Economizer Controls Package I/O/M manual

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Package Description

The economizer replacement controls package is designed to clean your air and save on utility costs. Packages include ion air cleaners for 400 CFM/Ton nominal Roof Top Units (RTU) & standard loading, VOC sensor, CO_2 sensor, 2 temperature probes and an ion mounting plate. If your current system has drastically different CFM/Ton, contact the factory for more information on adjustments that are needed. These economizer controllers are compatible with RTU Open and Carrier Comfort Network.

ETL LISTED US INTERTEK CM

UL 867
CSA C22.2
File# 101141865COL-003

CE

iAIRE *For information on energy and cost savings for your business, visit:* www.myultrapure.com

Part Number

EC - 1 - 2 3 4 5 - 6

type

EC - ECONOMIZER

unit/ton (1)

26	6075
712	100
1525	125
3050	150

Controls Only

CHAS12
CHAS34
CHAS5
CHAS69

Carrier

A-BOX
B-BOX
C-BOX
D-BOX
E-BOX
F-BOX

Lennox

FND35	PREC810
PACK13	VOY12
PREC35	VOY12HE
PREC48	VOY1525HE
PREC610	

Trane

AFF	SCL34
LXS	SCLHE12
LXL	SCLHE34
SCS12	PRED
SCS34	PREDS
SCSHE12	SL
SCSHE34	SLL
SCL12	SLU

York

configuration (2)

0 - NO ECON
C - CONVERTIBLE
H - HORIZONTAL
V - VERTICAL

actuator (3)

0 - NO ACTUATOR
A - 20 IN-LB
B - 62 IN-LB
C - 160 IN-LB

controls (4)

0 - ECON ONLY
A - IAQ
B - IAQ (NO IONIZATION)
D - DCV

power exhaust (5)

0 - NO POWER EXHAUST
A - 208/230V 1Φ FIXED PE
B - 208/230V 3Φ FIXED PE
C - 460V 3Φ FIXED PE

options (6)

0 - NONE
B - HUMIDITY
C - BACNET
D - BLDG PRESSURE*
R - RTU OPEN
U - ULTRA LOW LEAK

Note: By adding option "D" any powered exhaust will be modulating.

iAIRE, LLC

iAIRE Economizer Controller

Package Matrix

Part #		EC-26-*-*	EC-712-*-*	EC-1525-*-*	EC-3050-*-*	EC-6075-*-*	EC-100-*-*	EC-125-*-*	EC-150-*-*
					Quantities				
Ion Generator mod. # ION-0A*00		1	2	4	8	12	16	20	24
Ion Generator Mounting Kit mod. # UNV-0016-Kit		1	2	4	8	12	16	20	24
VOC Sensor mod. # SEN-0071		1	1	1	1	1	1	1	1
Transformer mod. # TRN-0005 Kit		0	0	1	1	2	2	2	2
Economizer Controller mod. # CNT-0088		1	1	1	1	1	1	1	1
CO2 Sensor mod. # SEN-0002		1	1	1	1	1	1	1	1
Temperature Probe mod. # SEN-0012		2	2	2	2	2	2	2	2
Electrical Data	24v	0.27A	0.44A	N/A	N/A	N/A	N/A	N/A	N/A
	230v	N/A	N/A	0.08A	0.15A	0.22A	0.29A	0.36A	0.43A
	460v	N/A	N/A	0.04A	0.08A	0.11A	0.14A	0.18A	0.21A
Total Weight		1.07 lbs	1.72 lbs	5.52 lbs	8.12 lbs	10.72 lbs	15.82 lbs	18.42 lbs	21.02 lbs

Package Add-Ons

Humidity Sensor mod. # SEN-0001	If you would like to add enthalpy sensing to your system, include a humidity sensor.	
Actuators mod. # MTR-000*	Allows for feedback to be given. Can replace current actuators without a feedback system. MTR-0002 - 20 in-lbs; MTR-0003 - 60 in-lbs; MTR-0004 - 160 in-lbs	
BACnet Translator mod. # PRG-BACNET-ECON-5.** KIT	For reliable protocol translation, add our BACNet Translator to your system.	
BP Sensor mod. # SEN-0065	Allows for low-pressure measurement for building energy management and comfort control.	

Tools/Parts (provided by contractor)

- Wire cutters / strippers
- Screwdriver (small flathead and philips)
- Needle nose pliers
- Drill with 5/16 nut driver bit, step bit and 1/2" drill bit for temperature probe holes.
- Wire (thermostat wire) for VOC, CO2, ion generator, optional humidity, optional transformer, optional BACnet translator, optional actuator and/or mod power exhaust.

Hardware Included with controls package
(not shown on pg. 3). Reference pg. 3 for major components.

- Wire connectors (6)
- Screws (40 self tapping)
- Wire ties (5)

Economizer Controls Installation
Supply Air Temperature Sensor

⚠ **IMPORTANT** *Before beginning installation, test all Roof Top Unit (RTU) functionality to ensure it is working properly. Once complete, shut off all power to the RTU and follow lock-out tag-out procedures, then continue with the installation below.*

Start by removing the blower access panel to gain access for the installation of the supply air temperature sensor (SAT) and ion generator(s).

The SAT should be mounted in the blower (either by inserting into an existing hole, or by using a drill bit to create an opening). See **figures [1.1]** and **[1.2]** below.
(For SAT instructions, refer to SEN-0012 install documents in reference documentation (page 41))

The temperature sensor should clear the blower wheel. Make sure to tie wires away from any moving parts or areas that may cause wires to be sucked into the blower.

figure [1.1]
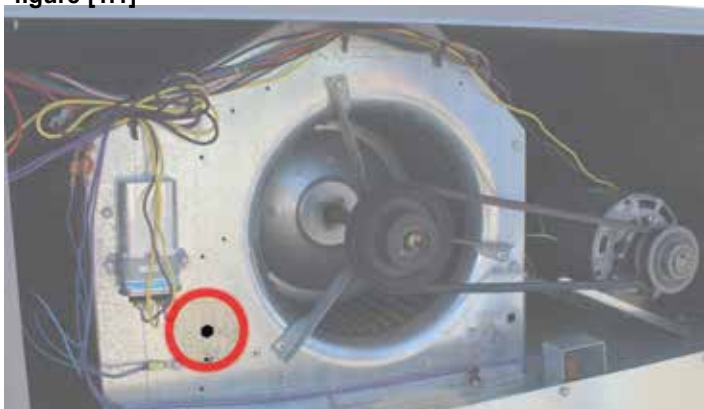
figure [1.2]
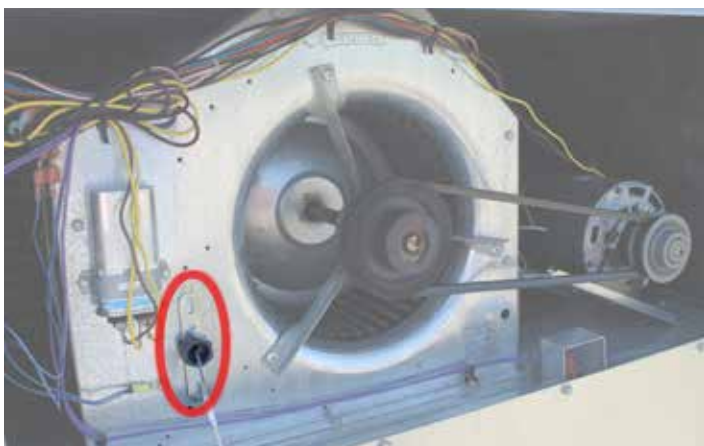
Ion Generator(s)

Next, mount your ion generator(s) perpendicular to the air stream between the carbon fiber needles. Some ion generator(s) should be installed by the inlet of the supply fan on the opposite side of the drive shaft and belt. See figure [1.3] below. This may require the removal of the top panel on the RTU. If multiple blowers exist, evenly distribute the number of ion generators between them.

figure [1.3]
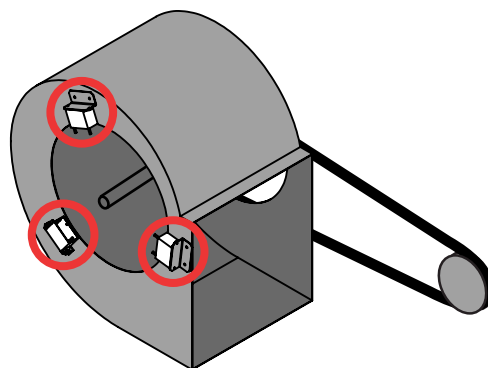
If using multiple ion generators, tie the wires of each generator together after mounting (if using the mounting plate, mount the generators to the plate and tie the wires of each generator together before mounting each plate). Be sure to keep all wires away from the generator tips, moving objects and areas that may cause wires to be sucked into the blower.

*(For additional instructions, refer to ION-0A*0 install and data sheet documentation (page 42)).*

*(When wiring to the **iAIRE** economizer controller, the wires will land on the terminal in the spot labeled 24V)*

After mounting the SAT and the ion generator(s), run the wiring over to the controller so the wires can land on the controller terminal strip. This may require the removal of the top panel on the RTU. See **figure [1.4]** below.

figure [1.4]

VOC and CO2 Sensors

Wire and mount your VOC and CO2 sensors in the building occupied space at the same level as the thermostat. *(Refer to installation documentation for VOC (part # - SEN-0071) on page 44 and CO2 (part # - SEN-0002) on page 43)*

"Alternatively, if the air in the duct needs to be monitored, iAire sells dedicated sensors suitable for duct mounting."

(When wiring to the iAIRE economizer controller, the wires will land on the terminal in the spots labeled VOC and CO2)

Outside Air Temperature Sensor

Next, install the Outside Air Temperature sensor (OAT) in the top of the economizer damper. The temperature probe should be mounted in the center of the outside air opening. Use a drill bit to make a 3/4" hole for the probe to be inserted (it should be installed so that the probe is closest to the hood edge of the economizer and does not interfere with the damper blade). See **figure [1.6]** at the top of the next column.
(For OAT instructions, refer to SEN-0012 install documents in reference documentation (page 41))

figure [1.6]

(When wiring to the iAIRE economizer controller, the wires will land on the terminal in the spot labeled OAT)

Optional Parts Installation

After installation of the OAT sensor, if you have purchased the optional humidity sensor, actuator or BACNet translator, follow the installation instructions below. If you do not have any of these additional parts, please skip to the *iAIRE* controller section of the installation *(page 7)*.

Optional Humidity Sensor

The humidity sensor should be mounted in the hood of the RTU. Make sure the probe is in the outside air flow. See **figure [1.7]** below.
(For humidity instructions, refer to SEN-0001 install documents in reference documentation (page 47))

figure [1.7]

(When wiring to the iAIRE economizer controller, the wires will land on the terminal in the spot labeled ENT/HUM)

Optional Actuator

The replacement actuator should be mounted in the same location as the original actuator. See **figure [1.8]** below. If moving the mounting location, please reference the actuator installation documents for mounting instructions.
(For actuator instructions, refer to MTR-000 install documents in reference documentation (page45))*

figure [1.8]

*(When wiring to the **iAIRE** economizer controller, the wires will land on the terminal in the spot labeled ECON SIG, if you have feedback, that will land in the spot labeled ECON POS)*

Optional BACNet Translator

The BACnet Translator should be mounted to the back of the controller plate. (shown in **figure [1.9]**)
*(When wiring to the **iAIRE** economizer controller, the wires will plug in the controller in the spot labeled RS485)*

Economizer Controls Installation
Controller

Once all parts have been installed, you will remove the old economizer controller (refer to page 10 for information on where wires should land on the new controller from the old economizer controller). Next, you will mount the new **iAIRE** economizer controller to the top of the economizer damper. The controller should be mounted far enough to the back of the economizer damper that the screws clear the damper blades and the controller wires do not interfere with the RTU cover panel. See **figure [1.9]** at the top of the next column.

figure [1.9]

After the new **iAIRE** economizer controller is mounted, begin landing the wires from the sensors, ion generator(s) and temperature probes. Reference the **iAIRE** economizer controller wiring schematic on page 8 and the terminal detail on page 9 for further information on where wires should land.

iAIRE has provided some wire connectors with the package to assist in landing multiple wires under one screw terminal.

When the wiring is complete, restore power to the RTU and run the controller in IAQ mode, making sure that all set-points for this mode are correct. Once confirmed, make sure all panels and doors on the RTU are in place and resecured.

Additional installation questions? Contact us:

iAIRE LLC
2100 Consulate Dr. Suite 102, Orlando, FL. 32837 Toll Free: 844-348-9168

ECONOMIZER CONTROL SCHEMATIC

SCH-0014-O

REVISION V-05.02

OPTIONS

ACTUATOR

M — PINK / U, GRAY / Y, BLACK / G0, RED / G
E19, E24, E26, E25

VOC SENSOR — RED, BLACK, YELLOW
E23, E22, E20

CO2 SENSOR — RED, BLACK, BLUE
E23, E22, E21

HUMIDITY SENSOR — RED, BLACK, ORANGE, GREEN
E17, E22, E23

UNIT FACTORY CONTROL BOARD

SEE TERMINAL STRIP 3

R Y1 Y2 W1 W2 G C X

UNIT FACTORY CONTROL BOARD

SEE TERMINAL STRIP 3

Terminal Strip 3

G 1 GREEN
W1 2 WHITE
W2 3 BROWN
Y1 4 YELLOW
Y2 5 BLUE — E13
R 6 RED — E13
C 7 BLK — E14
P.E. RELAY 8
ALARM 9

SEE TERMINAL STRIP 1

E4 E3 E2 E1

ECONOMIZER CONTROLLER

DI4 DI3 DI2 DI1
BLK BLK BLK BLK
RED RED RED RED

DO 4 DO 3 DO 2 DO 1
RED RED RED RED

TO BACnet TRANSLATOR

E14 E13
RED BLK

24VAC / 24VAC
RED

AO 2 AO 1
GRAY
RED

AI8 AI7 AI6 AI5 AI4 AI3 AI2 AI1
JP5 JP6 JP7 JP8 JP9 JP10 JP11

SEE TERMINAL STRIP 3

E16 E15 E11 E12 E10
ORANGE BLUE YELLOW PINK WHITE GREEN

SEE TERMINAL STRIP 3

E8 E7 E6 E5

BACnet UPC

Rnet: +12V, Rnet+, Gnd, Rnet-, Signal Ground, n/c, Net+, Net-, Net+, Net-, Shield

BT485

Port 2

BAS PORT — MSTP (m), MSTP (s), N2, Modbus, EIA485, Lon

BAS Protocol — MSTP (m) 8 7 6 5 0 0 0 0, Modbus 0 1 0 0, N2 0 0 1 1, Lon 1 1 1 0

Switches (0 = off, 1 = on)

BAUD RATE — 9600, 19.2k, 38.4k, 76.8k

MODE

24Vac Hot, Gnd

BLACK E22, RED E23

+ COMMUNICATION
- COMMUNICATION

BROWN, GREEN

WHITE, BLK, RED
E18, E22, E23

NOTES / FIELD WIRING

HI - INSTALLED IN BUILDING OR DUCT
LO - INSTALLED INTO ATMOSPHERE

TUBING PLACEMENT

FIELD SUPPLIED WIRING - - - - - - -

NOTE 1: ALL FIELD WIRING MUST BE SHIELDED CABLE OR TWISTED PAIR WITH DRAIN WIRE

NOTE 2: BUILDING PRESSURE SENSOR USES 0-1" TRANSDUCER

NOTE 3: DUCT STATIC SENSOR USES 0-5" TRANSDUCER

Terminal Strip 2

24VAC 12 RED — E23
P.E. 0-10 VDC 11 BLK — E22
CO2 10 ORANGE — SEE P.E. (If applicable)
VOC 9 BLUE — E21
ECON POS (ACTUATOR FEEDBACK) 8 YELLOW — E20
BUILDING/DUCT PRESSURE 7 PINK — E19
ENTHUM 6 WHITE — E18
5 GREEN — E17
4 RED — E8
3 BLK — E7
2 RED — E6
1 BLK — E5

COMMON

OAT SENSOR, SAT SENSOR

SEE OPTIONS

Terminal Strip 1

G 1 GREEN — E4
W1 2 WHITE — E3
W2 3
Y1 4 YELLOW
Y2 5 BLUE
R 6 RED
C 7 BLK
24VAC 8
COMMON 9 BLK — E26
0-10 VDC 10 GRAY — E24

0-10 VDC, 24VAC, COMMON

E10, E11, E12, E15, E16, E1, E2

SEE OPTIONS

THERMOSTAT

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iAIRE Economizer Controller

iAIRE Controller Terminal Detail

Terminal Strip 3		Terminal Strip 1		Terminal Strip 2	
RED	R #1	RED	R (24V) #11	RED	SAT + #21
BLK	C #2	BLK	C (Common) #12	GRN	SAT SIG #22
GRN	G #3	GRN	G (Fan contact) #13	YLO	OAT + #23
WHT	W_1 #4	WHT	W_1 #14	BLU	OAT SIG #24
BRN	W_2 #5	BRN	W_2 #15	GRY	BP SIG #25 ENT/
YLO	Y_1 #6	YLO	Y_1 #16	ORG	HUM SIG #26
BLU	Y_2 #7	BLU	Y_2 #17		
PUR	PE1 #8	RED	24V #18	PNK	ECON POS #28
PNK	ALARM #9	BLK	Common #19	PUR	VOC SIG #29 CO2
ORG	MOD PE #10	GRY	ECON SIG #20	WHT	SIG #30

Actuator
Power should land on #1
Common should land on #2
Signal should land on #20
Feedback signal should land on #28 *(optional)*

SAT Sensor
Power should land on #21
Common should land on #22

OAT Sensor
Power should land on #23
Common should land on #24

Ion Generator(s)
Power should land on #18
Common should land on #19

VOC Sensor
Power should land on #11
Common should land on #12
Signal should land on #29

CO2 Sensor
Power should land on #18
Common should land on #19
Signal should land on #30

Humidity Sensor *(optional)*
Power should land on #11
Common should land on #12
Signal should land on #26

Building Pressure Sensor *(optional)*
Power should land on #18
Common should land on #19
Signal should land on #25

MOD PE *(optional)*
Signal should land on #10

BACnet Translator *(optional)*
Plug provided for direct insertion into the economizer controller at the spot labeled RS485.

ALARM Signal *(optional)*
Signal should land on #9

Economizer Controller Installation Guide

This document describes wiring, power up, basic troubleshooting and common installation issues for the *iAIRE* economizer controller.

INPUTS

Analog Inputs:
(AI1) = (0-5v)   Supply Air Temperature (SAT)
(AI2) = (0-5v)   Outside Air Temperature (OAT)
(AI3) = (0-5v)
(AI4) = (0-10v)   Outside Air Humidity (Enthalpy)
(AI5) = (0-10v)   Building/Duct Pressure
(AI6) = (0-10v)   Econ Pos Feedback
(AI7) = (0-10v)   Room VOC
(AI8) = (0-10v)   Room CO2

Digital Inputs:
(DI1) = (24vac)   Y2 In
(DI2) = (24vac)   Y1 In
(DI3) = (24vac)   W1 In
(DI4) = (24vac)   Occupied

OUTPUTS

Analog Outputs:
(AO1) = (0-10v) Modulating PE
(AO2) = (0-10v) Actuator Signal

Digital Outputs:
(DO1) = (24vac) Y1 Out
(DO2) = (24vac) Y2 Out
(DO3) = (24vac) PE Relay
(DO4) = (24vac) Alarm

WHILE INSTALLING THIS CONTROLLER

Installer must be an experienced and trained service technician.

Be sure to read instructions thoroughly. Incorrect installation could result in damage to the controller or create a hazard to those performing the installation.

Verify the ratings in the instructions and on the product to ensure it is suitable for your application.

Once the installation is complete, review controller operations provided with this installation document.

Additional Questions?
Visit our website at www.myiaire.com to view product data sheets, or email us at support@myiaire.com.

ACCESSORIES

Temp. Probe | SEN-0012
CO2 Sensor | SEN-0002
VOC Sensor | SEN-0071
Ion Generator | ION-0A*00
Mounting Plate | UNV0016

OPTIONAL ACCESSORIES

Humidity Sensor | SEN-0001
BP Sensor | SEN-0065
BACnet Translator | TRN-0005-Kit

indicates customer part selections.

INSTALLATION AND SETUP

The *iAIRE* economizer controller can be mounted at any orientation. When mounting, allowing for proper viewing of the controller LCD screen and use of the buttons should be taken into consideration.

WIRING

All wiring must be in compliance with local applicable electrical codes, or as specified on the installation wiring diagram (page 8 & 9 in this document).

Enthalpy Table

Enthalpy (but/lb/da)	Point P1		Point P2	
	Temp. °F	Humidity %RH	Temp. °F	Humidity %RH
32.4	86.0	38.9	72.4	80.3
28.0	80.0	36.8	66.3	80.1
26.0	75.0	39.6	63.3	80.0
24.0	70.0	42.3	59.7	81.4
22.0	65.0	44.8	55.7	84.2
20.0	60.0	46.9	51.3	88.5

The enthalpy table above shows sample enthalpy to help you determine what your enthalpy set points should be.

POWER UP

After the controller is mounted and wired, restore power to the RTU.

POWER UP DELAY

When powering up the VOC and humidity sensors, the VOC sensor has a first time warm up period of 48 hours. After first start-up, the warm up period is one (1) hour. The humidity sensor has a start-up delay of 3 minutes.

POWER LOSS

All setpoints and advanced settings are restored to the defaults after any power loss or interruption.

USING KEYPAD WITH MENUS

When using the keypad to navigate between menus:
• The up arrow is used to move to a previous menu.
• The down arrow is used to move to the next menu.
• The enter button will display the first item in the currently selected menu.
• The esc button is used to exit a menu's item and return to the list of menus.

USING KEYPAD WITH SETTINGS

• Navigate to the desired menu.
• Press enter to display the first item in the selected menu.
• Use the up and down arrows to scroll and select the desired parameter.
• Press enter to display the value of the current selection.
• Press the up arrow to increase or the down arrow to decrease the parameter value.

• Press enter to accept the value and store it.
• Press enter again to return to the selected menu
• Press esc to return to the previous menu.

CONTROLLER INFORMATION

There are (3) three lights that are visible from the front of the controller at different times of operation. These lights are:
    Status - Red Light
    Reset - Red Light
    Power - Green Light
When power is applied to the controller and it has the correct programing, the green power light should be on and the other two lights should be off. If the status and reset slights are flashing red, it is indicating the unit is in alarm.

MENU STRUCTURE

1. STATUS
Allows user to check current system statuses
2. SET POINTS
Allows user to enter system set points
3. CONFIGURATION
Allows user to set modes and configure set points
4. TEST
Allows user to put system into test mode to check individual functionality of system components
5. ALARMS
Allows user to view system alarms

MODES

1. Econo Mode
2. DCV Mode
3. IAQ Mode
4. IAQ ERV

* For mode details, see pages 9 and 10.-REPAGE

iAIRE Economizer Controller

STATUS MENU SETTINGS

Using the up and down arrows on the controller, find the status menu and hit enter.

```
STATUS
MENU
```

Using the up and down arrows, you will be able to check the system status for items listed below using the enter button:

```
ECONO POS
COMMAND STATUS
```

Allows you to view the controller commanded set points of the economizer damper.

```
ECONO POS
READ STATUS
```

Allows you to view the current actual position of the economizer damper.

```
MOD PWREXHT POS
COMMAND STATUS
```

Allows you to check to see if the power exhaust command is on.

```
COMPRESSOR1
OUTPUT STATUS
```

Allows you to check if the compressor 1 output is active or de-active.

```
COMPRESSOR2
OUTPUT STATUS
```

Allows you to check if the compressor 2 output is active or de-active.

```
POWER EXHAUST1
STATUS
```

Allows you to check if the power exhaust 1 output is active or de-active.

```
POWER EXHAUST2
STATUS
```

Allows you to check if the power exhaust 2 output is active or de-active.

```
OCCUPIED
INPUT STATUS
```

Allows you to check if the economizer enable option is active or de-active.

```
HVAC W1
INPUT STATUS
```

Allows you to check if the HVAC heating stage 1 from the thermostat is active or de-active.

```
COMPRESSOR1
INPUT STATUS
```

Allows you to check if the compressor 1 input from the thermostat is active or de-active.

```
COMPRESSOR2
INPUT STATUS
```

Allows you to check if the compressor 2 input from the thermostat is active or de-active.

```
IAQ CO2
INPUT STATUS
```

Allows you to check the current CO_2 PPM reading coming from the sensor.

```
ERV HEAT WHEEL
INPUT STATUS
```

Allows you to check if the ERV heat wheel is active or de-active.

```
ERV MAKEUPFAN
STATUS
```

Allows you to check if the ERV make up fan is active or de-active.

```
ERV PE1
STATUS
```

Allows you to check if the power exhaust fan is active or de-active.

```
ERV PE2
STATUS
```

Allows you to check if the power exhaust fan is active or de-active.

```
ERV OA FANSPEED
STATUS
```

Allows you to check the outside air fan speed.

```
ERV EX FANSPEED
STATUS
```

Allows you to check the exhaust air fan speed.

```
ERV OA CFM
STATUS
```

Allows you to check the outside CFM.

```
ERV EX CFM
STATUS
```

Allows you to check the exhaust CFM.

```
OUTSIDE AIR TEMP
STATUS
```

Allows you to check the outside air temperature.

```
SUPPLY AIR TEMP
STATUS
```

Allows you to check the supply air temperature.

```
VOC
STATUS
```

Allows you to check the current VOC PPM reading coming from the sensor.

```
MACHINE STATE
STATUS
```

Allows you to check the current machine state. (this helps when troubleshooting)

```
HUMIDITY PERCENT
STATUS
```

Allows you to check the current humidity reading coming from the sensor.

```
ENTHALPY
STATUS
```

Allows you to check the current calculated btu/lb reading.

```
FREE COOLING
STATUS
```

Allows you to check if free cooling is available or not.

```
OPERATION
PARAMETERS
```

Allows you to check the operation parameters.

CONFIGURATION MENU SETTINGS

> **CONFIGURATION MENU**

Using the up and down arrows, you will be able to configure your system using items listed below:

> **CONTROLLER MODE CONFIGURATION**

The controller mode allows the user to select which mode the controller will run in. There are (4) modes to choose from:

Econo Mode / DVC mode / IAQ mode / IAQ ERV mode

for mode details, see CONTROLLER MODE CONFIGURATION SETTINGS in the next column.

> **HVAC 2SPEED CONFIG**

This setting should be "disabled" unless the RTU has a 2-speed fan or a variable speed fan. If the RTU has a 2-speed fan or a variable speed fan, this setting should be "enabled". If the setting is "enabled", it allows the controller to have a damper offset to account for the difference in the static pressure coming in the outside air hood between the varying speeds of the motor and allows the damper to bring in the correct outside air regardless of blower speed.

> **HUMIDITY SENSOR CONFIG**

This setting should be "disabled" unless you have installed a humidity sensor into the control scheme. If a humidity sensor is installed, this setting should be "enabled". Once the setting is "enabled", the controller will calculated the outside air enthalpy and allow the user to input an enthalpy setting into the system to prevent free cooling from happening on humid cooler days.

> **ACTUATOR FEEDBK CONFIG**

Allows you to check if the Actuator Feedback is active or not.

> **SOFTWARE VER CONFIG**

This setting tells the user the version and revision of the software loaded into the controller.

CONTROLLER MODE CONFIGURATION SETTINGS

The controller mode allows the user to select which mode the controller will run in. To select the mode, use the up and down buttons to bring up the screen for the mode you would like and hit the enter button to enable the selection.

Mode 1 – Econo Mode

The controller is in the standard economizer mode of operation. The user selects a minimum outside air set-point. This set-point does not change unless the controller determines that free cooling is available. If free cooling is available, the controller will modulate the damper to control the SA set-point in the RTU.

Mode 2 - DCV mode

The controller is in demand control ventilation mode. In this mode, there is a CO_2 sensor present. The user will select a minimum outside air setting (the maximum air that is brought into the RTU) and a DCV set-point (the minimum air that is brought into the RTU). The user selects a minimum CO_2 PPM and a maximum CO_2 PPM to go with these airflow set-points. The CO_2 sensor will sense occupancy and output a PPM. If this PPM is less than the minimum CO_2 PPM set-point, the damper will be open to the DVC set-point. If the CO_2 PPM is more than the maximum CO_2 PPM set-point, the damper will be open to the minimum outside air setting. If the CO_2 PPM is in-between the minimum and maximum CO_2 set-points, the controller determines a straight line between the 2 points to determine the damper position. If free cooling is available, the controller will modulate the damper to control the SA set-point in the RTU. Refer to *Fig. A*.

For information how to adjust RTU Open or Carrier Comfort Network set points, see page 29.

Mode 3 – IAQ mode

The controller is in indoor air quality mode. In this mode, there is both a CO_2 & VOC sensor present. The user will select a minimum outside air setting (the maximum air that is brought into the RTU) and a DCV set-point (the minimum air that is brought into the RTU). The user selects a minimum CO_2 PPM and a maximum CO_2 PPM to go with these airflow set-points. The CO_2 sensor will sense occupancy and output a PPM. If this PPM is less than the minimum CO_2 PPM set-point, the damper will be open to the DVC set-point. If the CO_2 PPM is more than the maximum CO_2 PPM set-point, the damper will be open to the minimum outside air setting. If the CO_2 PPM is in-between the minimum and maximum CO_2 set-points, the controller determines a straight line between the 2 points to determine the damper position.

The user will select a minimum VOC set-point and a maximum VOC set-point. The user selects a minimum VOC

PPM and a maximum VOC PPM to go with these airflow set-points. The VOC sensor will sense occupancy and output a PPM. If this PPM is less than the minimum VOC PPM set-point, the damper will be open to the DVC set-point. If the VOC PPM is more than the maximum VOC PPM set-point, the damper will be open to the minimum outside air setting. If the VOC PPM is in-between the minimum and maximum VOC set-points, the controller determines a straight line between the 2 points to determine the damper position.

The controller will add the CO2 damper position and the VOC damper position together to determine the actual damper position. If free cooling is available, the controller will modulate the damper to control the SA set-point in the RTU. *Refer to Fig. A and Fig. B.*
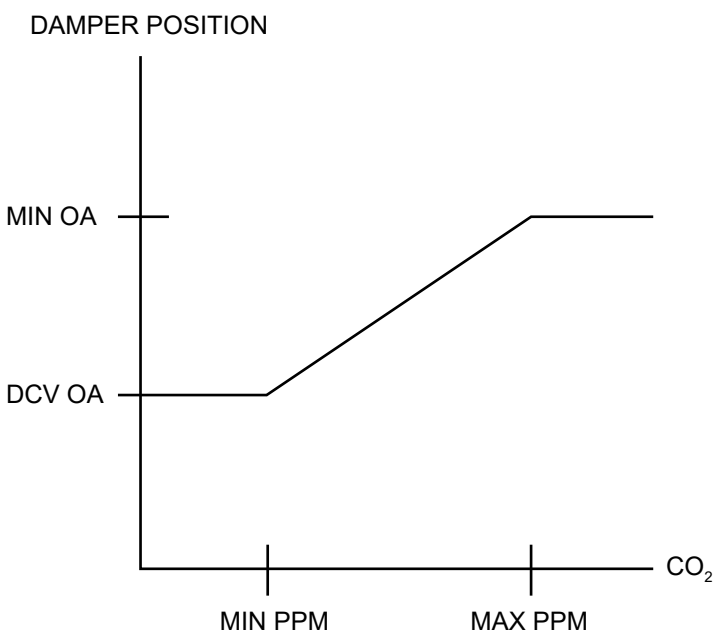
Mode 4 – IAQ ERV
The controller is in indoor air quality mode with an ERV present. In this mode, the ERV has fixed speed blowers. These blowers run continuously. They are meant to bring in air at the minimum required levels. All other air is brought into the space by opening the by-pass damper.

In this mode, there is both a CO2 & VOC sensor present. The user will select a minimum outside air setting (the maximum air that is brought into the RTU) and a DCV set-point (the minimum air that is brought into the RTU). The user selects a minimum CO2 PPM (zero) and a maximum CO2 PPM to go with these airflow set-points. The CO2 sensor will sense occupancy and output a PPM. If this PPM is less than the minimum CO2 PPM set-point, the damper will be open to the DVC set-point. If the CO2 PPM is more than the maximum CO2 PPM set-point, the damper will be open to the minimum outside air setting. If the CO2 PPM is in-between the minimum and maximum CO2 set-points, the controller determines a straight line between the 2 points to determine the damper position.

The user will select a minimum VOC set-point and a maximum VOC set-point. The user selects a minimum VOC PPM (zero) and a maximum VOC PPM to go with these airflow set-points. The VOC sensor will sense occupancy and output a PPM. If this PPM is less than the minimum VOC PPM set-point, the damper will be open to the DVC set-point. If the VOC PPM is more than the maximum VOC PPM set-point, the damper will be open to the minimum outside air setting. If the VOC PPM is in-between the minimum and maximum VOC set-points, the controller determines a straight line between the 2 points to determine the damper position.
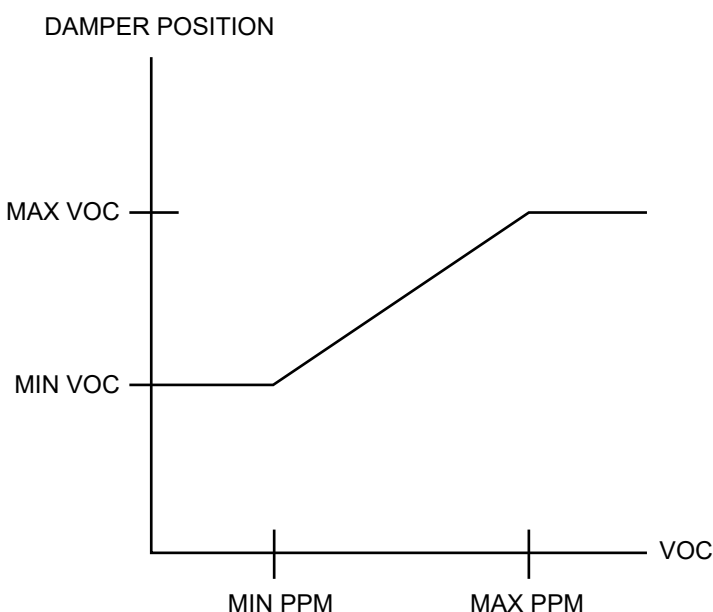
The controller will add the CO2 damper position and the VOC damper position together to determine the actual damper position. If free cooling is available, the controller will modulate the damper to control the SA set-point in the RTU. In free cooling the ERV blowers shut off.

Fig. A

DAMPER POSITION

MIN OA

DCV OA

MIN PPM   MAX PPM CO_2

+

Fig. B

DAMPER POSITION

MAX VOC

MIN VOC

MIN PPM   MAX PPM   VOC

SETPOINTS MENU SETTINGS

SETPOINTS
MENU

Using the up and down arrows, you will be able to change system set points for items listed below using the enter button:

ECON HIGHTMPLIMT
SETPOINT

Allows you to set the high temperature limit for the economizer.

ECON LOWTMPLIMT
SETPOINT

Allows you to set the low temperature limit for the economizer.

ECON FREECOOLSAT
SETPOINT

Allows you to set the free cooling temperature limit for the supply air.

ECON MIN POS
SETPOINT

Allows you to set the min outside air position for the economizer.

ECON MAX POS
SETPOINT

Allows you to set the max position of allowable damper stroke.

POWER EXHT1 POS
SETPOINT

Allows you to set where the power exhaust is positioned.

POWER EXHT2 POS
SETPOINT

Allows you to set where the power exhaust is positioned.

BUILDING PRESS
SETPOINT

Allows you to set the building pressure.

DCV ECONO MIN
POS

Allows you to set the min DCV economizer position.

MAX DCV LEVEL
POS (PPM)

Allows you to set the max CO2 level.

MIN DCV LEVEL
POS (PPM)

Allows you to set the min CO2 level.

MIN OA CFM
LEVEL

Allows you to set the min CFM level.

EXHAUST CFM OFFE
LEVEL

Allows you to set the exhaust CFM offset level.

IAQ OA CFM
LEVEL

Allows you to set the min VOC CFM level.

MIN VOC LEVEL
PPM

Allows you to set the min VOC PPM level.

```
MAX VOC LEVEL
PPM
```

Allows you to set the max VOC PPM level.

```
VOC ECONO  MIN
POS
```

Allows you to set the min VOC economizer position.

```
VOC ECONO MAX
POS
```

Allows you to set the min VOC economizer position.

```
HVAC 2SPEED ECON
OFFSET POS
```

Allows you to set the economizer offset position if you are using a 2 speed unit.

```
ENTHALPY
SETPOINT
```

Allows you to set the btu/lb point for enthalpy for free cooling.

```
ERV OA FAN
SETPOINT
```

Allows you to set the outside air fan position.

```
ERV PE FAN
SETPOINT
```

Allows you to set the power exhaust fan position.

```
OA ERV MIN FAN
SPEED
```

Allows you to check outside air ERV min fan speed.

```
EX ERV MIN FAN
SPEED
```

Allows you to check exhaust ERV min fan speed.

```
OA ERV DCV
FAN SPEED
```

Allows you to check outside air ERV DCV fan speed.

```
OA ERV VOC
MIN FAN SPEED
```

Allows you to outside ERV VOC min fan speed.

```
OA ERV VOC
MAX FAN SPEED
```

Allows you to outside ERV VOC max fan speed.

```
EX ERV VOC MIN
FAN SPEED
```

Allows you to check exhaust ERV VOC min fan speed.

```
EX ERV VOC
MAX FAN SPEED
```

Allows you to check exhaust ERV VOC max fan speed.

```
FAN SPEED
DEAD BAND
```

Allows you to fan dead band.

```
FAN SPEED
TIMER
```

Allows you to check timer.

TEST MENU SETTINGS

```
TEST MODE
MENU
```

Using the test menu you will be able to turn off and on the test mode for the system to check the functionality of the system components.

```
TEST MODE
```

After hitting enter, you can use the arrow buttons to select yes or no for enabling the test mode.

ALARM MENU SETTINGS

```
ALARMS
MENU
```

Using the up and down arrows, you will be able to view system alarms for items listed below:

```
CO2 ALARM STAT
ALARM    XXX
```

```
VOC ALARM STAT
ALARM    XXX
```

```
OATEMP STAT
ALARM    XXX
```

```
SATEMP STAT
ALARM    XXX
```

```
OADAMPER STAT
ALARM    XXX
```

```
HUMIDITY STAT
ALARM    XXX
```

```
DIRTY FILTER
ALARM    XXX
```

Each screen displays alarm status as either active or deactive in place of the "xxx" shown in the picture.

TROUBLESHOOTING

1. Make sure the unit has power and the green power light on the controller is on.
2. If the unit has flashing red status and reset lights, it is indicating the unit has an alarm.

Go to the controller screen and push the up arrow until you get to the alarm menu and hit enter.

Once you are in the alarm menu, scroll through the following possible alarms to see which one(s) are active:

1. **CO2** - If active, the controller does not sense the CO2 sensor. Check the wiring to make sure the sensor is wired up to the unit correctly. You must have the ground, power & signal wires all attached for the sensor to work. If the sensor is wired correctly and has power, check the sensor to make sure there is a 0-10 VDC output coming from the sensor. When the alarm is active, the controller automatically moves the economizer damper to the Econo Min Position so the building is receiving the appropriate amount of air.

2. **VOC** - If active, the controller does not sense the VOC sensor. Check the wiring to make sure the sensor is wired up to the unit correctly. You must have the ground, power & signal wires all attached for the sensor to work. If the sensor is wired correctly and has power, check the sensor to make sure there is a 0-10 VDC output coming from the sensor. When the alarm is active, the controller automatically moves the economizer damper to the Econo Min Position so the building is receiving the appropriate amount of air.

3. **Outside Air temperature sensor (OAT)** - If active, the controller does not sense the OAT sensor. Check the wiring to make sure the sensor is wired up to the unit correctly. If the wiring is correct, the sensor is bad.

4. **Supply Air temperature sensor (SAT)** - If active, the controller does not sense the SAT sensor. Check the wiring to make sure the sensor is wired up to the unit correctly. If the wiring is correct, the sensor is bad.

5. Outside Air Damper - If active, the controller does not have feedback from the economizer actuator. If the controller was used as a replacement for a system already in the field, the previous actuator may not have feedback. If feedback is not present, this alarm will be (and remain) active. The system will continue to function normally with this alarm on.

To assist with troubleshooting the system, it may be helpful to put the controller in test mode. The mode allows the user to test the controller by forcing certain items in the system to see if they are operational. The user can force the following:

- Economizer position
- Modulating PE speed
- Comp
- Comp
- PE
- PE
- ERV wheel
- ERV OA fan
- ERV OA fan speed
- ERV EX fan speed

APPENDIX INFORMATION

The default set points and configurations for each mode are outlined on pages 21 through 27.

If a field replacement of an existing controller is needed, please contact the manufacturer by phone or email at: 844-348-9168 | sales@myiaire.com.com

If the optional BACNet translator is being used, please see the reference points list on the next page (page 29).
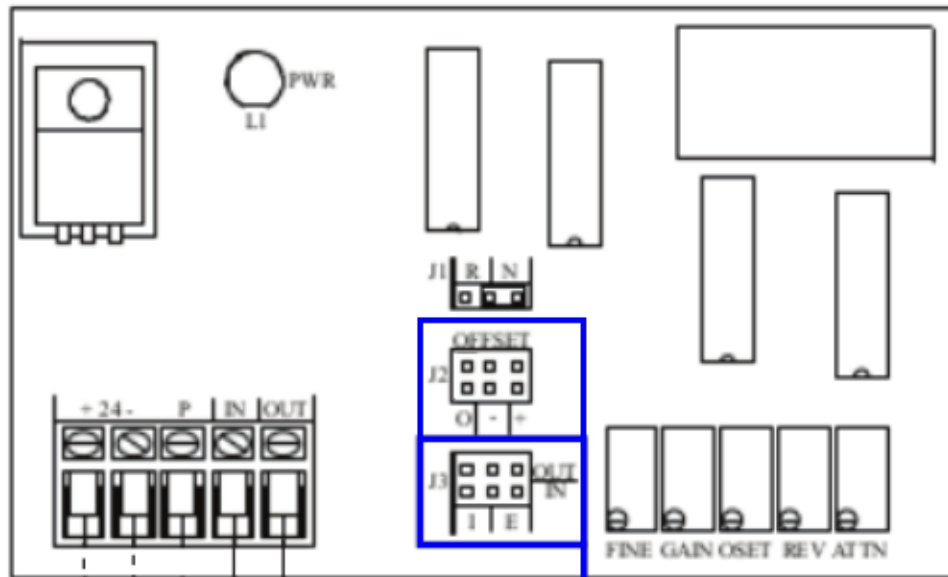
RTU Open / CCN Adjustment Instructions

iAire Economizer Controls are compatible with RTU Open as long as the following adjustments are made.

The RTU Open controller is expecting a 4-20mA signal from an IAQ sensor. However, the iAire Economizer Controller already receives an IAQ signal from a CO2 senser and outputs a 0-10V signal from Analogue Output 1 to instruct the economizer blades to open or shut accordingly. To use that signal the 0-10V output from the iAire Economizer Controller must be feed through an Analog Rescaling Device (CNT-0043) to be converted into a 4-20mA signal. On the Analog Rescaling device, set up the J3 jumper to allow for a voltage signal in and a current signal out.

Also, due to the added VOC sensor, the output from the iAire Controller to the Analog Rescaling Module must be shifted up 2V. Shift the output signal range up by setting the "OFFSET" jumper shunt "J2" in the "+" position and adjust the "OFFSET" trim pot until you increase the voltage reading on the meter to match the desired minimum output voltage. When the iAire system in outputting 0V to the Analog Rescaling Module (meaning the system is below the minimum requirements on CO2 and VOC), then we want to adjust the signal going to RTU Open up to 2V. (Remember, this also increases the maximum output signal by the same amount.) Follow the wiring diagram below to connect the three devices.
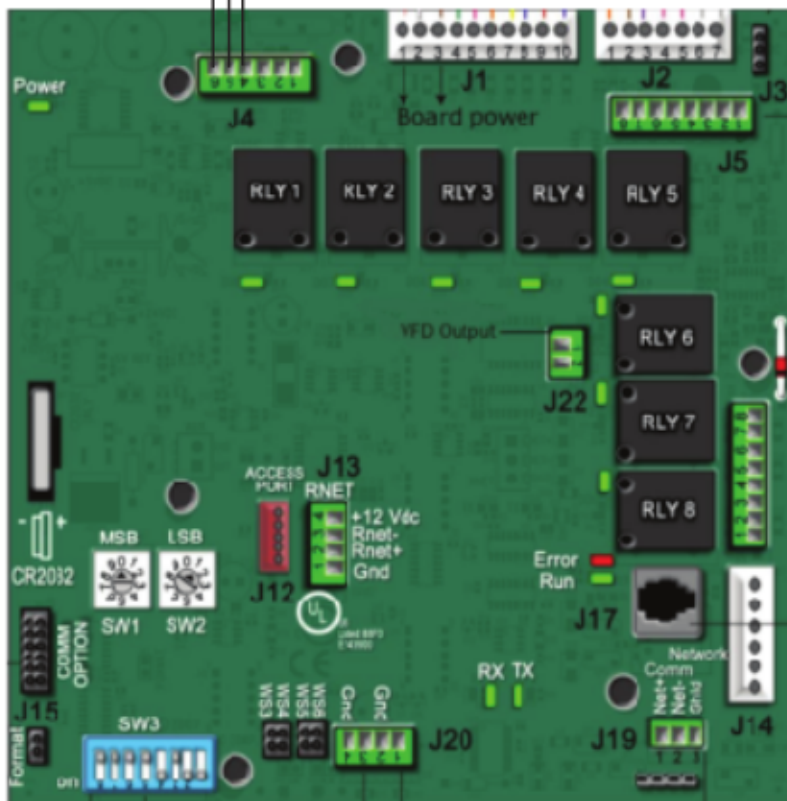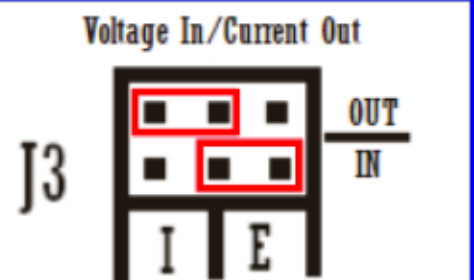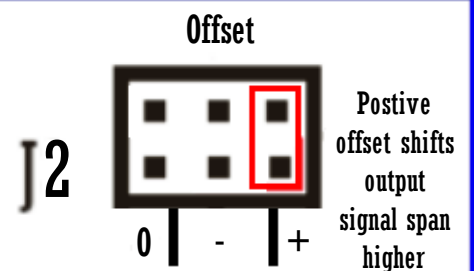
The RTU open controller does not have the same output settings as the iAire Economizer Controller and thus the setting must be change. Using an RS485 dongle, adjust the Vent Dmpr Pos/DCV Min Pos to 0% open. This set point in the minimum outdoor air damper position maintained during occupied periods. Also, adjust the DCV Max Vent Damper Pos set point to 75% open.

RTU Open Wiring Diagram

Offset

J2

Postive offset shifts output signal span higher

0 - +

Voltage In/Current Out

J3

OUT
IN

I   E

24 VAC/DC Power Supply

Analog Input Signal From iAire Controller AO1

BACnet Points List

OBJECT ID	iAIRE POINT NAME	POINT TYPE	BACNET OBJECT NAME	OBJECT TYPE	DEFAULT SET POINTS	READ ACCESS
1	OUTSIDE AIR TEMPERATURE	ANALOG		AV	N/A	READ ONLY
2	SUPPLY AIR TEMPERATURE	ANALOG		AV	N/A	READ ONLY
3	ECON HIGH LIMIT SETPOINT	ANALOG		AV	65 DEGF	READ / WRITE
4	ECON LOW LIMIT SETPOINT	ANALOG		AV	0 DEGF	READ / WRITE
5	ECON FREE COOL SETPOINT	ANALOG		AV	55 DEGF	READ / WRITE
6	ECON MIN POSITION SETPOINT	ANALOG		AV	20%	READ / WRITE
7	ECON MAX POSITION SETPOINT	ANALOG		AV	100%	READ / WRITE
8	ECONOMIZER DAMPER POSITION	ANALOG		AV	N/A	READ ONLY
9	ECONOMIZER DAMPER COMMANDED	ANALOG		AV	N/A	READ ONLY
10	VOC STATUS	ANALOG		AV	N/A	READ ONLY
11	VOC MAX SETPOINT	ANALOG		AV	900 PPM	READ / WRITE
12	VOC MIN SETPOINT	ANALOG		AV	400 PPM	READ / WRITE
13	VOC MIN POSITION	ANALOG		AV	0%	READ / WRITE
14	VOC MAX POSITION	ANALOG		AV	15%	READ / WRITE
15	CO2 STATUS	ANALOG		AV	N/A	READ ONLY
16	CO2 MAX SETPOINT	ANALOG		AV	900 PPM	READ / WRITE
17	CO2 MIN SETPOINT	ANALOG		AV	500 PPM	READ / WRITE
18	IAQ Min Position	ANALOG		AV	0%	READ / WRITE
19	HUMIDITY STATUS	ANALOG		AV	N/A	READ ONLY
20	OUTSIDE ENTHALPY SETPOINT	ANALOG		AV	80 KJ/KG	READ / WRITE
21	ENTHALPY STATUS	ANALOG		AV	N/A	READ ONLY
22	BUILDING PRESSURE	ANALOG		AV	N/A	READ / WRITE
23	BUILDING PRESSURE SETPOINT	ANALOG		AV	0.05 IN-WC	READ / WRITE
24	PWR EXHAUST DMP POSITION	ANALOG		AV	30	READ / WRITE
25	PWR EXHAUST STATUS	DIGITAL		BV	N/A	READ ONLY
26	PWR EXHAUST %	ANALOG		AV	N/A	READ ONLY
27	HEATING STG 1 INPUT	DIGITAL		BV	N/A	READ ONLY
28	HEATING STG 2 INPUT	DIGITAL		BV	N/A	READ ONLY
29	HEATING STG 1 OUTPUT	DIGITAL		BV	N/A	READ ONLY
30	HEATING STG 2 OUTPUT	DIGITAL		BV	N/A	READ ONLY
31	COOLING STG 1 INPUT	DIGITAL		BV	N/A	READ ONLY
32	COOLING STG 2 INPUT	DIGITAL		BV	N/A	READ ONLY
33	COOLING STG 1 OUTPUT	DIGITAL		BV	N/A	READ ONLY
34	COOLING STG 2 OUTPUT	DIGITAL		BV	N/A	READ ONLY
35	FREE COOLING STATUS	DIGITAL		BV	N/A	READ ONLY

Standard Economizer Mode

NAME	FUNCTION	DEFAULT SET POINTS
Econ HighTmpLimt Setpoint	Sets the high temperature limit for when free cooling can happen (in degrees F)	65
Econ LowTmpLimt Setpoint	Sets the low temperature limit for when free cooling can happen (in degrees F)	0
Econ Free Cool Sat Setpoint	Discharge temperature setting that damper is controlling temperature to	55
Econo Min Position Configuration	High CO2 damper setpoint & maximum design outside air condition	20
Econo Max Position Configuration	Maximum stroke of economizer damper	100
Power Exht1 Position Configuration	Damper setpoint where user desire PE1 relay to energize	30
Power Exht2 Position Configuration	Damper setpoint where user desire PE2 relay to energize	70
Building Pressure	Inside building pressure if using modulating powered exhaust (inches H2O)	0.05
HVAC 2-speed Conf	Is the unit a 2-speed fan RTU?	Deactive
HVAC 2-speed ECON offset	Damper default when the RTU is goes to high fan speed	-10
Humidity Sensor Config	Does the system have a humidity sensor	Deactive
Enthalpy Set Point	Free cooling is possible less than this default setting (KJ/KG)	80

DCV Economizer with CO2 Mode

NAME	FUNCTION	DEFAULT SET POINTS
Econ HighTmpLimt Setpoint	Sets the high temperature limit for when free cooling can happen (in degrees F)	65
Econ LowTmpLimt Setpoint	Sets the low temperature limit for when free cooling can happen (in degrees F)	0
Econ Free Cool Sat Setpoint	Discharge temperature setting that damper is controlling temperature to	55
Econo Min Position Configuration	High CO2 damper setpoint & maximum design outside air condition	20
Econo Max Position Configuration	Maximum stroke of economizer damper	100
Power Exht1 Position Configuration	Damper setpoint where user desire PE1 relay to energize	30
Power Exht2 Position Configuration	Damper setpoint where user desire PE2 relay to energize	70
Building Pressure	Inside building pressure if using modulating powered exhaust (inches H2O)	0.05
HVAC 2-speed Conf	Is the unit a 2-speed fan RTU?	Deactive
HVAC 2-speed ECON offset	Damper default when the RTU is goes to high fan speed	-10
Humidity Sensor Config	Does the system have a humidity sensor	Deactive
Enthalpy Set Point	Free cooling is possible less than this default setting (KJ/KG)	80
IAQ Econo Min position	Low CO2 damper setpoint	0
Min IAQ Level Pos	Low CO2 PPM setpoint	500
Max IAQ Level Pos	High CO2 PPM setpoint	900

IAQ Economizer with CO2 and VOC Mode

NAME	FUNCTION	DEFAULT SET POINTS
Econ HighTmpLimt Setpoint	Sets the high temperature limit for when free cooling can happen (in degrees F)	65
Econ LowTmpLimt Setpoint	Sets the low temperature limit for when free cooling can happen (in degrees F)	0
Econ Free Cool Sat Setpoint	Discharge temperature setting that damper is controlling temperature to	55
Econo Min Position Configuration	High CO2 damper setpoint & maximum design outside air condition	20
Econo Max Position Configuration	Maximum stroke of economizer damper	100
Power Exht1 Position Configuration	Damper setpoint where user desire PE1 relay to energize	30
Power Exht2 Position Configuration	Damper setpoint where user desire PE2 relay to energize	70
Building Pressure	Inside building pressure if using modulating powered exhaust (inches H2O)	0.05
HVAC 2-speed Conf	Is the unit a 2-speed fan RTU?	Deactive
HVAC 2-speed ECON offset	Damper default when the RTU is goes to high fan speed	-10
Humidity Sensor Config	Does the system have a humidity sensor	Deactive
Enthalpy Set Point	Free cooling is possible less than this default setting (KJ/KG)	80
IAQ Econo Min position	Low CO2 damper setpoint	0
Min IAQ Level Pos	Low CO2 PPM setpoint	400
Max IAQ Level Pos	High CO2 PPM setpoint	1000
Min VOC Level PPM	Low VOC PPM setpoint	400
Max VOC Level PPM	High VOC PPM setpoint	1000
VOC Econo Min Pos	Low VOC damper setpoint	0
VOC Econo Max Pos	High VOC damper setpoint	15

IAQ Sized ERV Mode

NAME	FUNCTION	DEFAULT SET POINTS
Econ HighTmpLimt Setpoint	Sets the high temperature limit for when free cooling can happen (in degrees F)	65
Econ LowTmpLimt Setpoint	Sets the low temperature limit for when free cooling can happen (in degrees F)	0
Econ Free Cool Sat Setpoint	Discharge temperature setting that damper is controlling temperature to	55
Econo Min Position Configuration	High CO2 damper setpoint & maximum design outside air condition	20
Econo Max Position Configuration	Maximum stroke of economizer damper	100
Power Exht1 Position Configuration	Damper setpoint where user desire PE1 relay to energize	30
Power Exht2 Position Configuration	Damper setpoint where user desire PE2 relay to energize	70
Building Pressure	Inside building pressure if using modulating powered exhaust (inches H2O)	0.05
HVAC 2-speed Conf	Is the unit a 2-speed fan RTU?	Deactive
HVAC 2-speed ECON offset	Damper default when the RTU is goes to high fan speed	-10
Humidity Sensor Config	Does the system have a humidity sensor	Deactive
Enthalpy Set Point	Free cooling is possible less than this default setting (KJ/KG)	80
IAQ Econo Min position	Low CO2 damper setpoint	0
Min IAQ Level Pos	Low CO2 PPM setpoint	400
Max IAQ Level Pos	High CO2 PPM setpoint	1000
Min VOC Level PPM	Low VOC PPM setpoint	400
Max VOC Level PPM	High VOC PPM setpoint	1000
VOC Econo Min Pos	Low VOC damper setpoint	0
VOC Econo Max Pos	High VOC damper setpoint	15
OA ERV fan speed	ERV OA outside air fan speed setpoint	75
EX ERV fan speed	ERV EX outside air fan speed setpoint	75
Min ERV damper position	Minimum damper position that econo damper will be in free cooling	20

Min IAQ Sized ERV Mode

NAME	FUNCTION	DEFAULT SET POINTS
Econ HighTmpLimt Setpoint	Sets the high temperature limit for when free cooling can happen (in degrees F)	65
Econ LowTmpLimt Setpoint	Sets the low temperature limit for when free cooling can happen (in degrees F)	0
Econ Free Cool Sat Setpoint	Discharge temperature setting that damper is controlling temperature to	55
Econo Min Position Configuration	High CO2 damper setpoint & maximum design outside air condition	20
Econo Max Position Configuration	Maximum stroke of economizer damper	100
Power Exht1 Position Configuration	Damper setpoint where user desire PE1 relay to energize	40
Power Exht2 Position Configuration	Damper setpoint where user desire PE2 relay to energize	75
IAQ Econo Min position	Low CO2 damper setpoint	0
Min IAQ Level Pos	Low CO2 PPM setpoint	400
Max IAQ Level Pos	High CO2 PPM setpoint	1000
Min VOC Level PPM	Low VOC PPM setpoint	400
Max VOC Level PPM	High VOC PPM setpoint	1000
VOC Econo Min Pos	Low VOC damper setpoint	0
VOC Econo Max Pos	High VOC damper setpoint	15
OA ERV fan speed	ERV OA outside air fan speed setpoint	1000
EX ERV fan speed	ERV EX outside air fan speed setpoint	1000
Min ERV damper position	Minimum damper position that econo damper will be in free cooling	20

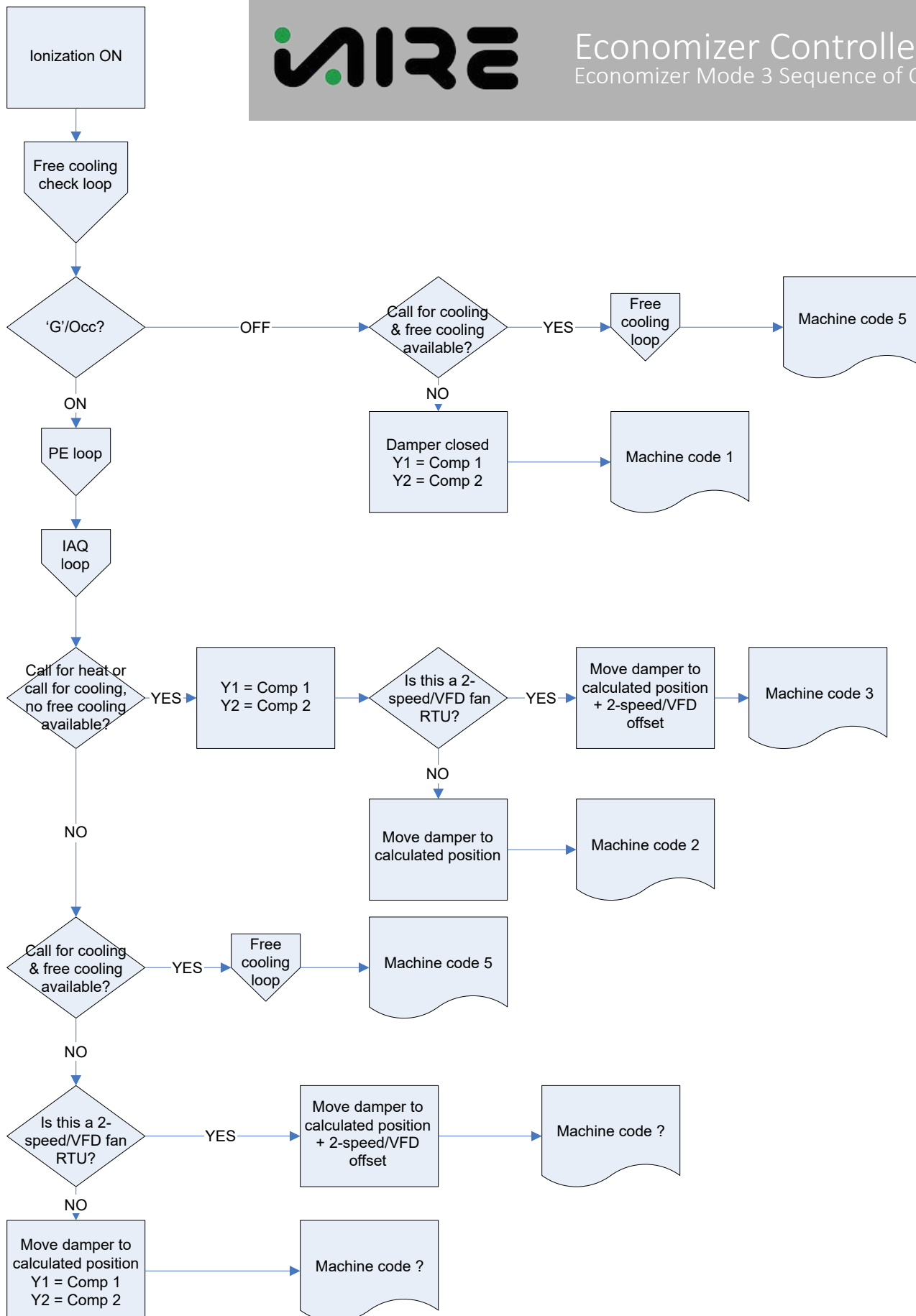# CONTROLLER SEQUENCE OF OPERATIONS

The following pages in this installation guide outline the sequence of operations for the *iAIRE* controller.
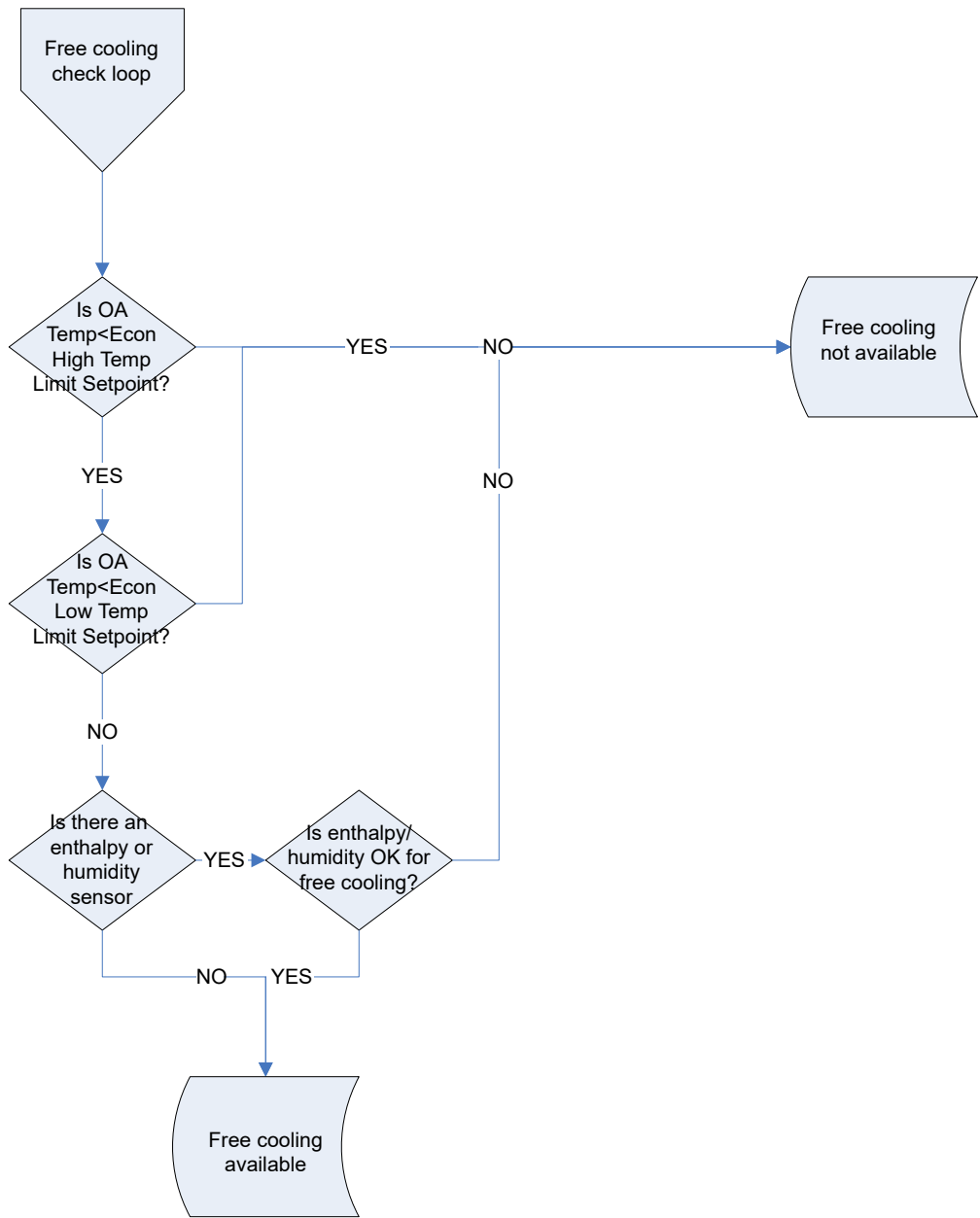
iAIRE

Economizer Controller
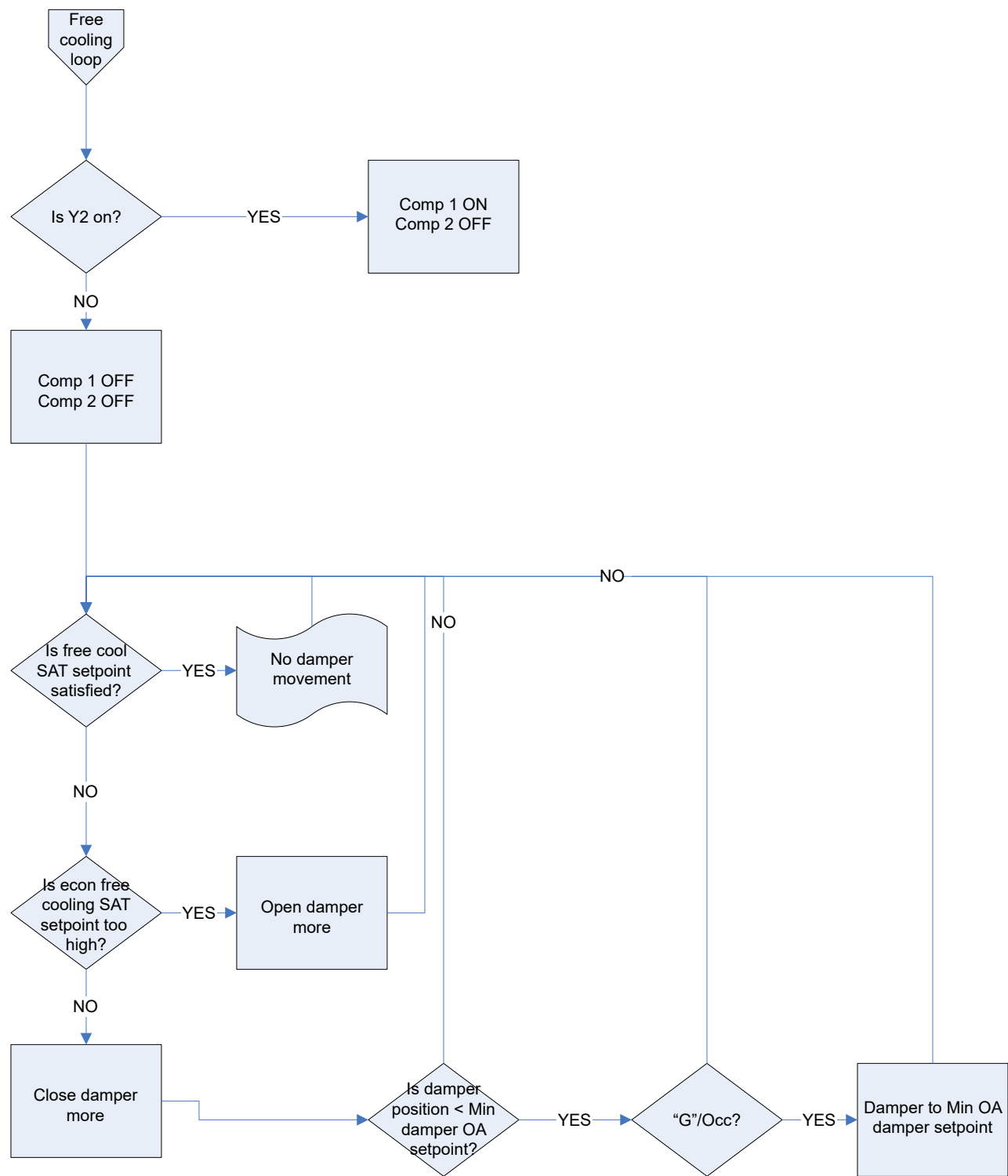Economizer Mode 3 Sequence of Operations

Ionization ON

Free cooling check loop

'G'/Occ? — OFF → Call for cooling & free cooling available? — YES → Free cooling loop → Machine code 5

Call for cooling & free cooling available? — NO → Damper closed Y1 = Comp 1 Y2 = Comp 2 → Machine code 1

'G'/Occ? — ON → PE loop → IAQ loop → Call for heat or call for cooling, no free cooling available?

Call for heat or call for cooling, no free cooling available? — YES → Y1 = Comp 1 Y2 = Comp 2 → Is this a 2-speed/VFD fan RTU? — YES → Move damper to calculated position + 2-speed/VFD offset → Machine code 3

Is this a 2-speed/VFD fan RTU? — NO → Move damper to calculated position → Machine code 2

Call for heat or call for cooling, no free cooling available? — NO → Call for cooling & free cooling available? — YES → Free cooling loop → Machine code 5

Call for cooling & free cooling available? — NO → Is this a 2-speed/VFD fan RTU? — YES → Move damper to calculated position + 2-speed/VFD offset → Machine code ?

Is this a 2-speed/VFD fan RTU? — NO → Move damper to calculated position Y1 = Comp 1 Y2 = Comp 2 → Machine code ?

iAIRE

Economizer Controller
Free Check Cooling Loop

Free cooling check loop

Is OA Temp<Econ High Temp Limit Setpoint?
— YES — NO → **Free cooling not available**

YES ↓

Is OA Temp<Econ Low Temp Limit Setpoint?

NO ↓

Is there an enthalpy or humidity sensor
— YES ► Is enthalpy/humidity OK for free cooling?

NO — YES

Free cooling available

iAIRE Economizer Controller
Free Cooling Loop

```
Free cooling loop
    │
    ▼
  Is Y2 on? ──YES──▶ Comp 1 ON / Comp 2 OFF
    │
    NO
    │
    ▼
Comp 1 OFF / Comp 2 OFF
    │
    ▼
Is free cool SAT setpoint satisfied? ──YES──▶ No damper movement
    │
    NO
    │
    ▼
Is econ free cooling SAT setpoint too high? ──YES──▶ Open damper more
    │
    NO
    │
    ▼
Close damper more ──▶ Is damper position < Min damper OA setpoint? ──YES──▶ "G"/Occ? ──YES──▶ Damper to Min OA damper setpoint
```

NO

NO

iAIRE

Economizer Controller
PE Loop

```
PE loop
  │
  ▼
Is BP enabled? ──YES──> Is BP = BP setpoint? ──YES──> Keep EX fan speed constant
  │                          │
  NO                         NO
  │                          ▼
  ▼                      Is BP < BP setpoint? ──NO──> Lower EX fan speed
Is damper position >         │
power exht 1 position        YES
configuration? ──NO──>       ▼
PE 1 OFF / PE 2 OFF      Increase EX fan speed
  │
  YES
  │
  ▼
Turn on PE1
  │
  ▼
Is damper position >
power exht 2 position
configuration? ──NO──> PE 2 OFF
  │
  YES
  │
  ▼
Turn on PE 2
```

PID

iAIRE

Economizer Controller
IAQ Loop

IAQ Loop

Is CO2 < DCV min level position?

YES → CO2 calculated OA & PE fan speed is DCV econo min position speed

NO

Is CO2 > DCV min level position?

YES → CO2 calculated OA & PE fan speed is econo min position configuration speed

NO

Calculate straight line OA & PE fan spped for CO2

Is VOC < VOC min level position?

YES → VOC calculated OA & PE fan speed is IAQ econo min position speed

NO

Is VOC > VOC min level position?

YES → VOC calculated OA & PE fan speed is IAQ econo max position speed

NO

Calculate straight line OA & PE fan spped for VOC

Calculate the new OA & PE fan speed adding CO2 & VOC speeds together

The following are reference product installation sheets

READ THESE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

INSTALLATION

The *iAIRE* temperature probe is both non-polarity and non-position sensitive. All thermistor type room units are supplied with a two-pole terminal block. It is recommended to use 18-20 AWG twisted pair wire or shielded cable for sensor installation (10 ft. provided).

MOUNTING

The temperature probe should be mounted using (2) two screws through the existing screw holes.
(Unit can be mounted in any position or angle)
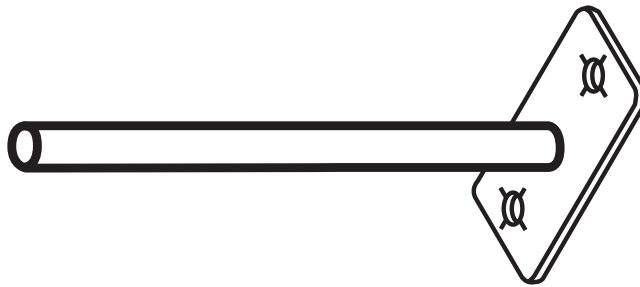
WIRING

The wires for the temperature probe should land at the desired location (either the SAT or OAT location on your controller).

⚠ *(Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)*

Black

Red
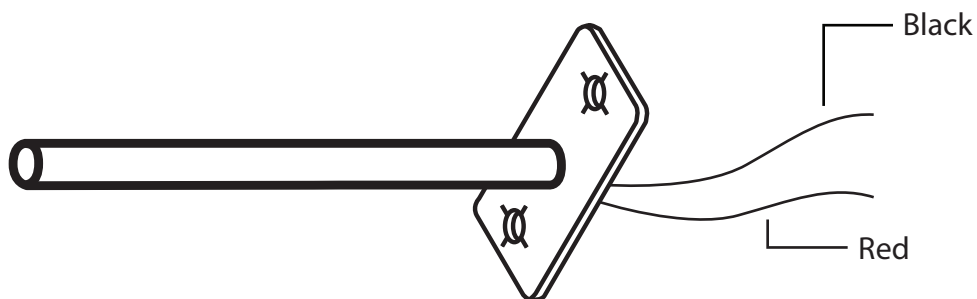
ION-0A*00 INSTALL

Ion Generator for AHUs, Heating and AC Units

READ THESE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

INSTALLATION

The *iAIRE* ion generator is a versatile product and can be mounted in any type HVAC system. It is designed for airflows of up to 2,500 CFM and standard VOC loading. 1250 CFM in smoking environments.

MOUNTING

Find a suitable location in the air stream. The optimal location is at the inlet to the supply fan. Keep the carbon fiber needles far enough away from any conductive surface to prevent arcing.

The ion air purifier has two mounting flanges with a hole to accommodate 1/8" self tapping sheet metal screws [figure 1.1]. With the provided metal screws, mount the ion air purifier perpendicular to and in the middle of the air stream such that air will flow between the carbon fiber needles [figure 1.2]. The exposed end of the screw should not protrude from the unit where someone can be cut on the screw tip.

In some cases, to properly mount the ion air purifier, the optional mounting bracket (not included) is required [figure 1.3].

This bracket has (4) holes: (2) that accommodate mounting of the ion air purifier and (2) for mounting with #10 hardware to a surface so the air purifier is perpendicular to the air stream.

fig. 1.1 (mounting)

Top

fig. 1.2 (airflow)
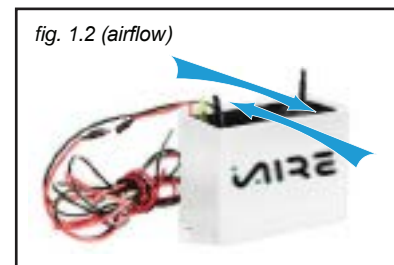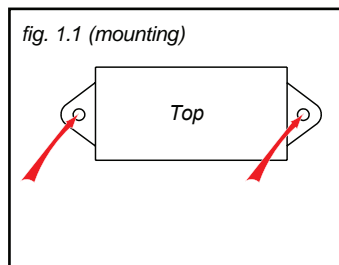
fig. 1.3 (optional mounting bracket)

Mounting holes for ion air purifier

Mounting holes for bracket

PN: UNV0016 (not included)
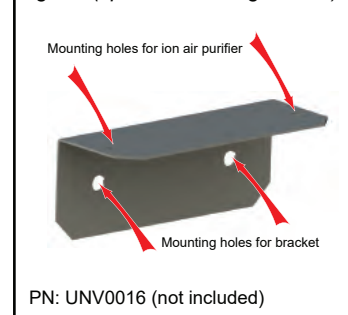
MAINTENANCE

A small cleaning brush (GNP-0148) is included for easy, routine maintenance. This should be done as the ion brushes become dirty, usually once a month.

⚠ *(Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)*

I O N - 0A * 00

VOLTAGE:
A - 24VAC / VDC, 1φ
D - 115VAC, 1φ
G - 208/230VAC, 1φ

- Verify the product will not overload the power requirement for the HVAC system before wiring.
- Check the label on the product and wire it only to the voltage range shown. The 24V product accepts VAC/VDC power and can be utilized as a lower voltage block with less output.
- Unit should be interlocked to fan operation ("G" terminal) or other similar control.
- Inline C-Class Fusing:

    500mA @ 24V; (FUS-0037)
    200mA @ 115V/208V/230V (FUS-0048)

- Green LED will illuminate when powered and operating.

35 inch red = Positive (HVAC "G" Terminal)

35 inch black = Neutral or Ground (HVAC "C" Terminal) or chassis in case of furnace

Inline C-Class Fuse

UL STD 867

CAN/CSA STD C22.2

CE

ETL

File# 101141865COL-003

SEN-0002 INSTALL

UltraPURE

READ THESE INSTRUCTIONS BEFORE YOU BEGIN INSTALLATION

INSTALLATION

The **iAIRE** CO2 sensor is a versatile product and can be mounted to any standard wall. It is designed for real-time CO2 detection in basic HVAC and Ventilation systems.
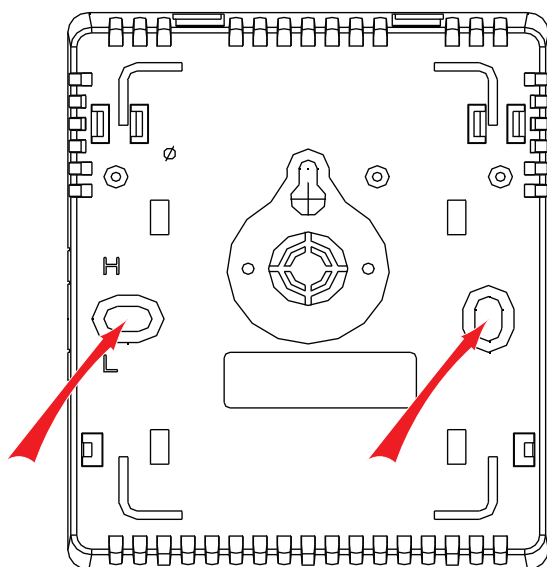
MOUNTING

Find a suitable location on the wall to mount the sensor. The sensor should be mounted at a similar height to the thermostat.

⚠ *(It is recommended when mounting on a wall to secure the unit using drywall anchors or to wall studs directly.)*

Using screws, mount the sensor to the wall ensuring it is secure.
(Unit should be mounted vertically so that product labels are facing up)

(hole for wall mounting located on back of device)

WIRING

⚠ *(Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)*

• Only 0~10VDC output

iAIRE, LLC   *iAIRE* Economizer Controller
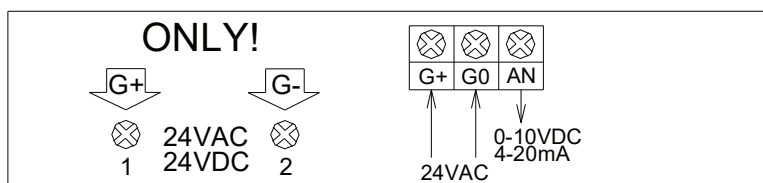
SEN-0071 INSTALL

SEN-0071 - Indoor Air Quality Indicator & Transmitter

READ THESE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

INSTALLATION

◆ Always cut off power before mounting, removing, or cleaning the monitor.

◆ Notice the supply power voltage of the transmitter: 24VAC/VDC. Do not install the transmitter on voltages higher than marked on the transmitter. 24VAC/VDC.

Figure.1
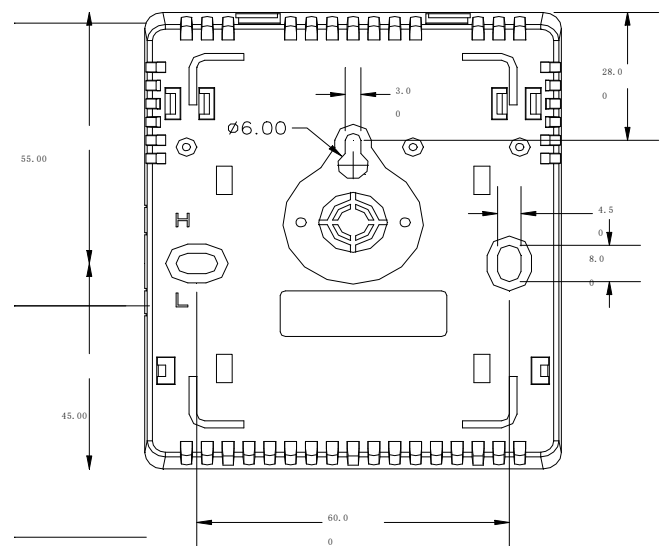
Mounting and Wire Connection

◆ With power off, put a flat head screwdriver deep inside of the hole on the top of the detector housing following step 1 in figure 2. Then slant the screwdriver and gently separate the cover from the wall plate by following steps 2 through 4.

Figure.2
Opening steps
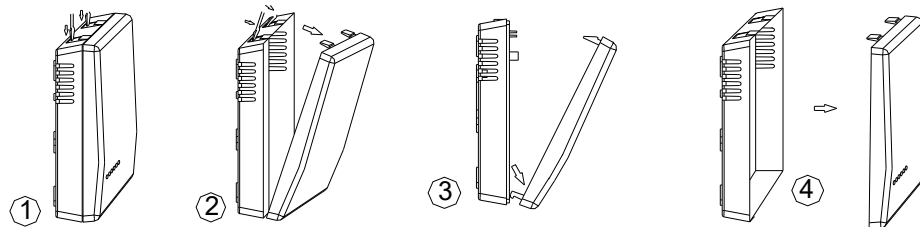
◆ The transmitter should be mounted near the place where you want to detect VOC level. However, do not mount the detector near a steam source, such as a diffuser, or in direct sunlight.

IOM-0027   **iAIRE, LLC | 2100 Consulate Drive, Suite 102, Orlando, FL 32837 www.myultrapure.com | Toll Free 844-348-9168**   PD 03/11/2021 - v 01.50

iAIRE, LLC   *iAIRE* Economizer Controller

iAIRE

SEN-0072 Install

SEN-0072 Duct VOC Sensor

READ THESE INSTRUCTIONS BEFORE YOU BEGIN INSTALLATION

INSTALLATION

The *iAIRE* VOC sensor is a versatile product and can be mounted to any standard duct. It is designed for real-time VOC detection in basic HVAC and Ventilation systems.

MOUNTING

Drill a 1-1/8" [28mm] hole in the air duct.

Slide a sealing ring onto the pitot tube and insert into the hole in the air duct. Orientate the pitot tube (see dimension drawing) based upon the direction of the airflow. Use a Phillips screwdriver to secure the pitot tube to the air duct with screws.

Slide main unit in horizontally (top of main unit is downstream) and then rotate it on the pitot tube interface 90 degrees clockwise. This will fix the main unit in place.
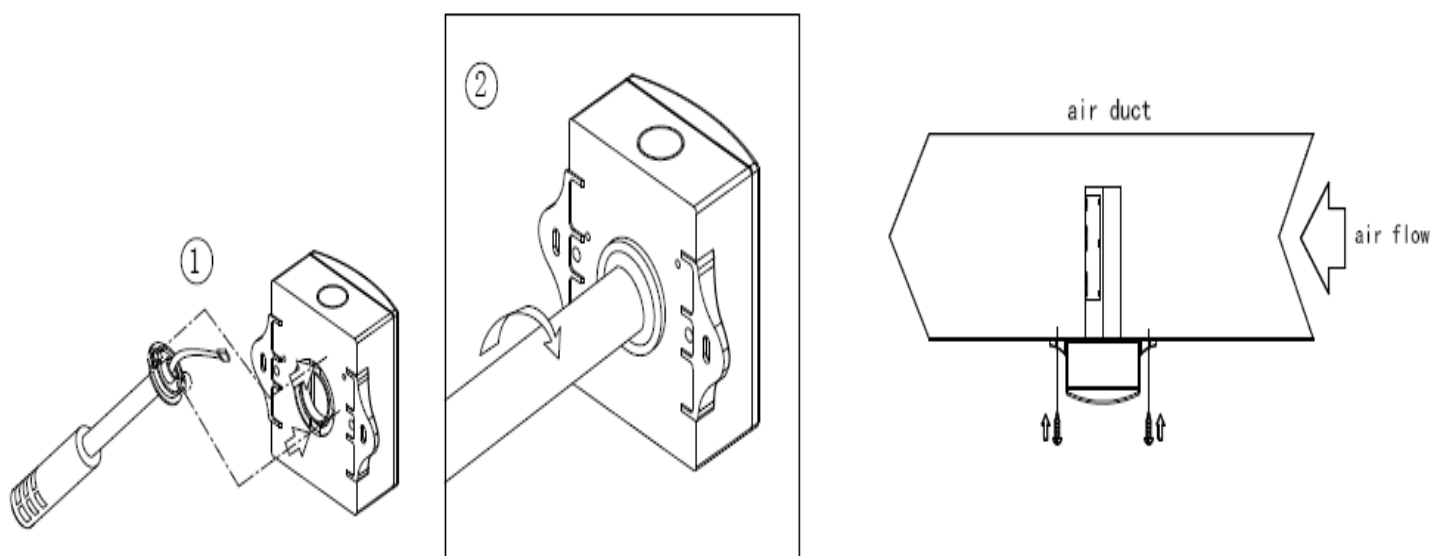
Install or move the probe

The air flow direction

Open the casing for the electrical wiring by removing the (2) screws.
After wiring the connections (see wiring diagram below), lock the inlet of the waterproof connection by tightening it securely. Replace the electrical casing and secure with the (2) screws.
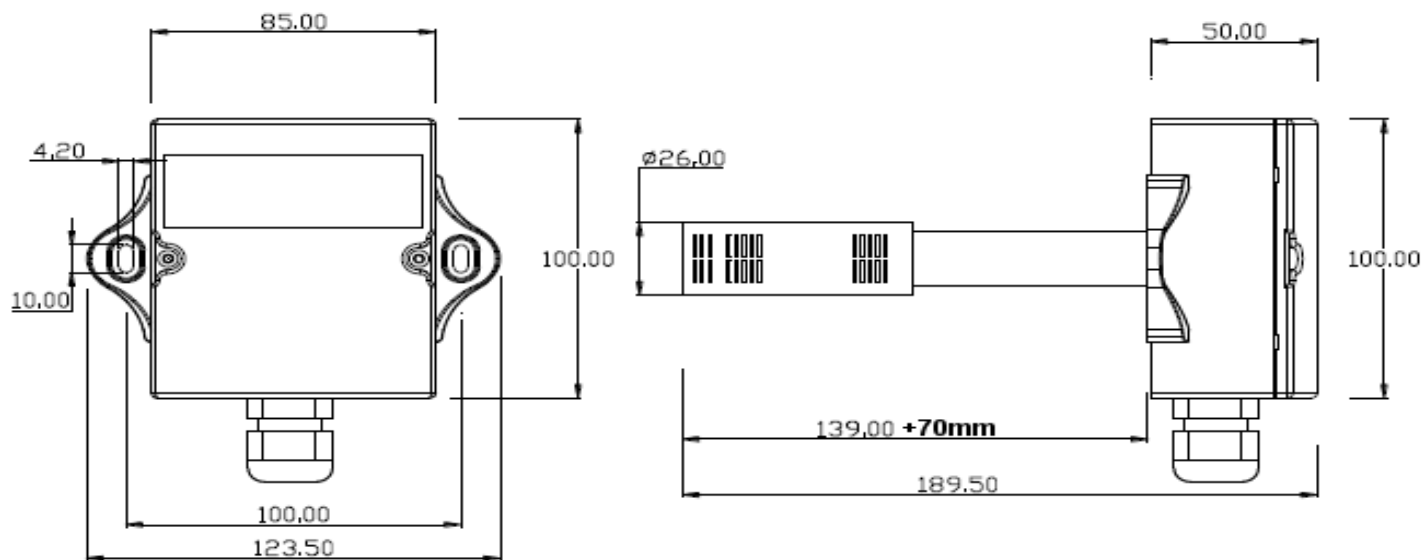
IOM-0042 | iAIRE, LLC | 2100 Consulate Drive, Suite 102, Orlando, FL 32837 www.myultrapure.com | Toll Free 844-348-9168 | PD 10/21/2021 - v 1.01

iAIRE, LLC | *iAIRE* Economizer Controller

DIMENSIONS
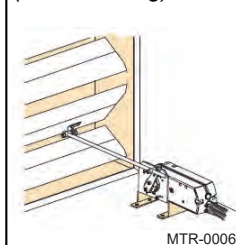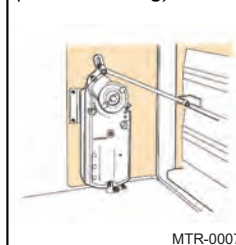

WIRING

⚠ (Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)

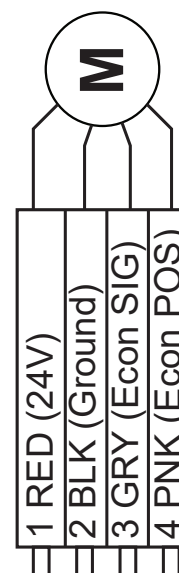iAIRE, LLC   *iAIRE* Economizer Controller

![iAIRE UltraPURE logo]
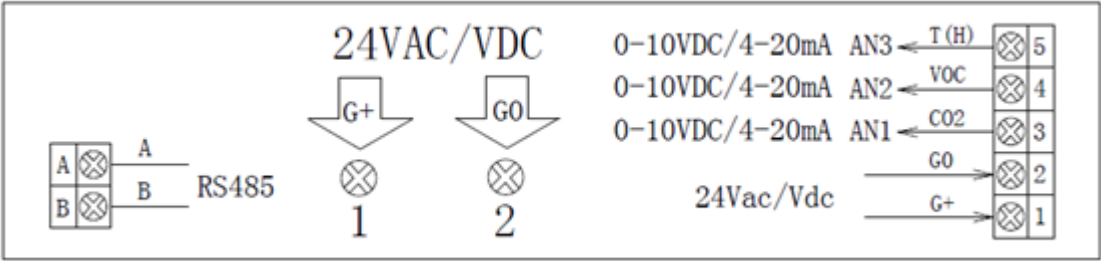
MTR-000* INSTALL

READ THESE INSTRUCTIONS BEFORE YOU BEGIN INSTALLATION

INSTALLATION

The *iAIRE* actuators have standardized footprints, wiring configurations and checkout procedures allowing for fast installation resulting in lower installed cost.

MOUNTING

There are several mounting options for the MTR-000* actuators.

For easy mounting on short shafts without special accessories, the self-centering shaft adapter can be mounted on the backside of the actuator. Each actuator includes an adapter so that the position indicator is still easily viewed [figure 1.1].

The frame mounting kit (MTR-0002) is used when the actuator cannot be directly mounted on the damper shaft due to space limitations [figure 1.2].

Easily replace existing Honeywell, Johnson and Barber-Colman modulating motors using the foot mounting kit (MTR-0003). The foot mounting kit can also be used for placing the actuator in the air stream and linking to the damper blades [figure1.3].

Other kits provide additional mounting options such as wall mounting (MTR-0004) [figure 1.4].

(For all kits, parts are included, except for the damper rod.)

fig. 1.1
(short shaft mounting)
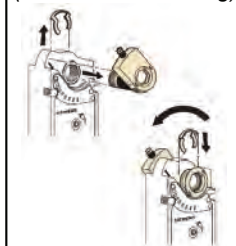
fig. 1.2
(frame mounting)
MTR-0005
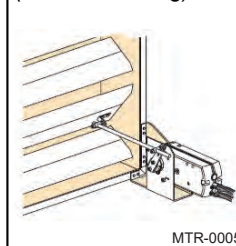
fig. 1.3
(foot mounting)
MTR-0006

fig. 1.4
(wall mounting)
MTR-0007

WIRING

⚠ *(Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)*

Multiple acutators can be powered off of one transformer (up to ten on one transformer) [figure 2.1].

Actuators can be wired in parallel with one signal driving up to ten actuators. Feedback should not be wired together and can be read off of one of the actuators [figure 2.2].

Actuators can be wired in parallel with one signal driving a bank of up to ten actuators. Multiple transformers can power multiple actuators. Feedback should not be wired together and can be read off of one of the actuators [figure 2.3].

Master and slave actuators can be tandem mounted for 0 to 10 V applications. This effectively doubles the torque produced by one actuator. This unique feature allows the actuators to operate in a wider range of applications [figure 2.4].

With the settings shown in [figure 2.5], two 0 to 10 V actuators can be sequenced such that the first one will operate at 0 to 2 V and the second at 2 to 10 V. This feature allows for specialized applications, such as staging or minimum required airflow.

M

1 RED (24V)
2 BLK (Ground)
3 GRY (Econ SIG)
4 PNK (Econ POS)

IOM-0033   **iAIRE, LLC | 2100 Consulate Drive, Suite 102, Orlando, FL 32837**
www.myultrapure.com | Toll Free 844-348-9168   PD 03/25/2021 - v 01.30

iAIRE, LLC   *iAIRE* Economizer Controller

MTR-000* INSTALL

WIRING CONFIGURATIONS

fig. 2.1
(one transformer)
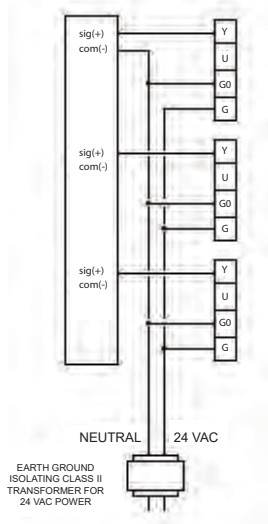
fig. 2.2
(parallel w/ one signal)
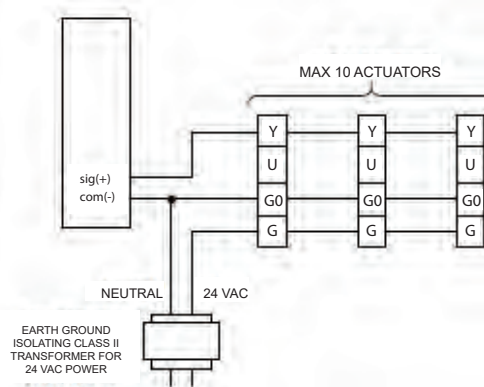

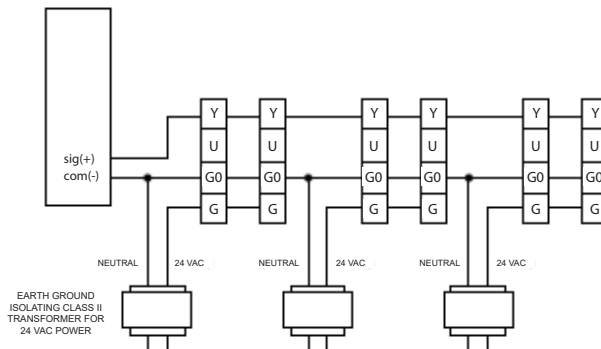MAX 10 ACTUATORS

fig. 2.3
(parallel w/ multiple transformers)

fig. 2.4
(master and slave)

fig. 2.5
(sequencing)
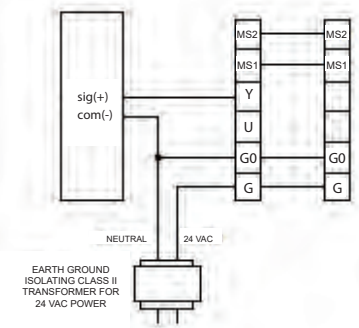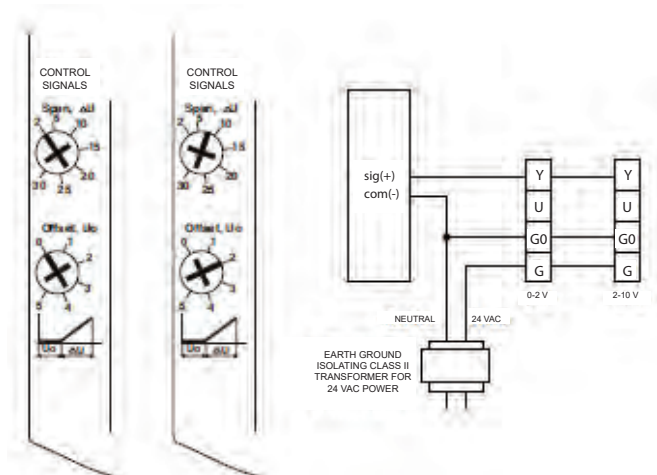
iAIRE, LLC   *iAIRE* Economizer Controller

![iAIRE UltraPURE]

SEN-0001 INSTALL

READ THESE INSTRUCTIONS BEFORE YOU BEGIN INSTALLATION

INSTALLATION

The *iAIRE* Humidity sensor is a versatile product and can be mounted to any standard wall. The unit is designed to transmit relative humidity and temperature measurements.

MOUNTING

Find a suitable location on the wall to mount the sensor.
⚠ *(It is recommended when mounting on a wall to secure the unit using drywall anchors or to wall studs directly.)*

Using screws, mount the sensor to the wall ensuring it is secure.
(Unit should be mounted vertically so that product labels are facing up)

(holes for wall mounting)
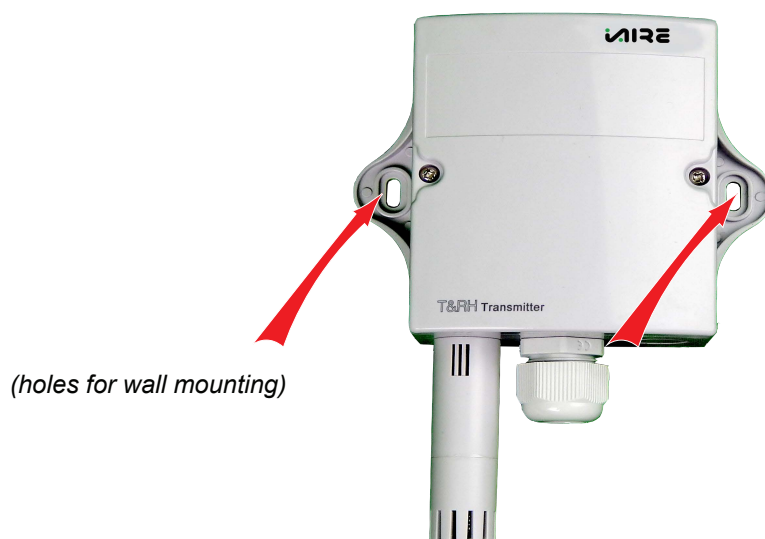
WIRING

⚠ *(Be sure to follow all local and electrical codes. Turn off power to the unit before mounting or making any connections.)*

- 2x0~10VDC (default) or 2x4~20mA(selectable by jumpers)
- 2x0~5VDC (selected when order is placed)

To change the output, follow steps below:
 - Power off and remove the face cover, you can see a set of short-circuit block jumpers S1-S4 in the middle of the PCB board. When you block the top two pins of the S1-S4, the analog output is voltage output. Blocking the lower two pins sets analog output.

 - There is a set of short circuit block jumpers J1-J3 in the top of the PCB board. Connecting or disconnecting the J1 will switch between 0-10V and 4-20mA outputs.

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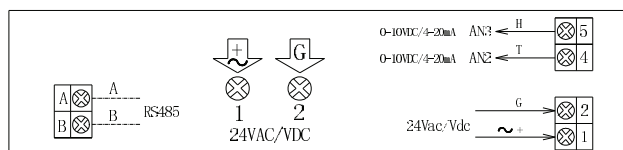
Addendum:
# Wiring Diagrams

Existing Controller Wiring Diagrams

When replacing the economizer controller, use the diagrams below to verify where wires should be cut and landed to the new *iAIRE* economizer controller terminal strips.
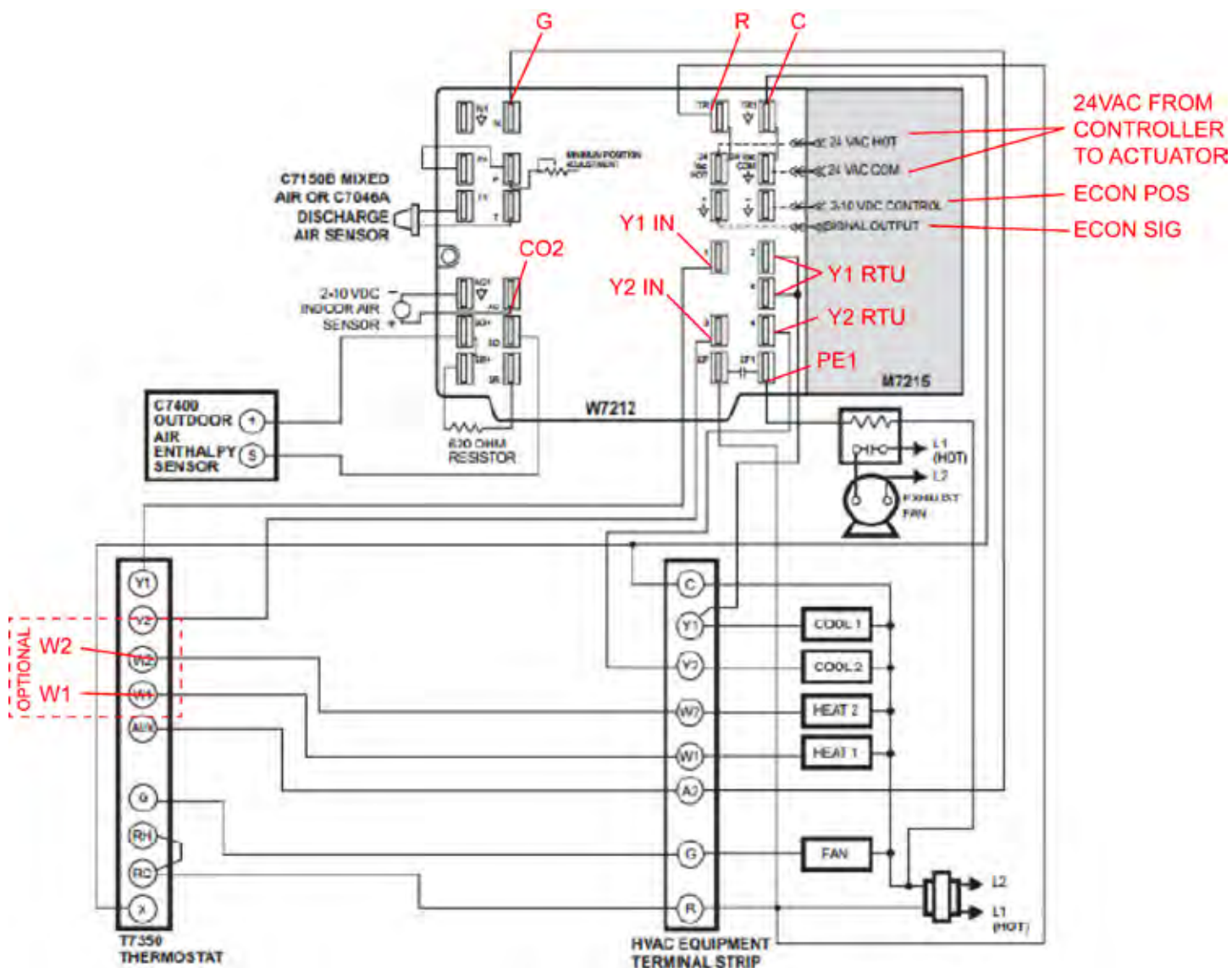
(Honeywell W7212)
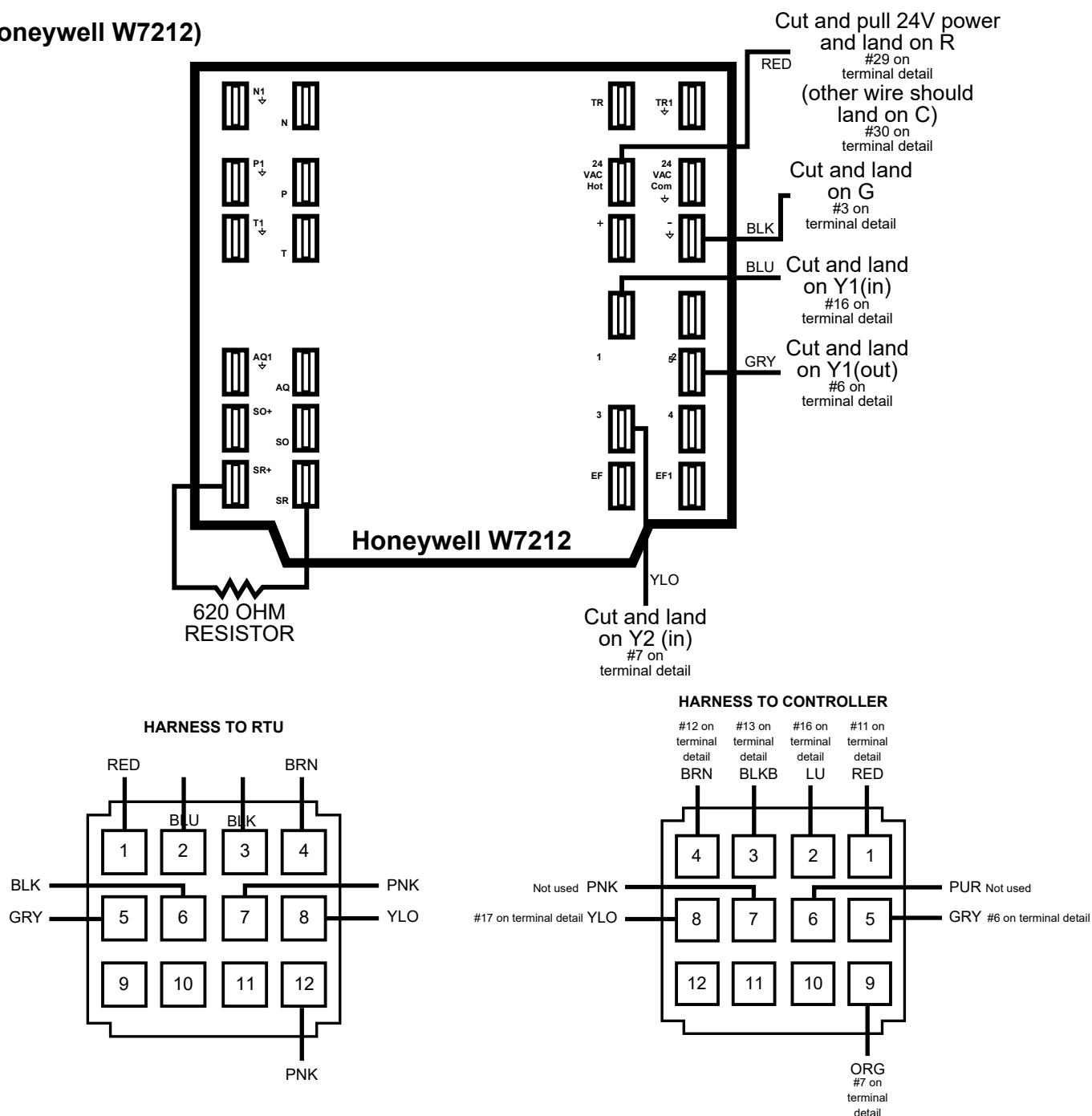
Leave the two halves of the harness plugged together. Tie wires off of harness to the controller plug end to the *iAIRE* **terminal strips.**
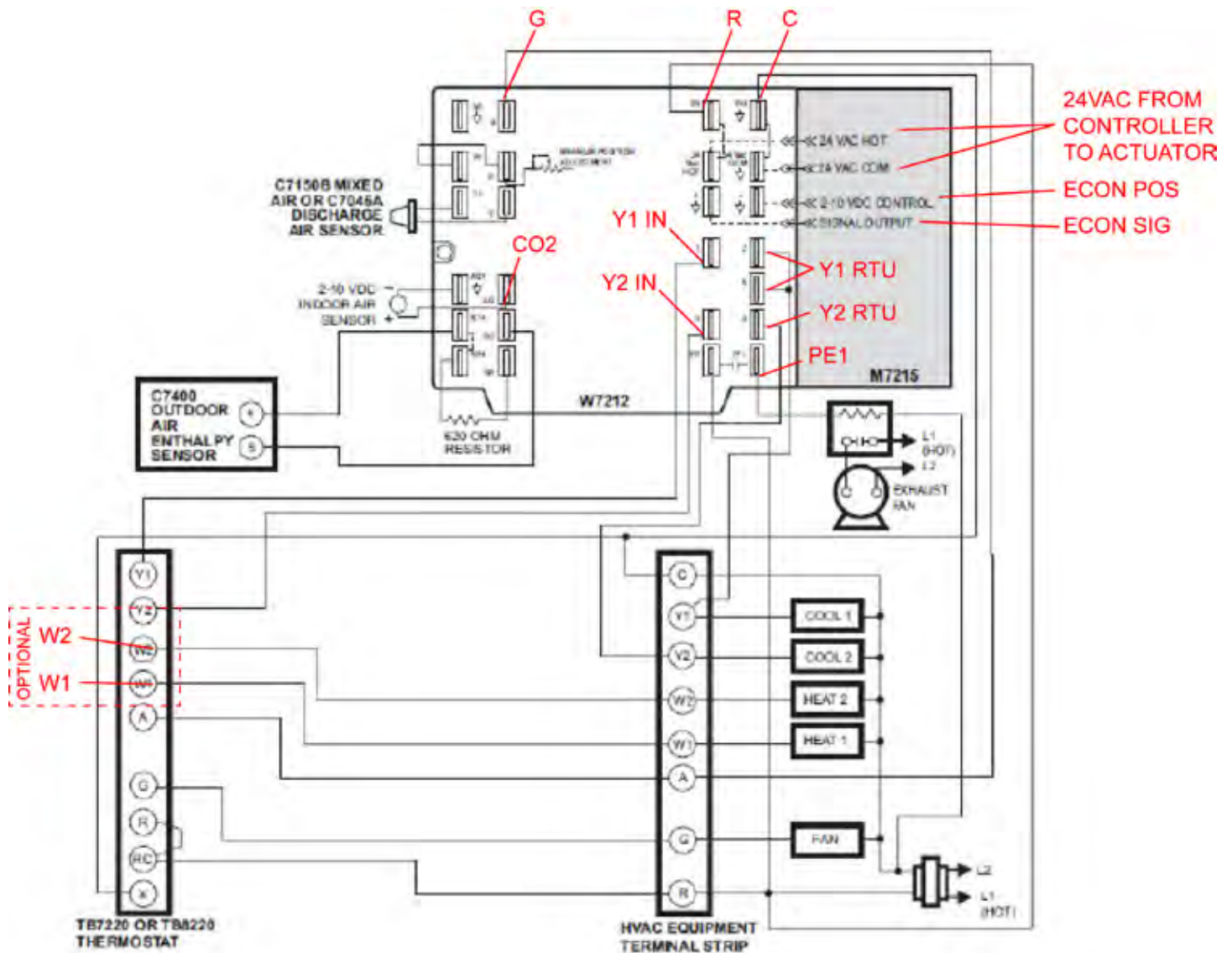
All other wires are not needed. Either discard extra wires or make sure they will not interfere with the new *iAIRE* controls system.
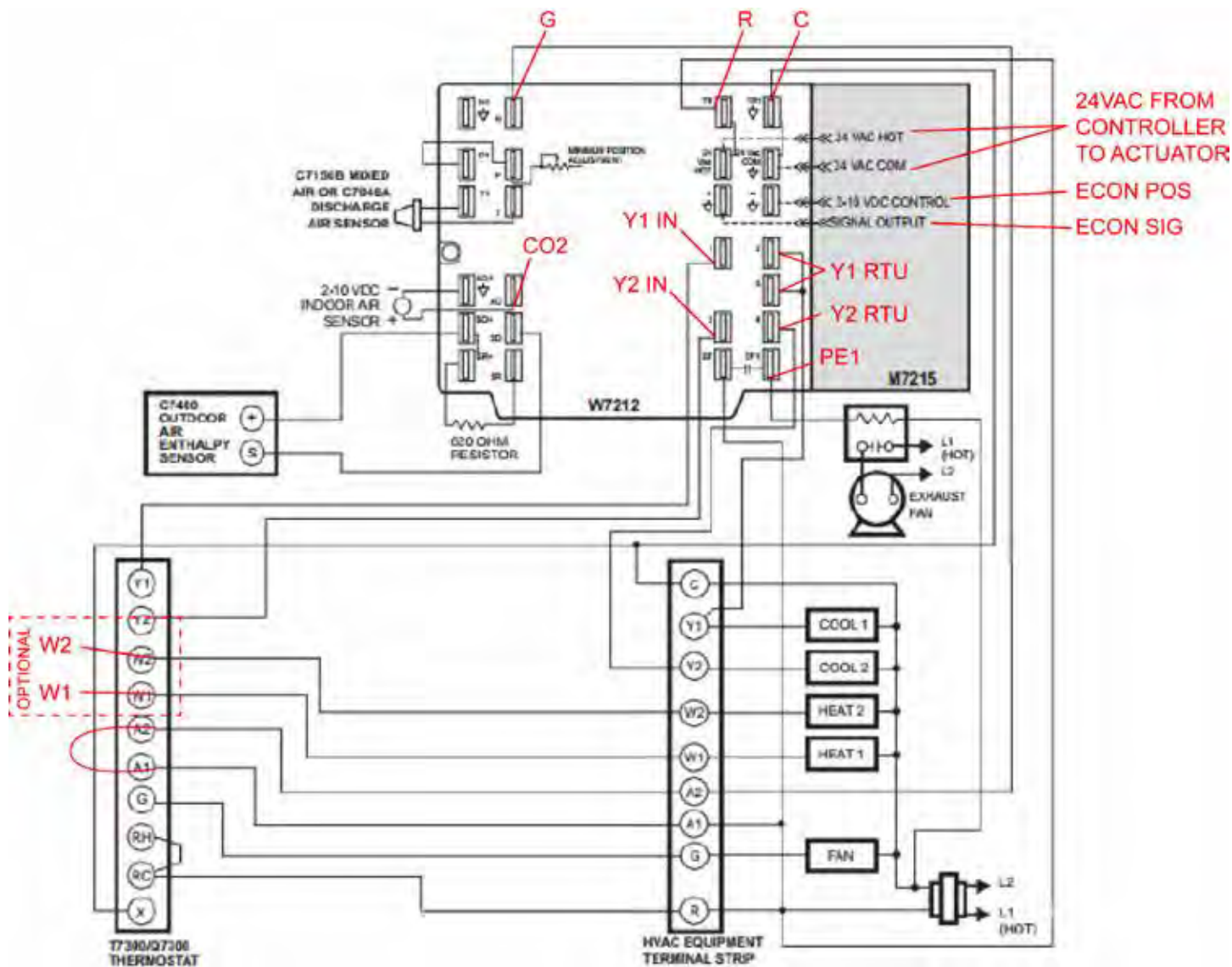
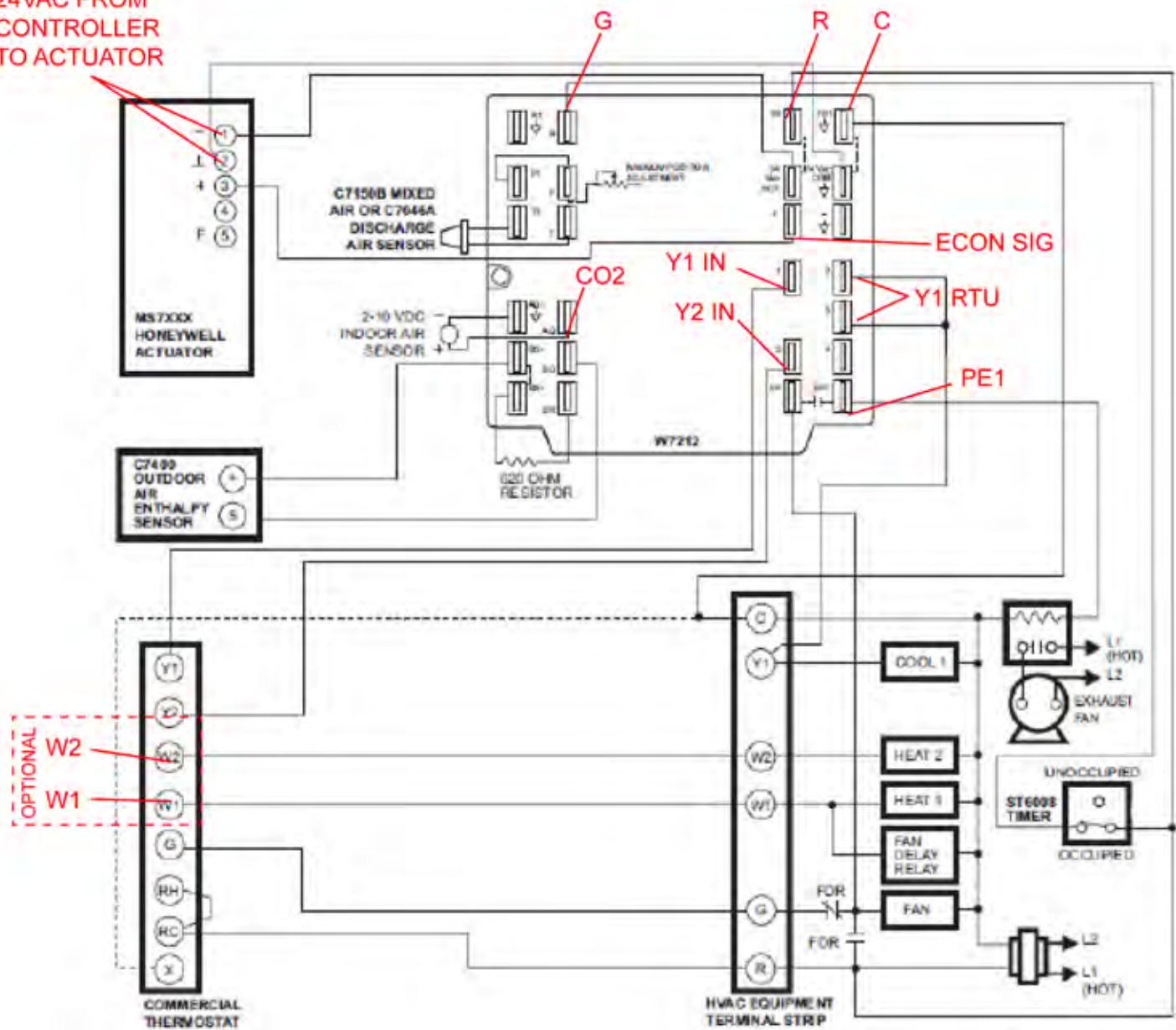**7212 with M7215 damper motor and T7300 thermostat**

24VAC FROM CONTROLLER TO ACTUATOR
ECON POS
ECON SIG

7212 with M7215 damper motor and T7350 thermostat

7212 with M7215 damper motor and TB7220 or TB8220 thermostat

24VAC FROM CONTROLLER TO ACTUATOR

G   R   C

C7150B MIXED AIR OR C7046A DISCHARGE AIR SENSOR

ECON SIG

CO2

Y1 IN

Y2 IN

Y1 RTU

PE1

MS7XXX HONEYWELL ACTUATOR

2-10 VDC INDOOR AIR SENSOR

C7400 OUTDOOR AIR ENTHALPY SENSOR

620 OHM RESISTOR

W7212

COMMERCIAL THERMOSTAT

OPTIONAL
W2
W1

HVAC EQUIPMENT TERMINAL STRIP

COOL 1

HEAT 2

HEAT 1

FAN DELAY RELAY

FAN

FDR

L1 (HOT)
L2

EXHAUST FAN

UNOCCUPIED

ST6008 TIMER

OCCUPIED

L2
L1 (HOT)

7212 with single-stage cooling system with single enthalpy changeover and Honeywell actuator and time clock for occupancy.
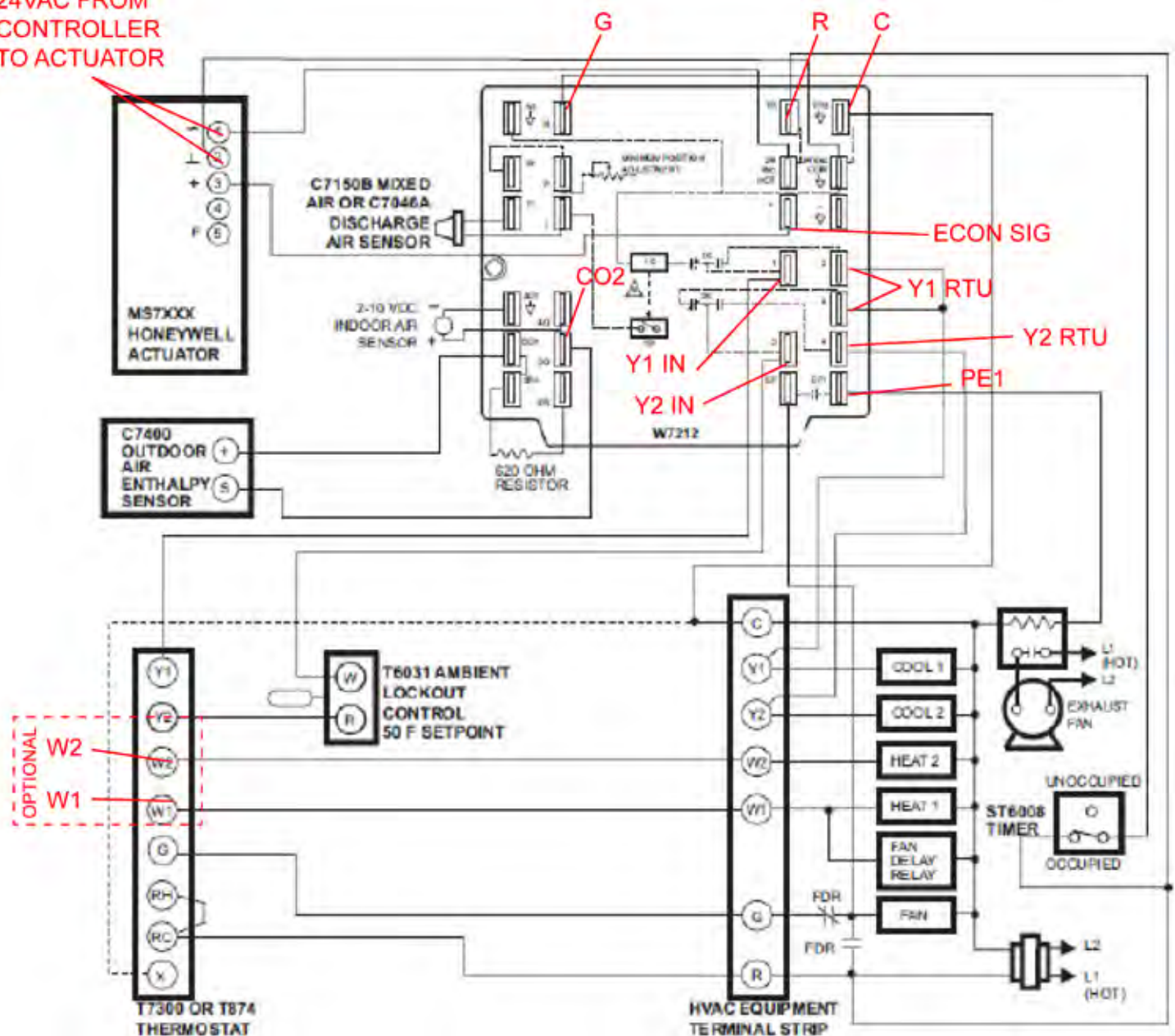
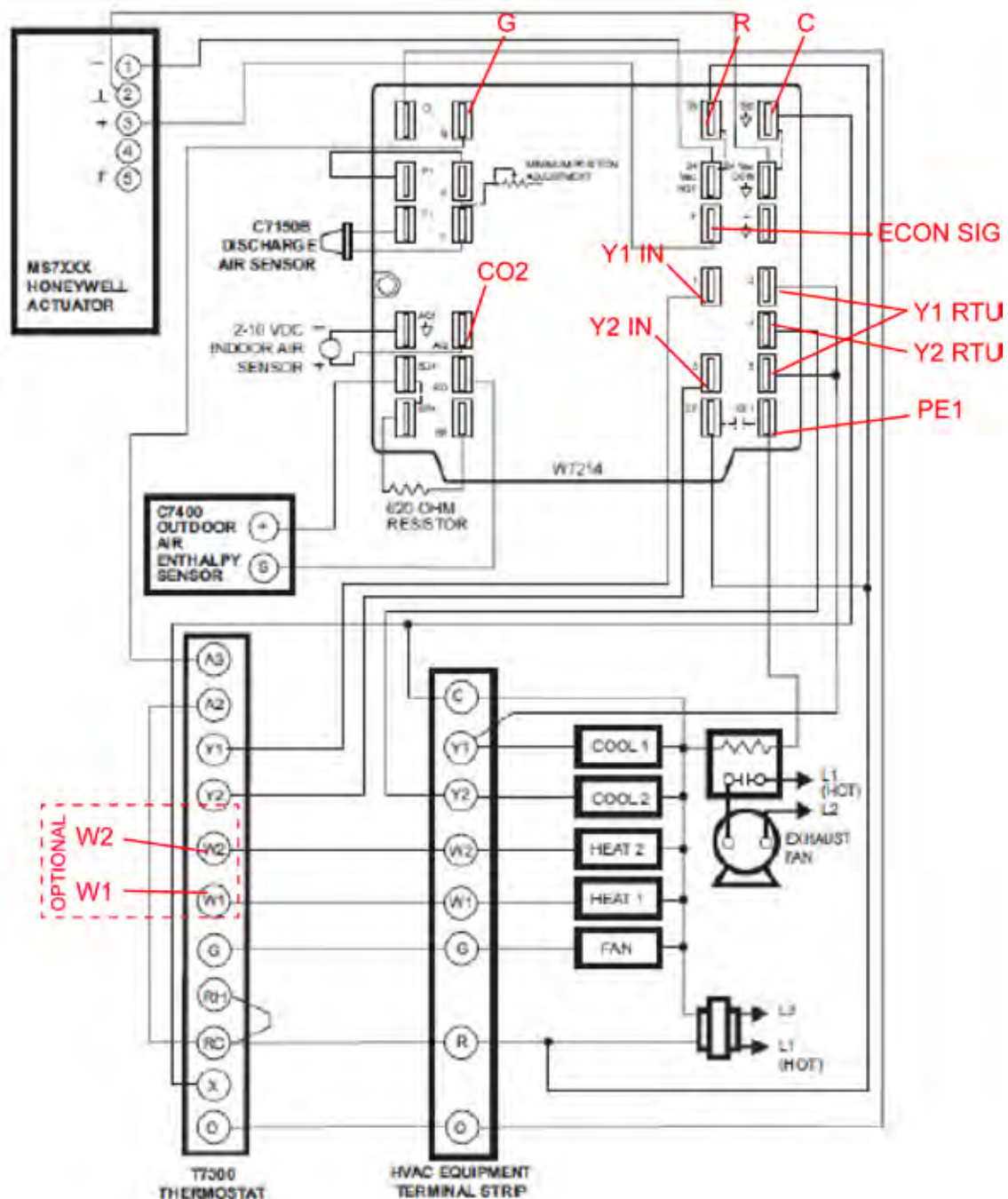**7212 with two-stage cooling system with Honeywell Series 72 Actuator and time clock for occupancy.**
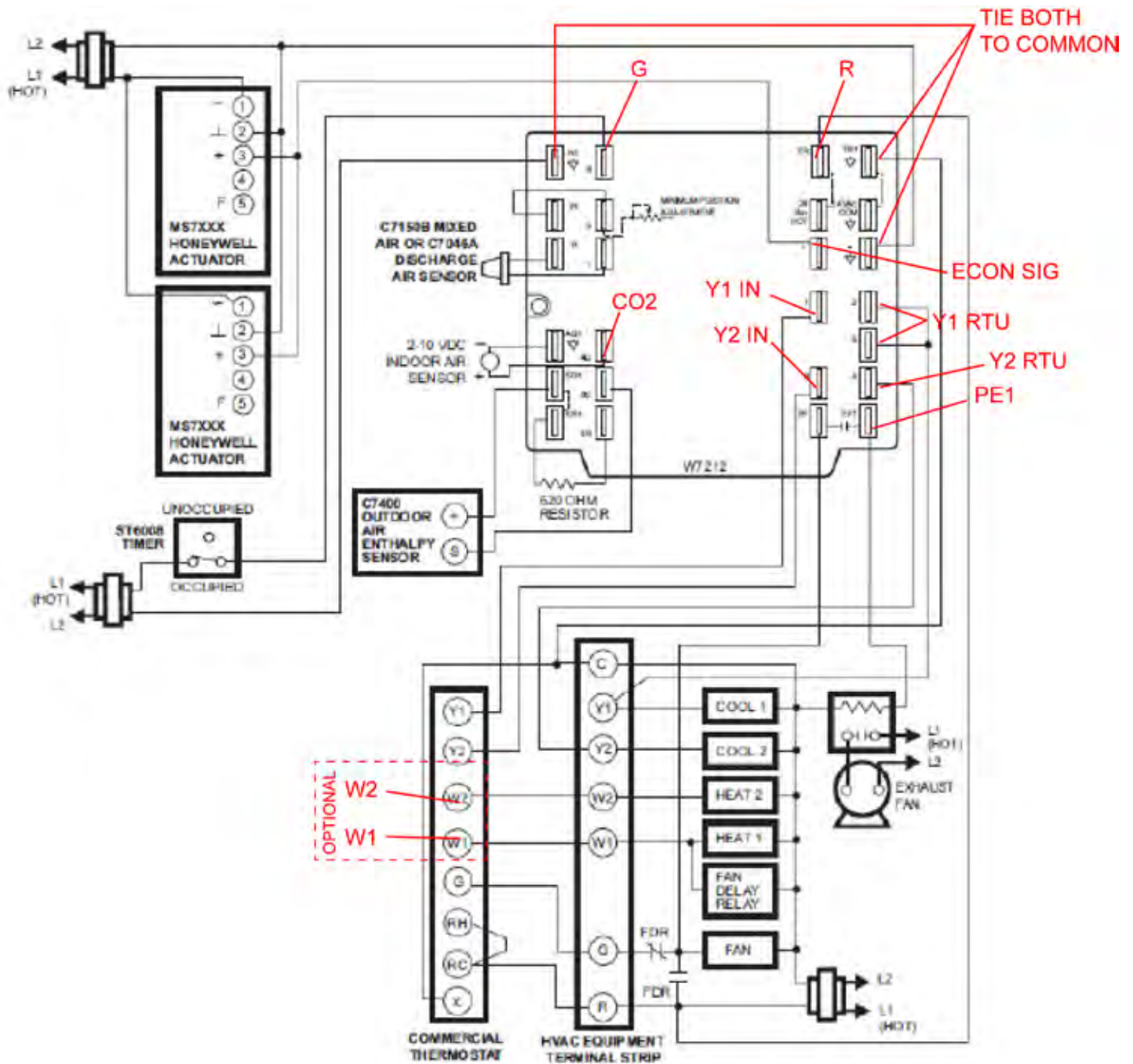
7212 controlling parallel-wired Honeywell Series 72 Actuators and time clock for occupancy.

7213, 7214 controlling heat pump system.