PRODIGY 2.0 (M3 UNIT CONTROLLER) FREQUENTLY ASKED QUESTIONS

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Q1. Is there training and tutorials available for the Prodigy® unit controller?

Yes, we have training and tutorials available on the Lennox Commercial website. You can also go to the following links to access Prodigy® training sessions and videos:

- Prodigy® Controller Training: http://www.lennoxcommercial.com/support/training.asp
- Controls Link: http://www.lennoxcommercial.com/prodigy
- Prodigy® How-To Videos: http://www.lennoxcommercial.com/landing/prodigy/how-to-videos.asp

Q2. How do I program the replacement M3 controller?

Reprogram the replacement M3 Unit Controller as follows (follow the flowchart in figure1 for assistance):

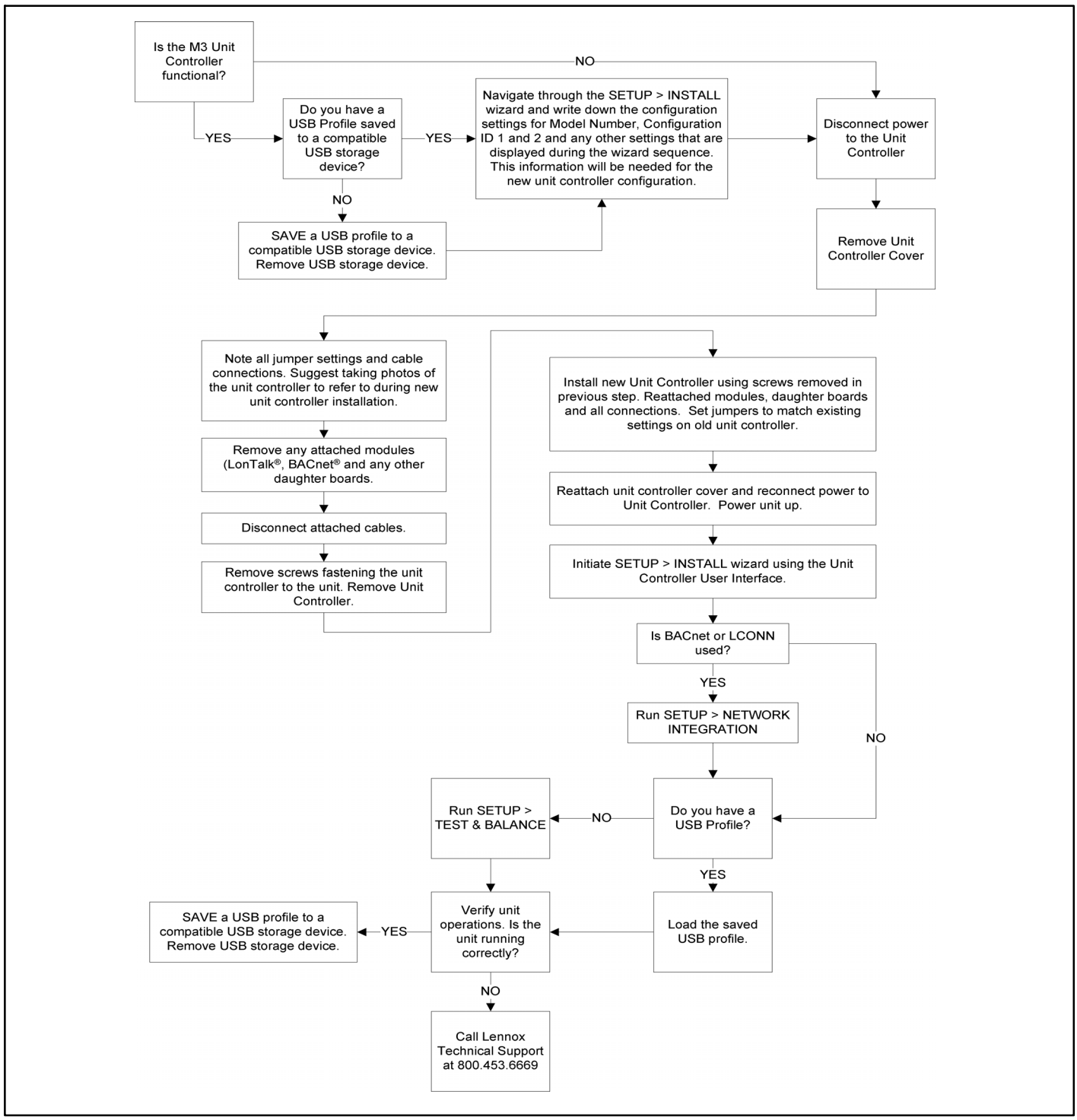

Figure 1. Control Replacement

Saving USB Profile (Old M3 Unit Controller)

If there is a current saved USB Profile, then proceed to Loading USB Profile section. If not available, use the following procedure to save a USB Profile.

If the old unit controller is operational, run the SETUP > INSTALL wizard to capture the current configuration of the old unit controller. Data such as model number, configuration ID 1 and 2, catalog number, serial number and RTU description should all be written down in order to configure the new unit controller correctly. Once the above configuration settings has been collected, use the following procedure to save a USB Profile.

1..Insert a compatible USB storage device.

2..Go to S**ERVICE > REPORT** and select USB PROFILE SAVE.

3..The USB PROFILE SAVE screen will appear requesting that you provide a unique name for the profile. Select a unique name and press SAVE.

NOTE - If "NOT APPLICABLE EQUIPMENT IS NOT PRESENT" is displayed, it may indicate the unit controller was unable to read the USB storage device. Remove and reinsert USB storage device and attempt to save the USB Profile again. If problem persist, try a different USB storage device.

4..If successful the screen will return to the REPORT menu options.

Loading USB Profile (New M3 Unit Controller)

The USB profile saves specific data only. Data saved includes configuration information such as Test & Balance settings and any parameters that were manually configured through SETTINGS > RTU OPTIONS > EDIT PARAMETER screen.

If a current USB Profile is available, use the following procedure to load the existing profile to the new unit controller.

NOTE - If no USB Profile is available, information concerning the unit configuration and accessories installed is available from the following sources:

- *Unit Nameplate (catalog, model and serial numbers)*
- *Original Factory Unit Configuration label located in control box area*
- *Unit parameter labels located on unit or in the unit installation instruction should have recorded data concerning any parameters that were manually changed from defaults.*

1..Run **SETUP > INSTALL** wizard.

2..Select desired LANGUAGE and press **SAVE** button.

3..Select DATE/TIME and press **SAVE** button.

4..Select either FAHRENHEIT or CELISUS and press **SAVE** button.

5..Enter the MODEL NUMBER from the unit nameplate or data collected from the Saving USB profile procedure. Press **SAVE** to continue.

NOTE - Until Configuration ID 1, positions 1, 2 and 3 are configured correctly, alarm messages will be displayed. Press the BACK button to clear the messages from the display.

6..Enter the configuration ID 1 and 2 information that was collected prior to removal of the old unit controller. If no information was collected, use the information located on a label to the right of the new unit controller in the control box area. Press the **SAVE** button to continue after both IDs have been configured.

NOTE - If the Original Factory Unit Configuration labels are missing from the unit, refer to the M3 Installation and Setup Guide included with this kit for model number and configuration ID 1 and 2 setting information.

NOTE - Information for steps 7 and 8 is also listed on the Unit Nameplate.

7..Enter the Catalog Number and press **SAVE**.

8..Enter the Serial Number and press **SAVE**.

9..Enter the RTU Description and press **SAVE**.

NOTE - Depending on accessories configured, additional settings will be prompted to be completed.

10.. Go to **SETUP > NETWORK INTEGRATION** and complete the network wizard.

11.. Insert the USB storage device that contains the current saved USB profile.

12.. Go to **SERVICE > REPORT > USB PROFILE LOAD**. Press **SAVE** to continue.

NOTE - If "NOT APPLICABLE EQUIPMENT IS NOT PRESENT" is displayed, it may indicate either the unit controller was unable to read the USB storage device or it is missing. Remove and reinsert USB storage device and attempt to load the USB Profile again. If the issue continues, all data will have to be entered manually.

13.. Select the desired USB Profile by using the adjust and set values arrows. Select the desired USB Profile and press **SAVE**.

14.. The screen will return to the REPORT menu options. Proceed to the next section below.

Running Setup > Test & Balances

1..If a USB Profile was loaded, Test & Balances settings have already been configured and this procedure is not required.

2..If no USB Profile was available, then go to SETUP > TEST & BALANCE and complete all applicable menu options under that section.

NOTE - Refer to the Original Factory Unit Configuration label located in control box area and additional data located on the unit access panel which provide more information concerning factory and field settings.

Go to Technical Documents:

http://www.lennoxcommercial.com/technical-documents/installation-instructions.asp

Q3. How do I operate the unit in test mode?

Table 1 shows the sub-menus in the SERVICE menu of the Prodigy M3. In order to perform any kind of testing, you will need to enter the TEST mode and perform your desired test. The display will show the current status of the unit i.e. Idle, Cooling, Heating etc. To access Test Mode use the following path: **SERVICE > TEST**. Once satisfied with the test, press the **select** button to disable the active test. To return to normal unit operation, press the **BACK** button the number of times needed to return to the unit's current status screen.

Table 1. Menu Interface (Level 1 - SERVICE)

Note: Available menu options are dependent on hardware configuration.

Level 1	Level 2	Level 3	Use the **Adjust and set values** arrows to scroll up or down for selection options.	WHEN SELECTED (PRESS BACK TO RETURN TO THE PREVIOUS MENU)
SERVICE	TEST	COOL	OPTIONS ARE COOL 1, COOL 2, COOL 3 AND COOL 4.	COOL X ON RAT: XX.X F DAT: XX.X F OR NOT APPLICABLE EQUIPMENT NOT PRESENT
		HEAT	OPTIONS ARE HEAT 1, HEAT 2, HEAT 3 AND HEAT 4.	HEAT X ON RAT: XX.X F DAT: XX.X F OR NOT APPLICABLE EQUIPMENT NOT PRESENT
		BLOWER	BLOWER ON	
			BLOWER TEST AIRFLOW: NO = XX %	
		DAMPER	POSITION	ACTUAL: 0.1%. *NOTE: THIS FUNCTION IS ONLY AVAILABLE IF CONFIGURATION ID 1, POSITION 2 HAS BEEN CONFIGURED.*
			POWER EXHAUST	POWER EXHAUST ON OR NOT PRESENT
		FANS	OPTIONS ARE FAN 1, 2, 3, 4, 5 OR 6	FAN X ON OR NOT APPLICABLE EQUIPMENT NOT PRESENT
		DEHUMIDIFIER	OPTIONS ARE DEHUMIDIFIER 1 AND DEHUMIDIFIER 2	WHEN SELECTING OPTION, RESPONSE WILL BE EITHER DEHUMIDIFIER X ON OR NOT APPLICABLE EQUIPMENT NOT PRESENT.
		OUTPUTS	SERVICE RELAY	SERVICE RELAY ON

Q4. How can I setup the unit to operate temporarily using the factory-installed return air sensor, prior to installation of the A2 zone sensor? (How do I set the unit up for temporary heating and cooling?)

You can also refer to the HowTo video at the following link for help:

http://www.lennoxcommercial.com/landing/prodigy/how-to-videos.asp

In order to temporarily operate the unit with the installed return air sensors, go to

SETUP > NETWORK INTERGRATION > RTU STANDALONE press the **SAVE** button. Room sensor back up mode will appear and use the adjust value buttons until you see **= RETURN AIR BACKUP** and press the **SAVE** button. Continue through and set the desired temperature set points, until the display returns to the **SETUP** menu.

Since the unit is now running off of the factory installed return air sensor we need to make the blower run continuous so it has a good sample of the air temperature. To do this go to;

SETTINGS > RTU OPTION> EDIT PARAMETER=154

Press and hold the adjust up button until a parameter **154** appears and press **SAVE**. Press the adjust up button until **=ON-CONTINUOUS 1** is displayed and press **SAVE**. Press the back button as many times as needed to return to the unit status screen. After a five minute time delay the unit will start operation based on the temperature read at the return air sensor.

CAUTION: The use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit. If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- The vent hood must be installed per these installation instructions.
- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filter must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

Q5. How do I set-up the economizer operation?

1.1. General

The economizer, when configured, controls:

- Damper position, which determines how much outdoor air is used to meet free cooling or indoor air quality requirements, and
- Optional power exhaust fans.

On a cooling demand, outdoor air is used for free cooling instead of first-stage compressor(s) when outdoor air is suitable.

1.2. Enabling Economizer and Settings

To enable the economizer if installed go to **SETUP > INSTALL** and go through the wizard. When reaching **Configuration ID 1**, position **2** will need to be set to the applicable type of economizer. Valid types are as indicated below:

- **M** = Motorized Outdoor Air Damper Only
- **T** = Economizer - Temperature *(Note: Used for both setpoint and offset temperature control.)*
- **G** = Economizer - Global
- **S** = Economizer - Single Enthalpy
- **D** = Economizer - Dual Enthalpy

The following options are available depending on economizer set above. These settings are available through the main menu at **SETUP > TEST & BALANCE > DAMPER**.

Table 2 . Menu Interface (Level 1 - SETTINGS)

Note: Available menu options are dependent on hardware configuration.

Level 2	Level 3	Level 4	Level 5	USE THE **ADJUST AND SET VALUES** ARROWS TO SCROLL UP OR DOWN FOR SELECTION OPTIONS.
RTU OPTION	DAMPER	ECONOMIZER ENTHALPY OFFSET = X MA		
		ECONOMIZER TEMP ECON TYPE = TEMPERATURE OFFSET OR TEMPERATURE SETPT		
		ECONOMIZER OAT SETPOINT = XX.X F		
		FREE COOLING SUPPLY AIR SETPOINT = XX F		
		MIN DAMPER POSITION BLOWER ON HIGH = X.X %		
		MIN DAMPER POSITION BLOWER ON LOW = X.X %		
		DEMAND CONTROL VENT DAMPER START OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER FULL OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER MAX OPENING = XXX.X%		
		POWER EXHAUST ON BY ECON TRAVEL = XX.X %		
		FRESH AIR HEATING ENABLE FAH = YES OR NO	FRESH AIR HEATING FAH SETPOINT = XX F	
		FRESH AIR COOLING ENABLE AFC = YES OR NO	FRESH AIR COOLING AFC SETPOINT = XX F	

1.3. Damper Operation During Free Cooling

These are operating profile options for the economizer damper (Parameter 164 - ECONOMIZER PROFILE) during free cooling when any compressor is on and can be selected as follows:

Option 0: Damper continues to modulate while compressors are on, but the effect of mechanical cooling may force the damper closed to its minimum position. After compressor starts, the free cooling setpoint is lowered to 45°F.

Option 1: Damper opens to its max-open position (Parameter 132 - MIN DAMPER POSITION) when any compressors start.

NOTE - When using Option 1 and after the compressor is stopped, the M3 shall resume damper modulation.

Option 2: Damper continues to modulate while compressors are on, but the effect of mechanical cooling may force the damper closed to its minimum position. This is the factory default setting.

- Holds-off compressor on Y2 call until damper has modulated to maximum position (Parameter 132 - MIN DAMPER POSITION) for three minutes.
- After three minutes, Y2 allows compressor to start. After compressor starts, the free cooling setpoint is lowered to 45°F. Damper is not locked at maximum open while compressor is on, but modulates to maintain 45°F discharge air temperature.
- When Y2 is satisfied, compressor goes off and free cooling setpoint is restored to 55°F.

Option 3: Same as Option 2, but with a 10 minute delay instead of a three minute delay.

1.4. Free Cooling Compressor Lockout Mode

Go to **SETTINGS > RTU OPTION > EDIT PARAMETER = 285 (FRCL COMP LCKOUT MD)**. Default value is 0. Range is 0 to 3.

0 = Disable Free Cooling Low Ambient Compressor Lockout (default).

1 = Lockout Compressor whenever the outdoor air is suitable regardless of outdoor air temperature.

2 = Enable Free Cooling Low Ambient Compressor Lockout.

1.5. Free Cooling Low Ambient Lockout Set Point

When the outdoor air temperature falls below the free-cooling set point, and outdoor air is suitable, then mechanical cooling is kept off, or is turned off if it is on.

Go to **SETTINGS > RTU OPTION > EDIT PARAMETER = 108 (FREE LO AMB LCKT SP)**. Default value is 55°F. Range is 44 to 80°F.

1.6. Outdoor Air Suitable for Free Cooling

The M3 Unit Controller displays the outdoor air suitability information on the status screen. There are six options available to determine outdoor air suitability for free cooling and are described in table 3.

The appropriate sensors are provided when the economizer is factory-configured. When the economizer is field-installed and configured, the outdoor enthalpy mode requires additional field-provided sensor(s). See table 3. The TEMP mode uses sensors provided with all units.

Table 3. Free Cooling Options						
Parameter	**Screen Name**	**Short Description**	**Range Setting**	**Default Setting**	**Config ID1 POS 2)**	**Outdoor air is suitable for free cooling when:**
160	ECON FREECL TEMP SP	Economizer Free Cooling Temperature Setpoint	40 F - 75 F	75°F	T	Outdoor air temperature (RT17) is less than the Outdoor Air Temperature set point value.
161	ECON FRCL TMP OFFST	Economizer Free Cooling Temperature Offset	0°F - 40°F	10°F	T	Outdoor air temperature (RT17) is less than return air temperature (RT16) by at least the parameter value.
162	ECN FREECL ENTH SP	Economizer Free Cooling Enthalpy Setpoint	10mA - 19 mA	12.0 mA	S	Outdoor air enthalpy (A7) is less than enthalpy set point parameter.
163	ECN FRCL ENTH OFFST	Economizer Free Cooling Enthalpy Offset	1 mA - 5 mA	1.0 mA	D	Outdoor air enthalpy* (A7) is less than return air enthalpy (A62) by at least the OFFSET value.
Global	Not Applicable	Not Applicable	Not Applicable	Not Applicable	G	Global input is energized by (P297-9). This setting is also used for outdoor air damper applications. Global input also brings on the blower. (This mode is NOT used when OAS signal is provided via network connection. GLO is only used when a 24VAC signal is used to energize the P297-9 GLO input.)
Temp	Not Applicable	Not Applicable	Not Applicable	Not Applicable		Either of the TEMP modes (set point or offset) can be used when a network OAS signal is provided by an energy management or building control system, via BACnet, LonTalk, or L Connection. The network can command OAS, NOT OAS, or AUTO. AUTO returns to local control of OAS, which is the selected TEMP mode..
Note: Enthalpy includes effects of both temperature and humidity.						

1.7. Enthalpy Set Point

This setting pertains to the outdoor enthalpy free cooling mode only. The M3 Unit Controller will enable free cooling when outdoor air enthalpy (A7) is less than the enthalpy set point. Figure 2 shows the approximate enthalpy sensor output at various temperatures and percentage of relative humidity.

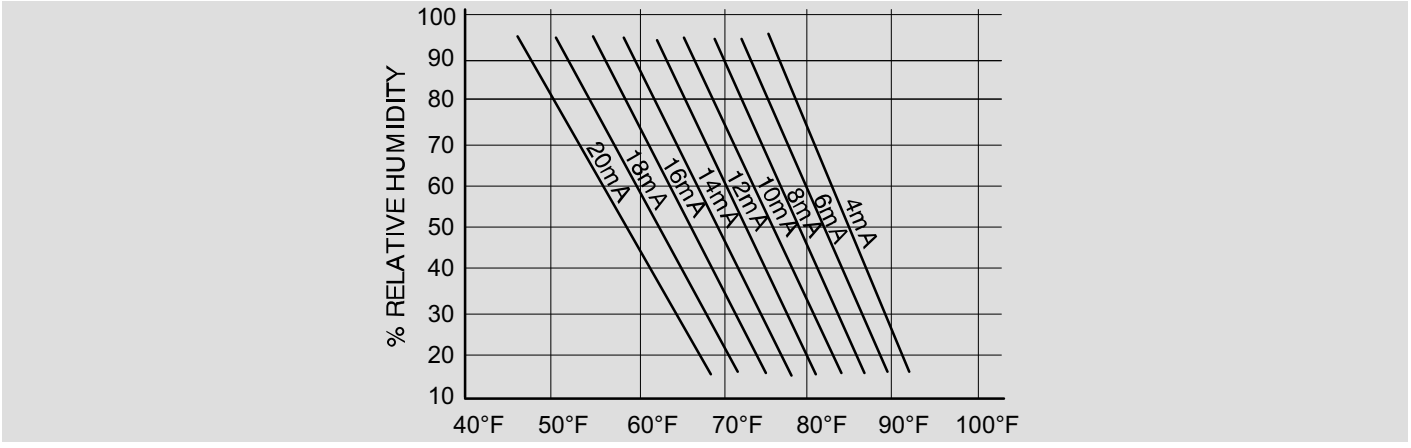

Figure 2. Enthalpy Sensor Output Current Honeywell C7400

1.8. Free Cooling Damper Maximum Position

Damper Maximum position is set using the following menu path.

SETUP > TEST & BALANCE > DAMPER > DAMPER MAX OPENING = .%

1.9. Minimum Damper Position

Use the following menu path to modified the minimum damper positions for both high and low operations.

SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON HIGH = .%

SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON LOW = .%

1.10. Motorized Outdoor Air Damper

Set damper position according to “Minimum Damper Position” section 1.9. For normal operation, make sure the motorized outdoor air damper is set correctly in **CONFIGURATION ID 1**, character position two. Character to be used is **M**. The damper will open to the specified position during the occupied time period and close during the unoccupied time period.

1.11. Economizer Checkout

The following checkout procedures are completed with unit energized. Confirm proper operation of the heartbeat LED. Step 1 will determine whether the economizer is allowing full damper travel. Use step 2 when the damper does not respond to step 1.

Steps 3, 4, 5, and 6 checkout the operating modes; checkout only the mode that applies to the unit being worked on.

CAUTION - Power exhaust fans will be functional. To prevent operation of power exhaust fans, disconnect power to unit and then PED jack/plug P/J18.

Step 1.ECONOMIZER OUTPUT VOLTAGE

- **A** Go to **SERVICE > TEST > DAMPER>POSITION > DAMPER POSITION ACTUAL: 0.0%** The motor will slowly modulate to the closed position.
- **B** Change DAMPER POSITION ACTUAL to 100.0%.The motor will slowly modulate to the fully opened position.
- **C** If the motor does not respond, go to step 2. If the motor does respond properly, go to the appropriate mode of operation checkout.

Step 2.OUTDOOR ENTHALPY OPERATION

- **A** Go to **SERVICE > TEST > DAMPER > POSITION > DAMPER POSITION ACTUAL: 0.0%**
- **B** Adjust the DAMPER POSITION ACTUAL: to 0.0% position.
- **C** Measure the voltage on P262 between pin 3 (VOT damper control) and pin 2 (GND) **using pin 1 as common.** Voltage should read approximately 2 VDC.
- **D** Adjust the DAMPER POSITION ACTUAL: to 100.0% position.

NOTE - Allow approximately 90 seconds for actuator to react.

- **E** Measure the voltage between P262 between pin 3 (VOT damper control) and pin 2 (GND) **using pin 1 as common.** Voltage should read approximately **10 volts DC**. If not, check wiring and trouble shoot system.

Step 3.OUTPUT VOLTAGE CHECK

In the ODE mode, dampers open for free cooling when the outdoor enthalpy is less than the enthalpy set point; dampers will try to modulate discharge air temperature (RT6) to 55°F (13°C).

- **A** Go to **SETUP > INSTALL >** press **SAVE** until you get to the **Configuration ID 1,** position **2** change to **S** for Economizer - Single Enthalpy and press **SAVE**.
- **B** To simulate low outdoor enthalpy. Disconnect A7 outdoor enthalpy sensor jack/plugs J/P104. Connect a 200 ohm resistor across plug J104-1 and J104-2. J104 is located in the filter access area.
- **C** Check all connections and wiring between J104 and the control.

Step 4.OUTDOOR ENTHALPY DIFFERENTIAL MODE OF OPERATION

In the DIF mode, dampers open for free cooling when the outdoor air enthalpy is lower than the return air enthalpy; dampers will modulate discharge air temperature (RT6) to 55°F.

- **A** Go to **SETUP > INSTALL** > press **SAVE** until you get to the **Configuration ID 1** and change the position two to **D** for Economizer - Dual Enthalpy and press **SAVE** if performing an economizer field-install.
- **B** Use two resistors to simulate outdoor air enthalpy suitable.
  - Disconnect A62 return air enthalpy sensor jack/plug J/P105. Place a 750 ohm resistor between J105-1 and J105-3. J/P105 is located in the filter access area.
  - Disconnect A7 outdoor enthalpy sensor jack/plugs J/P104. Connect a 100 ohm resistor across J104-1 and J104-2.

Step 5.ALL TEMPERATURE MODES OF OPERATION

In the Economizer – Temperature mode, the damper opens for free cooling when the outdoor air temperature is:

- Less than return air temperature
- Parameters 160, 161, 162 and 163 less than return air temperature
- Less than Parameters 160, 161, 162 and 163.

In all modes, dampers will try to modulate discharge air temperature (RT6) to 55°F.

Refer to the “Displaying Sensor Inputs" section to read return air (RT16) and outdoor air (RT17) temperatures. If outdoor air is not cooler than return air, simulate a colder outdoor air temperature with a resistor. Select a resistor value that corresponds to a temperature (see table 4):

- Less than return air temperature
- Parameters 160, 161, 162 and 163 less than return air temperature
- Less than Parameters 160, 161, 162 and 163

Table 4. TMP Mode Resistor Values							
Temp. °F (°C)	Size Resistor	Temp. °F (°C)	Size Resistor	Temp. °F (°C)	Size Resistor	Temp. °F (°C)	Size Resistor
30 (-1)	34,566	50 (10)	19,904	70 (21)	11,884	90 (32)	7,332
40 (4)	26,106	60 (16)	15,313	80 (27)	9,298	100 (38)	5,826

A Locate RT17 sensor in unit. Disconnect 1/4" quick connect terminals on wires leading from sensor.

B Jumper RT17 wires leading back to control with the appropriate resistor.

C Check all connections and wiring between RT17 and the M3 Unit Controller, and between RT16 and the M3 Unit Controller.

Table 5. Economizer Parameters							
Control Parameter			Control Value				
No	Screen Name	Parameter Short Description	Min.	Default	Max.	Units	Description
160	ECON FREECL TEMP SP	Economizer Free Cooling Temperature Setpoint	40	75	75	°F	Outdoor Air Temperature is less than parameter setpoint between 41-70°F, or when Outdoor Air temperature is less than Return Air Temperature between 0-40°F.
161	ECON FRCL TMP OFFSET	Economizer Free Cooling Temperature Offset	0	10	40	°F	Economizer Free Cooling Temperature Offset
162	ECON FREECL ENTH SP	Economizer Free Cooling Enthalpy Setpoint	10	12.0	19	mA	Economizer Free Cooling Enthalpy Setpoint
163	ECN FRCL ENTH OFFST	Economizer Free Cooling Enthalpy Offset	1	1.0	5	mA	Economizer Free Cooling Enthalpy Offset

Step 6.GLOBAL MODULATING MODE OF OPERATION

In the GLO (modulating) mode, dampers modulate open for free cooling when the global input is energized; dampers will try to modulate discharge air temperature (RT6) to 55°F.

NOTE - The global input turns on the blower.

A Set **global** mode using the **CONFIGUATION ID 1**, position 2, character **G.**

B Connect a jumper between A55_P297-1 (24VAC) and A55_P297-9 (global). The blower will be energized and the damper will slowly open if discharge air temperature (RT6) is greater than 55°F.

C Disconnect 24VAC to A55_P297-9. The blower will turn off and the damper will close.

D If the damper does not actuate check all connections and wiring between P262A and B.

Step 7.ENTHALPY SENSOR OPERATION (A7 and A62)

A Connect a direct current ammeter as shown in figure 3 to measure current output of A7 or A62.

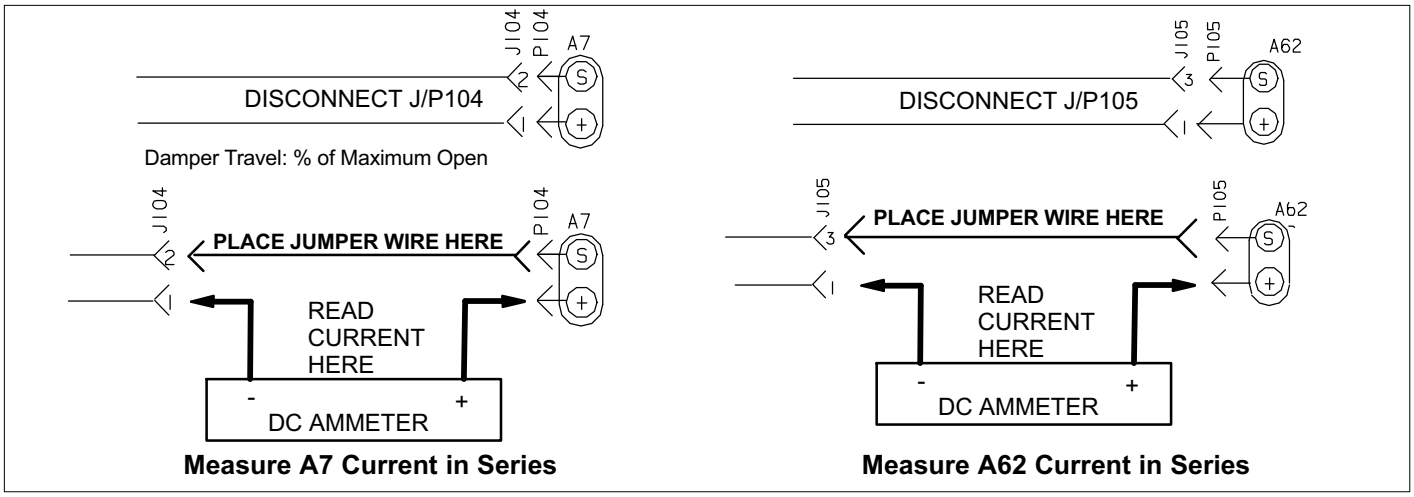

Figure 3. Measure A7 and A62 Current in Series

B The reading will be between 4 and 20 ma. depending on outdoor temperature and humidity. Refer to figure 4 to approximate reading.

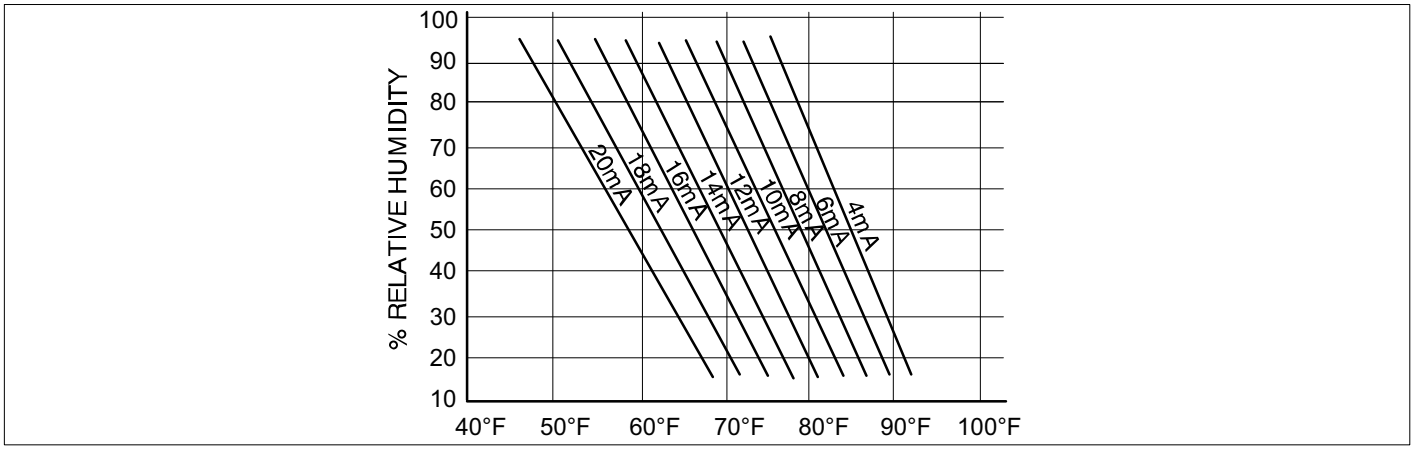

Figure 4. Enthalpy Sensor Output Current Honeywell C7400

C If the meter reads zero, check sensor wiring harness for continuity and/or check polarity of sensor wiring.

1.12. Demand Control Ventilation

1.12.1. General

A field-provided and installed indoor air quality (IAQ) sensor can be used with the modulating economizer or OADM to control carbon dioxide levels in the conditioned space. The carbon dioxide level in a space is an indicator of the number of people occupying a room. As the carbon dioxide level rises (indicating the occupancy of a room has increased), dampers modulate open - regardless of outdoor air suitability. Likewise, as the carbon dioxide level falls (indicating the occupancy has decreased), dampers modulate further closed.

Standard economizer installations have a minimum fresh air ventilation requirement based on maximum room occupancy. With standard economizer use, the amount of air required for maximum room occupancy is heated or cooled with each heating or cooling cycle. IAQ installations use the maximum amount of required ventilation air only with maximum room occupancy; less outdoor air needs to be heated or cooled when fewer people are in the conditioned space.

If the economizer is operating in the free cooling mode and the indoor air quality control requires the damper to open further, the indoor air quality demand will override the free cooling demand.

The IAQ function is not energized during the unoccupied or night time period.

NOTE - The IAQ sensor may also be used with systems containing a motorized outdoor air damper.

1.12.2. Default Operation

The M3 Unit Controller has a 0-10VDC indoor air quality input for a standard 0-2000ppm carbon dioxide sensor. The economizer starts opening at a carbon dioxide level of 500 ppm (“start open" set point) and reaches full open at a carbon dioxide level of 1000ppm (“full open" set point). The damper opens to 100%. Determine damper travel position using the following formula.

$$\%\ \text{Damper Travel} = \frac{\text{carbon dioxide ppm - Start Open ppm}}{5}$$

Example: *At a carbon dioxide level of 750ppm, the damper will be approximately 50% open:*

$$\%\ \text{Damper Travel} = \frac{750-500}{5} = 50\%$$

Use the menu interface to read carbon dioxide ppm. **DATA > IN/OUTPUTS > SENSORS > C02**. Figure 5 shows default or proportional operation.

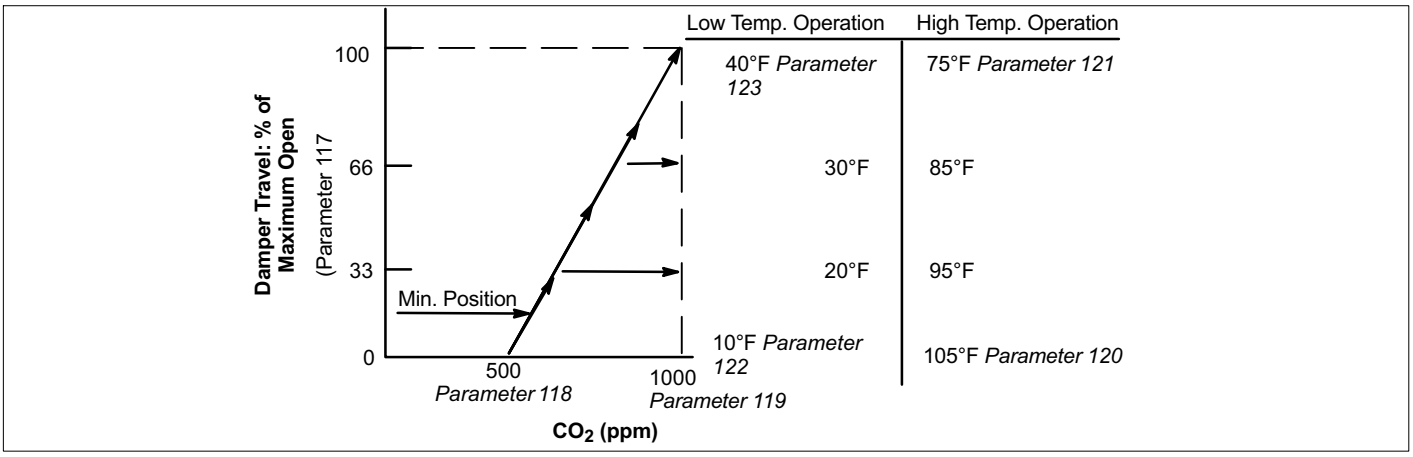

Figure 5. Default Direct Current Operation

1.12.3. Parameter Adjustments

Default indoor air quality economizer operation is based on common or average applications. Adjustments may be made to the indoor air quality parameters to alter operation or meet required specifications. Use the user interface to change Parameter 117 through 120.

SETTINGS > RTU OPTIONS > EDIT PARAMETER.

Select a demand control ventilation mode or outdoor air control mode with Parameter 134. Modes 4 and 5 will bring on the unit blower when demand control ventilation calls for maximum damper open, and returns to auto-blower when demand control ventilation damper returns to 0. The other modes only operate when the unit blower is on, but will not bring it on themselves.

Some applications require a different carbon dioxide set point range than default settings. Damper “start open" (Parameter 118 or 124) and “full open" (Parameter 119 or Parameter 125) carbon dioxide set points may be adjusted from 0 to 1992ppm. Use the following formula to determine damper travel.

NOTE - When changing carbon dioxide set point range, “start open" set point should be less than “full-open" set point.

$$\%\ \text{Damper Travel} = \frac{\text{carbon dioxide ppm - Start Open ppm}}{\text{Full Open - Start Open}} \times \text{Max Open (Parameter 117)}$$

Example: *An application requires the dampers open at 800 CO_2 ppm and reach full open at 1200. If the carbon dioxide level in the space reads 1000 ppm, calculate the damper percent open as follows.*

$$\%\ \text{Damper Travel} = \frac{1000 - 800}{1200 - 800} \text{ or } \frac{200}{400} \text{ or } .5 = 0.5 \times 100 = 50\%$$

Table 6. Demand Control Damper Parameters							
Control Parameter			Control Value				
No	Screen Name	Parameter Short Description	Min.	Default	Max.	Units	Description
117	DCV MAX DAMPER OPEN	Demand Control Ventilation Maximum Damper Open	0	95	100	%	• Damper “start open" CO_2 set point for Demand Control Ventilation. • Level where fresh air damper begins to open.
118	DCV DAMP START OPEN	Demand Control Ventilation Damper Start Open	0	705	2000	PPM	• Damper “start open" CO_2 set point for Demand Control Ventilation. • Level where fresh air damper begins to open.
119	DCV DAMP FULL OPEN	Demand Control Ventilation Maximum Damper Full Open Setpoint	0	1200	2000	PPM	• Damper “full open" CO_2 set point for Demand Control Ventilation. • Level where fresh air damper is opened to maximum.
120	DCV HI TMP OV FL CL	Demand Control Ventilation Outdoor Air Control Hi Temperature Override Full Closed	-31	105	132	°F	• High outdoor air temp. where fresh air damper is closed to minimum position. • Also used for outdoor air control.
121	DCV HI TMP OV ST CL	Demand Control Ventilation Outdoor Air Control Hi Temperature Override Start Closing	-31	75	132	°F	• High outdoor air temperature where fresh air damper begins to close. • Also used for outdoor air control.
122	DCV LO TMP OV FL CL	Demand Control Ventilation Outdoor Air Control Low Temperature Override Full Closed	-31	10	132	°F	Low outdoor air temperature where fresh air damper is closed to minimum position for Demand Control Ventilation and Outdoor Air Control.
123	DCV LO TMP OV ST CL	Demand Control Ventilation Outdoor Air Control Low Temperature Override Start Closing	-31	40	132	°F	• Low outdoor air temp. where fresh air damper begins to close. • Also used for outdoor air control.

1.12.3.1. Set Point Control Option

Set point control mode is commonly used in areas with high occupancy and frequent change out such as classrooms or conference rooms.

In applications requiring this on/off damper response to carbon dioxide levels, set the start open (Parameter 118 - DCV DAMP START OPEN) set point higher than the full open (Parameter 119 - DCV DAMP FULL OPEN) set point. The dampers will drive to fully-open position immediately. Figure 6 shows the set point control option.

Change Parameters 122 (DCV LO TMP OV FL CL) and 123 (DCV LO TMP OV ST CL) to set the minimum outdoor temperature limits. Change Parameters 120 (DCV HI TMP OV FL CL) and 121 (DCV HI TMP OV ST CL) to set the maximum temperature value.

IMPORTANT *- Mixed air temperatures less than 45°F (7°C) on units with an aluminized heat exchanger or less than 30°F (-1°C) on stainless steel heat exchangers will void the manufacturer's warranty.*

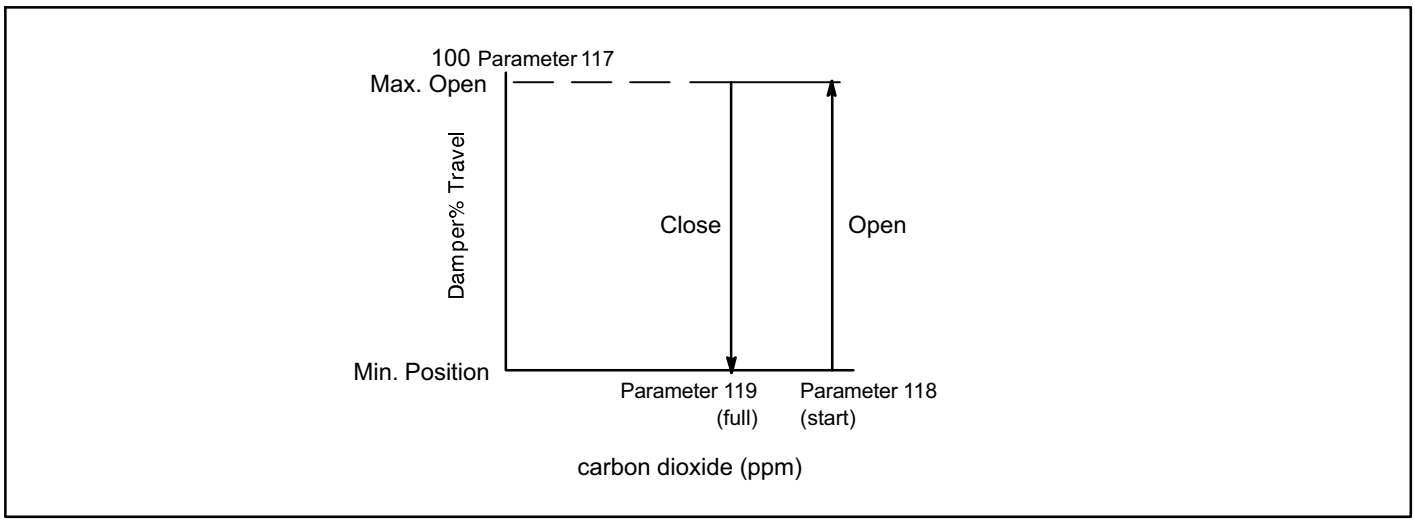

Figure 6. Set point Control Indoor Air Quality Option

1.12.3.2. Determining Indoor Air Quality Inputs

DATA> IN/OUTPUTS > SENSORS menu selection from the M3 Unit Controller menu display.

Q6: How do I adjust the Economizer for minimum damper settings?

Use the following menu path to modified the minimum damper positions for both high and low operations.

SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON HIGH = .%