INSTALLATION INSTRUCTIONS
MODELS (-)XRD-RMCM3
HORIZONTAL AIRFLOW ECONOMIZERS

⚠WARNING

THIS ACCESSORY IS TO BE INSTALLED BY A QUALIFIED, LICENSED SERVICE PERSON. TO AVOID UNSATISFACTORY OPERATION OR DAMAGE TO THE PRODUCT AND POSSIBLE UNSAFE CONDITIONS, INCLUDING ELECTRICAL SHOCK, REFRIGERANT LEAKAGE AND FIRE, THE INSTALLATION INSTRUCTIONS PROVIDED WITH THIS ACCESSORY MUST BE STRICTLY FOLLOWED AND THE PARTS SUPPLIED USED WITHOUT SUBSTITUTION. DAMAGE TO THE PRODUCT RESULTING FROM NOT FOLLOWING THE INSTRUCTIONS OR USING UNAUTHORIZED PARTS MAY BE EXCLUDED FROM THE MANUFACTURER'S WARRANTY COVERAGE.

⚠WARNING

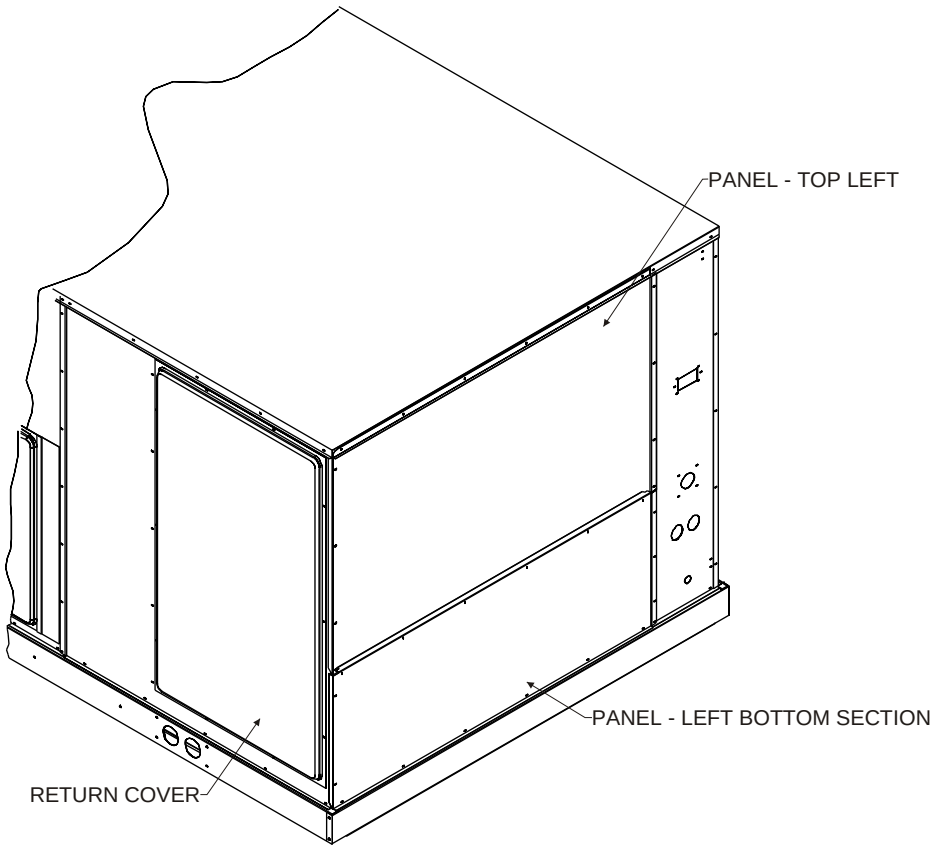
DISCONNECT ELECTRICAL POWER TO THE UNIT. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

TOOLS REQUIRED FOR INSTALLATION:	
3/8" electric drill with 5/16" socket	Small flat blade (0.125" wide) screwdriver
Waterproof exterior duct sealant	Sheet metal tools (e.g. shears)

TABLE 1

PACKAGE CONTENTS		(-)XRD-RMCM3 economizer with controller, actuator, and outside enthalpy sensor attached
ITEM	**DESCRIPTION**	**PART No.**
1	(2) Permanent Filters	6039D16 / 8568 (23.875" X 23.875")
2	(2) Spotweld Assy - Bird Screen	6039D16 / BSWA
3	(2) Exhaust Air Rainhood - Top	6039D16 / EHT2
4	OA Rainhood Assy - Left Side	6039D16 / EHSL
5	OA Rainhood Assy - Right Side	6039D16 / EHSR
6	(2) Exhaust Air Rainhood - Left Side	6039D16 / EHS3L
7	(2) Exhaust Air Rainhood – Right Side	6039D16 / EHS3R
8	OA Rainhood Assy - Filter Bracket Strip	6039D16 / ADP
9	OA Rainhood Assy – Top	6039D16 / EHT
10	OA Rainhood - Front Filter Support	6039D16 / EHB
11	OA Filter Rail	6039D16 / FCH
12	Hardware Bag	6039D16 / HDW
13	Exhaust Air Rain Hood Spacer	6039D16 / ADP2

FIGURE 1



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STEP 1:
Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers and a damage claim filed with the last carrier.

STEP 2:
Remove RETURN COVER, PANEL – TOP LEFT, and PANEL – LEFT BOTTOM SECTION from the unit and retain for reuse **(SEE FIGURE 1)**. Retain screws.

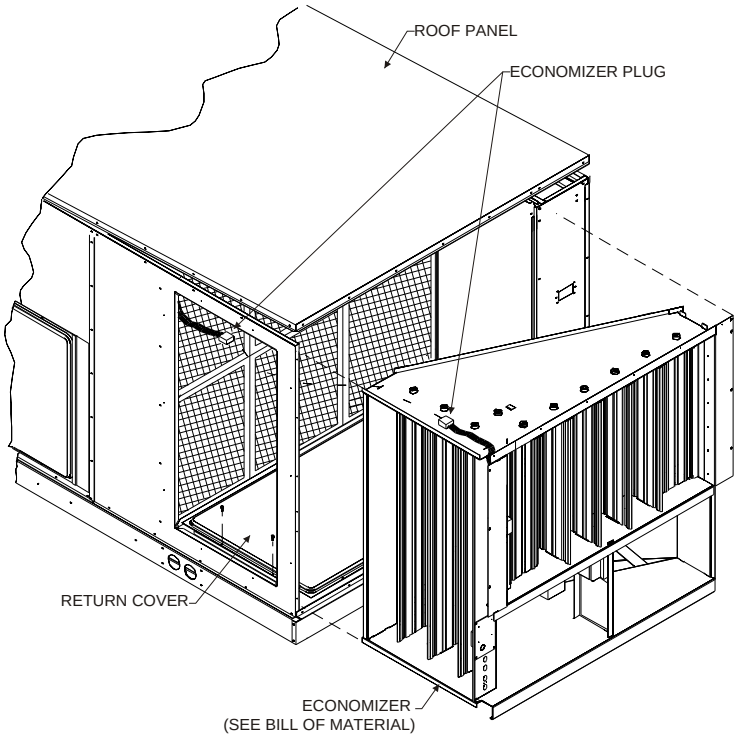
STEP 3:
Fasten RETURN COVER **(SEE FIGURE 2)** over bottom return opening using 4 retained screws.

STEP 4:
Remove screws from 3 sides of ROOF PANEL so that it can be raised during economizer insertion.

STEP 5:
Remove jumper plug PL7 and connect unit ECONOMIZER PLUG to economizer mating plug and slide economizer into unit. Reinstall jumper plug PL7to PL21 located on economizer.

STEP 6:
Connect 4-pin plug in unit economizer harness to ELM (Economizer Logic Module).

FIGURE 2



A1005-01

STEP 7:
Mount PANEL – LEFT BOTTOM SECTION to unit **(SEE FIGURE 3)**. Use only 2 screws (one on each side) for easy removal during calibration.

STEP 8:
Fasten ⑧ FILTER BRACKET STRIP to unit using 2 screws (one on each side). See **Table 1** for identification.

STEP 9:
Fasten ⑪ OA FILTER RAIL to ⑧ FILTER BRACKET STRIP with 4 screws. Fasten ⑧ FILTER BRACKET STRIP to economizer with 4 neoprene washer head screws provided.

STEP 10:
Fasten ④ OA RAINHOOD - LEFT SIDE and ⑤ OA RAINHOOD - RIGHT SIDE to unit using 3 screws provided.

STEP 11:
Slide ① PERMANENT FILTERS between ④ OA RAINHOOD - LEFT SIDE and ⑤ OA RAINHOOD - RIGHT SIDE back into the ⑪ OA FILTER RAIL.

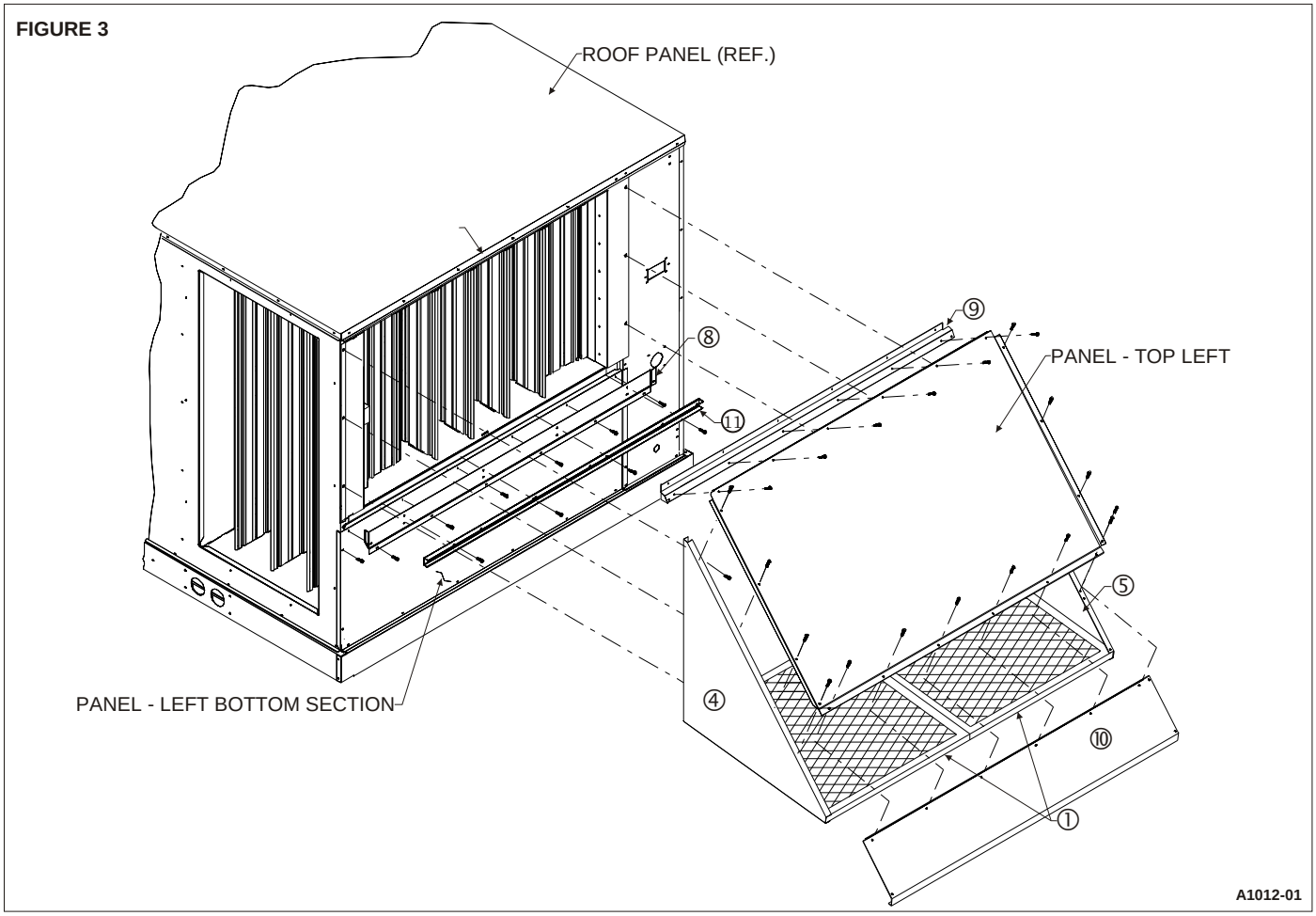
STEP 12:
Fasten ⑩ OA RAINHOOD - FRONT FILTER SUPPORT to PANEL – TOP LEFT. The bottom lip should support the ① PERMANENT FILTERS.

STEP 13:
Fasten PANEL – TOP LEFT to ④ OA RAINHOOD - LEFT SIDE and ⑤ OA RAINHOOD - RIGHT SIDE and ⑩ OA RAINHOOD - FRONT FILTER SUPPORT using 16 screws.

STEP 14:
Position the ⑨ OA RAINHOOD ASSY – TOP under edge of ROOF PANEL.

STEP 15:
Re-secure ROOF PANEL using existing screws.

FIGURE 3

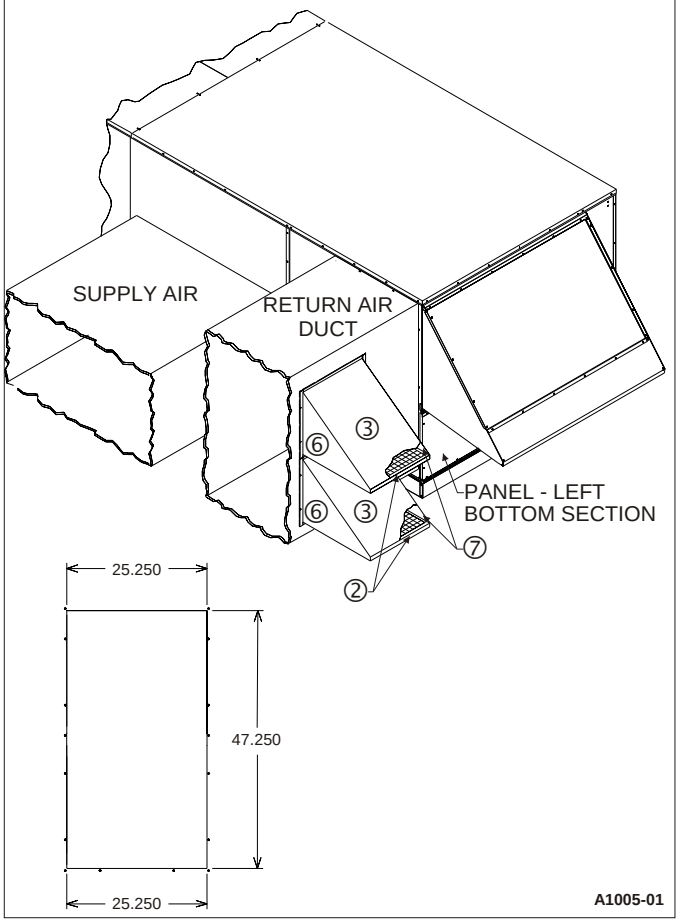


STEP 16:
Provide opening in return air duct to mount the two barometric relief dampers and hoods **(SEE FIGURE 4)**. Locate a convenient distance from unit.

STEP 17:
Using self-drilling screws provided, assemble exhaust air rain hoods (③ EXHAUST AIR RAINHOOD – TOP, ⑥ EXHAUST AIR RAINHOOD - LEFT SIDE, ⑦ EXHAUST AIR RAINHOOD - RIGHT SIDE, ② SPOTWELD ASSY - BIRD SCREEN) and install in return air duct. Use sealant (not provided) as required.

STEP 18:
Upon start-up check the economizer sequence of operation using the steps provided in these instructions. After testing unit operation and setting outside air damper minimum position, secure PANEL – LEFT BOTTOM SECTION **(SEE FIGURE 3)** with remaining screws.

FIGURE 4



DIRECT MOUNT ECONOMIZER SEQUENCE OF OPERATION

GENERAL

This accessory economizer package is designed to save energy costs by using outdoor air for cooling and ventilation in place of mechanical cooling whenever possible. The economizer continuously monitors indoor and outdoor air conditions and compares them to a user-selected setpoint to determine if free cooling is available.

ACCESSORIES

RXRX-AV03 – Dual Enthalpy Upgrade Kit

For maximum energy savings, this upgrade kit will allow the economizer to compare the outdoor enthalpy to the return air enthalpy, instead of a user-selected setpoint to determine if "free cooling" is available.

RXRX-AR02 - Wall-Mounted Carbon Dioxide Sensor

For installations requiring Demand Control Ventilation (DCV) based upon indoor air levels of carbon dioxide (CO_2). When the unit supply fan is running, the CO_2 sensor modulates the outside air damper to maintain a user-selected CO_2 level inside the occupied space. Energy savings are achieved by not bringing in excessive amounts of outdoor air when the indoor air conditions are suitable. Energy savings can be substantial on buildings with highly variable occupancy rates.

Wall-Mounted Remote Potentiometer

For installations requiring remote adjustment of damper minimum position by the occupants, a remote potentiometer (270 ohm), such as the Honeywell S963B1136 can be used.

RXRX-BGF02C, RXRX-BGF02D, RXRX-BGF02Y – Power Exhaust Kit

For installations requiring more space static pressure relief than can be obtained with the standard barometric relief damper included with the economizer, a power exhaust kit can be added.

STARTUP

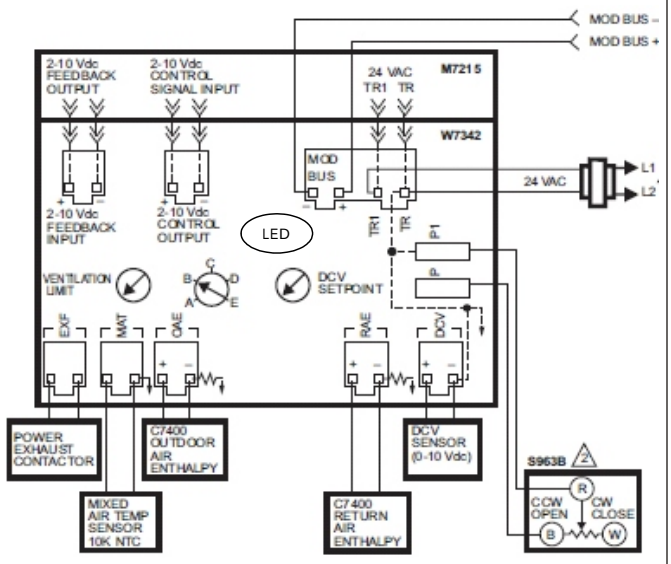
Attach 12-pin Rooftop unit wiring harness to 12-pin harness on economizer. Attach 4-pin Rooftop unit wiring harness directly to economizer logic module (ELM). A separate mixed air sensor is not required. It is supplied with the Rooftop unit and communicates the temperature and other information to the ELM via the 4-pin plug.

ADJUSTMENTS ON ELM CONTROLLER

3 potentiometers with screwdriver adjustment slots, starting from top of controller (**See Figure 5**).

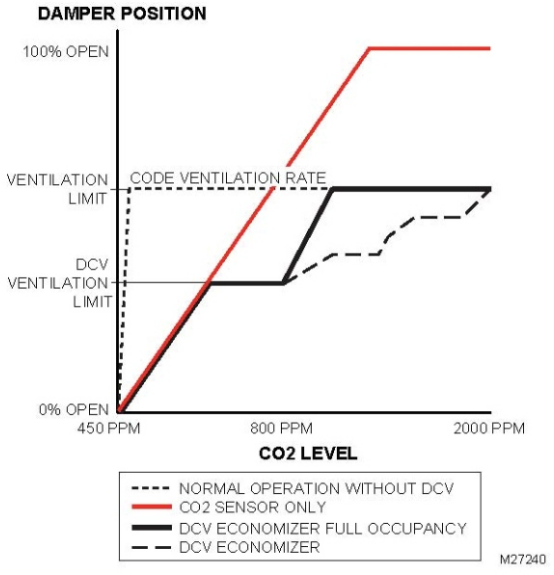
Note: Before any adjustments are made, the Rooftop Unit Controller should be placed in "Occupied" Mode.

FIGURE 5



1. Ventilation Limit – Outside Air Damper minimum position
   A. Adjust the Ventilation Limit potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building (**See Figure 6**). The CO_2 sensor, if present, should be disconnected or **DISABLED** during this step.

FIGURE 6



B. Range of adjustment is from 0-100% (2-10Vdc output); in most applications the minimum position is adjusted to allow 10% to 25% outside air to enter the system.

C. Whenever the supply fan signal is present, the damper will open to this minimum position unless:

I. It may modulate to a lesser position if overridden by the CO_2 sensor (DCV).

ii. It may not open if overridden by the discharge air temperature sensor (Freeze Protect Mode).

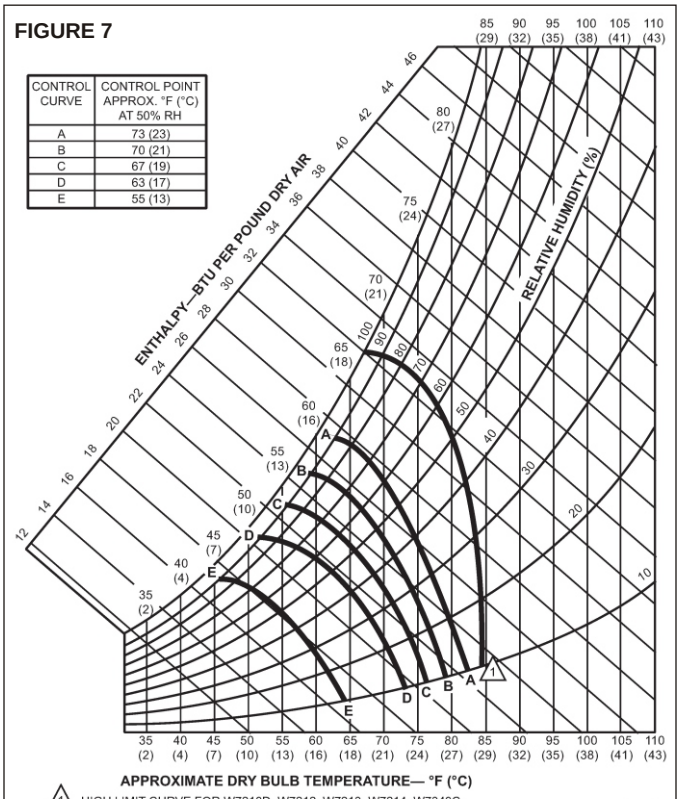
iii. The unit controller or communication network may override any adjustments made to the economizer controller. Adjustments may be made from the Rooftop Unit Controller keypad and display or the communication network and has priority over the potentiometer setting.

2. Economizer Setpoint

A. Only the coolest, driest outside air is used for economizer operation when the potentiometer is on setting "E". For greatest energy savings, the potentiometer is on setting "A" (**See Figure 7**).

FIGURE 7

CONTROL CURVE	CONTROL POINT APPROX. °F (°C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)
E	55 (13)



B. Adjustment range is A, B, C, D, or E.

I. Setting "A" = 73°F db or 27 Btu/lbm @ 50% RH

ii. Setting "B" = 70°F db or 25 Btu/lbm @ 50% RH

iii. Setting "C" = 67°F db or 23 Btu/lbm @ 50% RH

iv. Setting "D" = 63°F db or 22 Btu/lbm @ 50% RH

v. Setting "E" = 55°F db or 18 Btu/lbm @ 50% RH

C. Economizer Setpoint potentiometer can be adjusted at any time, but not through the Rooftop Unit Controller keypad or network.

D. The controller compares the enthalpy sensor input with the economizer setpoint to determine if free cooling is available.

I. Single enthalpy strategy: If outdoor air enthalpy is lower than the setpoint, then free cooling is available.

ii. Dual enthalpy strategy: If outdoor air enthalpy is lower than return air enthalpy, then free cooling is available (if using dual enthalpy, the Economizer Setpoint must be at the "D" setting).

3. DCV Setpoint – Demand Control Ventilation (DCV) Setpoint

A. The DCV can be any sensor that provides a 0-10Vdc output. The DCV modulates the outdoor damper to provide ventilation based on occupancy. Typically a carbon dioxide sensor (CO_2) is used to indirectly monitor occupancy level.

B. No cooling signal is required for the DCV to override the outdoor air damper when ventilation requires outdoor air.

C. The controller must receive a supply fan signal to open the damper.

D. Range of adjustment is from 0 volts to 10 volts.

E. The DCV setpoint can be adjusted at any time. The default setting is 50% of the Ventilation Limit setting.

F. The Rooftop Unit Controller or communication network may override any adjustments made to the economizer controller and has priority over the potentiometer setting.

G. The controller compares the CO_2 sensor input to the DCV setpoint to determine the damper minimum position. If a CO_2 sensor is present, the damper modulates between the DCV setpoint and the Ventilation Limit.

I. If the actual CO_2 level is below the setpoint, then the damper minimum position is determined by the DCV setpoint potentiometer setting.

ii. If the actual CO_2 level rises above the setpoint, then the damper minimum position is overridden proportionally more open to a maximum of the Ventilation Limit potentiometer setting.

iii. If the discharge air temperature drops below 48°F (Freeze Protect Mode), the DCV input will be overridden and the damper may not open.

H. Compatible CO_2 sensors will have a 0-10Vdc output for a 0-2000 ppm CO_2 input.

I. Ensure proper polarity of the sensor wires when connecting to the economizer logic module (ELM). Incorrect polarity negates the sensor signal.

NORMAL OPERATION

1. Fan Only
   A. Damper will go to minimum position (in 90 seconds or less) whenever the supply fan signal is present.
   B. When supply fan signal is removed, the outside air damper closes against blade seals for a tight shutoff of outside air.
   C. If the discharge air temperature drops below 48°F, then the control will override the minimum position setting and will modulate the outside air damper closed.
2. Call for First Stage of Cooling
   A. Economizer Unavailable (warm outdoor air). Compressor 1 is commanded on without delay.
   B. Economizer Available (free cooling). The controller tries to maintain a discharge air temperature of 53°F ± 5 by modulating the outside air damper position. Compressor 2 is not activated in the economizer mode.
3. Call for Second Stage of Cooling
   A. Rooftop unit in Thermostat Control Mode
      I. Economizer Unavailable (warm outdoor air). Compressor 2 is commanded on without delay.
      ii. Economizer Available (free cooling). Compressor 1 is commanded on without delay. The controller tries to maintain a discharge air temperature of 53°F ± 5 by modulating the outside air damper position. Compressor 2 is not activated in the economizer mode.
   B. Rooftop unit in Network Control Mode
      I. Economizer Unavailable (warm outdoor air). Compressor 2 is commanded on without delay.
      ii. Economizer Available (free cooling). Compressor 1 is commanded on without delay. The outside air damper position is held in the 100% open position until the call for second stage cooling is removed. The discharge temperature is ignored. Compressor 2 is not activated in the economizer mode.
4. Call for Heat
   A. If the control detects that the supply fan is on, then the control will open the damper to minimum position.
   B. If the discharge air temperature drops below 48°F, then the control will override the minimum position setting and will modulate the outdoor damper closed.

COMMUNICATION

The Rooftop Unit Controller communicates to the Economizer Logic Module (ELM) via the 4-pin Rooftop unit wiring harness under the RS485 (MODBUS® RTU) standard.

The table (**Table 2**) lists the values that are shown on the Rooftop Unit Controller Display and are communicated to the Economizer Logic Module (ELM). The Rooftop Unit Controller is the master device and sends requests to the ELM slave device which then responds.

	Economizer Menu On Rooftop Controller	Adjustable Range	Default setting
1	**Econ. Status** Economizer OK / Economizer Not OK	N/A	N/A
2	**Econ. Status** Diff Enthalpy / Single Enthalpy	N/A	N/A
3	**Econ. Status** Exh. Fan is ON/OFF	N/A	N/A
4	*** Enthalpy Setpt.** A / B / C / D / E	A/B/C/D/E	A
5	**Eff.Mix.Air Temp** XXX.X °F	N/A	N/A
6	*** Mixed Air Setpt.** XXX.X °F	0 - 99	45
7	**Ext.Mix.Air Temp** XXX.X °F	N/A	N/A
8	*** Econ. Vent. Limit** XXX %	0 - 100	0
9	*** Econ.Exh. ON/OFF** XXX %	0 - 100	50
10	*** Econ. DCV Limit** XXX %	0 - 100	0
11	*** DCV Control** Enabled / Disabled	Enabled / Disabled	Disabled
12	*** DCV Level Setpt.** XXXX ppm	500 - 2000	700
13	**Ext. DCV Level** XXXX ppm	N/A	N/A
14	**Eff. DCV Level** XXXX ppm	N/A	N/A
15	**Eff.Eco.Position** XXX %	N/A	N/A
16	**Eff.Min.Position** XXX %	N/A	N/A
17	**Local. Min. Pos.** XXX %	N/A	N/A
18	**Econ. Faults** DCV Sensor Fault OAE Sensor Fault RAE Sensor Fault MAT Sensor Fault	N/A	N/A
19	**Econ Firm Vrsn**	N/A	0103

TABLE 2
***MENUS THAT ARE USER ADJUSTABLE**

1. Econ. Status. Displays whether the enthalpy is acceptable for economization.
2. Econ. Status. Displays whether the system is using single or differential enthalpy.
3. Econ. Status. Displays the status of the optional power exhaust fan (if connected).
4. Enthalpy Setpoint. Displays the five levels the user must choose for the enthalpy set point. Figure 7 indicates what each of those levels represents in the psychometric chart. This setting determines the level at which economization is allowed. If Dual Enthalpy Control is used, the setting must be "D".

5. Eff. Mix. Air Temp. Displays the current value of mixed air temperature.
6. Mix Air Setpt. When the mixed air temperature falls below this set point, the freeze protection control will disable the mixed air control and close the outdoor damper to the effective minimum position.
7. Ext. Mix. Air Temp. Displays the discharge air temperature reading from the Rooftop Unit Controller.
8. Econ. Vent. Limit. Displays the minimum acceptable outside-air ventilation rate as a percentage of outdoor air damper position. The volumetric flow-rate of outside air required can be determined from building codes, ASHRAE standards, or standard practice. The use of a CO sensor can lower the minimum outdoor air quantity as described in the next section for Demand Control Ventilation (DCV). The system allows the adjustment of the ventilation limit through four different methods, listed below in order of priority:
   A. Network interface (BACnet® or Lonworks®)
   B. Rooftop Unit Controller Display and Keypad
   C. Remote potentiometer
   D. Direct adjustment through the Ventilation Limit potentiometer on the ELM control.
9. Econ. Exh. ON/OFF. Display allows the user to change the set point of what percentage of outside air damper position the exhaust fan is energized. The default value is 50% of full outside air.
10. Econ. DCV Limit The economizer will allow the dampers to close more than the minimum position if the indoor air quality is not contaminated. The Econ. DCV Limit can be set from 0 to 100% but must be lower than the Ventilation Limit setting. The default value is 50% of the Ventilation Limit setting.
11. Econ. DCV Control. If connected to a CO sensor, the ELM regulates the amount of outdoor air supplied to the space to maintain the level of carbon dioxide below the recommended 700ppm above the outdoor level. In this case, CO levels serve as a proxy for building occupancy and the rate of human-generated indoor pollutants. Once the DCV is operating, the minimum damper position can then be lowered to the DCV Setpoint. By default, this value is 50% of the ventilation limit, but the user has the option to adjust it through network or Rooftop Unit Controller keypad and display. The user also has the option to disable DCV altogether.
12. DCV Level Setpt. The DCV level setpt is a selectable level of carbon dioxide that system does not allow to be exceeded. The set point is communicated to the economizer and the minimum ventilation position is changed in order to prevent the increase of CO.
13. Ext. DCV Level. Displays the value the Rooftop Unit Controller sends to the Economizer (used with networked CO sensors not connected directly to the economizer).
14. Eff. DCV Level. Displays the actual DCV Level (CO level) in ppm.
15. Eff. Eco. Position. Displays the actual position of the economizer outside air damper.
16. Eff. Min Pos. Displays the current value of the effective minimum outside air damper position.
17. Local Min. Pos. Displays the local ventilation limit position that is set at the ELM.
18. Econ Faults. Displays any ELM sensor faults.
19. Econ Firm Vrsn. Displays the build date and the software version installed on the ELM.

TROUBLESHOOTING

The ELM status LED (**See Figure 5**) will be:

1. On steady when economizer is operating normally.
2. On and off (blinking) occurs 20 seconds after the economizer senses a fault in the system, e.g. no signal from sensor, no communication from Rooftop Unit Controller. Check Rooftop Unit Controller Display for fault readout.
3. Off when the economizer does not have power.

When diagnosing the system, the best results are obtained by first putting the fan setting for Thermostat Controlled units to the "Continuous Fan" mode. For Network controlled units, the Rooftop Unit Controller should be set to the "Occupied Mode".

NOTES

1. The mist eliminator (Permanent Outdoor Air Filter) is of aluminum mesh construction and should be cleaned by flushing regularly with warm soapy water. The replacement mist eliminator size is listed on the first page of these instructions.
2. Operation of the optional power exhaust only depends upon the supply fan running and the damper position (it is possible to set the minimum position high enough to engage the power exhaust in the heating mode).
3. For operation in Thermostat mode, this economizer requires a two-stage thermostat.
4. Upon loss of power to the unit or economizer, the outside air damper will spring close shut in about 5 seconds.
5. Compressor Time Delays, Compressor Interstage Delays, Compressor Low Ambient Lockouts, etc. are not provided by the economizer controller.
6. If DCV is **DISABLED** and a CO sensor is connected to the economizer, the CO level will still display on the Rooftop Unit Controller, but will not be used for control.

HARNESS ENDS AT PL21 & PL20

COMPONENT CODE

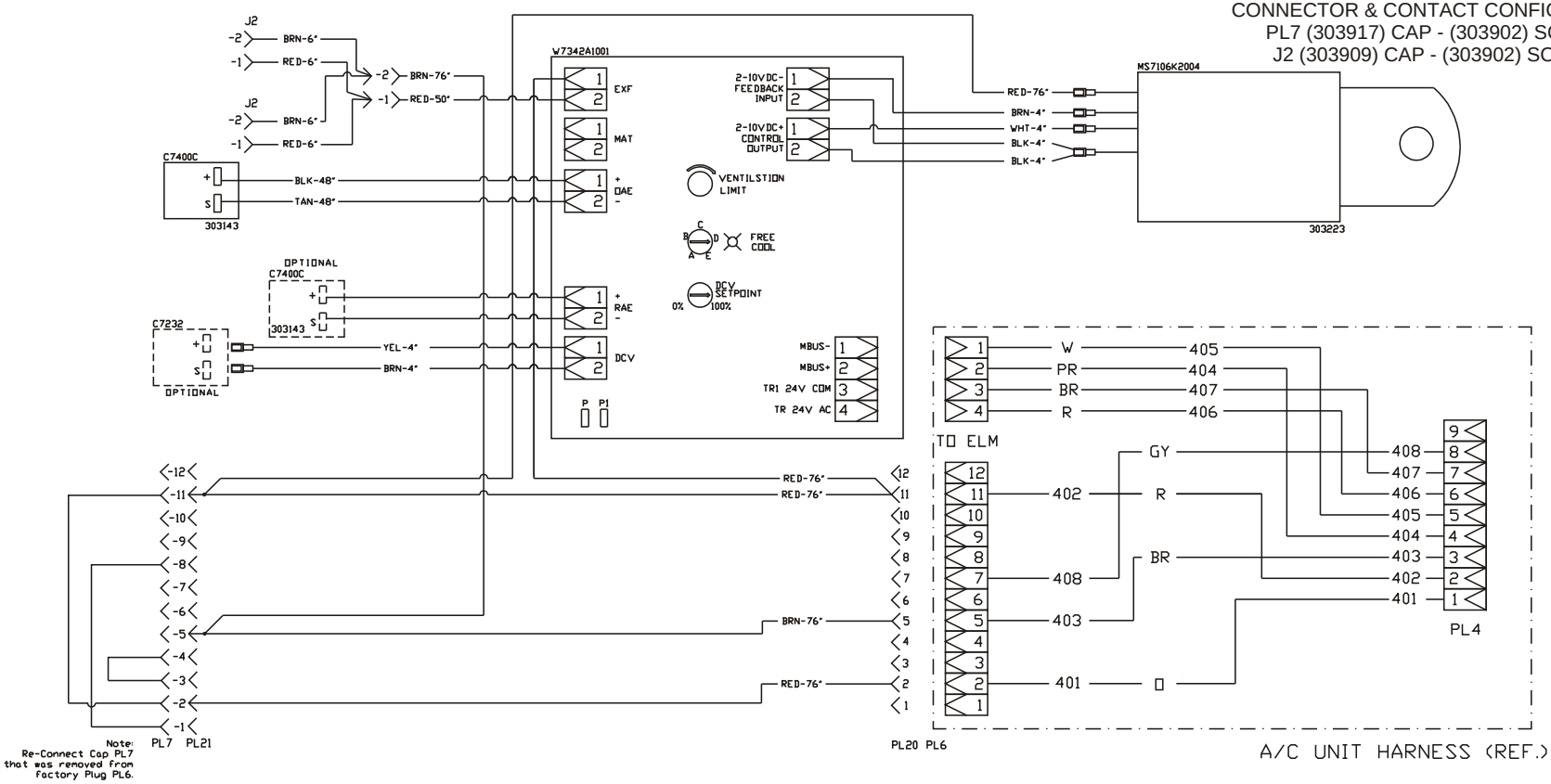
C7400C	Fresh Air Sensor
J2	Power Exhaust Cap
MS7106K	Damper Actuator 24v
PL6	Male A/C Unit Plug
PL7	Female A/C Unit Plug
PL20	Female Economizer Cap
PL21	Male Smoke Plug
W7342A	Logic Module

WIRE COLOR CODE

BLK	Black	BLU	Blue
BRN	Brown	GRN	Green
GRY	Gray	ORG	Orange
PNK	Pink	RED	Red
TAN	Tan	VIO	Violet
WHT	White	YEL	Yellow

Revision	Change	Date
A	ECN# 5695	01-06-11
B	Changed wiring diagram	08-27-12

CONNECTOR & CONTACT CONFIGURATION
PL7 (303917) CAP - (303902) SOCKET
J2 (303909) CAP - (303902) SOCKET



Notes:
1. Unit wiring shown as reference only. Check unit wiring for actual unit wiring.
2. Relays 1K and 2K actuate when the Outdoor Air Enthalpy is lower than the Return Air Enthalpy.
3. 1S is an electronic switch which closes when powered by a 24 VAC input.
4. Factory installed resistor should be removed only if C7400 Differential Enthalpy Sensor is added.
5. Y2 must be energized for the compressor to operate.

Modulating Gear Economizer
RKNL / RLNL 180-300

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Date:	August 27, 2012
Supersedes:	01-07-11
Drawn by:	JP
Unit #:	60-39D-16
Diagram#:	6039D16W
Approved by:	