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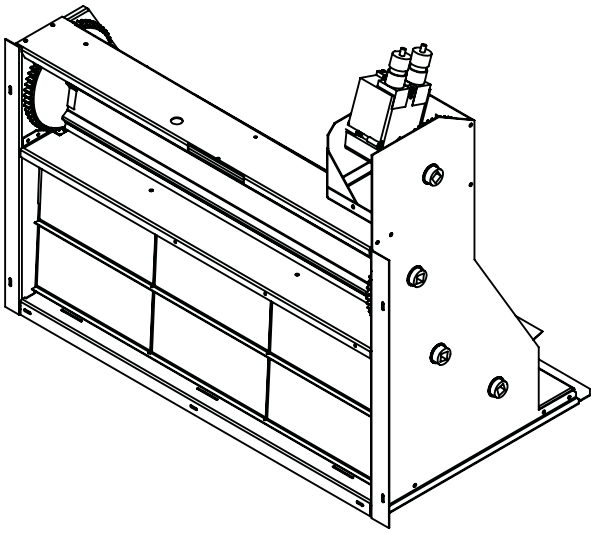
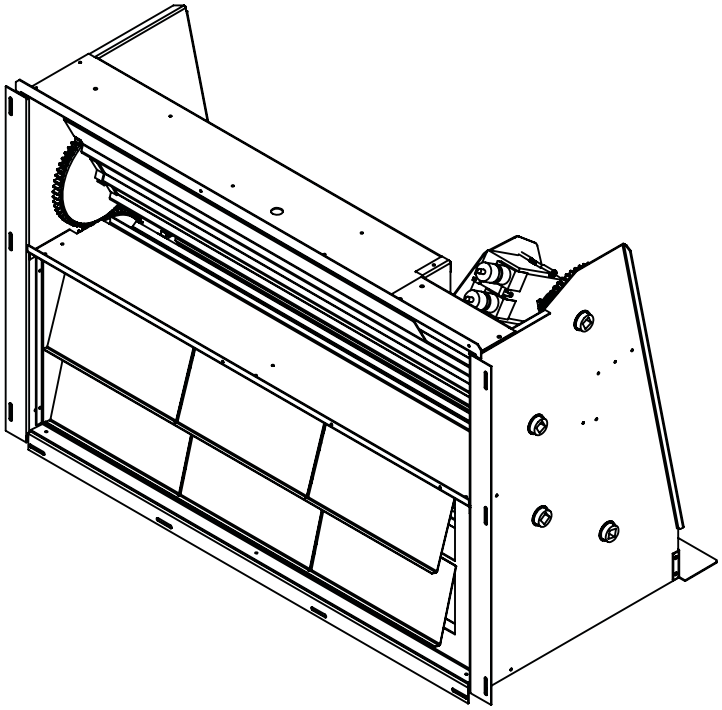
INSTALLATION INSTRUCTIONS FOR

CARRIER 3A (CAS PART #1022355/1022911)
CARRIER 4A (CAS PART #1022356/1022912)
CARRIER 74A (CAS PART #1022558/1022936)
ECONOMIZER

DOWNSHOT CONFIGURATION



1022355/1022911
3A ECONOMIZER
FOR 3-6 TON UNITS



1022356-1022912
4A ECONOMIZER
FOR 7.5-12.5 TON UNITS

1022558/1022936
74A ECONOMIZER
FOR 12.5 [HIGH EFF], 15
TON UNITS

READ COMPLETELY BEFORE INSTALLING!!!

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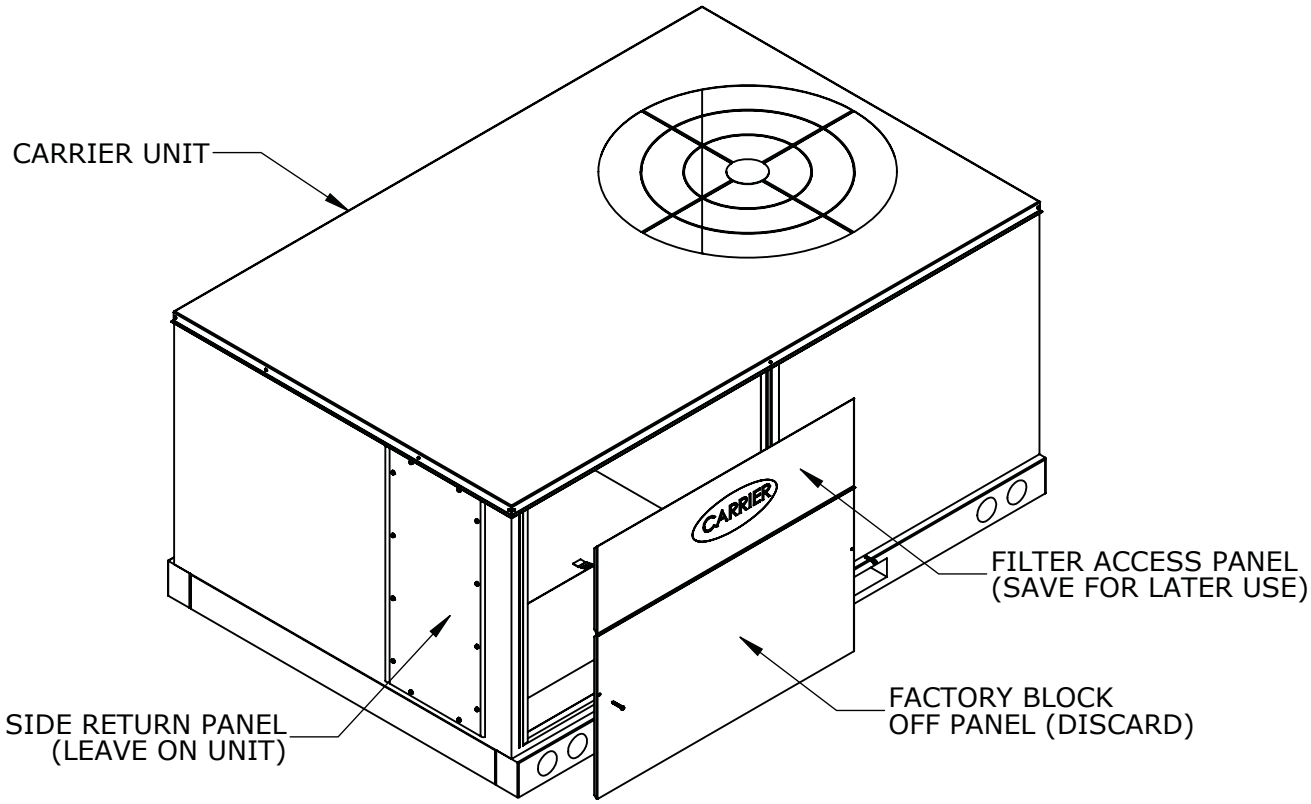
BEFORE BEGINNING VERIFY DOWNSHOT ECONOMIZER CONFIGURATION
IF AIR FLOW IS HORIZONTAL SEE PAGE 7 FOR INSTRUCTIONS

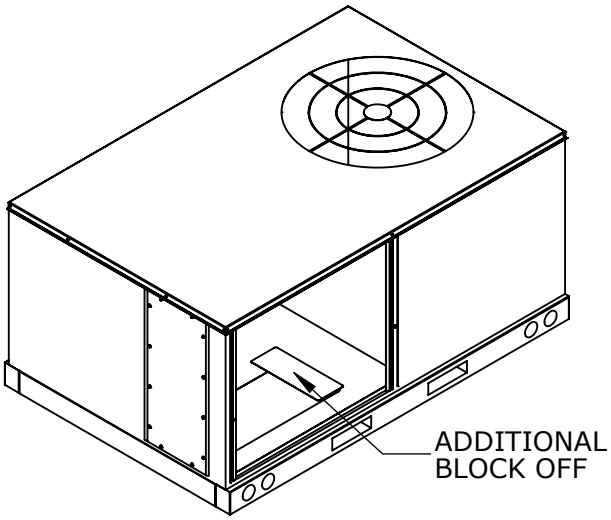


STEP 1: PANEL REMOVAL

REMOVE FILTER ACCESS PANEL (KEEP FOR LATER USE) AND FACTORY BLOCK OFF PANEL (DISCARD) FROM THE UNIT AS SHOWN ABOVE.

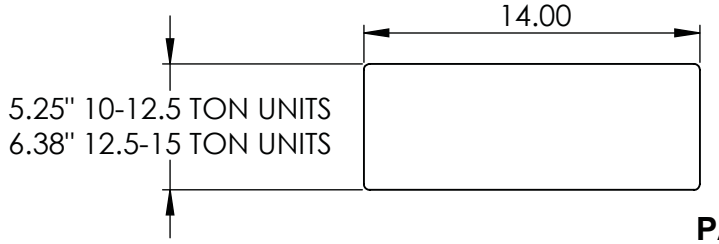
STEP 2: DUAL ENTHALPY

IF DUAL ENTHALPY OPTION HAS BEEN ADDED NOW IS THE TIME TO INSTALL THE SECOND ENTHALPY SENSOR (SOLD SEPARATELY) BELOW THE ECONOMIZER IN THE RETURN AIR DUCT. SEE PAGE 18 FOR ENTHALPY SENSOR WIRING DETAIL



STEP 3: BLOCK OFFS

IF 10-15 TON UNIT IS BEING INSTALLED, AN ADDITIONAL BLOCK OFF IS REQUIRED ON THE BOTTOM RETURN OPENING. INSTALL 5.25" X 14" PANEL FOR 10-12.5 TON UNITS AND 6.38" X 14" PANEL FOR 12.5 [HIGH EFF]-15 TON UNITS ON RIGHT SIDE OF OPENING.



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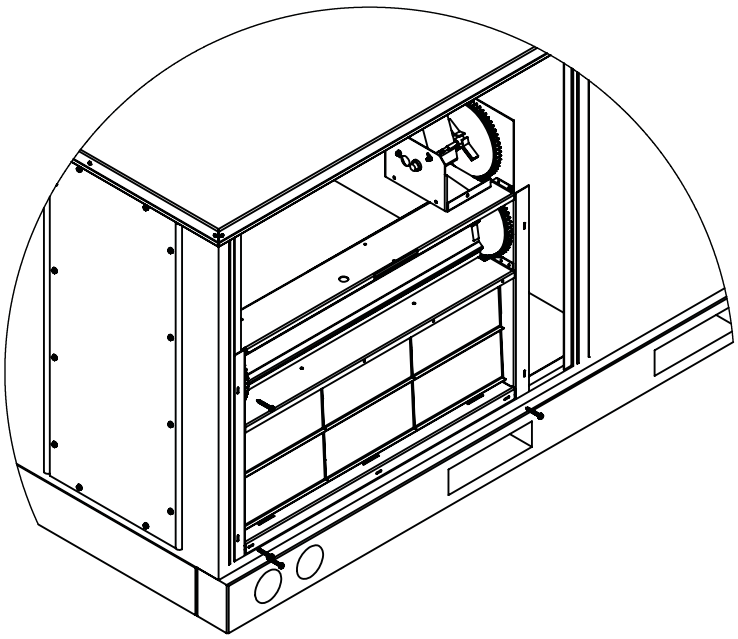
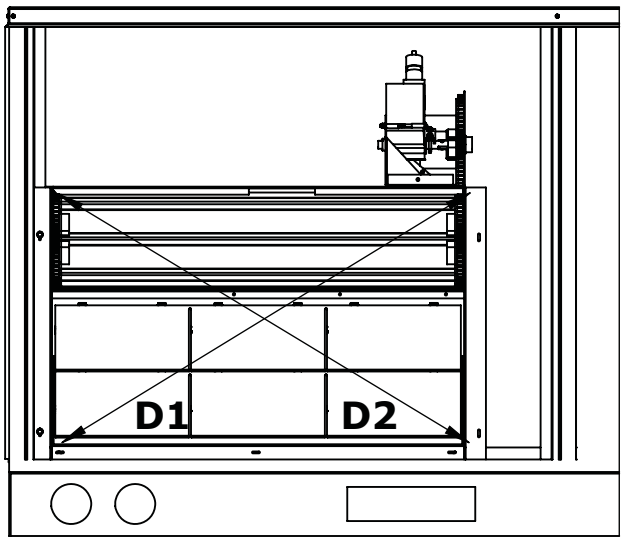


ISO VIEW

D1 = D2 +/- .125"



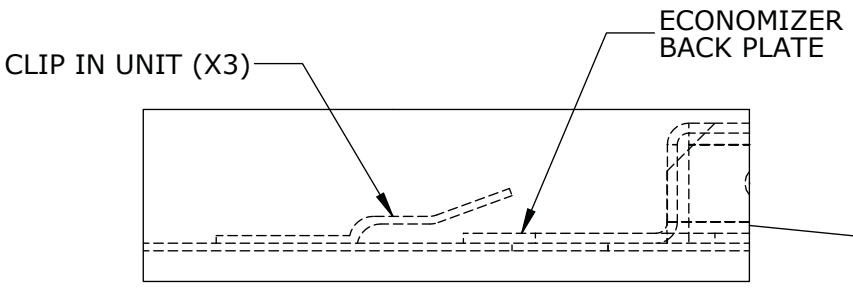
FRONT VIEW

STEP 4: ECONOMIZER INSTALL

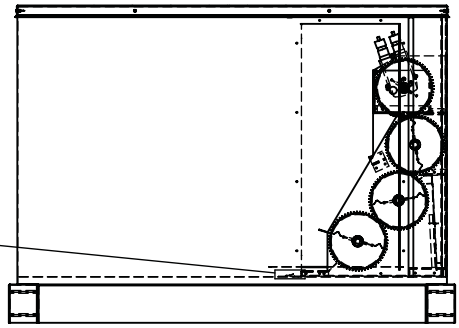
INSERT ECONOMIZER INTO UNIT. SLIDE ECONOMIZER TO BOTTOM LEFT CORNER OF UNIT AS SHOWN ABOVE. ALSO, ENSURE BACK PLATE OF ECONOMIZER SLIDES INTO CLIPS LOCATED BEHIND BOTTOM RETURN OPENING (SEE BELOW). BOTTOM RIGHT EDGE OF ECONOMIZER WILL LINE UP WITH RIGHT HAND SIDE OF RETURN OPENING IF ECONOMIZER IS POSITIONED CORRECTLY.

MAKE SURE ECONOMIZER IS SQUARE TO WITHIN .125" (SEE FRONT VIEW). ATTACH ECONOMIZER TO UNIT USING [2] SCREWS ON LEFT HAND SIDE AND [2] SCREWS ON BOTTOM EDGE (SCREWS PROVIDED BY CAMBRIDGEPORT).

WARNING: PRE-DRILLED HOLES MAY NOT ALWAYS LINE UP WITH HOLES IN UNIT. KEEPING ECONOMIZER SQUARE IS OF UTMOST IMPORTANCE. DO NOT FORCE SCREWS INTO PRE-DRILLED HOLES AND COMPROMISE THE ECONOMIZERS POSITION. IF NECESSARY DRILL NEW HOLES.



DETAIL A



LEFT VIEW

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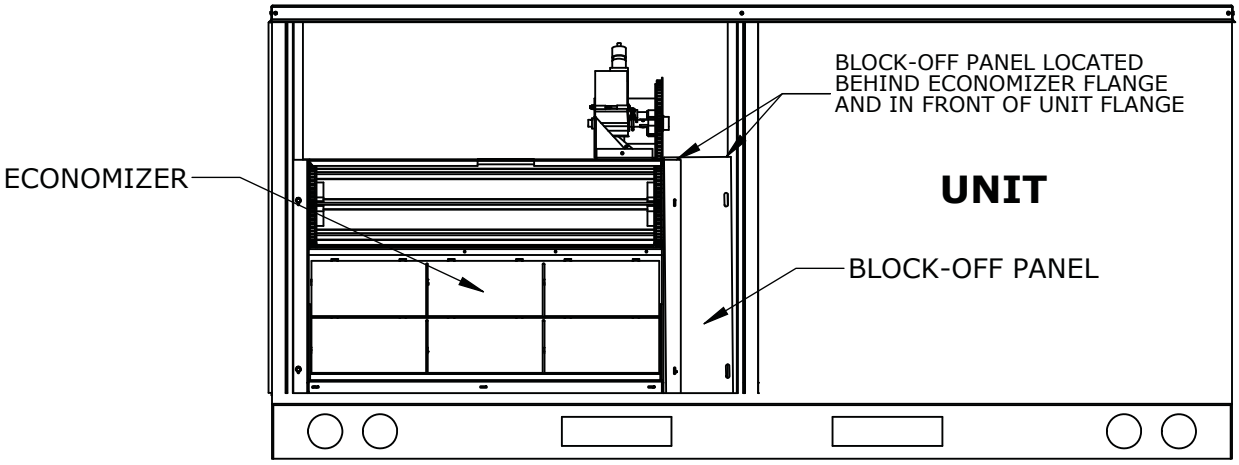
STEP 5: BLOCK OFF INSTALL

I) 3-12.5 TON UNITS

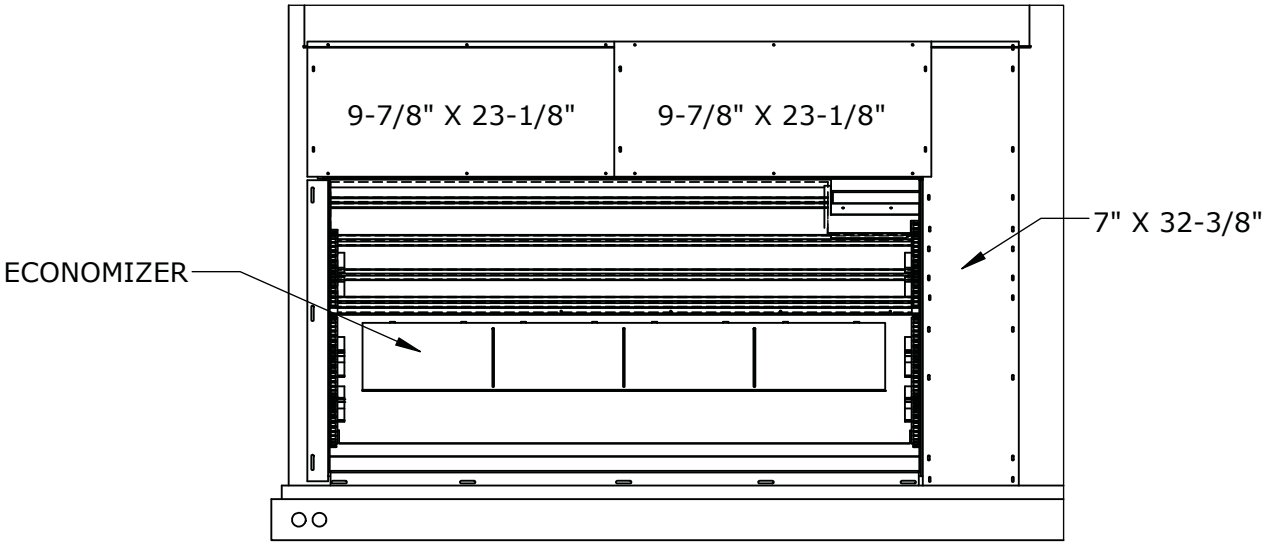
INSTALL EXTRA BLOCK OFF PANEL ON RIGHT HAND SIDE OF ECONOMIZER. POSITION PANEL SUCH THAT HOLES/SLOTS IN ECONOMIZER/UNIT LINE UP WITH PRE-PUNCHED HOLES IN BLOCK OFF PANEL. PANEL WILL MEASURE EITHER 4-7/8" X 17-5/8" OR 4-3/4" X 23-1/8" DEPENDING ON UNIT SIZE.



II) 12.5 [HIGH EFF],15 TON UNITS

NOTE: BEFORE INSTALLING PANELS SEE STEP 6 AND STEP 7 ON FOLLOWING PAGE

FOR 74A (12.5 [HIGH EFF],15 TON) UNIT IN DOWNSHOT CONFIGURATION INSTALL THREE [3] SUPPLIED BLANK-OFF PANELS AS SHOWN.



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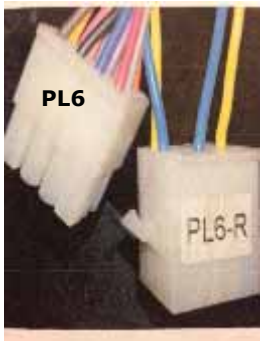
STEP 6: WIRING HARNESS

IN ECONOMIZER SECTION OF THE RTU LOCATE FACTORY WIRING HARNESS "PL-6" AND REMOVE FACTORY HARNESS JUMPER LABELED "PL6-R". (NOTE: SAVE JUMPER "PL6-R" FOR FUTURE USE IF ECONOMIZER NEEDS TO BE BYPASSED.

CONNECT CAMBRIDGEPORT ECONOMIZER WIRING HARNESS TO THE UNIT WIRING HARNESS "PL-6".

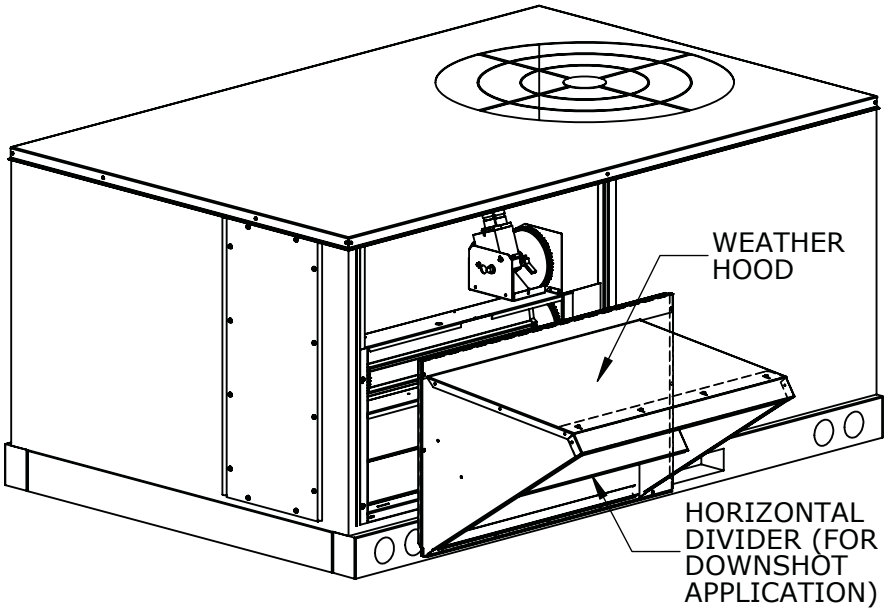


STEP 7: ACTUATOR CHECK:

LOCATE WINDOW ON SIDE OF ACTUATOR BRACKET WHICH IS MOUNTED ON TOP OF DAMPER BLADE ASSEMBLY.

ENSURE BLACK SWITCH IS LOCATED IN THE COUNTERCLOCKWISE (POINTED UP) POSITION AS SHOWN HERE. IF SWITCH IS CLOCKWISE THEN FLIP SWITCH TO BE IN CCW POSITION.

WARNING: IF SWITCH IS IN THE INCORRECT POSITION ECONOMIZER WILL NOT OPERATE PROPERLY



STEP 8: HOOD INSTALL

INSTALL WEATHER HOOD OVER DAMPER ASSEMBLY AND BLOCK OFF PANEL. SLIDE WEATHER HOOD FLANGES INTO GROOVES ON LEFT AND RIGHT SIDE OF RTU OPENING. SECURE HOOD TO UNIT USING SCREWS REMOVED IN STEP 1.

KEEP FILTERS, FILTER CLIPS, AND FILTER CAP UNINSTALLED DURING THIS STEP. ALSO, HORIZONTAL BAFFLE IS INSTALLED FOR DOWNSHOT ECONO. CONFIGURATION.

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STEP 9 - WEATHER HOOD FILTERS

i. LOOSEN [4/5] SCREWS AND REMOVE FILTER CAP.

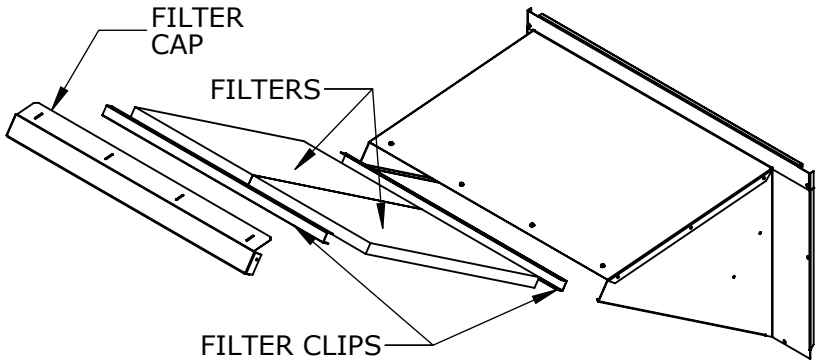
ii. PUT FILTERS TOGETHER AND CAP TOP/BOTTOM WITH FILTER CLIPS.

iii. SLIDE ADJOINED FILTERS DOWN FILTER TRACKS LOCATED ON EITHER SIDE OF WEATHER HOOD.

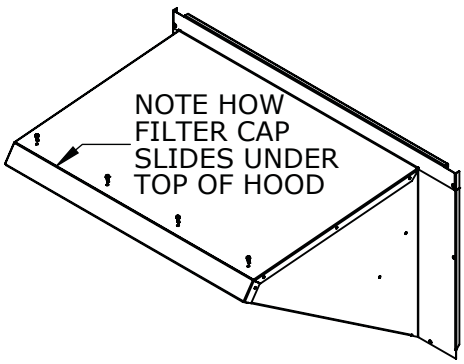
iv. SLIDE FILTER CAP UNDER HOOD ROOF BUT ENSURE SIDE FLANGES CAP OVER LEFT AND RIGHT WALLS (SEE "ASSEMBLED VIEW").

v. SLIDE FILTER CAP UP AS FAR AS POSSIBLE AND REATTACH AT [4/5] LOCATIONS.

vi. VERIFY FILTERS ARE SECURE AND ALL PARTS ARE ASSEMBLED CORRECTLY.



EXPLODED VIEW

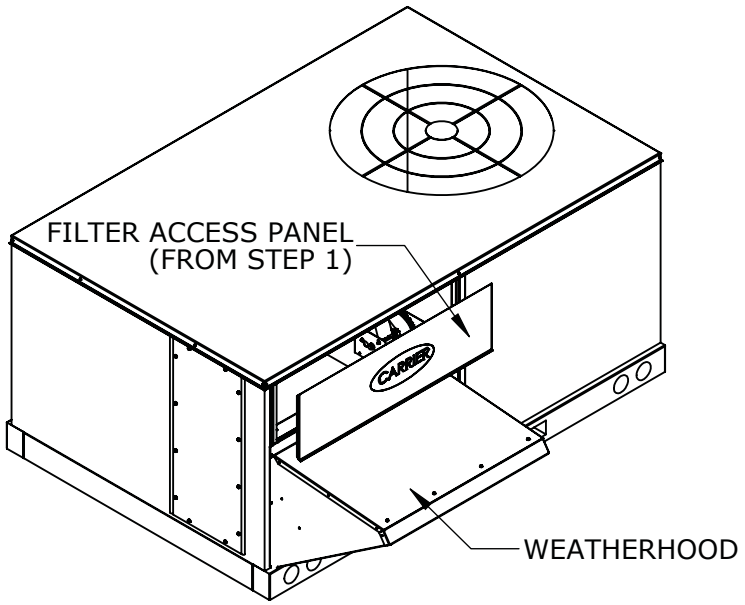


ASSEMBLED VIEW

STEP 10: FILTER ACCESS AND WIRING

REINSTALL FILTER ACCESS PANEL (REMOVED FROM STEP 1) ON TOP OF WEATHERHOOD.

FOLLOW INSTRUCTIONS FOR WIRING AND BELIMO ZIP MODULE SETUP ON PAGE 14.



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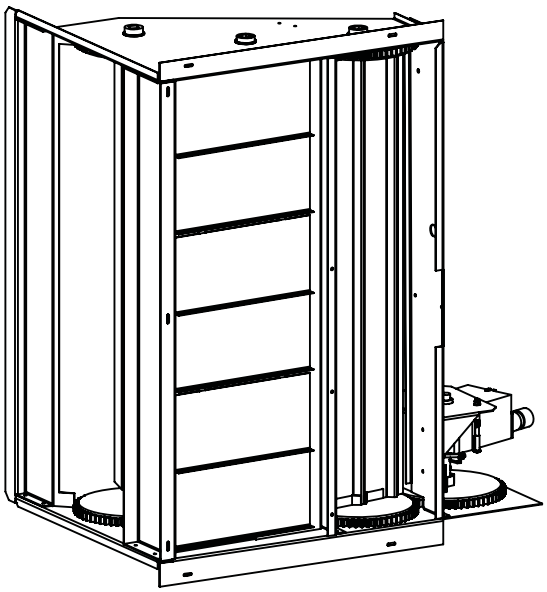
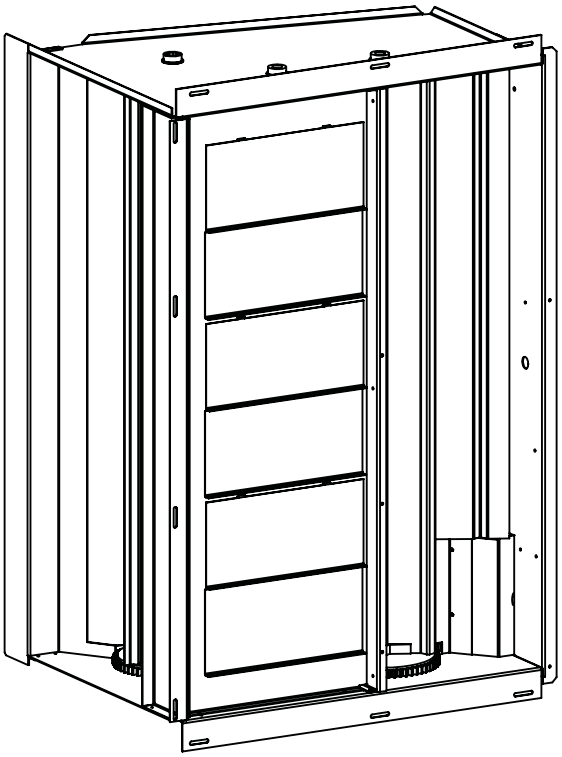
INSTALLATION INSTRUCTIONS FOR

CARRIER 3A (CAS PART #1022355/1022911)
CARRIER 4A (CAS PART #1022356/1022912)
CARRIER 74A (CAS PART #1022558/1022936)
ECONOMIZER

HORIZONTAL CONFIGURATION



1022355-1022911
3A ECONOMIZER
FOR 3-6 TON UNITS



1022356/1022912
4A ECONOMIZER
FOR 7.5-12.5 TON UNITS

1022558/1022936
74A ECONOMIZER
FOR 12.5 [HIGH EFF], 15 TON UNITS

READ COMPLETELY BEFORE INSTALLING!!!

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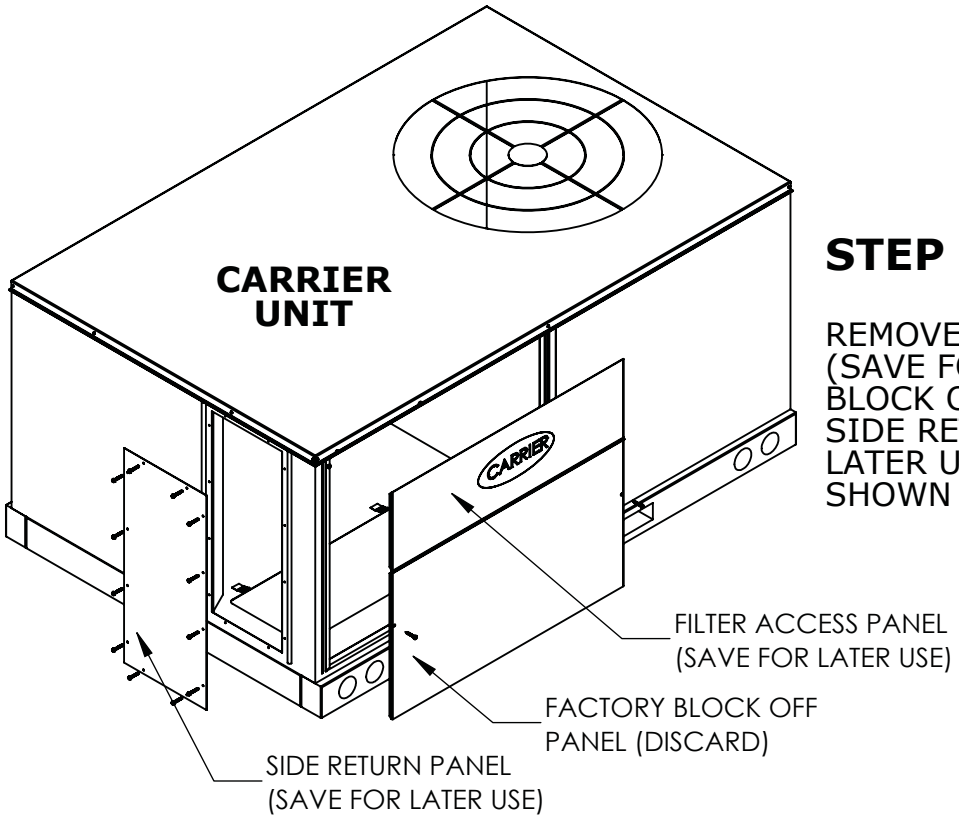
BEFORE BEGINNING VERIFY HORIZONTAL ECONOMIZER CONFIGURATION
IF AIR FLOW IS HORIZONTAL USE DOWNSHOT CONFIGURATION INSTRUCTIONS

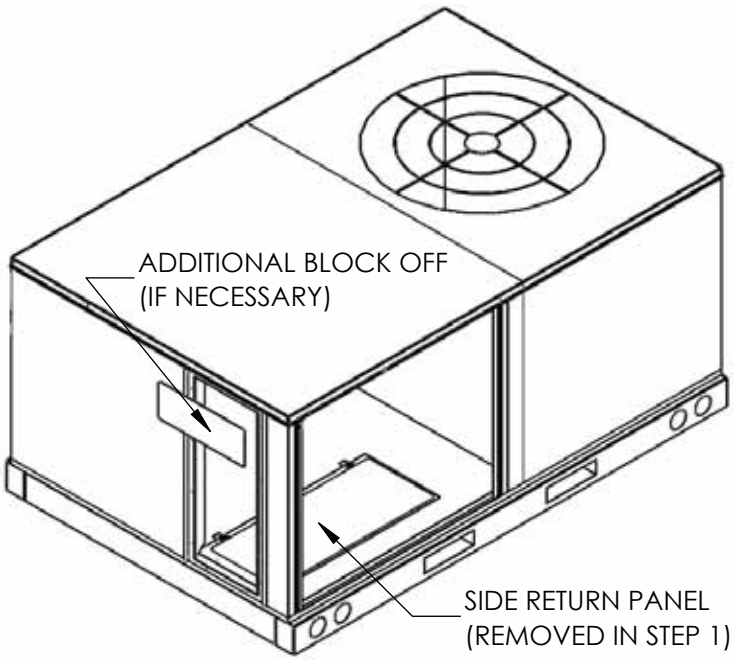


STEP 1: PANEL REMOVAL

REMOVE FILTER ACCESS PANEL (SAVE FOR LATER USE), FACTORY BLOCK OFF PANEL (DISCARD), AND SIDE RETURN PANEL (SAVE FOR LATER USE) FROM CARRIER UNIT AS SHOWN HERE.

STEP 2 (OPTION): DUAL ENTHALPY

IF DUAL ENTHALPY OPTION HAS BEEN ADDED NOW IS THE TIME TO INSTALL THE SECOND ENTHALPY SENSOR (SOLD SEPARATELY) IN THE RETURN AIR DUCT. SEE PAGE 18 FOR ENTHALPY SENSOR WIRING DETAIL



STEP 3: BLOCK OFFS

INSTALL SIDE RETURN PANEL (REMOVED FROM STEP 1 ON LEFT HAND SIDE OF UNIT) OVER BOTTOM RETURN OPENING.

IF 10-12.5 TON UNIT IS BEING INSTALLED, AN ADDITIONAL BLOCK OFF IS REQUIRED ON THE SIDE RETURN OPENING. INSTALL 5.25" X 14" PANEL AT TOP OF SIDE RETURN OPENING.

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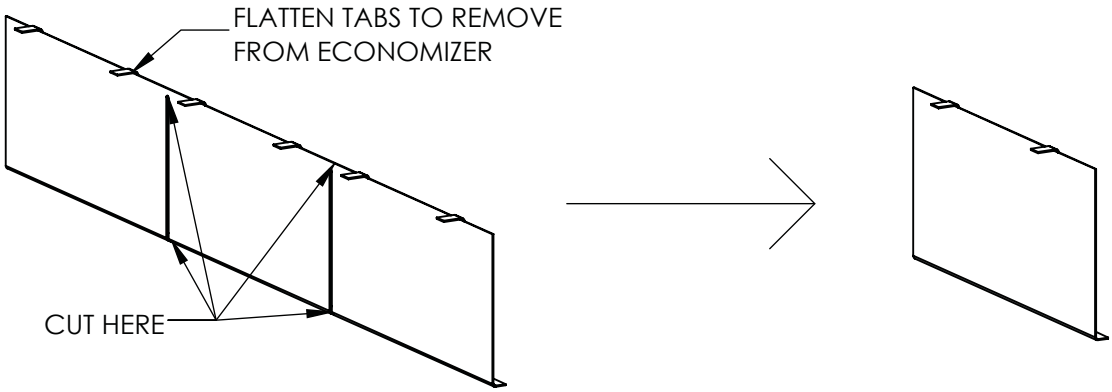
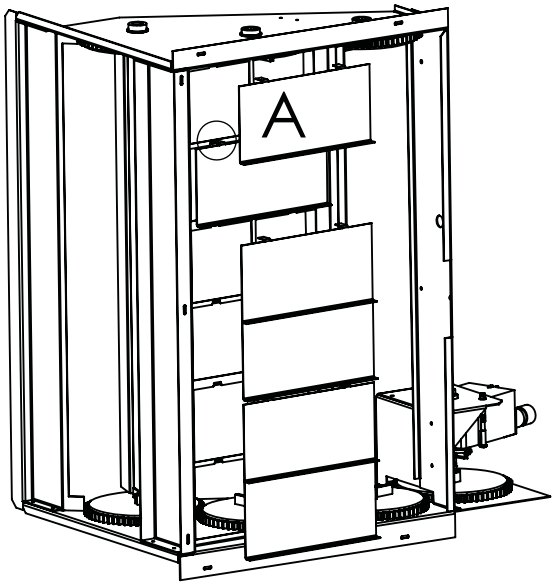
STEP 4: BAROMETRIC RELIEF BLADES

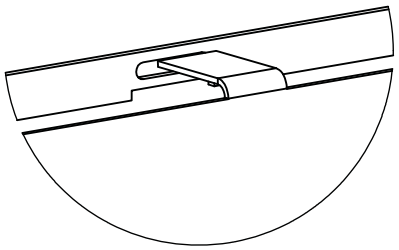
BAROMETRIC RELIEF BLADES ARE SHIPPED CONFIGURED FOR DOWNSHOT ECONOMIZERS. REPOSITION BLADES FOR HORIZONTAL APPLICATION.

i) FLATTEN TABS, REMOVE BLADES FROM ECONOMIZER, THEN CUT AT SLOTS.



ii) ROTATE BLADES 90° AND PLACE IN ECONOMIZER AT SIX (6) LOCATIONS.



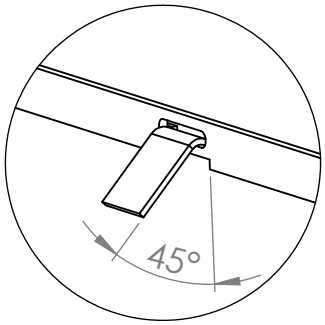


DETAIL A
SCALE 1 : 1

iii) BEND TABS BACK TO 45° TO HOLD IN ECONOMIZER AND ALLOW FOR OPENING

*****IMPORTANT*****

TABS MUST BE BENT BACK AS SHOWN OR THEY WILL PREVENT DAMPER FROM OPENING



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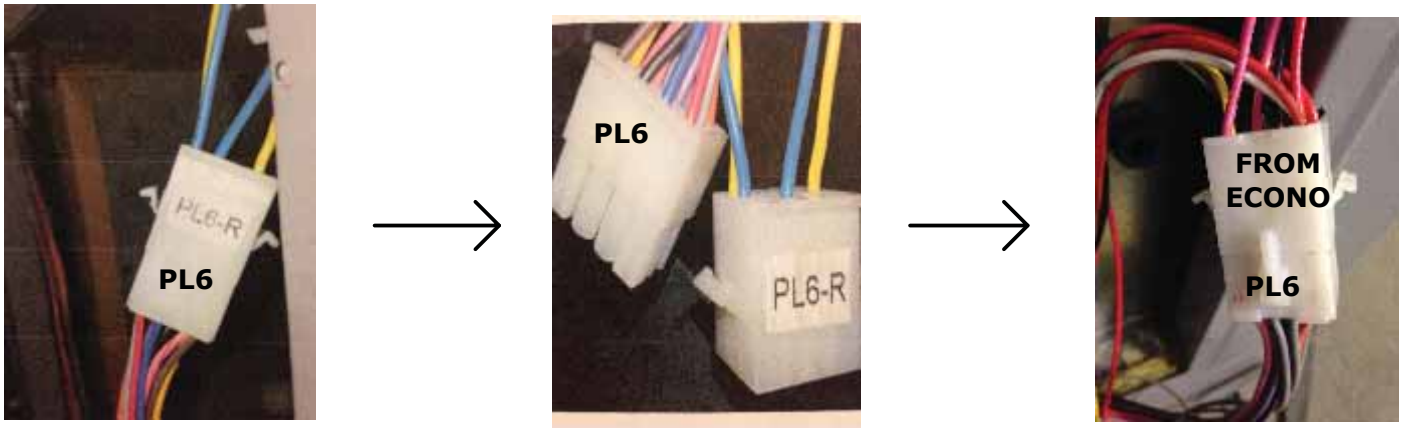
STEP 5: WIRING HARNESS

IN ECONOMIZER SECTION OF THE RTU LOCATE FACTORY WIRING HARNESS "PL-6" AND REMOVE FACTORY HARNESS JUMPER LABELED "PL6-R". (NOTE: SAVE JUMPER "PL6-R" FOR FUTURE USE IF ECONOMIZER NEEDS TO BE BYPASSED)

SET ECONOMIZER LOOSELY IN CORNER OF UNIT SO THAT PLUG FROM ECONOMIZER REACHES UNIT HARNESS. CONNECT CAMBRIDGEPORT ECONOMIZER WIRING HARNESS TO THE UNIT WIRING HARNESS "PL-6".

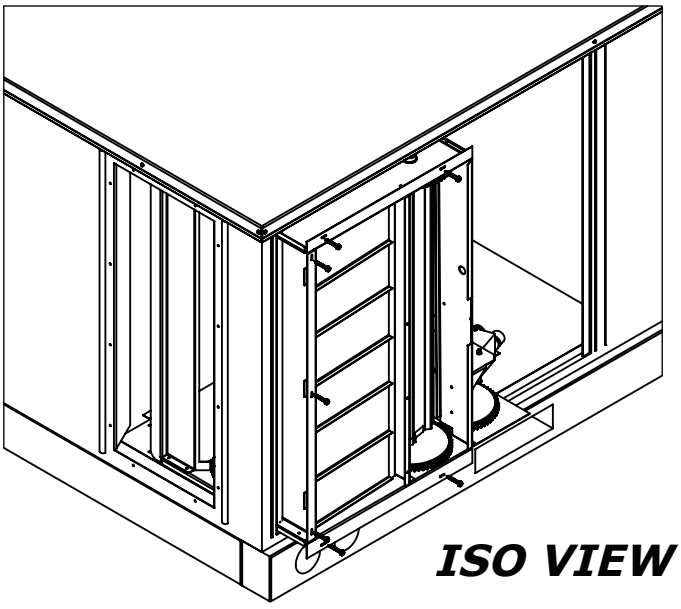


STEP 6: ECONOMIZER INSTALL

INSTALL ECONOMIZER IN BOTTOM LEFT HAND SIDE OF UNIT AS SHOWN ABOVE. ALLOW FLANGE ON PERIMETER OF ECONOMIZER TO REST OVER FLANGE IN UNIT.

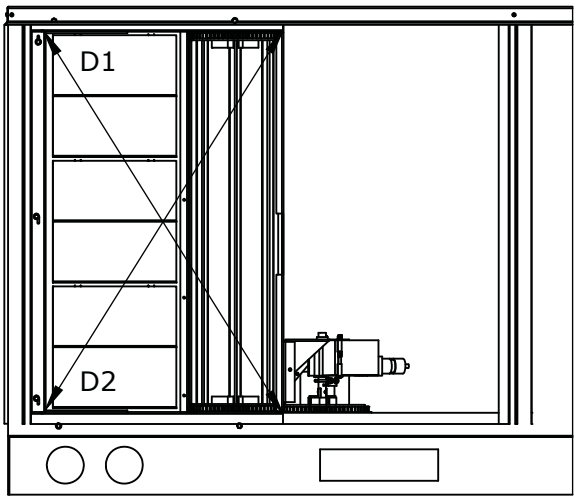
WARNING: ECONOMIZER MUST BE INSTALLED "SQUARE" OR COMPONENT DAMAGE WILL RESULT! CAMBRIDGEPORT WILL NOT ACCEPT RESPONSIBILITY FOR DAMAGED PARTS DUE TO IMPROPER INSTALLATION/ OPERATION!

NOTE: THE PRE-DRILLED HOLES MAY NOT LINE UP WITH THE UNIT. **DO NOT** FORCE SCREWS INTO PRE-DRILLED HOLES. DRILL NEW HOLES IF NECESSARY.



ISO VIEW

D1 = D2 +/- .125"



FRONT VIEW

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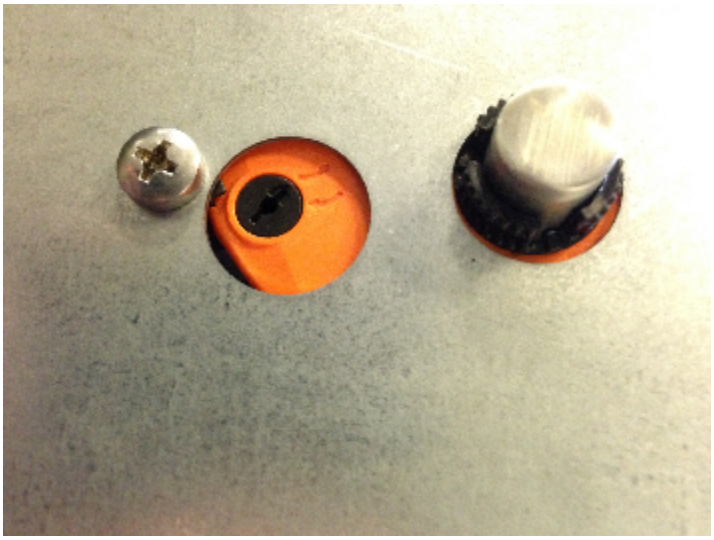
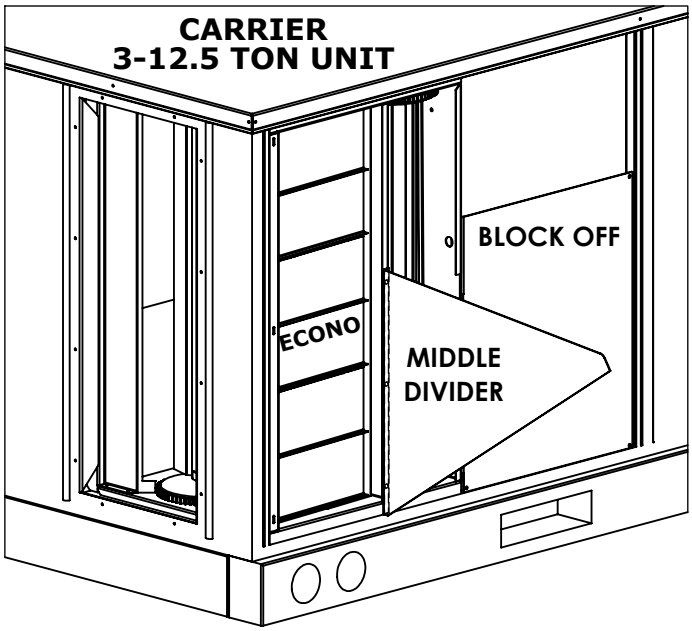
STEP 7: ACTUATOR CHECK

LOCATE WINDOW ON SIDE OF ACTUATOR BRACKET WHICH IS MOUNTED ON TOP OF DAMPER BLADE ASSEMBLY.

ENSURE BLACK SWITCH IS LOCATED IN THE COUNTERCLOCKWISE (POINTED UP) POSITION AS SHOWN HERE. IF SWITCH IS CLOCKWISE THEN FLIP SWITCH TO BE IN CCW POSITION.

WARNING: IF SWITCH IS IN THE INCORRECT POSITION ECONOMIZER WILL NOT OPERATE PROPERLY



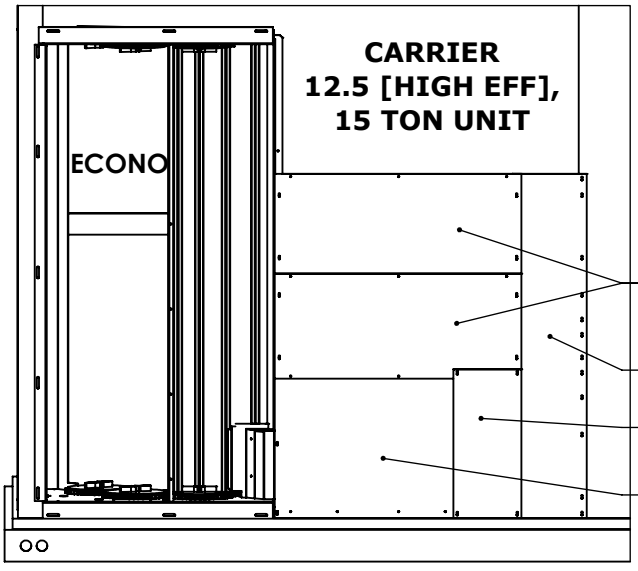


STEP 8: BLOCK OFFS AND HOOD DIVIDER

INSTALL MIDDLE DIVIDER FOR HOOD DIRECTLY TO FLANGE IN CENTER OF ECONOMIZER AS SHOWN.

FOR 3-12.5 TON UNITS FIND APPROPRIATE BLOCK OFF PANEL AND INSTALL OVER OPEN AREA TO THE RIGHT OF MIDDLE DIVIDER AS SHOWN.

FOR 12.5 [HIGH EFF],15 TON UNITS ARRANGE FIVE (5) PANELS TO THE RIGHT AS SHOWN BELOW.



FOR 3-10 TON UNITS

USE 15" X 17-7/8" BLOCK OFF PANEL

FOR 10.5-12.5 TON UNITS

USE 17" X 23-5/8" BLOCK OFF PANEL

FOR 12.5 [HIGH EFF],15 TON UNITS

USE PANEL ARRANGEMENT BELOW

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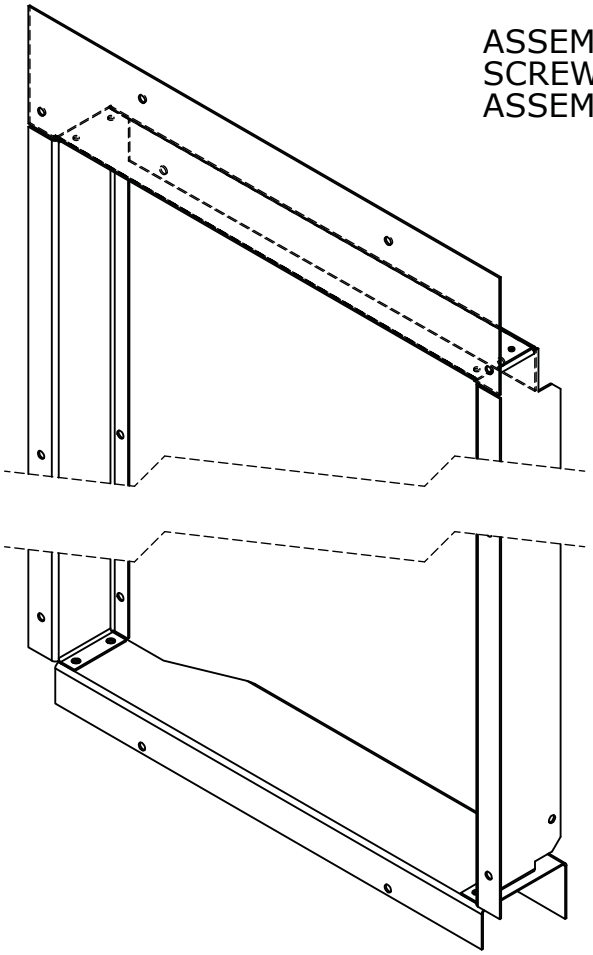
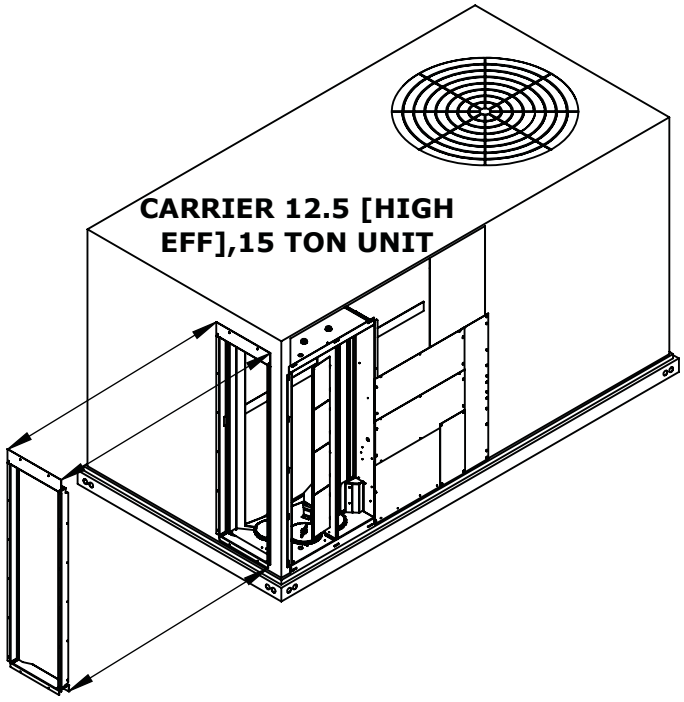
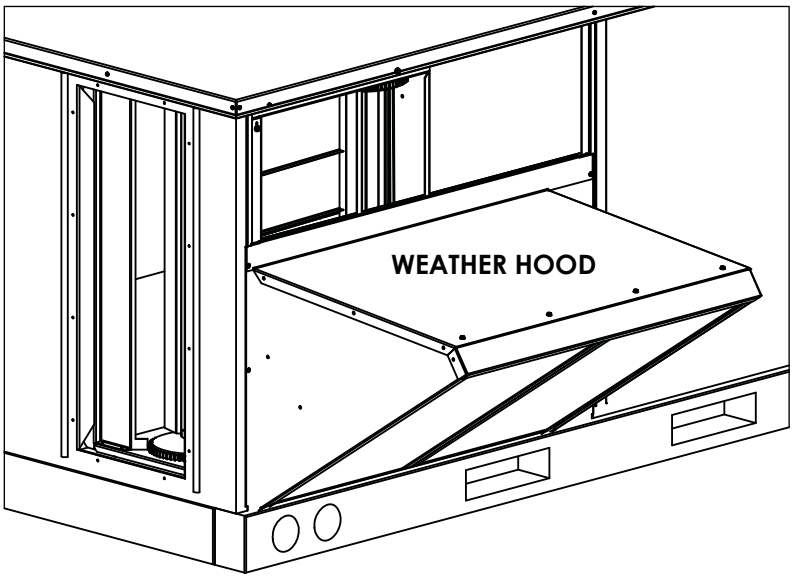
STEP 9: SAFING

IF OPERATING A 12.5 [HIGH EFF], 15 TON UNIT (ECONOMIZER PART #1022558/1022936) SAFING MUST BE INSTALLED IN SIDE RETURN AIR OPENING FOR PROPER AIRFLOW.



ASSEMBLE SAFING AS SHOWN WITH CAS PROVIDED TEK SCREWS. USE TWO SCREWS PER CORNER AND SLIDE ASSEMBLY INTO SIDE RETURN OPENING IN UNIT.





STEP 10: WEATHER HOOD

HORIZONTAL DIVIDER SHIPPED INSTALLED MUST BE REMOVED FOR PROPER OPERATION. REMOVE TWO SCREWS ON BOTH SIDES OF HOOD AND TAKE OUT DIVIDER.

INSTALL WEATHER HOOD ON THE RTU SO THAT THE VERTICAL FLANGES SIT IN GROOVES ON THE RTU. HOOD WILL SIT OVER DIVIDER INSTALLED IN STEP 8. SECURE WITH SCREWS REMOVED FROM BLOCK OFF PANEL IN STEP 1.

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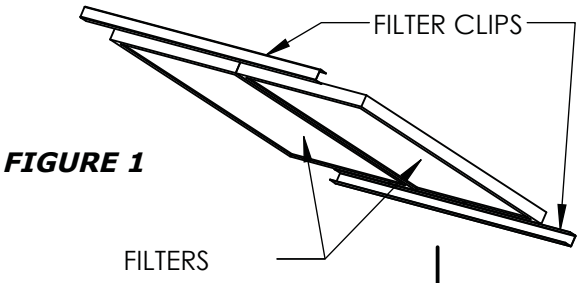


FIGURE 1

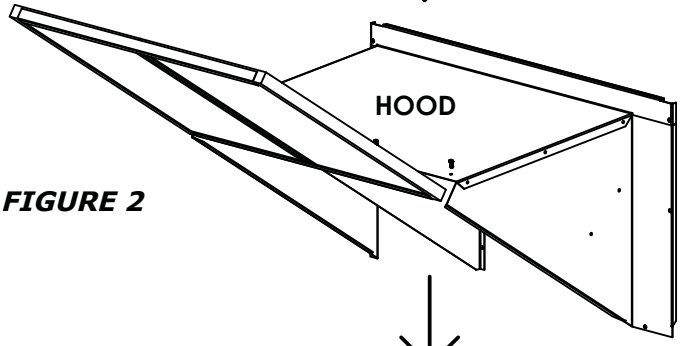


FIGURE 2

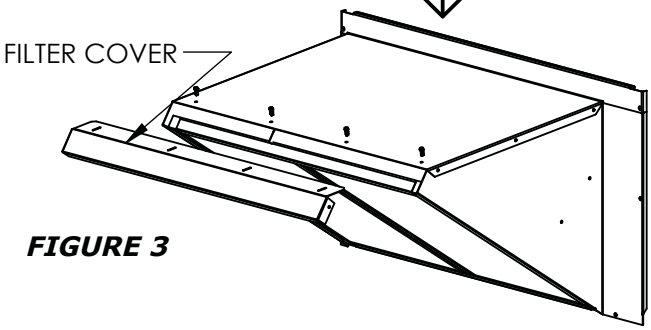


FIGURE 3

STEP 11: FILTER INSTALLATION

i) REMOVE FILTER COVER FROM TOP OF WEATHER HOOD.

ii) PUT FILTERS TOGETHER AND HOLD IN PLACE BY ATTACHING FILTER CLIPS OVER TOP AND BOTTOM EDGE. (FIGURE 1)

iii) SLIDE FILTER ASSEMBLY DOWN FRONT OF WEATHERHOOD WHILE ENGAGING EDGE FLANGES ON BOTH SIDES. (FIGURE 2)

iv) ATTACH FILTER COVER TO WEATHERHOOD BY SLIDING FLANGE **UNDER** ROOF OF HOOD. (FIGURE 3,4)

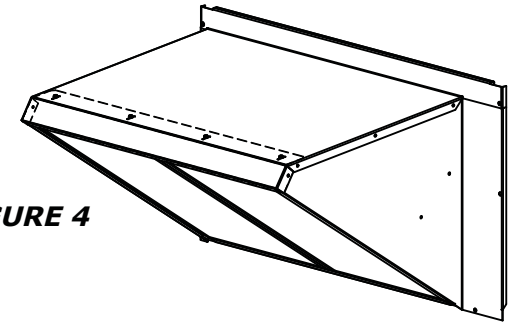
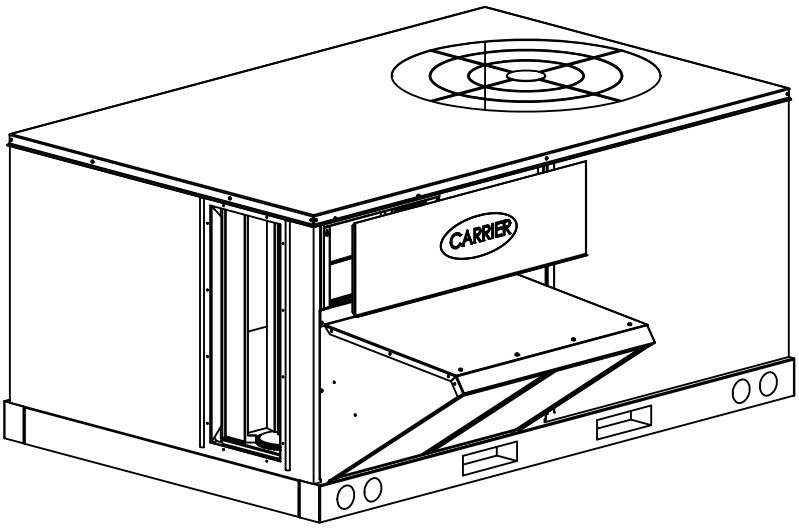


FIGURE 4

STEP 12: FILTER ACCESS PANEL AND WIRING

REINSTALL FILTER ACCESS PANEL (REMOVED FROM STEP 1) ON TOP OF WEATHERHOOD.

FOLLOW INSTRUCTIONS FOR BELIMO WIRING AND SETUP ON PAGE [14].



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BELIMO ZIP CONTROLLER

WIRING INSTRUCTIONS

NOTE: 2-STAGE THERMOSTAT NECESSARY FOR OPERATION

FOR CARRIER UNITS WITH CENTRAL TERMINAL BOARD (CTB) TURN TO PAGE 15 FOR WIRING INSTRUCTIONS

FOR CARRIER UNITS 2008 OR OLDER (UNITS WITHOUT CTB)

IF INSTALLING ECONOMIZER 1022911, 1022912, OR 1022936 TURN TO PAGE 25, STEP B

IF INSTALLING ECONOMIZER 1022355, 1022356, OR 1022558 WITH A PURCHASED 9800296 HARNESS (RETROFIT) SEE PAGE 24

IF REWIRING ECONOMIZER 1022355, 1022356, OR 1022558 FOR USE IN UNIT WITHOUT CTB TURN TO DIAGRAM ON PAGE 23

READ COMPLETELY BEFORE INSTALLING!!!

CAMBRIDGEPORT IS NOT RESPONSIBLE FOR IMPROPERLY INSTALLED EQUIPMENT

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STEP 1: MOUNT CONTROLLER

MOUNT BELIMO ZIP CONTROLLER INSIDE ELECTRICAL PANEL OF THE RTU USING SUPPLIED #10 SELF-TAPPING SCREWS.

STEP 2: HARNESS

DISCONNECT FACTORY INSTALLED ECONOMIZER HARNESS FROM THE CENTRAL TERMINAL BOARD (CTB). CONNECT THE 10 PIN (7 WIRE) HARNESS FROM THE ZIP CONTROLLER TO THE CTB. ATTACH AT SAME LOCATION THAT PREVIOUS HARNESS WAS DISCONNECTED.

IMPORTANT: NOTE ORIENTATION OF NEW HARNESS!!!!!

DISCONNECT FACTORY INSTALLED ECONOMIZER HARNESS

CONNECT 10-PIN 7-WIRE HARNESS FROM ZIP MODULE IN ORIENTATION SHOWN

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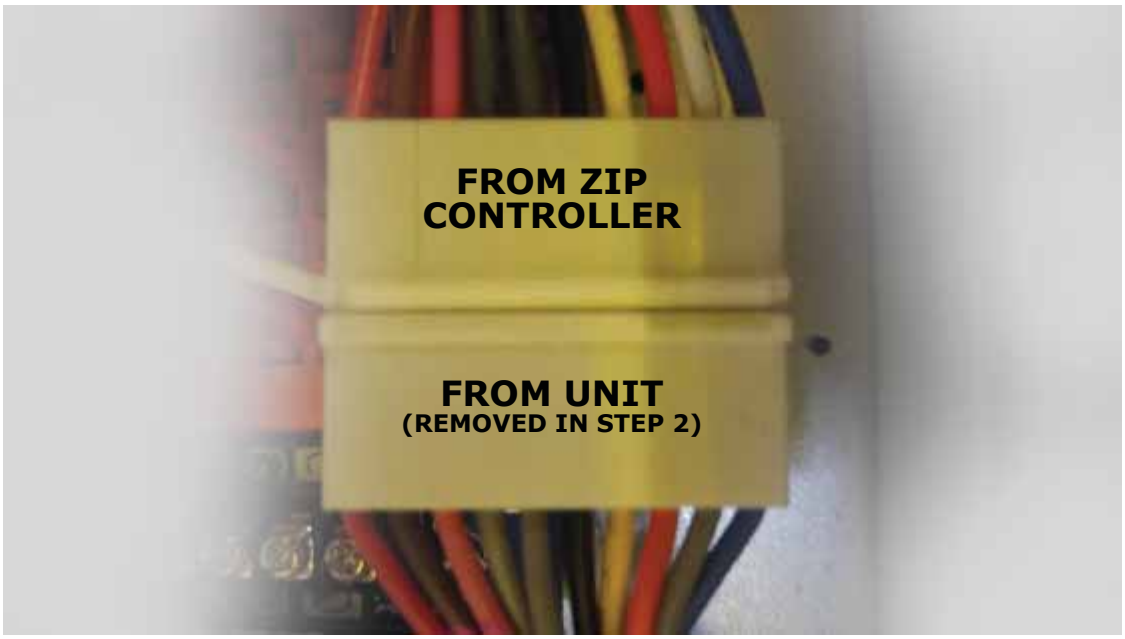
STEP 3: HARNESS

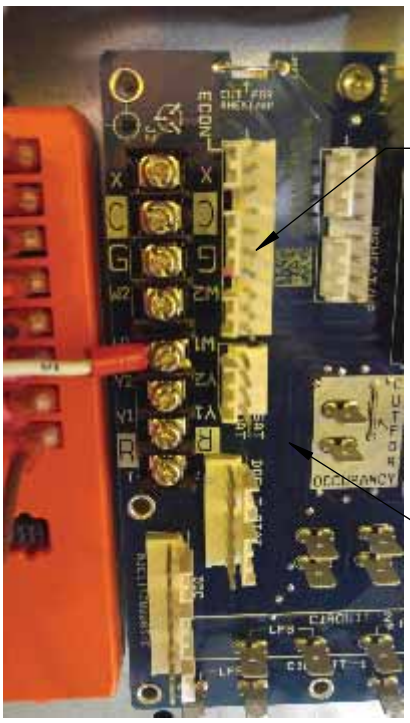
CONNECT THE 10-PIN (10-WIRE) HARNESS FROM ZIP CONTROLLER TO THE FACTORY ECONOMIZER HARNESS THAT WAS DISCONNECTED FROM CTB IN BEGINNING OF STEP 2.

NOTE ORIENTATION OF PLUGS!!!



STEP 4: WHITE WIRE

CONNECT END OF WHITE WIRE LABELED "W1" HANGING FROM ZIP MODULE TO "W1" TERMINAL ON CTB.



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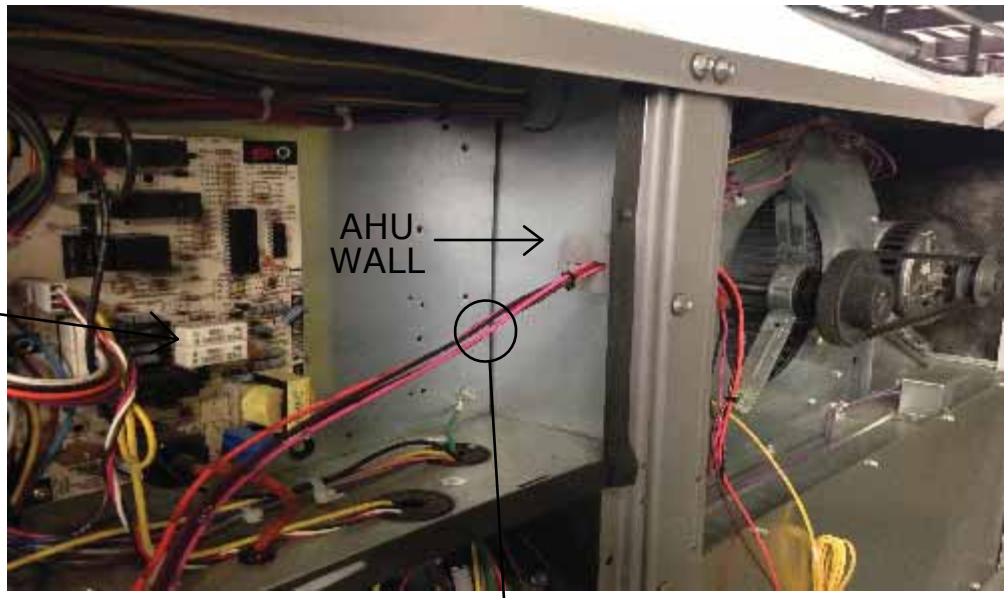
STEP 5: WIRE PLACEMENT

LOCATE 4 WIRES RUNNING FROM ZIP MODULE THAT ARE ZIP TIED TOGETHER. (ORANGE SAT-, BROWN SAT+, PURPLE OAT+, PINK OAT-). RUN ALL WIRES THROUGH AHU WALL.



WIRE BUNDLE

STEP 6: WIRE ATTACHMENT

INSTALL S/A SENSOR FOUND IN HARDWARE BAG. USE PRE-DRILLED HOLES IN SUPPLY FAN SECTION AND ATTACH WITH 2 SCREWS PROVIDED.

ATTACH BROWN (SAT+) AND ORANGE (SAT-) WIRES TO YELLOW S/A SENSOR WIRE BUNDLE AND INSTALL SENSOR IN SUPPLY AIR STREAM OF UNIT.

PURPLE (OAT-)/PINK (OAT+) WIRE CONNECTION

BROWN (SAT+)/ORANGE (SAT-) WIRE CONNECTION

S/A SENSOR

FAN SECTION OF UNIT

ATTACH PURPLE (OAT+) AND PINK (OAT-) WIRES TO THE TWO FACTORY CONNECTORS HANGING IN THE FAN SECTION.

USE ENCLOSED ZIP TIES TO ROUTE AND SECURE ALL WIRES AS REQUIRED.

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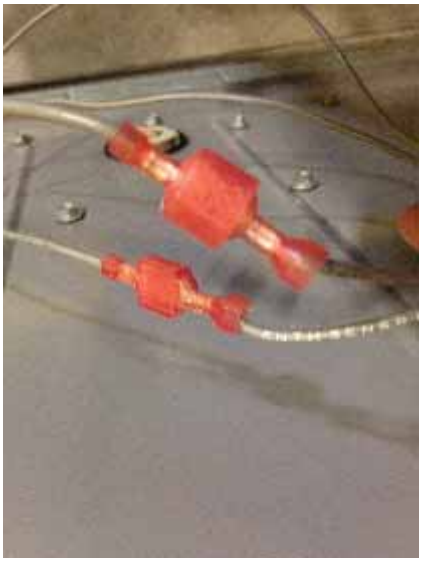
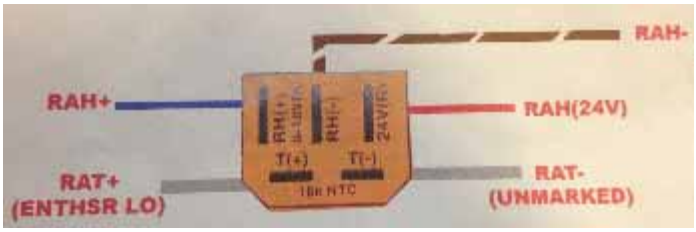
STEP 7 (FOR DUAL ENTHALPY APPLICATIONS ONLY!): ENTHALPY SENSOR



DISCONNECT TWO GREY WIRES IN FILTER SECTION OF THE RTU. THESE WIRES ARE LOCATED IN THE FACTORY WIRING BUNDLE (PL-6). ONE IS LABELED "ENTH SENSR" AND THE OTHER IS UNLABELED. ONCE REMOVED CONNECT FEMALE ENDS TO R/A SENSOR AS SHOWN BELOW.



STEP 8 (FOR POWER EXHAUST APPLICATIONS ONLY!):

LOCATE YELLOW WIRE LABELED "EX" AND BLACK COMMON WIRE FROM ECONOMIZER WIRING HARNESS. CONNECT BOTH WIRES TO POWER EXHAUST CONTACTOR COIL.

STEP 9: BELIMO ZIP CONTROLLER SETUP

*****REQUIRED*****
UNIT WILL ALARM AND NOT FUNCTION PROPERLY IF SKIPPED

POWER UP UNIT AND SET UP ZIP CONTROLLER AS SHOWN BELOW. USE "UP" AND "DOWN" ARROWS TO SCROLL, "OK" BUTTON TO ENTER, AND "ESC" BUTTON TO GO BACK.

PRESS "OK"

PRESS "OK"

PRESS "OK"
USE UP/DN TO FIND #
PRESS "OK" TO ENTER EACH #
PRESS "ESC" TO GET BACK TO ZIP CODE SCREEN

PRESS DOWN ARROW UNTIL YOU GET TO "VENT MIN POS" SCREEN

PRESS "OK" AND USE ARROWS TO SET MIN OUTSIDE AIR % (10-15% RECOMMENDED)
PRESS "OK" WHEN DONE

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...STEP 9 CONTINUED

FOR STANDARD UNIT OPERATION (NO HEAT PUMP OR DEMAND CONTROL VENTILATION [DCV]) SKIP TO PAGE 21 FOR SERVICE AND COMMISSIONING PROCEDURE.

A) UNIT WITH HEAT PUMP ADDITION

NOTE: AFTER SETTING MINIMUM DAMPER POSITION ALARM LIGHT WILL BE ON

RETURN TO SETTINGS MENU SCROLL UP TO "HEAT PUMP OP" PRESS "OK"

USING "UP" AND "DN" ARROWS SET EITHER [B],[O], OR [W1] PRESS "OK"

PRESS "DN" ONCE TO "NO COMPRESSOR DETECTED" SCREEN. PRESS "OK"

CHOOSE APPROPRIATE COMPRESSOR QTY AND SELECT "OK"

IF DEMAND CONTROL VENTILATION IS NOT BEING USED SKIP TO PAGE 21 FOR SERVICE AND COMMISSIONING PROCEDURE

B) DEMAND CONTROL VENTILATION [DCV] ADDITION

ENTER SETTINGS MENU UNIT WILL DETECT CO2 SENSOR. SELECT "OK"

SET DCV MIN DAMPER VENTILATION RATE IN % DAMPER OPEN

SET DESIRED CO2 CONCENTRATION. SET POINT OF 1000PPM RECOMMENDED

FOR MORE INFORMATION ON DCV SETUP SEE PAGE 32 OF APPENDIX

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C) 2-SPEED FAN ADDITION

IF A 2-SPEED FAN/VFD IS BEING USED:

RETURN TO "SETTINGS" MAIN MENU SCREEN

SCROLL "UP"/"DN" TO ARRIVE AT "2 SPEED FAN"

PRESS "OK"

PRESS "OK" AGAIN AND SELECT "UP"/"DN" FOLLOWED BY "OK"
TO TURN 2 SPEED FAN SETTINGS ON

I) LOW SPEED VENT MIN

SCROLL "DN" TO "LOW SP VENT MIN" SCREEN AND PRESS "OK" TO ENTER LOW SPEED VENT MINIMUM POSITION. THIS VALUE WILL BE GREATER THAN THE VENT MINIMUM POS, HOWEVER EQUAL THE SAME AIRFLOW RATE VALUE.

II) LOW SPEED DCV MIN (C02 SENSOR INSTALLED)

SCROLL "DN" TO "LOW SP DCV MIN POS". PRESS "OK" AND ENTER LOW SPEED DCV MINIMUM POSITION. THIS POSITION WILL BE GREATER THAN DCV MIN POS, HOWEVER EQUAL THE SAME MEASURED AIRFLOW RATE VALUE.

III) LOW EXHAUST FAN POSITION (POWER EXHAUST INSTALLED)

SCROLL "DN" TO "LOW EXH FAN POS". PRESS "OK" AND ENTER LOW EXHAUST FAN ON POSITION. THIS POSITION WILL BE GREATER THAN EXHAUST FAN ON POS, HOWEVER EQUAL THE SAME AIRFLOW RATE VALUE.

THESE VALUES SHOULD BE SET TO PROVIDE THE SAME AIRFLOW OF OUTSIDE AIR (OA) AND EXHAUST AS WHEN FAN IS OPERATING AT FULL SPEED. DUE TO LESS PRESSURE GENERATED BY THE FAN, THIS VALUE IS TYPICALLY A HIGHER PERCENTAGE OPEN VALUE.

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...STEP 9 CONTINUED

ZIP MODULE WILL RUN THROUGH THE FOLLOWING PROMPTS AFTER MINIMUM DAMPER POSITIONING:

SETUP IS NOW COMPLETE...
DAMPER WILL BEGIN CALIBRATION...
DAMPER SCALING COMPLETE...
UNIT WILL START IN 30 SECONDS...

SERVICE AND COMMISSIONING MUST BE PERFORMED AFTER INITIAL ECONOMIZER SET-UP IS COMPLETED. THIS ACCEPTANCE TEST IS MANDATED TO VALIDATE ECONOMIZER FUNCTIONALITY AND COMPONENT WARRANTY

*****IMPORTANT*****
UNIT INDOOR FAN MUST BE RUNNING DURING THIS TEST TO PREVENT COMPRESSOR DAMAGE! EITHER JUMP OUT FAN AT UNIT TERMINAL STRIP OR SET FAN TO "ON" VIA THERMOSTAT

PRESS DN TILL AT THIS SCREEN AND PRESS "OK"

PRESS DN AT MANUAL MODE TO GET TO THIS SCREEN

PRESS "OK" HERE THEN "OK" AGAIN TO START

FOLLOW PROMPTS TO COMPLETE TEST...YOU MUST CONFIRM AS PROMPTED BY PRESSING "OK" WHEN:

1) THE ECONOMIZER DAMPER FULLY OPENS
2) DAMPER STAYS OPEN AND 1ST STAGE COMPRESSOR STARTS AND RUNS IN INTEGRATED MODE
3) DAMPER FULLY CLOSES
4) DAMPER GOES TO MINIMUM

PRESS "OK"

PRESS "OK"

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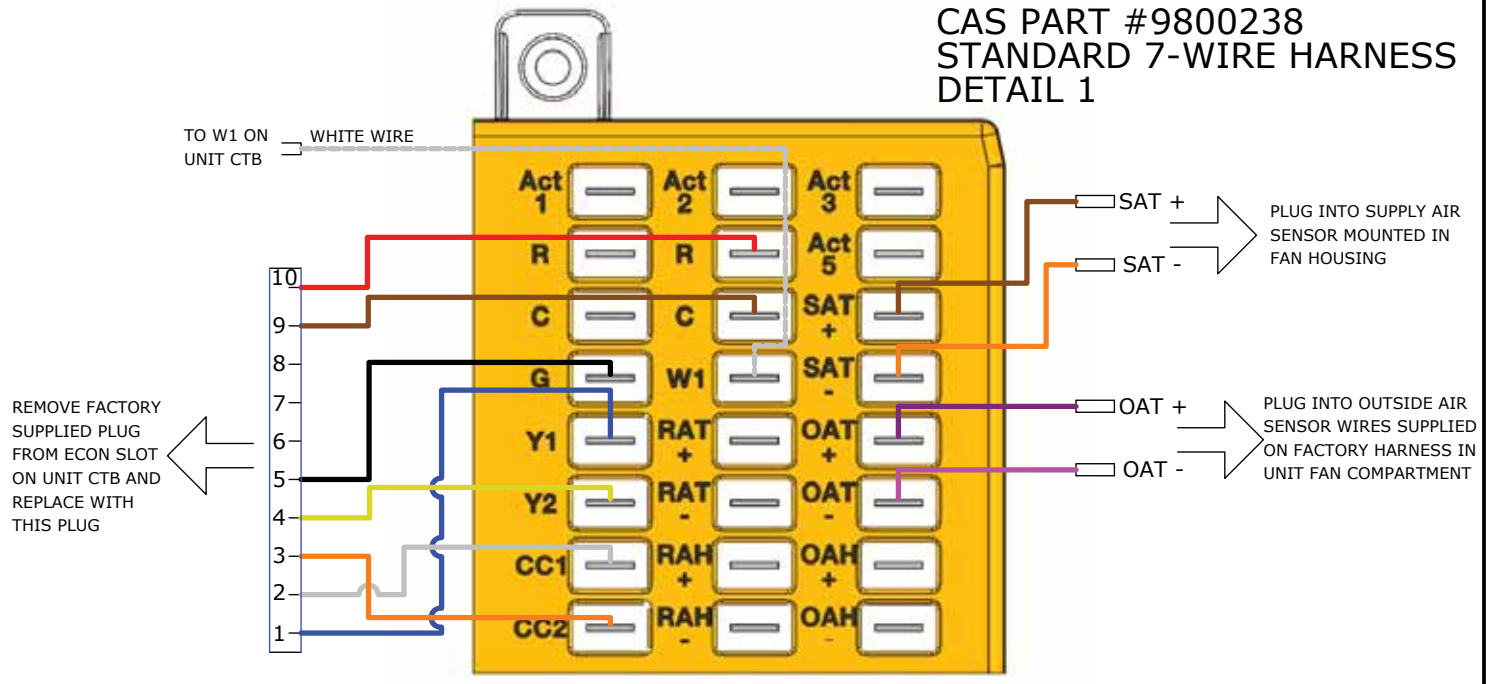
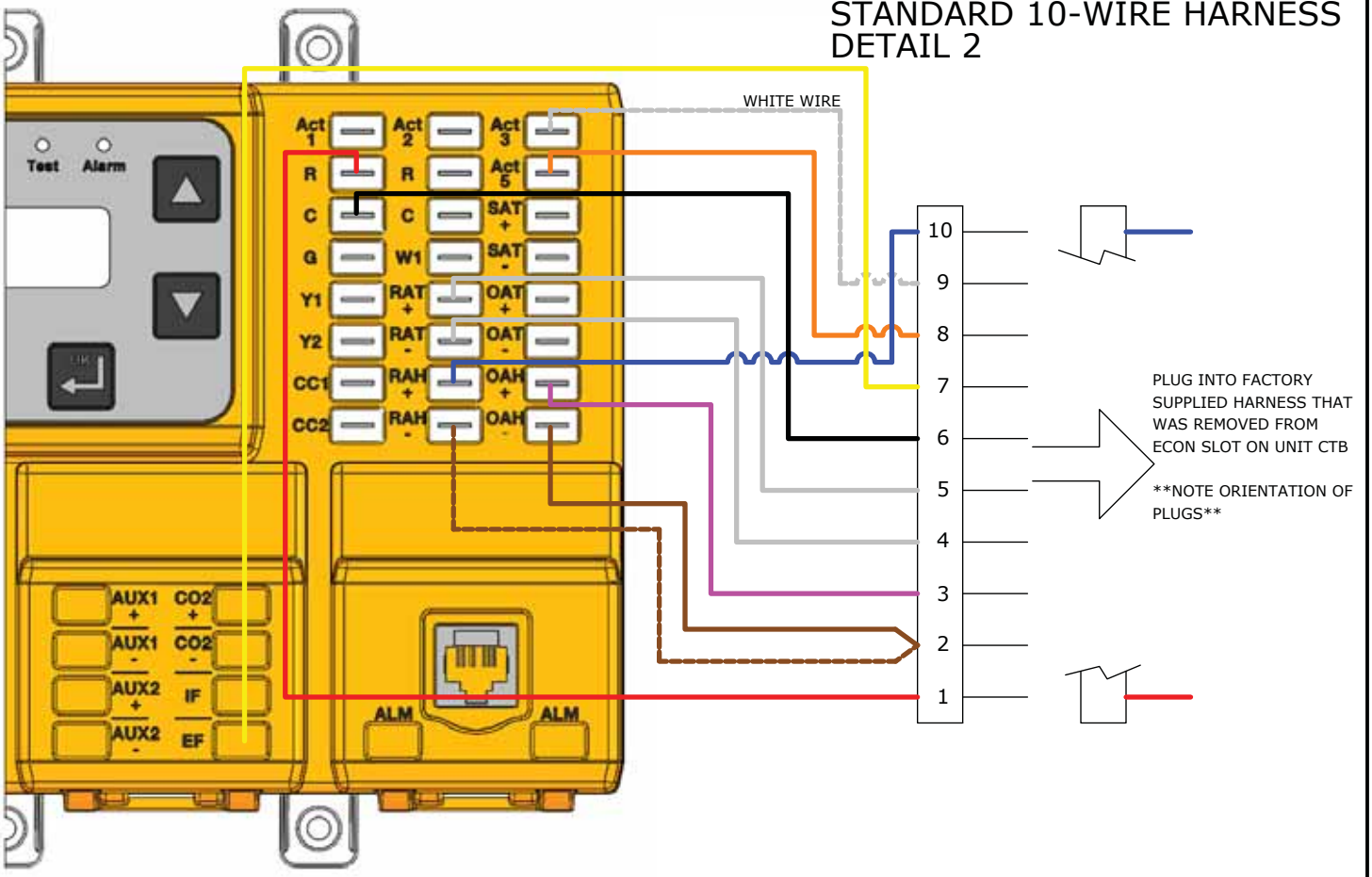
STANDARD OPERATION WIRING SCHEMATICS FOR PART 1022355, 1022356, OR 1022558

CAS PART #9800238 STANDARD 7-WIRE HARNESS DETAIL 1



CAS PART #9800238 STANDARD 10-WIRE HARNESS DETAIL 2



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OLD CARRIER UNIT (2008 OR BEFORE) ZIP WIRING INSTRUCTIONS

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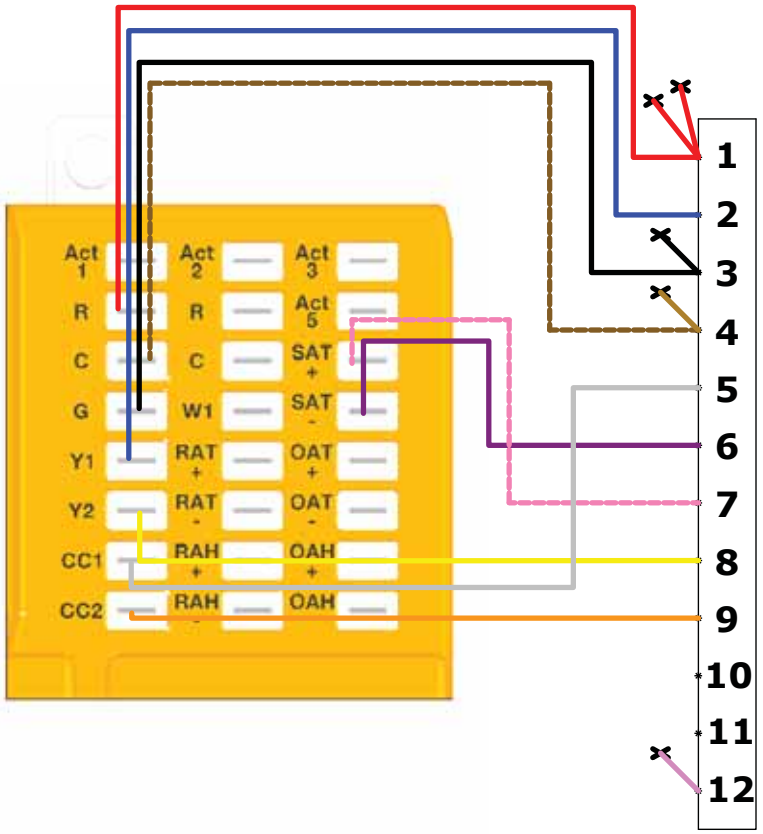
- **TWO 10-PIN HARNESSES PROVIDED WITH ZIP CONTROL WILL NOT BE USED IN THIS APPLICATION**
- **ZIP CONTROL MUST BE MOUNTED IN ECONOMIZER SECTION FOR THIS APPLICATION**
- **FOR FIELD RETROFIT AND REWIRING FOLLOW INSTRUCTIONS BELOW. IF CAS PART #9800296 (RETROFIT HARNESS) WAS ORDERED SEE PAGE 24 FOR WIRING DIAGRAM**

REMOVE ALL WIRES FROM THE BELIMO ZIP CONTROL.
LOCATE WIRING HARNESS INCLUDED WITH ECONOMIZER (12-PIN CONNECTOR).
WORK WITH ECONOMIZER HARNESS (NOT UNIT HARNESS!)

WHEN CUTTING WIRES DO NOT CUT FLUSH WITH PLUG. LEAVE 3-4" OF WIRE EXTENDING FROM PLUG

MODIFICATIONS TO STANDARD HARNESS

1. CUT AND CAP OFF TWO RED WIRES AND ATTACH THIRD TO EITHER "R" TERMINAL ON ZIP CONTROLLER
2. ATTACH BLUE WIRE TO "Y1"
3. CUT AND CAP OFF ONE BLACK WIRE AND ATTACH SECOND TO "G"
4. CUT AND CAP OFF BROWN WIRE AND ATTACH BROWN/WHITE WIRE TO EITHER "C" TERMINAL ON ZIP CONTROLLER
5. ATTACH WHITE WIRE TO "CC1"
6. ATTACH PURPLE WIRE TO "SAT-"
7. ATTACH PINK/WHITE WIRE TO "SAT+"
8. ATTACH YELLOW WIRE TO "Y2"
9. ATTACH ORANGE WIRE TO "CC2"
10. N/A
11. N/A
12. CUT AND CAP OFF PINK WIRE



12-PIN HARNESS

CONNECT 12-PIN ECONOMIZER HARNESS TO UNIT HARNESS HANGING TO THE LEFT OF THE UNITS FILTERS. (MAKE SURE RED WIRES LINE UP FOR ORIENTATION OF HARNESS)

WIRE ENTHALPY SENSOR AND ACTUATOR AS SHOWN ON PAGE 25

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OLD CARRIER UNIT (2008 OR BEFORE) ZIP WIRING INSTRUCTIONS

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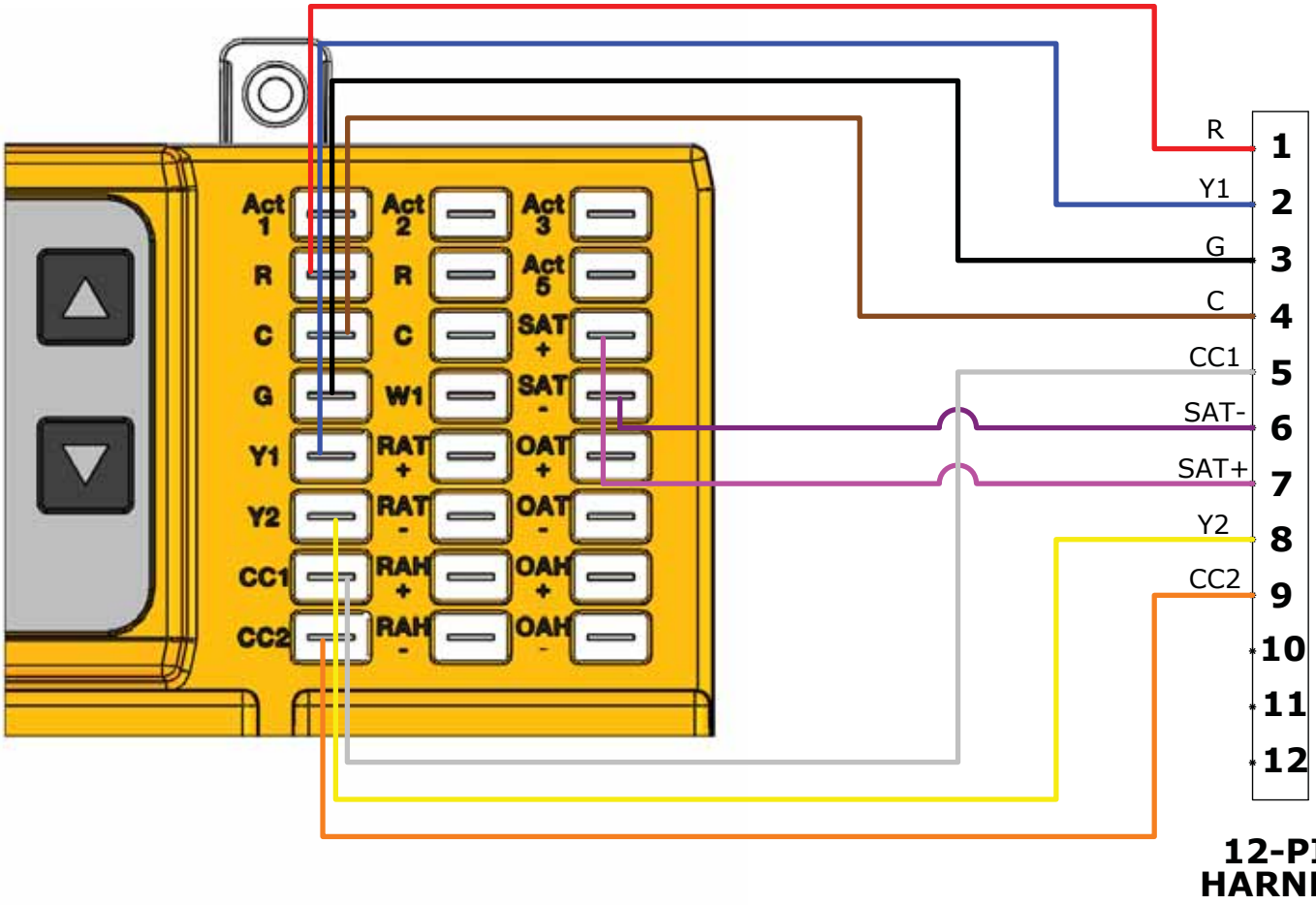
REMOVE ALL WIRES FROM THE BELIMO ZIP CONTROL.

REMOVE ALL WIRES FROM ACTUATOR AND ENTHALPY SENSOR.

THE (2) 10 PIN PLUGS, (1) 12 PIN PLUG, AND 60" LONG HARNESS ARE NOT REQUIRED AND WILL BE REPLACED AS INDICATED BELOW.

CAS PART NUMBER 9800296 (RETROFIT HARNESS)



12-PIN HARNESS

CONNECT 12-PIN ECONOMIZER HARNESS TO UNIT PL-6 HARNESS (SEE PG 5/10) HANGING TO THE LEFT OF THE UNITS FILTERS. (MAKE SURE RED WIRES LINE UP FOR ORIENTATION OF HARNESS)

WIRE ENTHALPY SENSOR AND ACTUATOR AS SHOWN ON PAGE 25

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OLD CARRIER UNIT (2008 OR BEFORE) ZIP WIRING INSTRUCTIONS

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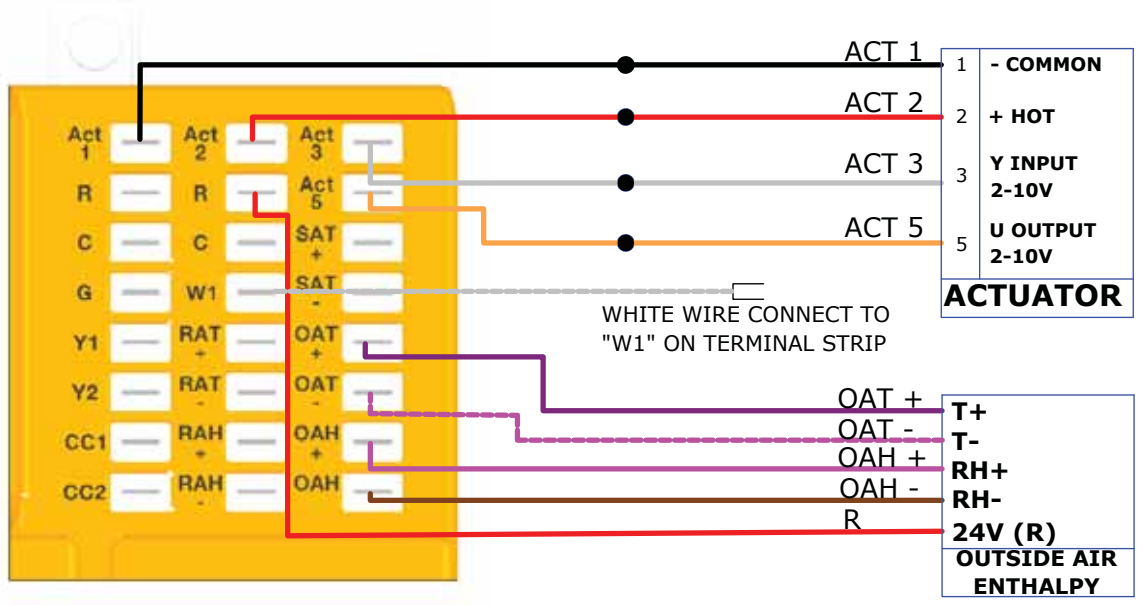
ACTUATOR AND ENTHALPY WIRING FOR ALL PRE-2008 UNITS

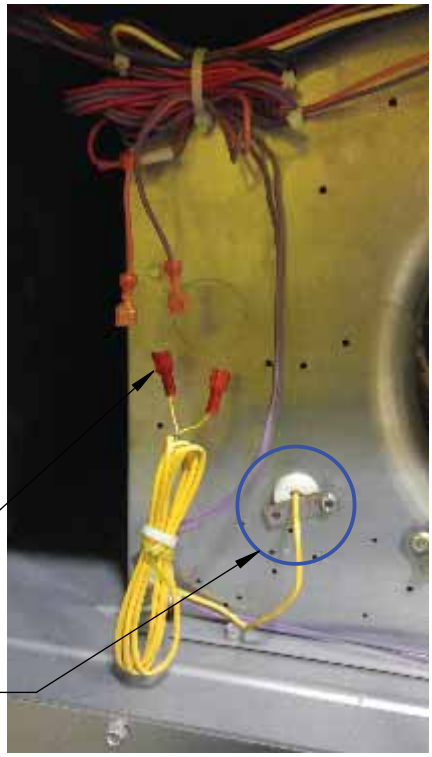


A.) MOUNT THE BELIMO ZIP CONTROLLER TO THE TOP SHELF OF THE ECONOMIZER. ENSURE THAT THE CONTROL AND THE WIRES ARE NOT INTERFERING WITH THE ECONOMIZER OPERATION.

B.) CONNECT WHITE WIRE FROM "W1" TERMINAL ON LOW VOLTAGE STRIP IN UNIT ELECTRICAL PANEL TO "W1" TERMINAL ON THE ZIP CONTROL

C.) DRILL HOLE IN FAN HOUSING FOR THE SUPPLY AIR SENSOR. MAKE SURE SENSOR DOES NOT HIT FAN WHEEL. (SEE PICTURE)

D.) CONNECT SUPPLY AIR SENSOR TO THE PINK AND PURPLE WIRES HANGING IN THE FAN SECTION WHERE THE OLD MIXED AIR SENSOR WAS CONNECTED (SILVER WIRE DOES NOT NEED TO BE GROUNDED). INSTALL SENSOR IN PREVIOUSLY DRILLED HOLE AND SECURE WITH TWO SCREWS



RETURN TO PAGE 18 FOR BELIMO ZIP CONTROLLER SETUP

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Sequence of Operation

States

Virgin State

The ZIP Economizer comes shipped from the factory in this state. "Setup Incomplete" will be displayed. No control will occur until setup is completed.

Automatic State – all of the following strategies and operational modes are available in this state.

A minimum of two pieces of information (in level 2 Settings menu) must be entered before the ZIP Economizer will go into Automatic State:

- The appropriate ZIP code must be entered.
- The minimum damper position setpoint (Vent Min Pos) percentage must be entered.

When in Automatic State, the G input terminal is used to monitor a remote occupancy contact, time clock and/or indoor fan signal. When the G terminal is energized, the ZIP Economizer will operate in Occupied (damper will move to the proper ventilation position). Otherwise, the ZIP Economizer will operate in Unoccupied.

Strategies

Compressor Protection and Energy Savings

DXLL (Supply Air Low Temperature Protection in Mechanical Cooling)

This strategy is activated automatically when in Mechanical Cooling Mode depending on supply air temperature. Timers, temperature dead bands and SAT Y2 Limit setting all interact with this strategy.

SAT < 45°F	All compressor stages disabled.
45 °F ≤ SAT < 47°F	Compressor stages may or may not be enabled based on whether or not SAT is rising or falling.
SAT ≥ 47°F and SAT Y2 Limit=Off	Both compressor stages enabled.
47°F ≤ SAT < 56.5°F and SAT Y2 Limit=On	1st stage compressor enabled. 2nd stage compressor disabled.
SAT ≥ 56.5°F	Both compressor stages enabled.

SAT Y2 Limit

This strategy inhibits the 2nd stage compressor from coming on prematurely based on SAT temperature and time.

- IF Y2 is energized

  AND Compressor 1 has been running for less than 4 minutes

  AND Supply Air Temp is less than or equal to its required setpoint + 1.5° (56.5°F)

  THEN Compressor 2 will not be allowed to come on

LCLO (Low Ambient Compressor Lockout)

This strategy inhibits compressor operation at low outdoor air temperatures.

- IF OAT falls below the low limit (50°F)

  AND not in Heat Pump Mode

  THEN Compressor 1 and Compressor 2 will be disabled.

- IF OAT rises 2°F above the low limit (52°F)

  OR in Heat Pump Mode

  THEN Compressor 1 and Compressor 2 will be enabled.

Minimum On and Minimum Off Time

This strategy prevents the compressors from "short-cycling".

- IF any Compressor is energized

  THEN run it at least 180 seconds EXCEPT when entering Brownout Mode when compressors will be shut off immediately.

- IF any Compressor is de-energized

  THEN keep it off for at least 180 seconds

Not Simultaneous ON/Not Simultaneous OFF

On RTUs with 2 compressors this strategy is used to prevent both compressors from coming on at the same instant to keep electrical demand down.

- Compressors 1, 2 are kept from switching on together by a 10 second time delay.
- If SAT Y2 Limit is set to "On" compressor 2 is delayed by 240 seconds to evaluate if the single compressor already operating can bring SAT less than or equal to setpoint +1.5 °F (56.5°F).
- Compressors 1, 2 are kept from switching off together by a 5 second time delay EXCEPT when entering Brownout when compressors will be shut off immediately.

Brownout Protection

Input power (24 VAC) is monitored.

- IF input voltage drops to 75%

  AND it stays below there for 30 seconds

  THEN Brownout will be enabled.

- IF input voltage rises to 85%

  AND it stays there for 300 seconds

  THEN Brownout will be disabled.

Under Brownout conditions the current operating mode will be maintained EXCEPT Mechanical Cooling and Integrated Cooling (where compressors are utilized).

Instead of Mechanical Cooling it will go to Ventilation, DCV or Unoccupied. Instead of Integrated Cooling it will go to Free Cooling.

This strategy prevents compressor operation during brownout conditions. Compressors will be turned off immediately (bypassing minimum on/off timers).

Random On Delay after Power Up

After a power blackout or any power restore, compressors will go through a random time delay before allowing them to operate. This random timer is between 30-180 seconds. This helps the electrical network to come back up without excessive demand from multiple RTUs and compressors coming back on after the blackout.

Freeze Protection

See Freeze Protection Mode of Operation below.

High Limit Changeover

(Four possibilities depending on installed sensors)

Note: Economizing is enabled based on one of the following and becomes active in Free Cooling and Integrated Cooling.

Single Dry Bulb Changeover

- If only an OAT sensor is connected, it will be analyzed against the reference Outdoor Air changeover temperature value (based on entered ZIP code).
  - IF OAT is 2°F below the reference value

    THEN economizing will be enabled.
  - IF OAT is above the reference value

    THEN economizing will be disabled.

Differential Dry Bulb Changeover

- Must have OAT and RAT sensors connected. OAT and RAT will be analyzed against each other and the OAT will be analyzed against the reference differential temperature high limit (based on entered ZIP code).
  - IF OAT is 2-8°F below the RAT (Value Climate Zone Dependent)

    AND OAT is 2°F below the reference differential temp high limit DTHL

    THEN economizing will be enabled.
  - IF OAT is greater than or equal to 0-6°F below the RAT (Value Climate Zone Dependent)

    OR the OAT is greater than the reference differential temp high limit DTHL

    THEN economizing will be disabled.

Single Enthalpy Changeover

- Must have OAH (RH) and OAT sensors connected. Outdoor air enthalpy (Outdoor Enth) will be calculated. They will be analyzed against the reference values as follows:
  - IF Outdoor Enth is 2 btu/lb less than the reference enthalpy high limit (default is 28 btu/lb – 2 btu/lb = 26 btu/lb)

    AND OAT is 2°F below the reference temperature high limit ETHL (based on entered ZIP code)

    THEN economizing will be enabled.
  - IF Outdoor Enth is greater than reference enthalpy high limit (default is 28 btu/lb)

    OR OAT is greater than the reference temperature high limit ETHL (based on entered ZIP code)

    THEN economizing will be disabled.

Differential Enthalpy Changeover

- Must have OAH, OAT, RAH and RAT sensors connected. Outdoor Air Enthalpy and Return Air Enthalpy will be calculated.
  - IF Outdoor Enth is 2.5 btu/lb less than Return Air Enth

    AND Outdoor Enth is 2 btu/lb less than the reference differential enthalpy high limit DEHL (30 btu/lb)

    AND OAT is 2°F below the reference differential temperature high limit DTHL (based on entered ZIP code)

    THEN economizing will be enabled.
  - IF Outdoor Air Enthalpy is 1 btu/lb less than Return Air Enthalpy

    OR Outdoor Air Enthalpy is greater than reference enthalpy high limit DEHL (30 btu/lb)

    OR OAT is greater than reference differential temperature high limit (based on entered ZIP code)

    THEN economizing will be disabled.

Operational Modes

Free Cooling

- Outdoor air ambient conditions are analyzed by one of the 4 changeover strategies above (Single or Differential Dry Bulb; Single or Differential Enthalpy) and has been deemed suitable for “free” cooling.
- Y1 is energized indicating a call for stage 1 cooling.
- Y2 is de-energized.
- W1 is de-energized.
- G input could be energized or de-energized (occupied or unoccupied state).
- Compressor 1 is off[2].
- Compressor 2 is off[2].
- Fan Speed could be energized (low speed, when OAT is below 50°F) or de-energized (high speed) for indoor fan[1].
- Exhaust Fan could be running or not based on % damper open position[1].
- Damper Pos output is modulated between the respective current minimum damper position setpoint and 100% open to attempt to maintain SAT setpoint (55°F). When OAT is at 55°F the damper will be fully open to outside air. As outdoor air continues to rise above 55°F, SAT will rise with it.

Integrated Cooling

- Outdoor air ambient conditions are analyzed by one of the four changeover strategies above (Single or Differential Dry Bulb; Single or Differential Enthalpy) and has been deemed suitable for “free” cooling.
- Y1 is energized indicating a call for stage 1 cooling.
- Y2 is energized indicating a call for stage 2 cooling.
- W1 is de-energized.
- G input could be energized or de-energized (occupied or unoccupied state).
- Compressor 1 is on[2].
- Compressor 2 is off[2].
- Fan Speed is de-energized (indoor fan is operating on high speed)[1].
- Exhaust Fan is on[1].
- Damper Pos output is fixed at 100% (fully open to outdoor air).

Note: Outdoor Damper must be fully open for 60 seconds before mechanical cooling will be enabled.

Mechanical Cooling

- Outdoor air ambient conditions are analyzed by one of the 4 changeover strategies above (Single or Differential Dry Bulb; Single or Differential Enthalpy) and has been deemed NOT suitable for "free" cooling.
- Y1 is energized indicating a call for stage 1 cooling.
- Y2 may or may not be energized depending on thermostat call for stage 2 cooling.
- W1 is de-energized.
- G input could be energized or de-energized (occupied or unoccupied state).
- Compressor 1 is on[2].
- Compressor 2 may or may not be on based on thermostat call for stage 2 cooling[2].
- Fan Speed may or may not be energized (indoor fan is operating on high or low speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output is at Vent Min Pos if indoor fan is on high speed. Output is at Low SP Vent Min if indoor fan is on low speed.

DCV[1]

- Outdoor air may or may not be suitable "for free cooling"; however still utilizing fresh air for cooling
- Y1 may or may not be energized depending on thermostat call for stage 1 cooling.
- Y2 may or may not be energized depending on thermostat call for stage 2 cooling.
- W1 may or may not be energized depending on thermostat call for heating.
- G input is energized indicating occupied state.
- Compressor 1 may or may not be on depending on thermostat call for stage 1 cooling[2].
- Compressor 2 may or may not be on depending on thermostat call for stage 2 cooling[2].
- Fan Speed may or may not be energized (indoor fan is operating on high or low speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos – Minimum outdoor damper position will be modulated based on CO2 levels. If indoor fan is on high speed and CO2 levels are high, minimum damper position will be at Vent Min Pos; if CO2 levels are low, minimum damper position will be at DCV Min Pos. As CO2 levels fluctuate, minimum damper position will modulate between these 2 minimum settings. If indoor fan is on low speed, the two minimum damper settings reference will change to Low SP Vent Min and Low SP DCV Min respectively.

Possible Co-existing Modes of Operation[3]:
Mechanical Cooling, Heating.

Ventilation

- Outdoor air may or may not be suitable "for free cooling".
- Y1 is de-energized.
- Y2 is de-energized.
- W1 is de-energized.
- G input is energized indicating occupied state of operation.
- Compressor 1 is off[2].
- Compressor 2 is off[2].
- Fan Speed will be energized (indoor fan is operating on low speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output is at Low SP Vent Min[1].

Possible Co-existing Modes of Operation[3]: DCV, Heating.

Heating

- Outdoor air may or may not be suitable "for free cooling".
- Y1 is off (unless RTU is a heat pump).
- Y2 is off (unless RTU is a heat pump).
- W1 is energized.
- G input may or may not be energized (occupied or unoccupied state).
- Compressor 1 is de-energized (unless Heat Pump Op in Settings menu is turned on)[2].
- Compressor 2 is de-energized (unless Heat Pump Op in Settings menu is turned on)[2].
- Fan Speed will be de-energized (indoor fan is operating on high speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output is at Vent Min Pos or damper in DCV position. See DCV mode[1].

Unoccupied

- Outdoor air may or may not be suitable "for free cooling".
- Y1 may or may not be energized depending on thermostat call for stage 1 cooling.
- Y2 may or may not be energized depending on thermostat call for stage 2 cooling.
- W1 may or may not be energized depending on thermostat call for stage 1 heating.
- G input is de-energized (unoccupied state).
- Compressor 1 may or may not be on depending on thermostat call for stage 1 cooling[2].
- Compressor 2 may or may not be on depending on thermostat call for stage 2 cooling[2].
- Fan Speed may or may not be energized (indoor fan is operating on high or low speed or not at all). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output is closed to Outdoor Air.

Possible Co-existing Modes of Operation[3]: Free Cooling, Integrated Cooling, Mechanical Cooling, Heating, or Purge.

Freeze Protection

- Outdoor air is suitable "for free cooling".
- Y1 may or may not be energized depending on thermostat call for stage 1 cooling.
- Y2 may or may not be energized depending on thermostat call for stage 2 cooling.
- W1 may or may not be energized depending on thermostat call for stage 1 heating.
- G input is energized indicating occupied state of operation.
- Compressor 1 is de-energized[2].
- Compressor 2 is de-energized[2].
- Fan Speed may or may not be energized (indoor fan is operating on high or low speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output is modulated from minimum to closed to maintain discharge air setpoint.

Possible Modes of Operation[3]: Heating , Free Cooling and Ventilation.

Energy Module Option Functions[1]

Purge[1]

(Purge Control in Settings Menu must be turned on to enable and 24 VAC applied to AUX1)

- Outdoor air may or may not be suitable "for free cooling".
- Y1 may or may not be energized depending on thermostat call for stage 1 cooling.
- Y2 may or may not be energized depending on thermostat call for stage 2 cooling.
- W1 may or may not be energized depending on thermostat call for stage 1 heating.
- G input may or may not be energized (occupied or unoccupied state).
- Compressor 1 may or may not be energized depending on thermostat call for stage 1 cooling[2].
- Compressor 2 may or may not be energized depending on thermostat call for stage 2 cooling[2].
- Fan Speed may or may not be energized (indoor fan is operating on high or low speed). See Indoor 2 Speed Fan sequence under Energy Module Option Functions[1].
- Exhaust Fan is off[1].
- Damper Pos output goes to value set in Purge Dmp Set.

Possible Co-existing Modes of Operation[3]: Mechanical Cooling, Heating.

Damper Override

- IF Remote Dmp Cntrl is turned on (enabled) in Settings menu

  AND G powered

  THEN Damper Pos will go to the value of the signal input (0-10 VDC) at AUX2.

Note: If outdoor air is suitable for "free cooling" and damper is override to closed position, there will be no cooling.

Indoor 2 Speed Fan

Thermostat Signal	Economizing Available	OAT	Energy Module Fan Relay	Fan Speed	ZIP Econ / RTU Mode
G, Y1, not Y2	No	N/A	Closed	Low	1 Stage DX
G, Y1, not Y2	Yes	>50ºF	Open	High	Economizing
G, Y1, not Y2	Yes	<50ºF	Closed	Low	Economizing
G, Y1, Y2	No	N/A	Open	High	2 Stage DX
G, Y1, Y2	Yes	N/A	Open	High	Integrated Economizer
G, W1	No	N/A	Open	High	Heating
G, W1	Yes	N/A	Open	High	Heating
G, not Y1, not W1	No	N/A	Closed	Low	Ventilation
G, not Y1, not W1	Yes	N/A	Closed	Low	Ventilation
not G, not Y1, not W1	No	N/A	Open	Off	Unoccupied[3]
not G, not Y1, not W1	Yes	N/A	Open	Off	Unoccupied

When indoor fan is on high speed, the high speed fan minimum damper position setpoints Vent Min Pos and DCV Min Pos will be referenced as the minimums for damper control.

When indoor fan is on low speed, the low speed fan minimum damper position setpoints Low Sp Vent Min and Low Sp DCV Min will be referenced as the minimums for damper control.

Note: Indoor fan speed will operate according to the above table whether in Occupied or Unoccupied.

Note: If RTU equipped with fan speed switching relays from the factory, an Energy Module is not required to set up 2 Speed Fan. See 2 Speed Fan Op in settings menu for more information.

Exhaust Fan

(Operates only in Free Cooling and Integrated Cooling.)

Note: In theory, if Exh Fan On Pos/Low Exh Fan Pos for damper % is set very low, then Exhaust Fan could also run in other modes (Ventilation, Mechanical, DCV).

- Control of the exhaust fan is damper position dependent. Damper setpoint for enable/disable of the exhaust fan is Indoor Fan Speed dependent (High Speed Damper Setpoint = Exh Fan On Pos; Low Speed Damper Setpoint = Low Exh Fan Pos).
  - IF Damper Pos is 10% greater than Exh Fan On Pos/ Low Exh Fan Pos

    OR Damper Pos is 100% open

    THEN Exhaust Fan will be energized.
  - IF Damper Pos is 10% less than Exh Fan On Pos/ Low Exh Fan Pos

    OR Damper Pos is less than 5% open

    THEN Exhaust Fan will be de-energized.

Example: If Exh Fan On Pos is set at 45%, when damper opens to 55%, exhaust fan will turn on. When damper closes to 35%, exhaust fan will turn off.

Service and Comissioning

Manual Mode

This menu is available after Setup has been completed. This is selected in Level 2 menu Service and Commissioning. This supports the commissioning phase allowing all connected RTU components (except for the room thermostat) to be tested by manually commanding them through the keypad interface. **To prevent RTU safety lockout and possible equipment damage, ensure the RTU indoor fan is running!** Return to Automatic will occur automatically between 1-8 hours (adjustable) unless Return to Automatic is selected.

Note: Damper will move at high speed.

Note: Compressors, exhaust fan[1] and indoor 2 speed fan[1] minimum on or minimum off time does NOT apply in this test state. They will be turned on and off immediately based on the entered command. Also, exhaust fan[1] will not be turned on automatically based on damper position in this mode, but it can be manually commanded.

Damper Scaling

If there was a mechanical failure or adjustment that prevented proper damper scaling from virgin to automatic, it can be rescaled. “Damper scaling starts in 10secs” and will countdown to 0. A message will scroll saying “Damper scaling for better operation if obstruction is present rescale damper in commissioning menu”. (For detailed instructions on this – please see the section “Service and Commissioning” below. This will open damper to 100% (re-scale control signal if needed). (Note: failure to identify obstructions or improper setup of damper assembly may result in an improper scaling and operation of the damper.)

Once scaling is complete, a message will appear saying “Damper scaling successful”. The ZIP will then show “maximum at 80° = 100%.” That message will show maximum rotation of the damper. This process ensures the damper is always operating and displayed from 0-100%.

Acceptance Test (Four possible options)

This menu is available after Setup has been completed. This complies with the California Title 24 Mechanical Testing and has four tests. **To prevent RTU safety lockout and possible equipment damage, ensure the RTU indoor fan is running!**

Economizer Test (NA7.5.4)

- This is an automatic functional and verification test that moves the damper 100% open/100% closed/and minimum position and switches on CC1 and EF[1] (if available). It leads one through the test step by step in accordance with California Title 24 test form.

  Note: 1 minute minimum on time; 1 minute minimum off time for compressor applies in this test to prevent damage from short cycling. Exhaust fan[1] does turn on based on damper position in this test.

Note: Damper will move at high speed.

Ventilation Test (NA7.5.1.2)

- This is a manual test that allows adjustment to the damper minimum position (Vent Min Pos) in the Settings menu for verification of ventilation rates.

  Note: Damper minimum position must be commanded to get damper to go to minimum position in this mode!

Example: Prior to going into this test, let’s say Vent Min Pos is set for 20%. After going into this test you still must go into Settings/Vent Min Pos and change the value by at least 1%, then you can change back to 20%. If you don’t create a change of value for Vent Min Pos the damper will not move off fully closed position in this test. The new Vent Min Pos setting you enter will be stored and used when you return to automatic.

RTU Test (NA7.5.2)

- This is a manual test used to test the following signals from the thermostat to the RTU:
  - G powered (Occupied) – damper is at minimum position (Vent Min Pos); otherwise the damper goes closed to outdoor air (Unoccupied).
  - Y1 powered – CC1 is energized; otherwise CC1 is de-energized.
  - Y2 powered – CC2 is energized; otherwise CC2 is de-energized.

    Note: 1 minute minimum on time; 1 minute minimum off time applies in this test mode to prevent damage from short cycling compressors.
  - W1 powered – Heating is enabled.

DCV[1] Test (NA7.5.5)[6]

- This is a manual test used for the following:
  - CO2 input will be used to modulate minimum damper position between DCV Min Pos and Vent Min Pos as CO2 levels vary below and above (respectively) the CO2 Setpoint.

All of the above tests can be aborted by selecting Return to Automatic in the Level 2 menu.

End of Sequences

[1] Only available with Energy Module Option. If no Energy Module exists associated menu options will not be displayed.

[2] Subject to Compressor Protection Strategies as noted earlier.

[3] The following modes listed below take display priority on the ZIP MMI when co-existing with this mode.

[4] This could possibly happen if W1 and Y1 are energized together calling for heating and cooling at the same time (provided that RTU is not configured as a Heat Pump.) An alarm will be generated.

[5] Minimum on/off times must be observed before compressor will be commanded.

[6] “G” must be energized to run test.

Quick Setup

Required "Settings" Parameters for All Configurations

Note: you may enter parameters in any order - eg: Vent min Pos before ZIP Code - If the RTU is a heat pump or uses a 2 speed indoor fan, these paramaters should be enabled first, otherwise the logic may go to Setup Complete prematurely.

1. ZIP Code US or Canada (sets the free cooling changeover high limit and temperature units F/C)
   a. When the Zip Code submenu is displayed enter "OK" to begin "US" Zip Code parameterization. If "Canada" Postal Code is desired press the up/down arrow to access.
      i. Press OK to access digit 1 (flashing) then use the up/down arrow to parameterize; enter OK when complete. Repeat until all digits are complete. If a mistake is made press "esc" and repeat from beginning

      ii. When all Zip Code or Postal Code digits are entered press "esc" to move up a level then press the up/down arrow to access next settings parameter.
2. Vent Min Pos (Outdoor Air Damper Ventilation Minimum Position)
   a. When the "Vent Min Pos" submenu is displayed press "OK" to parameterize (flashing).

   b. Use the up/down arrow to parameterize, press "OK" when complete. The actuator will immediately drive the damper to the minimum position.
3. Additional Parameters may require setting. The ZIP Economizer will auto-detect added Devices such as a CO2 sensor etc. When the ZIP Economizer detects a new device, it will prompt the user in the Status level; navigate to Settings and parameterize blank fields. If the devices are connected upon first start up their settings will require parameterization then.
4. When all parameters have been set, the ZIP Economizer will show "Setup Complete" if there are still parameters to set, there will be no action. You can verify by pushing esc until status level is reached and it will display "Setup Incomplete". If this is the case, re-enter settings menu and use up down arrows to find the parameter with blank fields and parameterize as described above.

Setup Complete - Initializing Automatic Mode

1. When all entries have been completed, the ZIP Economizer will switch to Status display and show "Setup Complete", and will immediately show a "Damper scaling starts in 10secs" and will countdown to 0 (**be aware, at 0 the damper will start to move at high speed**) . A message will scroll saying "Damper scaling for better operation if obstruction is present rescale damper in commissioning menu". (For detailed instructions on this – please see the section "Service and Commissioning" below. This will open damper to 100% (re-scale control signal if needed). (Note: failure to identify obstructions or improper setup of damper assembly may result in an improper scaling and operation of the damper.)

   Once scaling is complete, a message will appear saying "Damper scaling successful". The ZIP will then show "maximum at 80° = 100%" That message will show maximum rotation of the damper. This process ensures the damper is always operating and displayed from 0-100%.
2. Once the message has appeared, the actuator immediately closes the damper and a countdown begins, until the unit starts to operate in Automatic Mode **(be aware, when countdown complete, the RTU will respond to thermostat calls which may enable mechanical cooling).**

Service and Commissioning (Acceptance Test & Manual Mode)

The ZIP Economizer has built in commissioning processes found in Acceptance Test.

1. **Economizer Test.** Use "Economizer Test" to verify RTU Integrated Economizer operation. Navigate to the "Service and Commissioning" menu, press "OK"; press the down arrow to access "Acceptance Test". Press OK again when "Economizer Test" appears. Press "OK" again to confirm running test. Follow prompts during test. This test will open damper to 100%, enable power exhaust fan (if connected), enable 1st stage of Mechanical Cooling, reverse this process and then drive to Vent Min Position. When used with a Belimo actuator, the actuator will speed up to reduce test time.
2. **Manual Mode** is used to override outputs after entering a "Timeout" duration.
3. **Damper Scaling.** The test will re-scale the control signal range to maximum resolution (0-100%) over the calibrated (reduced) angle. When using a Belimo actuator, the actuator will speed up to reduce test time.

Note: Failure to identify obstructions or improper setup of damper assembly may result in an improper scaling and operation of the damper.)

Note: Additional testing can be found on page 36 of this document.

Demand Control Ventilation Setup

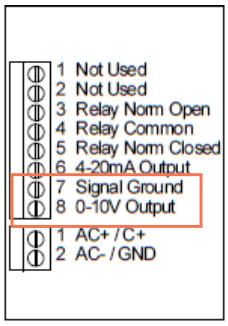
Before Getting Started

ECON-ZIP-EM and CO_2 sensor can be added during or after initial set up.

1. A CO_2 sensor is needed with the following characteristics:
   a. Output that is 0-10 VDC
   b. Range of 0-2000ppm
2. Attach the Energy Module ECON-ZIP-EM to the ZIP Economizer ECON-ZIP-BASE.

Wiring CO_2 Sensor to ZIP Economizer

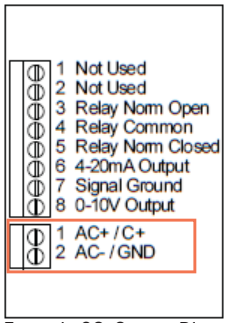
1. Wire CO_2 sensor 0-10 VDC output to ECON-ZIP-EM CO_2 sensor input.



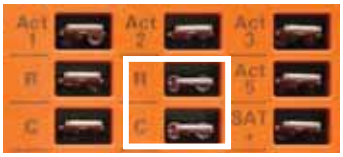
Example CO_2 Sensor Diagram

2. Wire CO_2 sensor power.

   Note: If RTU transformer VA is sufficient R/C terminals may be used on ZIP Economizer.



Example CO_2 Sensor Diagram



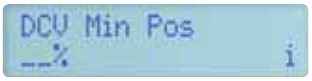
3. Setting PPM range (only required if sensor is configurable for other ranges).

Type of Output	Ventilation Rate (cfm/Person)	Analog Output	CO_2 Control Range (ppm)
Proportional	Any	0-10V	0-2000

4. Power RTU and enter Settings Menu.

   Note: When the CO_2 sensor is powered and 0-10 VDC is available at CO_2+ and CO_2, the ZIP Economizer will recognize the CO_2 presence and the prompt to set up CO_2 settings.

5. Setting DCV settings.
   a. With single speed indoor fan, only 2 DCV settings are required.
      i. DCV Min Pos – This is the minimum occupied or zero occupancy ventilation rate expressed in damper percent open (Title 24 2013 section 120.1(b)2; ASHRAE 62.1 Section 6.2.7).



      ii. CO_2 PPM Set Pnt – This is the CO_2 concentration that is desired in the space (Title 24 2013 section 120.1(c)4. prescribed as 600ppm plus outdoor air CO_2 concentration assumed to be 400ppm = a set point of 1000ppm).

Operation

The ZIP Economizer logic will control the outside air damper position based on space CO_2 dilution needs. If the CO_2 value is low, the damper shall remain at DCV Min Pos when not in free cooling. When the CO_2 concentration rises above the CO_2 PPM Set Pnt (as the space becomes more populated), then the damper will start to modulate towards Vent Min Pos to maintain level at CO_2 PPM set Pnt. When the CO_2 concentration drops in the space (the space population decreases) the damper will start to modulate back towards DCV Min Pos.

***WARNING** Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.