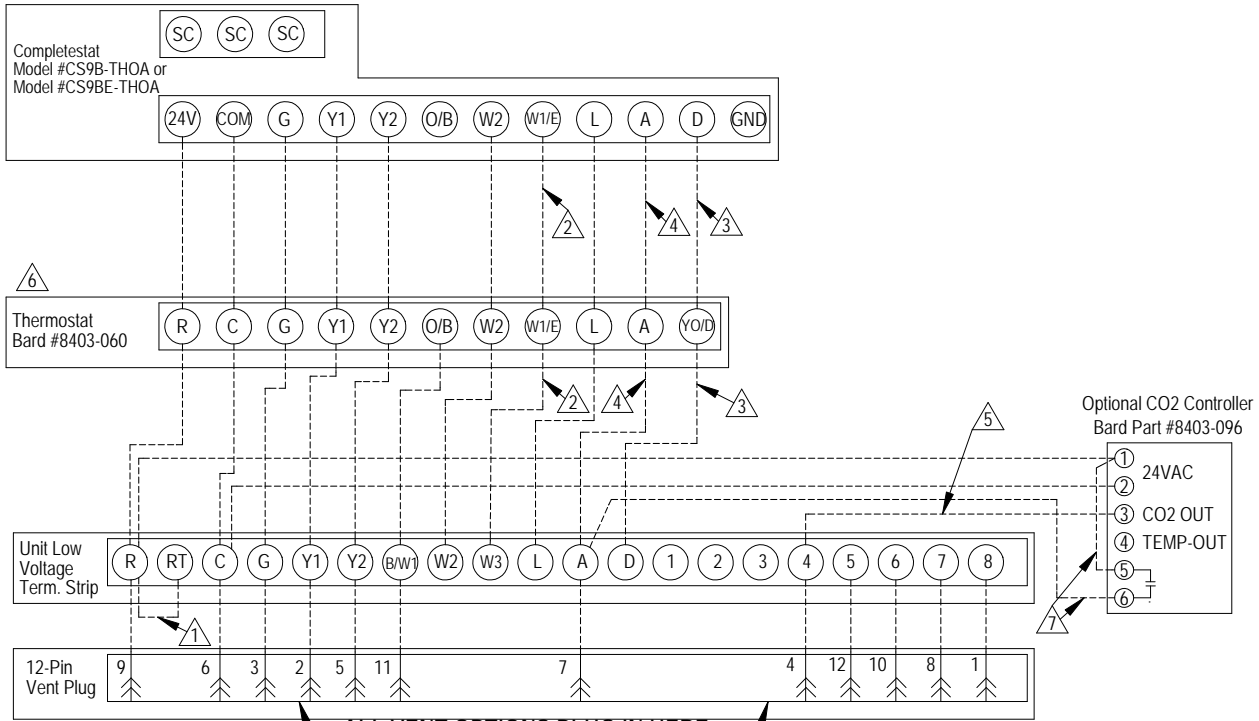


FIGURE 2
Programmable Thermostat Connections for CRV with 2-Stage Heat Pump

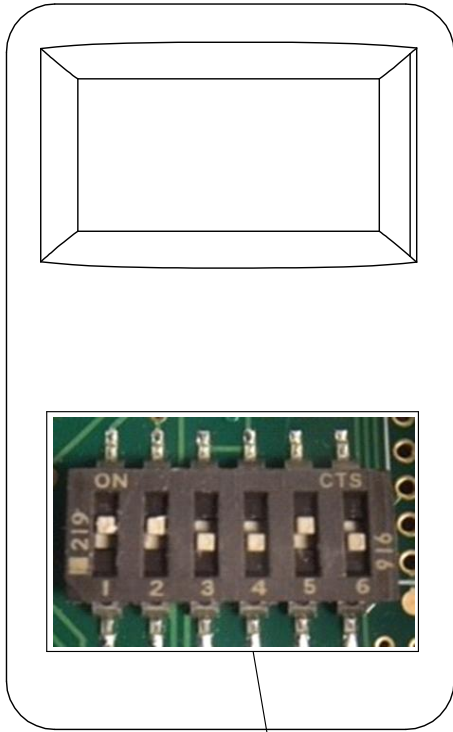


ALL VENT OPTIONS PLUG IN HERE
If not equipped with a ventilation option to plug in, a jumper plug must be installed.

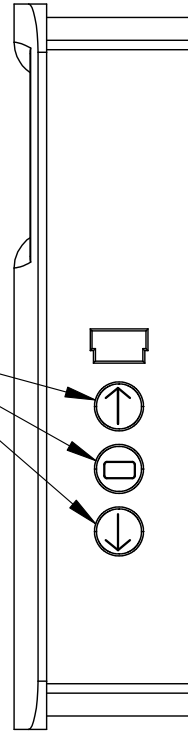
- △1 Factory installed jumper. Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.
- △2 Wire not needed below 15KW.
- △3 Wire required for dehumidification models only.
- △4 Do not connect "A" from thermostat if optional CO2 controller is used
- △5 0-10 VDC modulating CO2 control signal for modulating ventilation control (optional for ECON only - see vent instruction manuals)
- △6 Ensure model configuration is heat pump and not heat/cool. Must be configured to programmable and fan set to be programmed fan for the "A" output to function during scheduled occupied periods. Must be configured for multi-stage for Y1 output to be active 1st stage cooling. For dehumidification, must be configured for "No Economizer" for YO/D to be active for humidity control.
- △7 Do not add these wires if setting up for modulating control.

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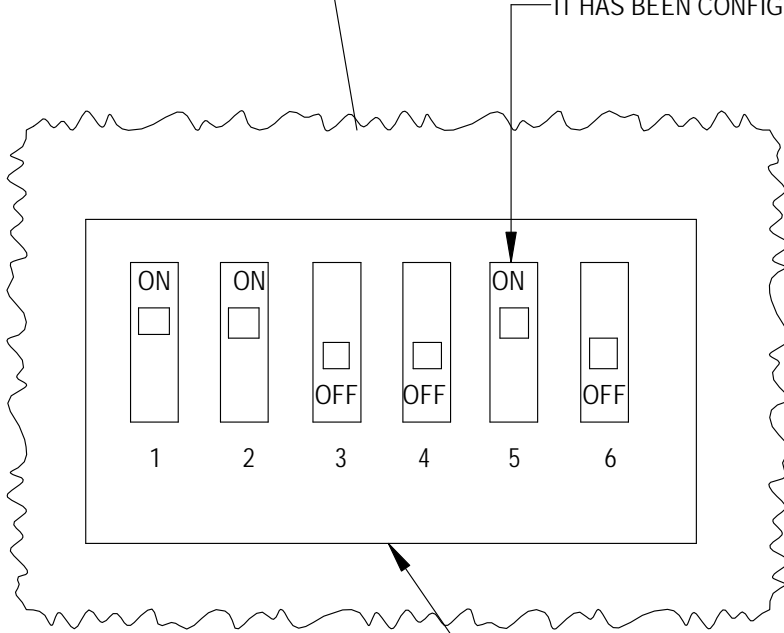
FIGURE 3
CO₂ Sensor Default and Final Settings
Bard P/N 8403-096 CO₂ Controller



PRESS UP AND DOWN
 ARROWS TO ENTER
 CONFIGURATION MODE
 USE ARROWS TO SELECT
 SETTING. PUSH MIDDLE
 BUTTON TO CHANGE.
 CONTROLLER WILL
 SHOW SET.



NOTE: MENU
 DIP SWITCH MUST
 BE IN "ON" POSITION #5
 TO CHANGE ANY
 SETTINGS WITH
 THE SIDE BUTTONS.
 TO LOCK THE CO₂
 CONTROLLER MOVE
 DIP SWITCH TO "OFF" AFTER
 IT HAS BEEN CONFIGURED.

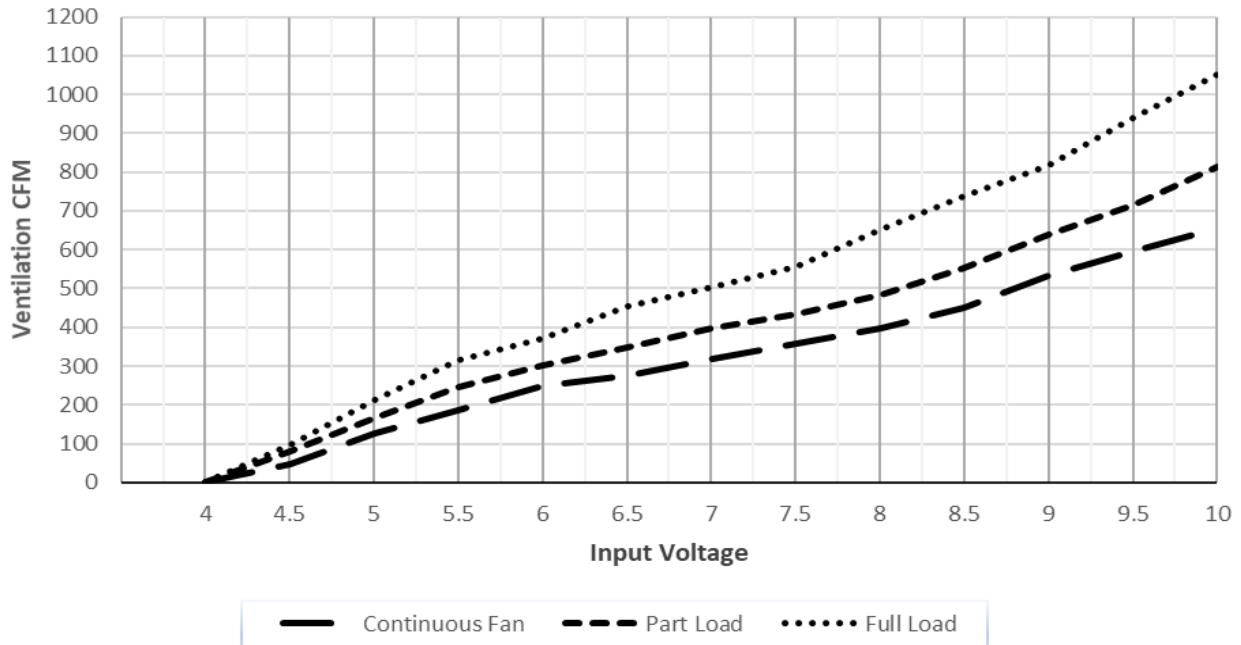


DIP SWITCHES MUST BE
 POSITIONED AS SHOWN
 FOR PROPER OPERATION

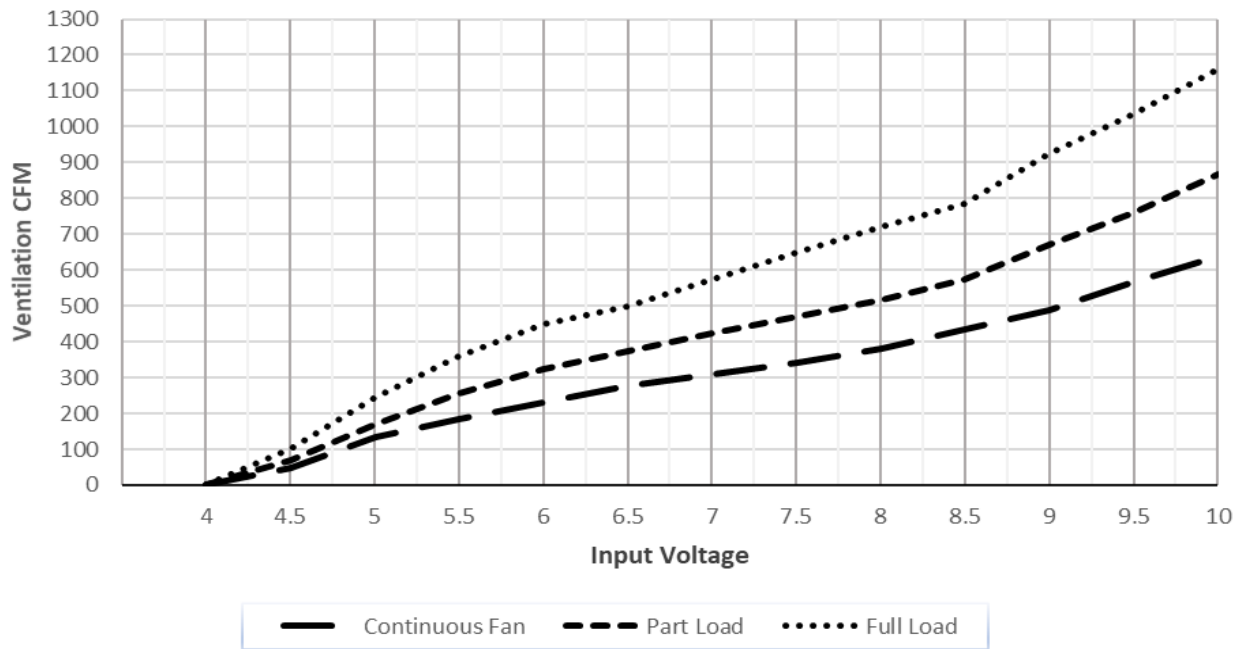
Settings	Recommended	Default
RON	Not Used	
ROF	Not Used	
DSP	C	CT
UNI	US	US
COL	700	0
COH	1500	2000
TOL	Not Used	
TOH	Not Used	
BAR	See Instrution with Controller For High Altitude Installations	
CAL	Used for Field Calibration	

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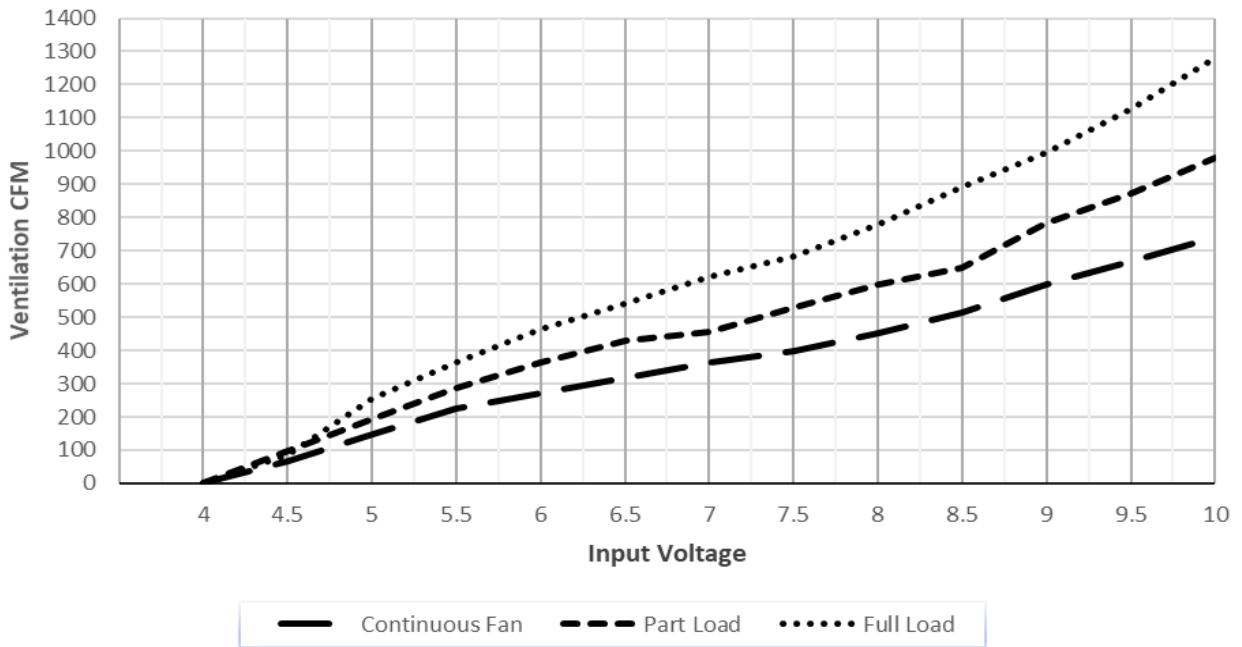
GRAPH 1
I36Z2 CRV Ventilation Delivery



GRAPH 2
I42Z2 CRV Ventilation Delivery



GRAPH 3
I48Z2 CRV Ventilation Delivery



GRAPH 4
I60Z2 CRV Ventilation Delivery

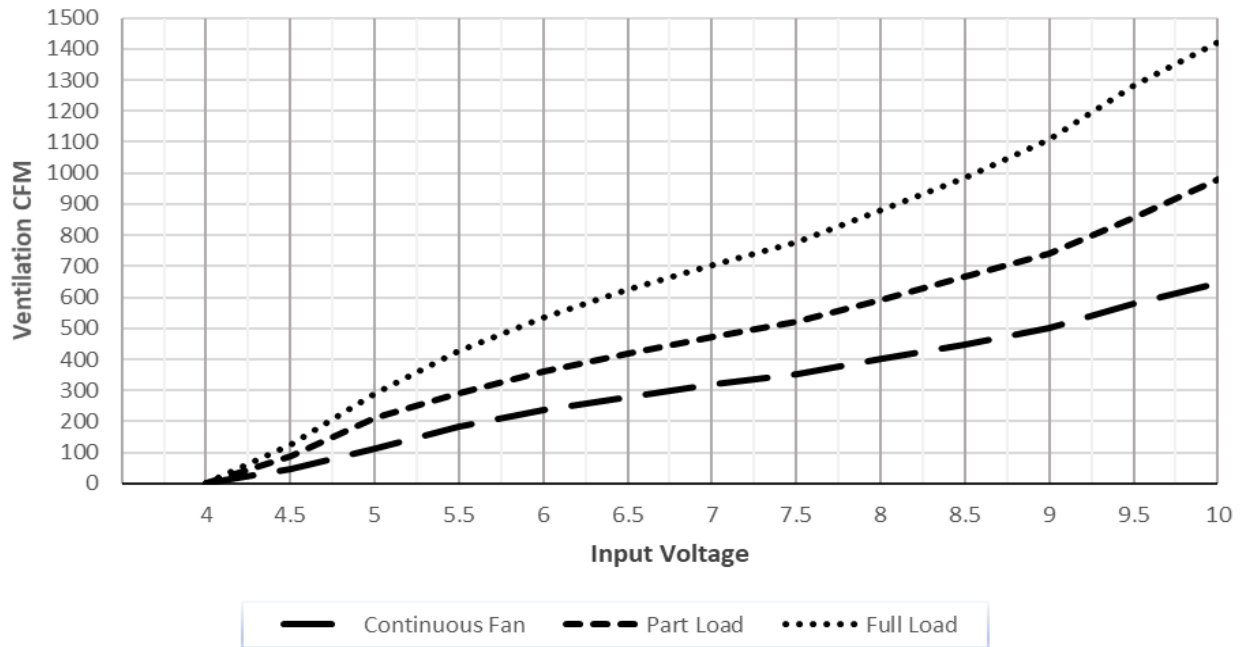
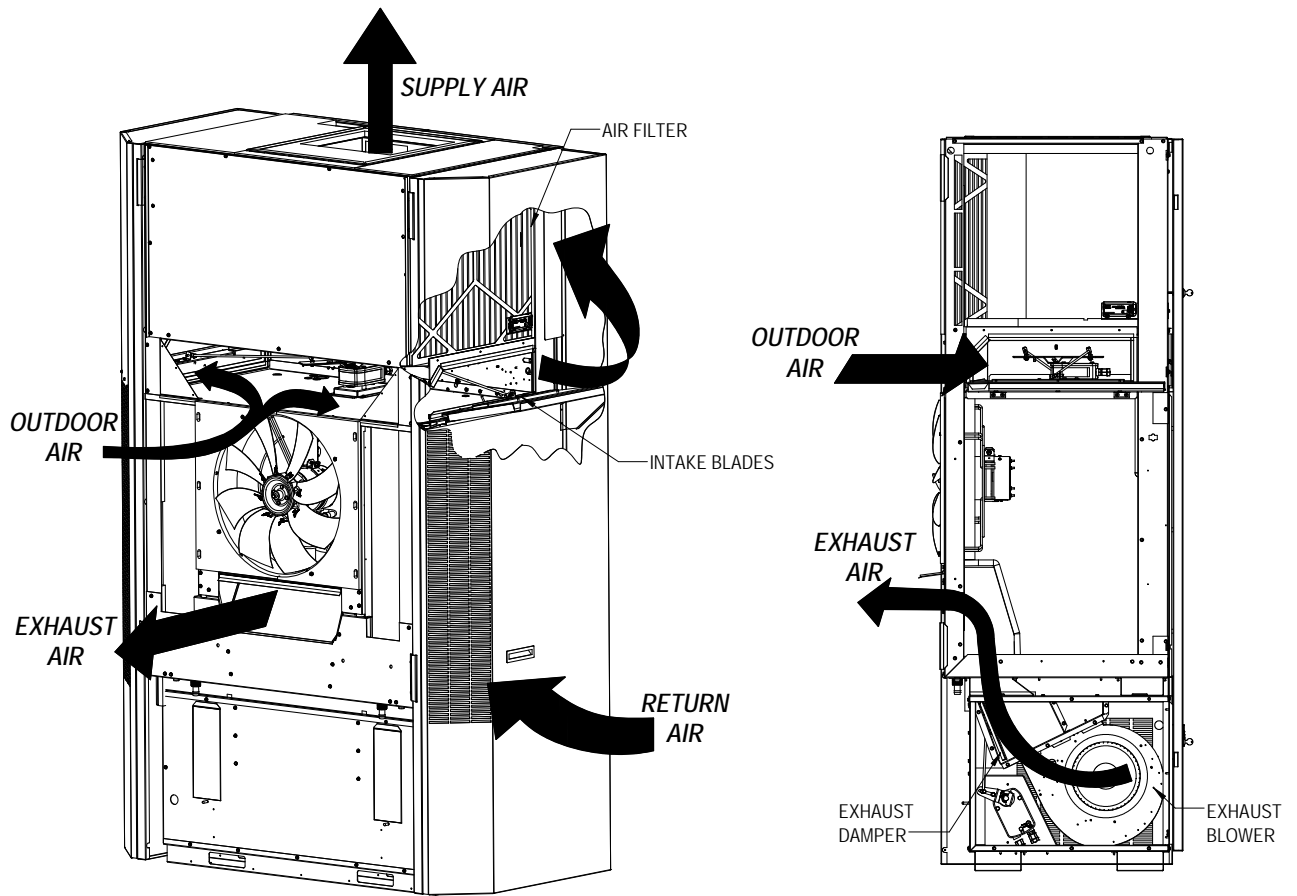


TABLE 1
Unit Operation with V (Variable CRV) Ventilation Option for 2-Stage Compressor Units

Unit Operation	Occ. Signal	Low Voltage 24VAC							Compressor	Fan Speed	Damper Position
		G	Y1	Y2	B/W1	W2	W3	A			
Blower Only	Yes	X						X	Off	Vent	OCC/PP
Blower Only	No	X							Off	Vent	Closed
Part Load Cool	Yes	X	X					X	On	Part Load	Y1
Part Load Cool	No	X	X						On	Part Load	Closed
Full Load Cool	Yes	X	X	X				X	On	Full Load	Y2
Full Load Cool	No	X	X	X					On	Full Load	Closed
1st Stage Heat	Yes	X	X		X			X	On	Part Load	Y1
1st Stage Heat	No	X	X		X				On	Part Load	Closed
2nd Stage Heat	Yes	X	X	X	X			X	On	Full Load	Y2
2nd Stage Heat	No	X	X	X	X				On	Full Load	Closed
2nd Stage Heat and EH	Yes	X	X	X	X	X		X	On	Full Load	Y2
2nd Stage Heat and EH	No	X	X	X	X	X			On	Full Load	Closed
Emergency EH	Yes	X				X	X	X	Off	Full Load	Y2
Emergency EH	No	X				X	X		Off	Full Load	Closed

FIGURE 4
Call for Ventilation With or Without Compressor Operation



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Service

IMPORTANT: Turn power off before performing any service to the unit.

Exhaust Damper and Actuator

The exhaust damper and actuator are located in the lower section of the unit in the vent box (see Figure 5). To access the actuator, the vent box door must be removed. The blower assembly can then be unplugged and removed to access the actuator.

Intake Actuator

The intake section of the vent is located behind the control panel (see Figure 6). If the unit is installed against the wall, the intake actuator can be accessed through a panel in the evaporator section of the unit. Unplug and remove the unit blower from the unit. This will provide access to the panel on the evaporator partition. Remove the panel to service the actuator.

FIGURE 5
Exhaust Damper Actuator Access

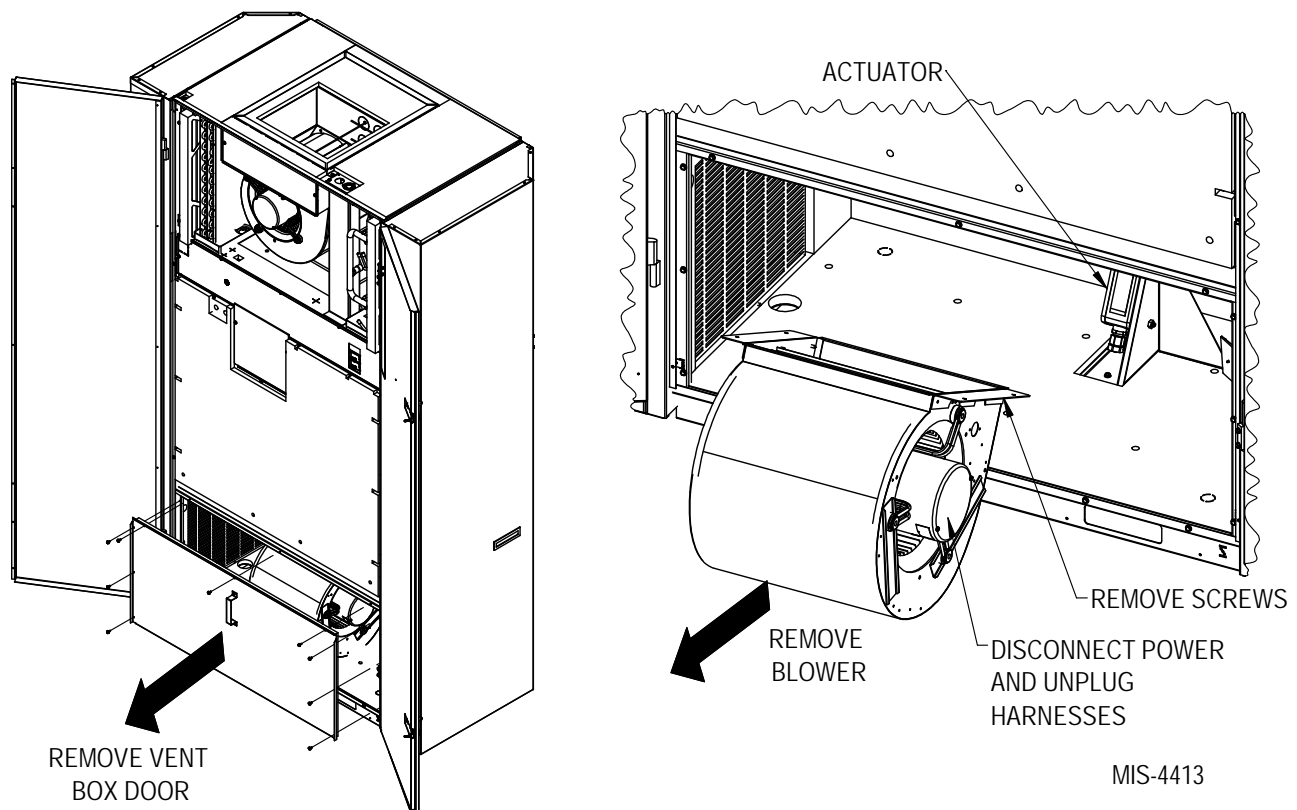
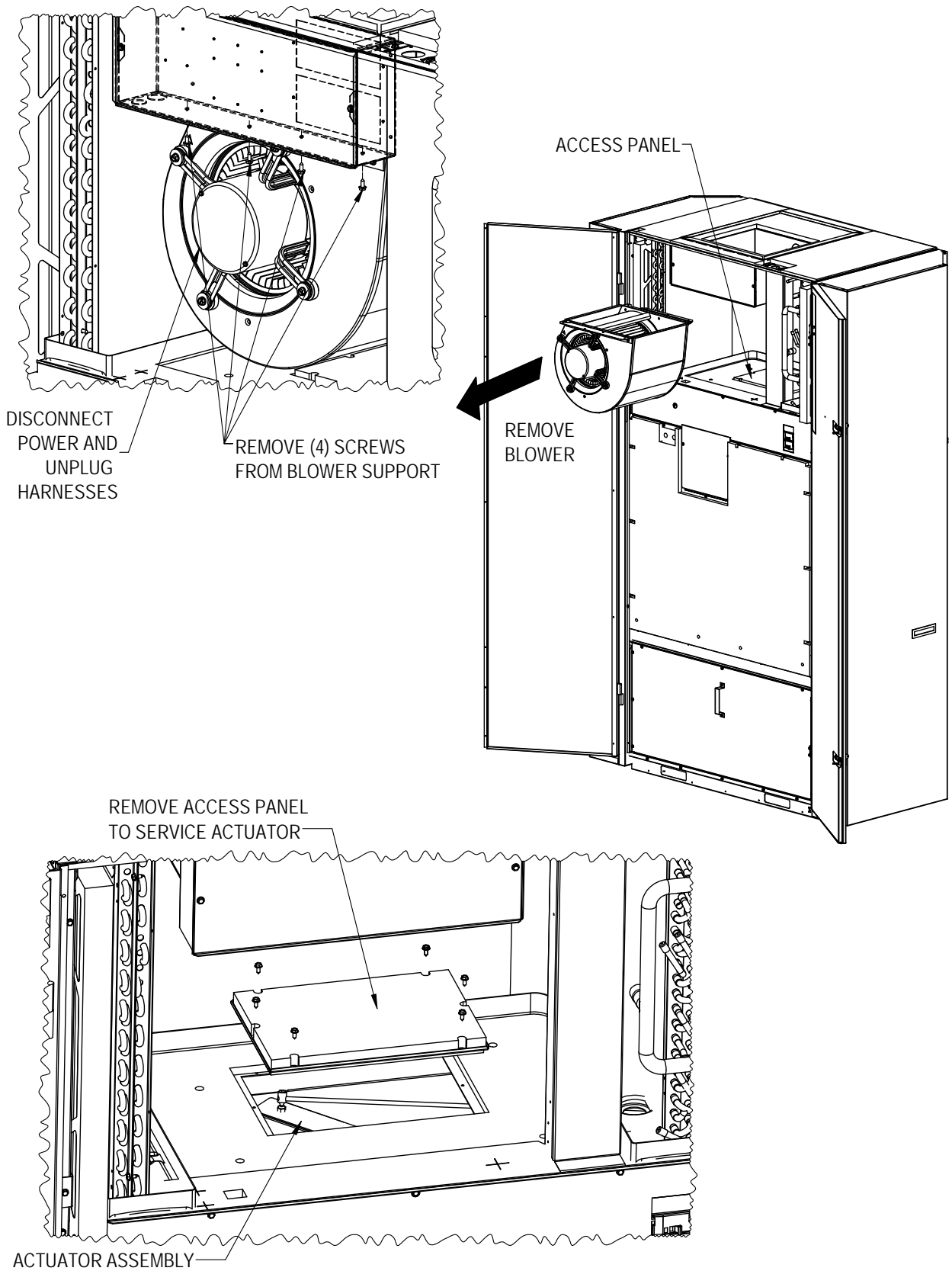


FIGURE 6
Intake Damper Actuator Access



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