EcoBlue and Economizer Training

Bob Friedman

Technical Support 1-800-264-2512 Option 3, then 1

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New 3-6 Ton Rooftop

Vane Axial Indoor Fan System

Gas Heating / Electric Cooling Models – 48FC

Nominal Cooling Ton Size	Cooling Stages	AHRI Efficiency (SEER) IEER
3	1	(14.0)
4	1	(14.0)
5	1	(14.0)
6	2	15.0

Electric Heat / Electric Cooling & Cooling Only Models – 50FC

Nominal Cooling Ton Size	Cooling Stages	AHRI Efficiency (SEER) IEER
3	1	(14.0)
4	1	(14.0)
5	1	(14.0)
6	2	15.2

Larger sizes are available now on the FC’s

48/50FC04-07 WeatherMaker® Single-Package Gas Heating/Electric Cooling and Electric Cooling Rooftop Units with Optional Electric Heat with Puron® Refrigerant (R-410A), 3 to 6 Nominal Tons

Product Data 02/01/2021 48-50FC-4-7-03PD

48/50FC08-16 WeatherMaker® Single-Package Gas Heating/Electric Cooling and Electric Cooling Rooftop Units with Optional Electric Heat with Puron® Refrigerant (R-410A), 7.5 to 15 Nominal Tons

Product Data 08/01/2022 48-50FC-8-16-01PD

48/50FC20-30 WeatherMaker® Single-Package Gas Heating/Electric Cooling and Electric Cooling Rooftop Units with Optional Electric Heat with Puron® Refrigerant (R-410A), 17.5 to 27.5 Nominal Tons

Product Data 08/01/2022 48-50FC-20-30-01PD

Gas Heating / Electric Cooling Models – High Efficient 48GC

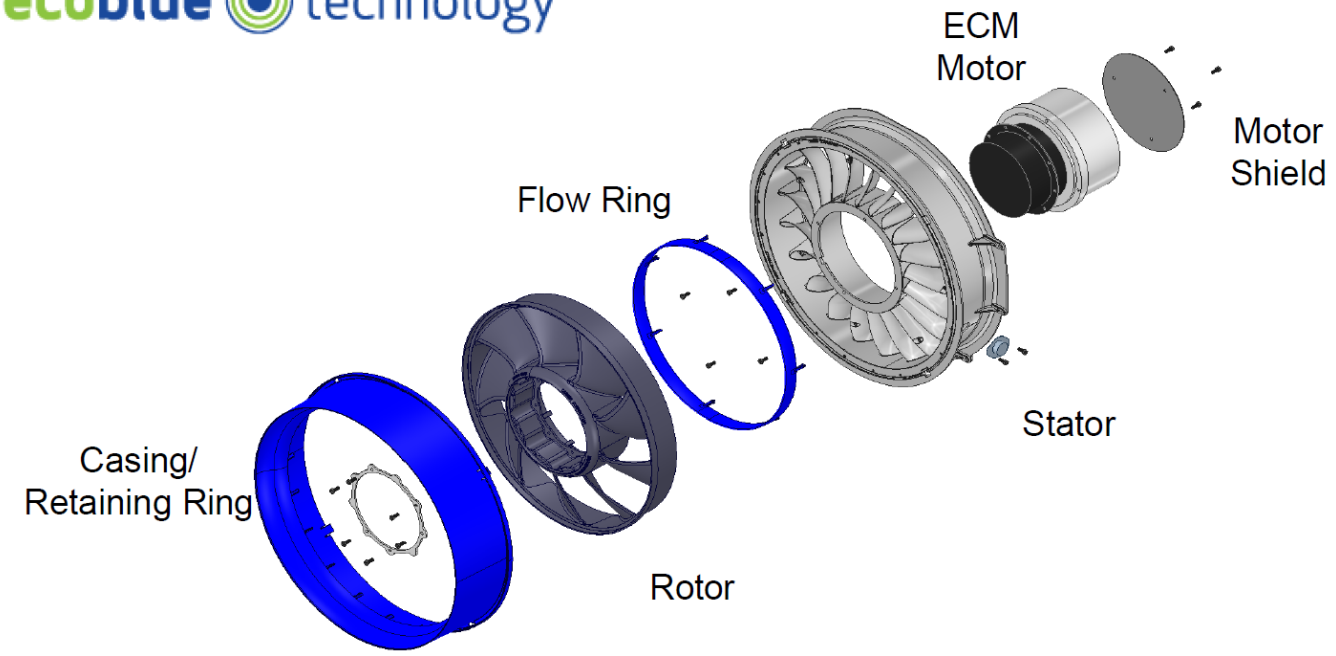
Nominal Cooling Ton Size	Cooling Stages	AHRI Efficiency SEER
3	2	16.0
4	2	16.0
5	2	16.0

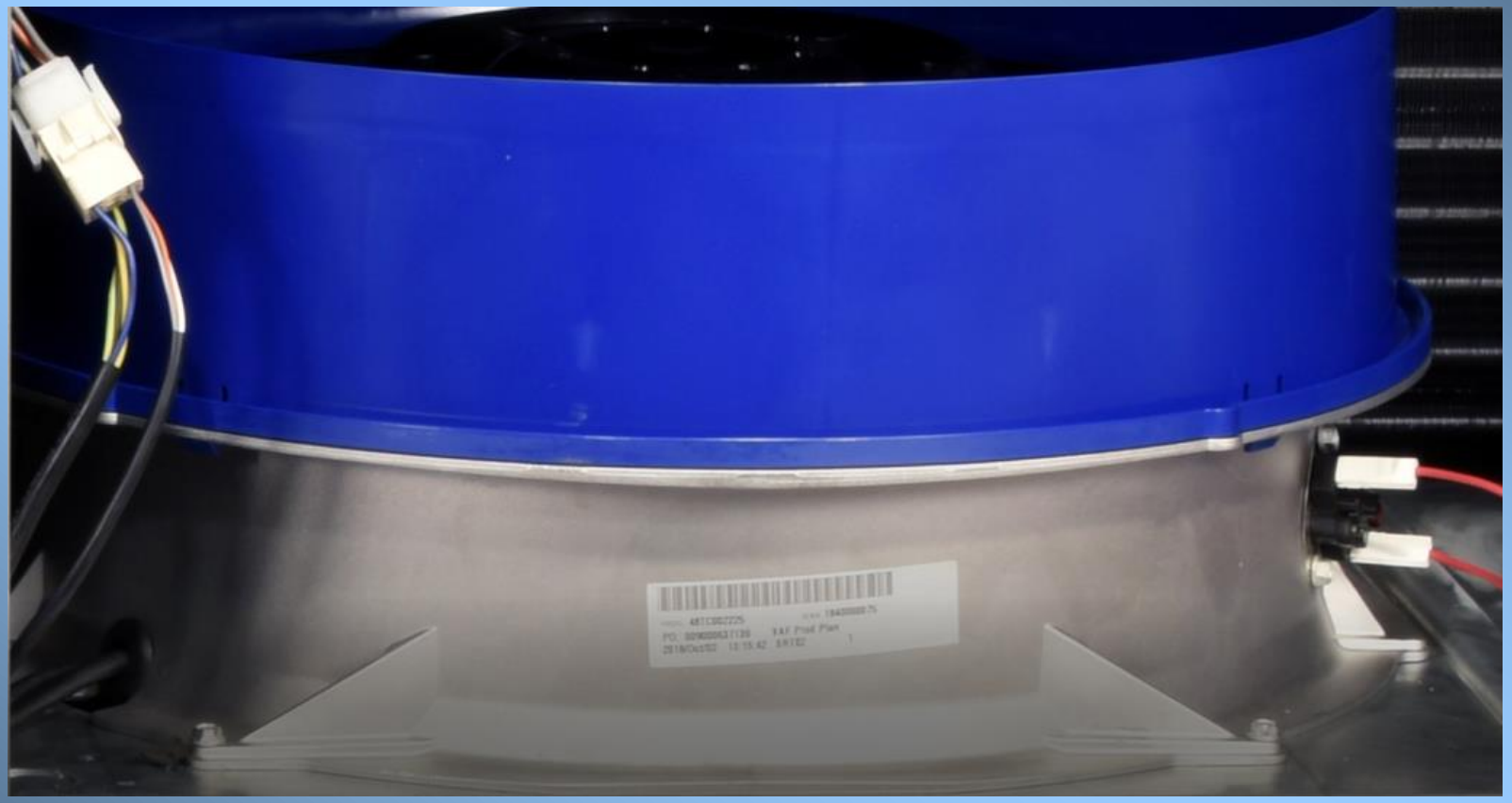
Electric Heat / Electric Cooling & Cooling Only Models – High Efficient 50GC

Nominal Cooling Ton Size	Cooling Stages	AHRI Efficiency SEER
3	2	16.0
4	2	16.0
5	2	16.0

NEW VANE AXIAL TECHNOLOGY

ecoblue™ technology





Removing the blower assembly

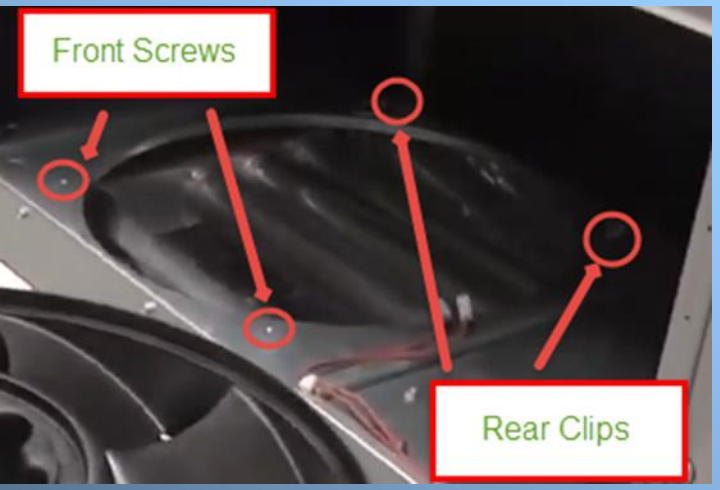
Follow normal safety precautions

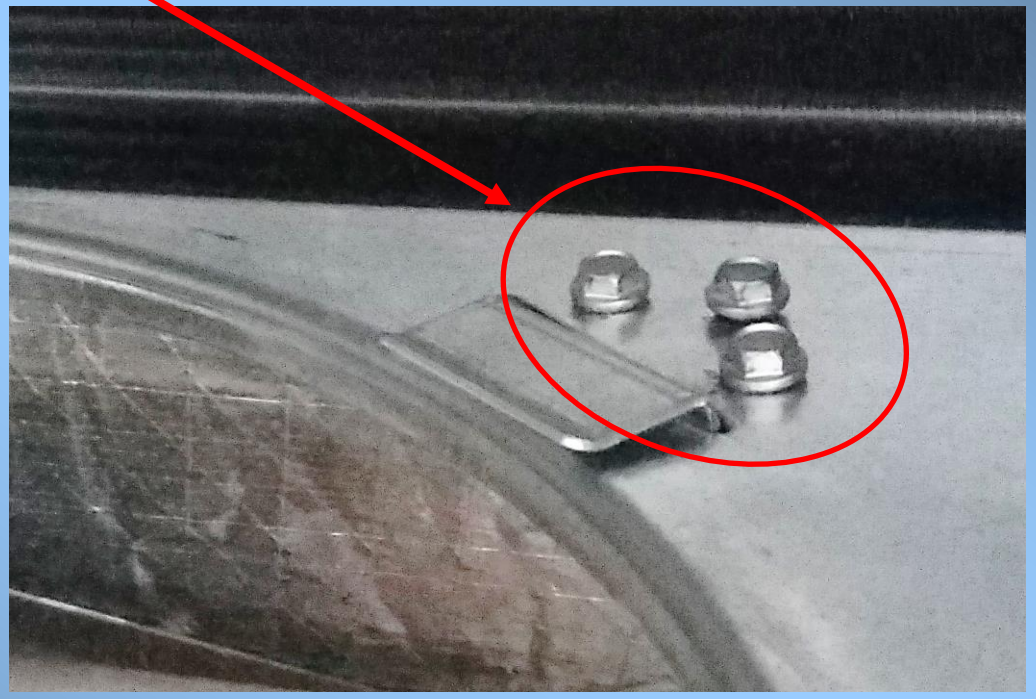
Removing the blower assembly

Removing the blower assembly

There are 2 clips that hold tension on the back of the Axial Fan Housing.

The (3) 5/16 screws need to be loosened on both back clips to allow easy removal of the fan assembly.

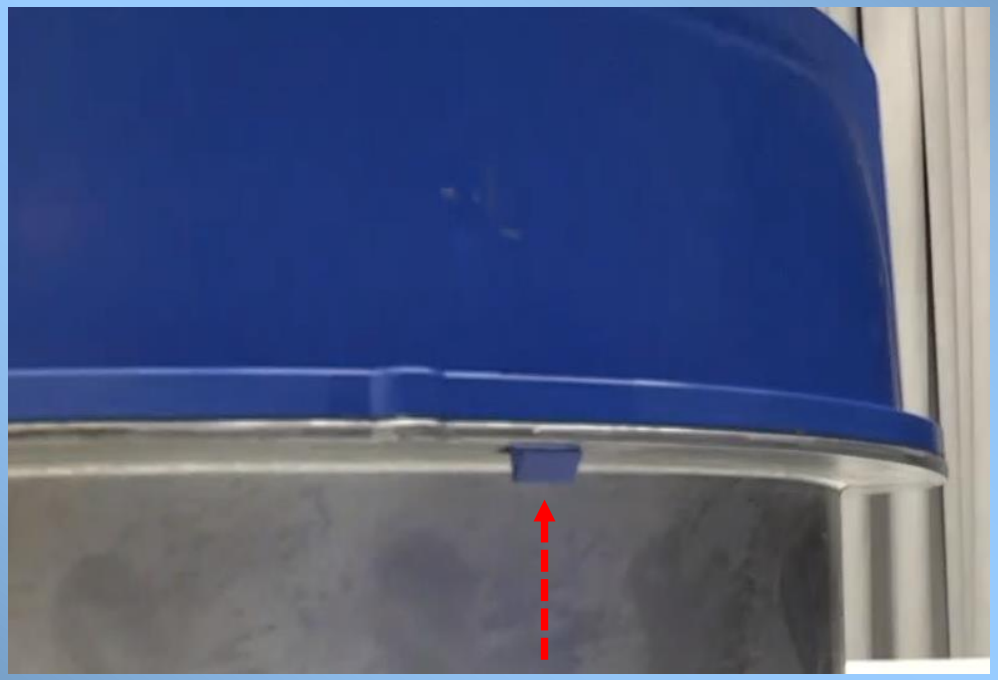




The front of the fan assembly is held in place with (2) 5/16 screws, these will have to be removed to pull the fan out.

Motor Replacement

Motor Replacement



Release all four tabs holding the blue casing to the stator

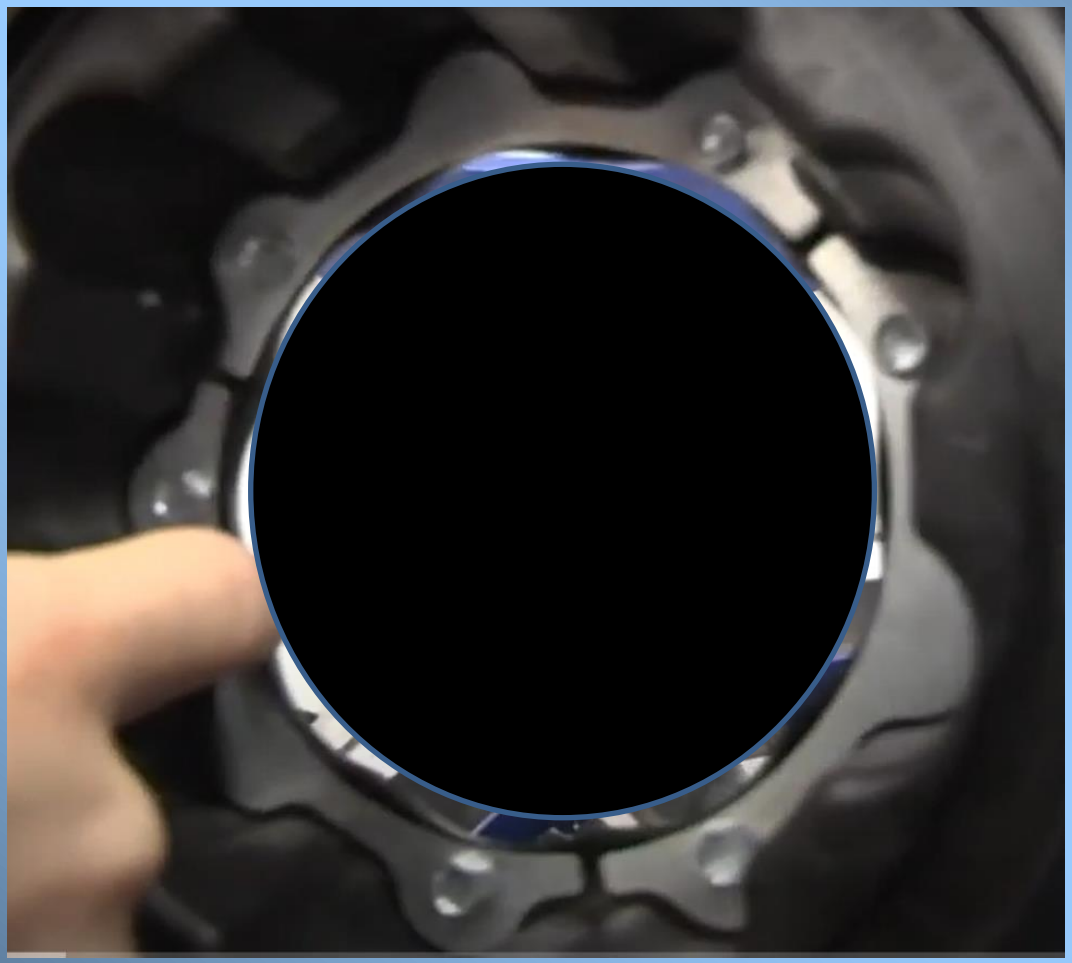
Motor Replacement

Motor Replacement

Motor Replacement

Separate the rotor from the motor hub

Motor Replacement



Motor Replacement

Remove the 4 motor mounting screws

Motor Replacement

Make sure the wiring grommet is released from the Stator

Motor Replacement

Lift the stator off the motor

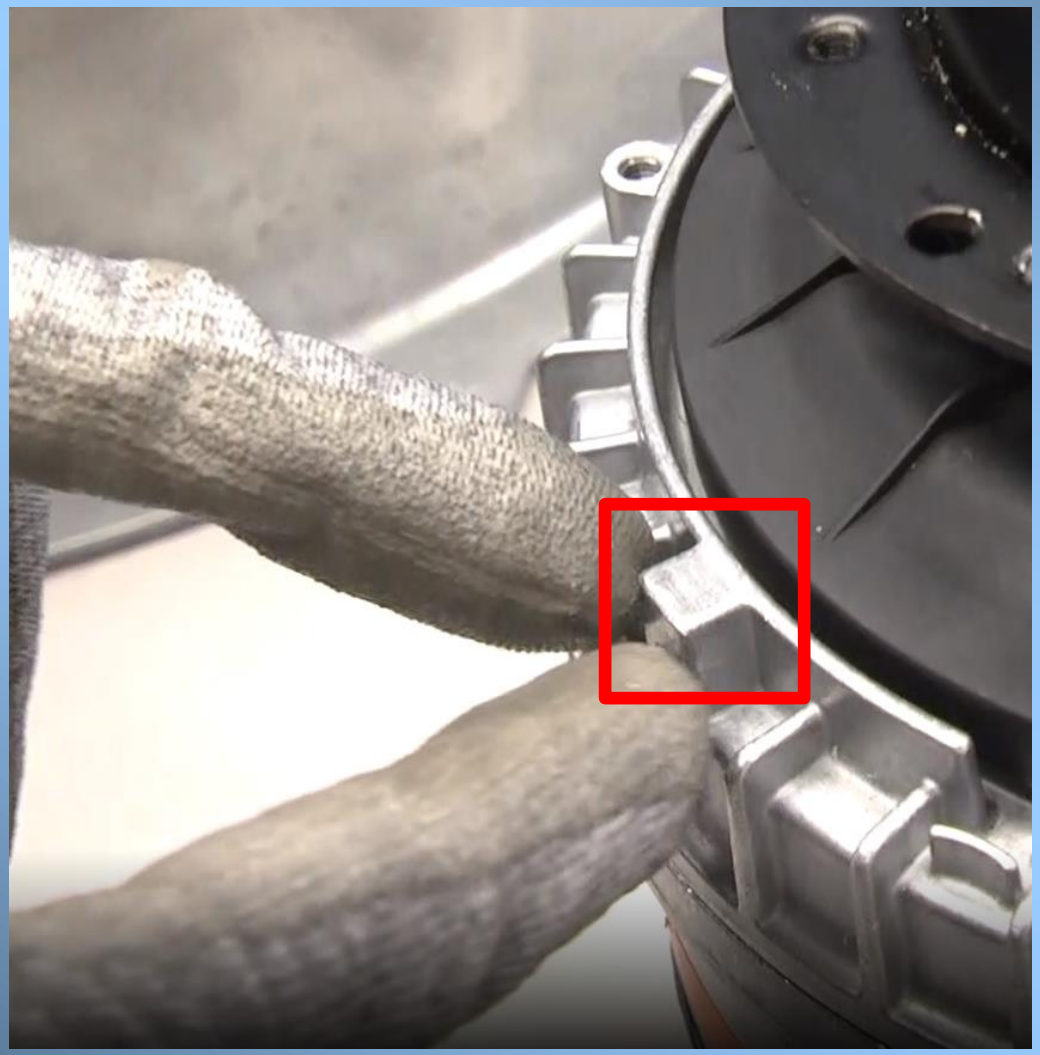
Motor Replacement

Motor Replacement

Motor Replacement

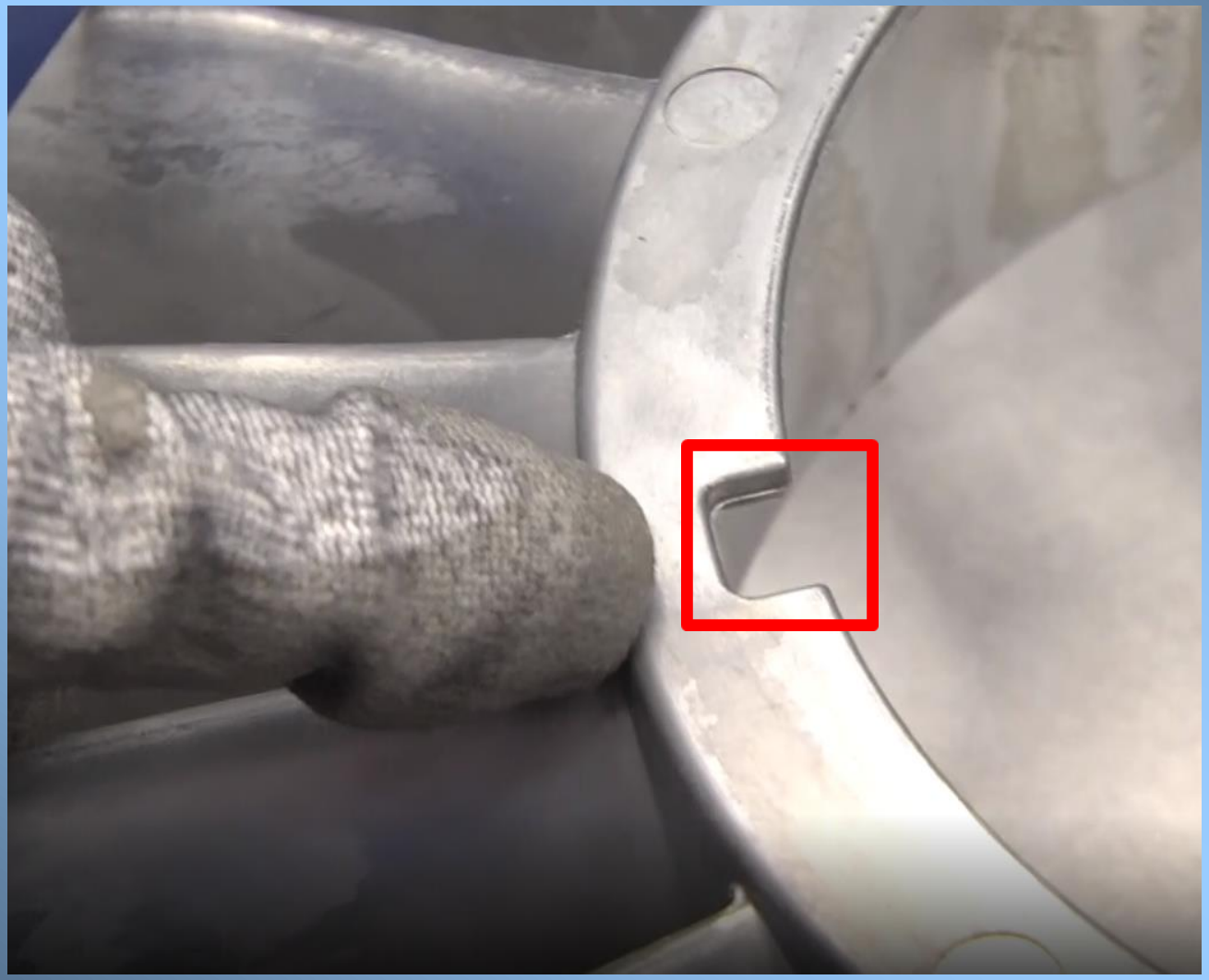
Motor Replacement

Motor alignment tab



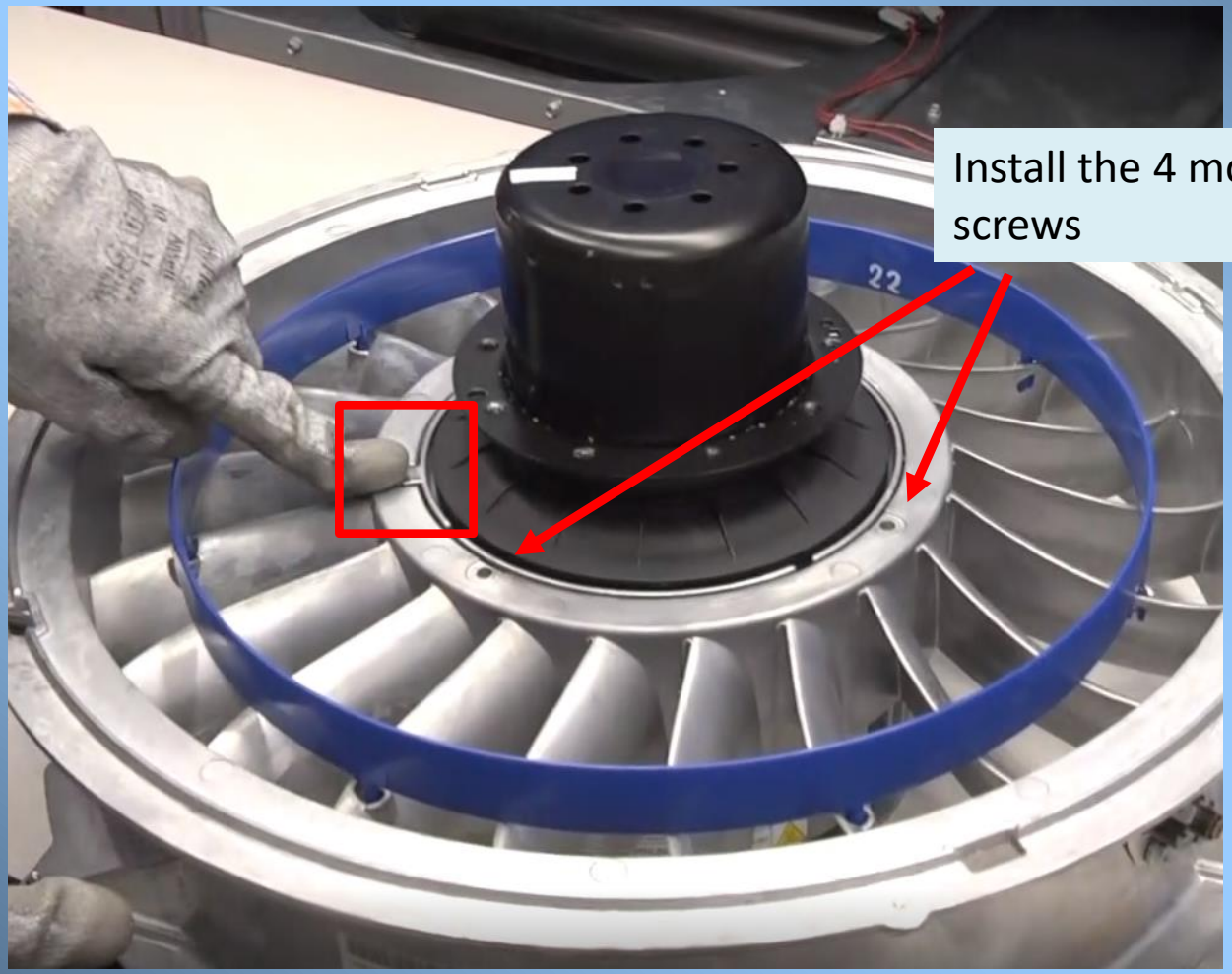
Motor Replacement

Stator alignment slot



Motor Replacement

Make sure the motor and stator line up correctly



Motor Replacement

Secure the wiring grommet back into the stator

Motor Replacement

When installing the rotor on the motor you may have to use a pocket screwdriver to get the holes aligned properly

Motor Replacement

Snap the blue casing back into place making sure all 4 tabs lock in properly

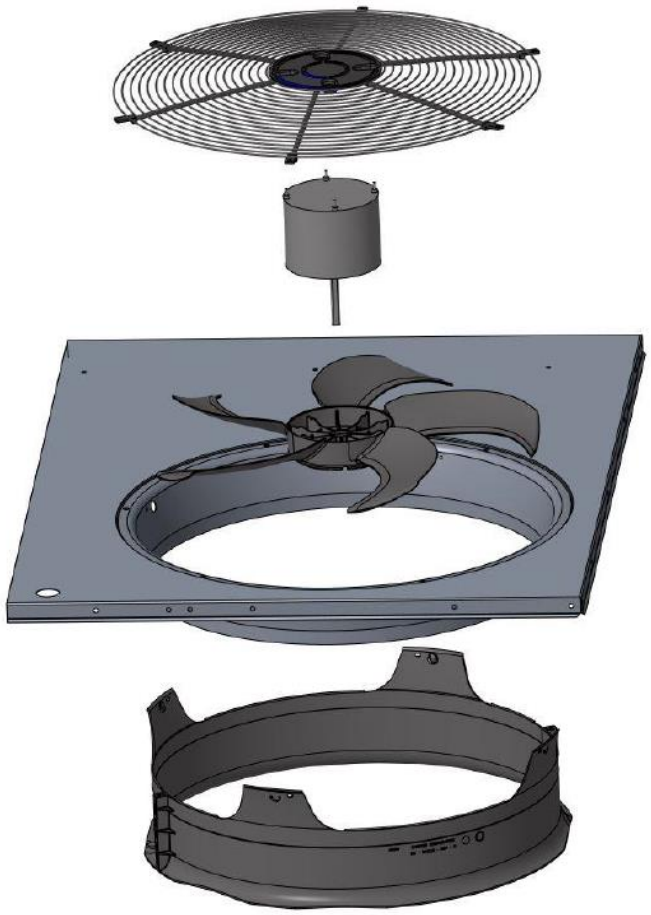
Motor Replacement

Make sure the motor spins freely before installing it back into the unit

Condenser Fan

High Efficiency Composite Outdoor Fan

New 3-6 Ton Rooftop



Decorative protective grille

High efficient outdoor fan motor with single and 2-speed on high efficiency models

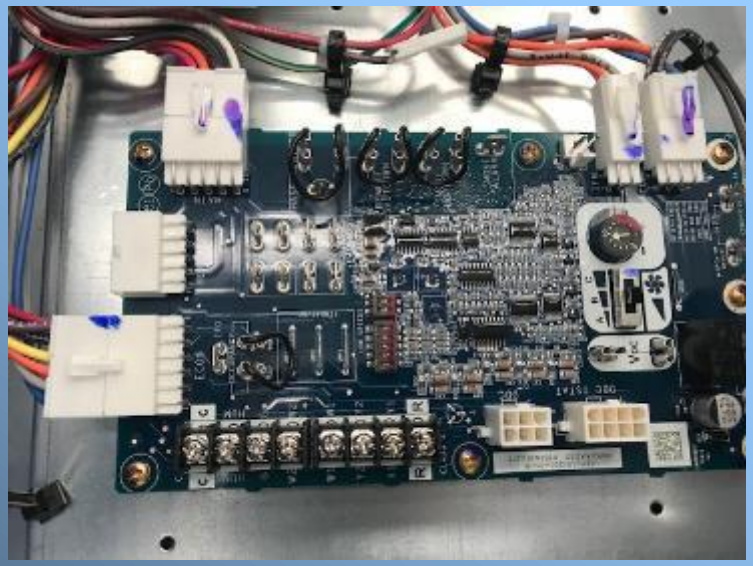
Non corrosive precision balanced outdoor fan blade

New air flow collar to improve efficiencies

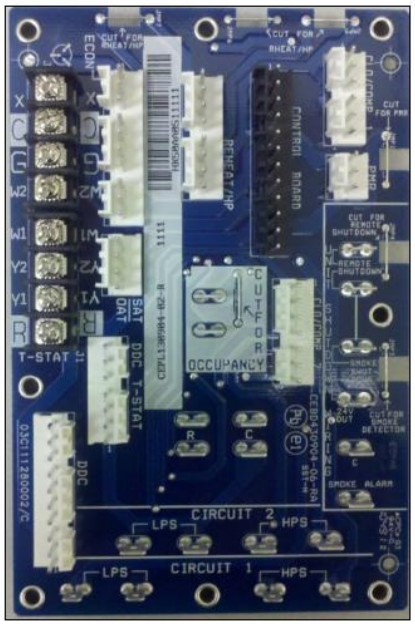
Condenser fan assembly

NEW VANE AXIAL UNITS UCB BOARD

Single Phase HK50AA055



Three Phase HK50AA058



CURRENT BOARD

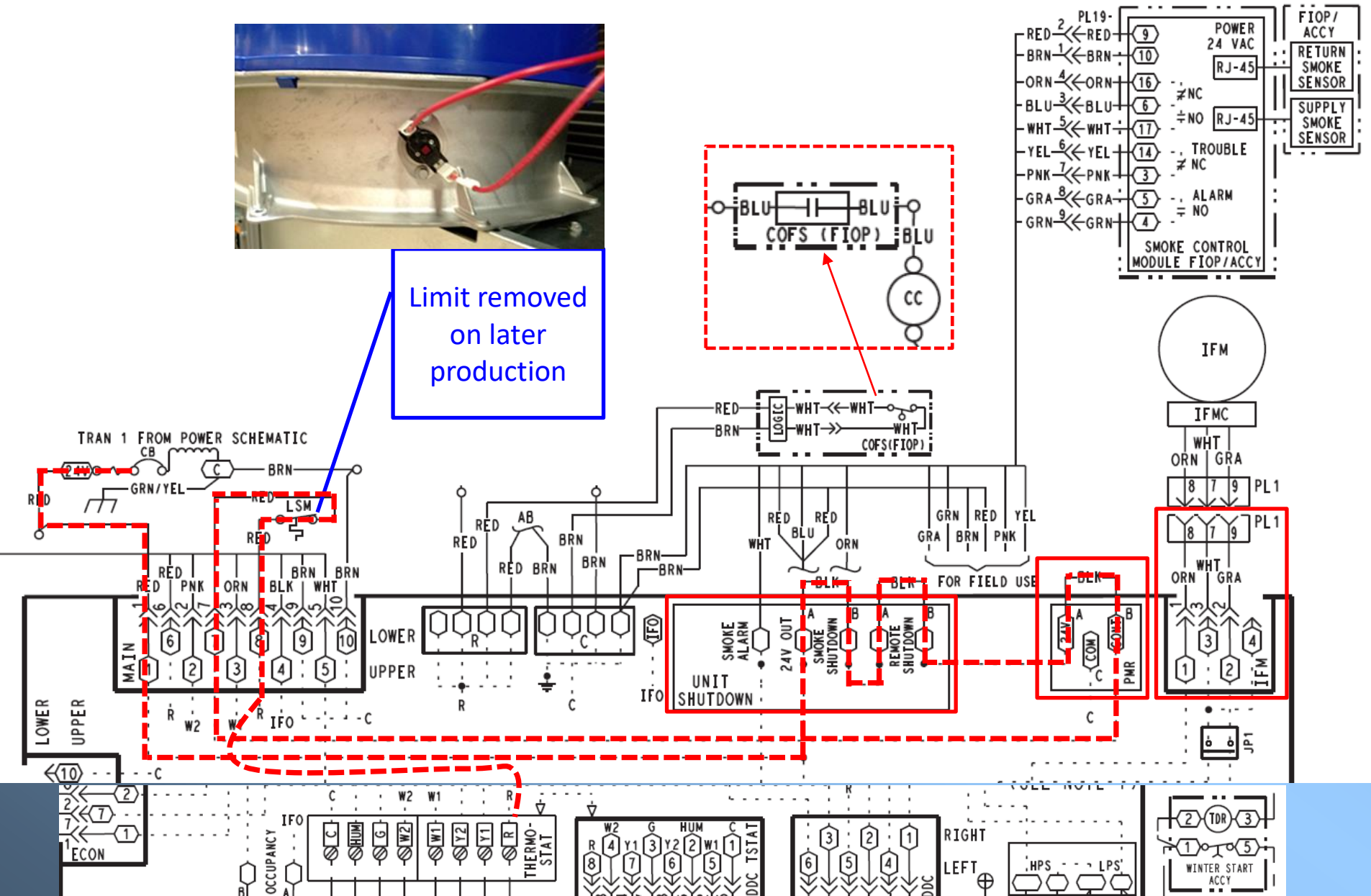
(Central Terminal Board)

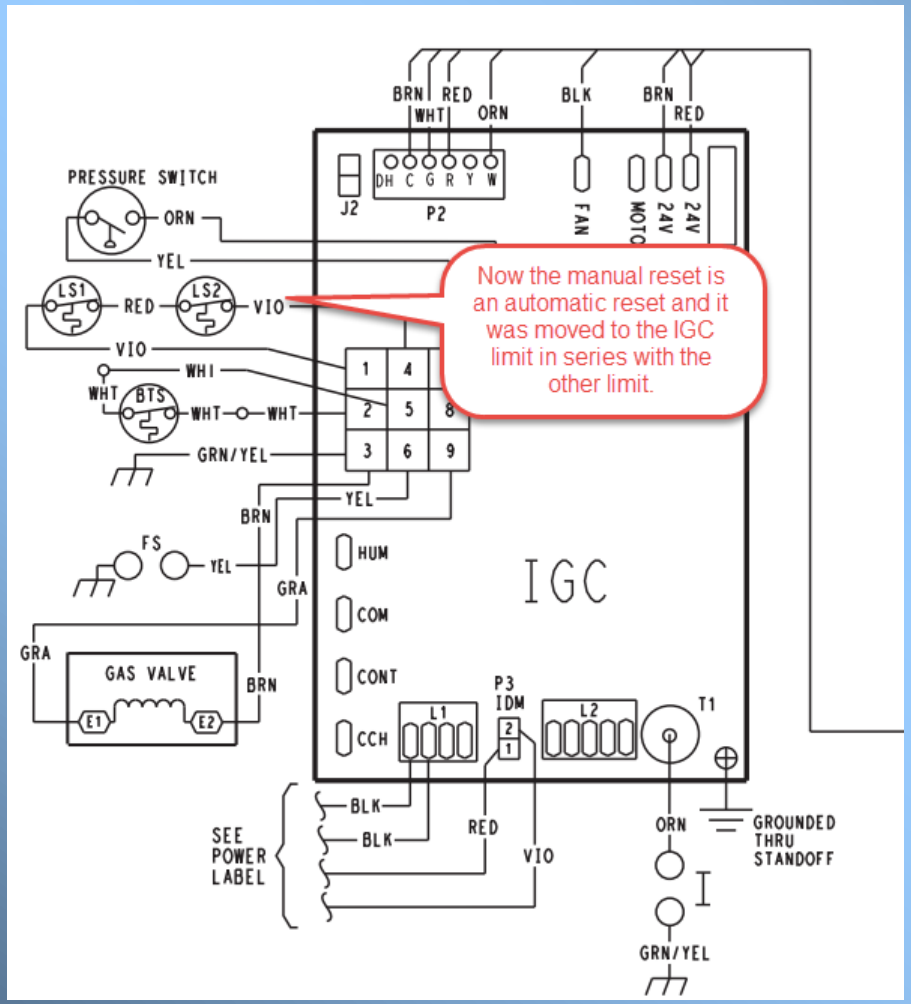
NEW BOARD

Unit Control Board

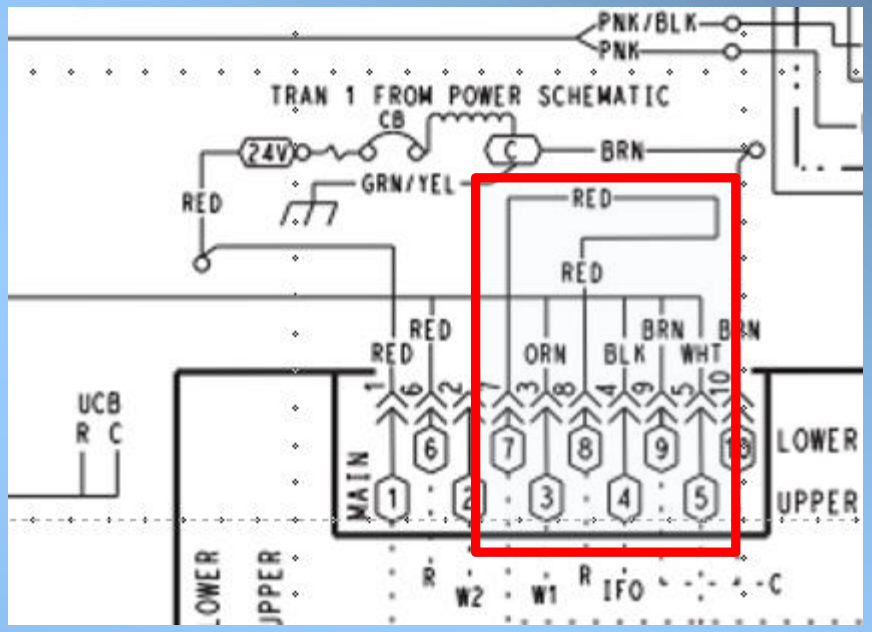
Low voltage safety and accessory wiring

Limit removed on later production

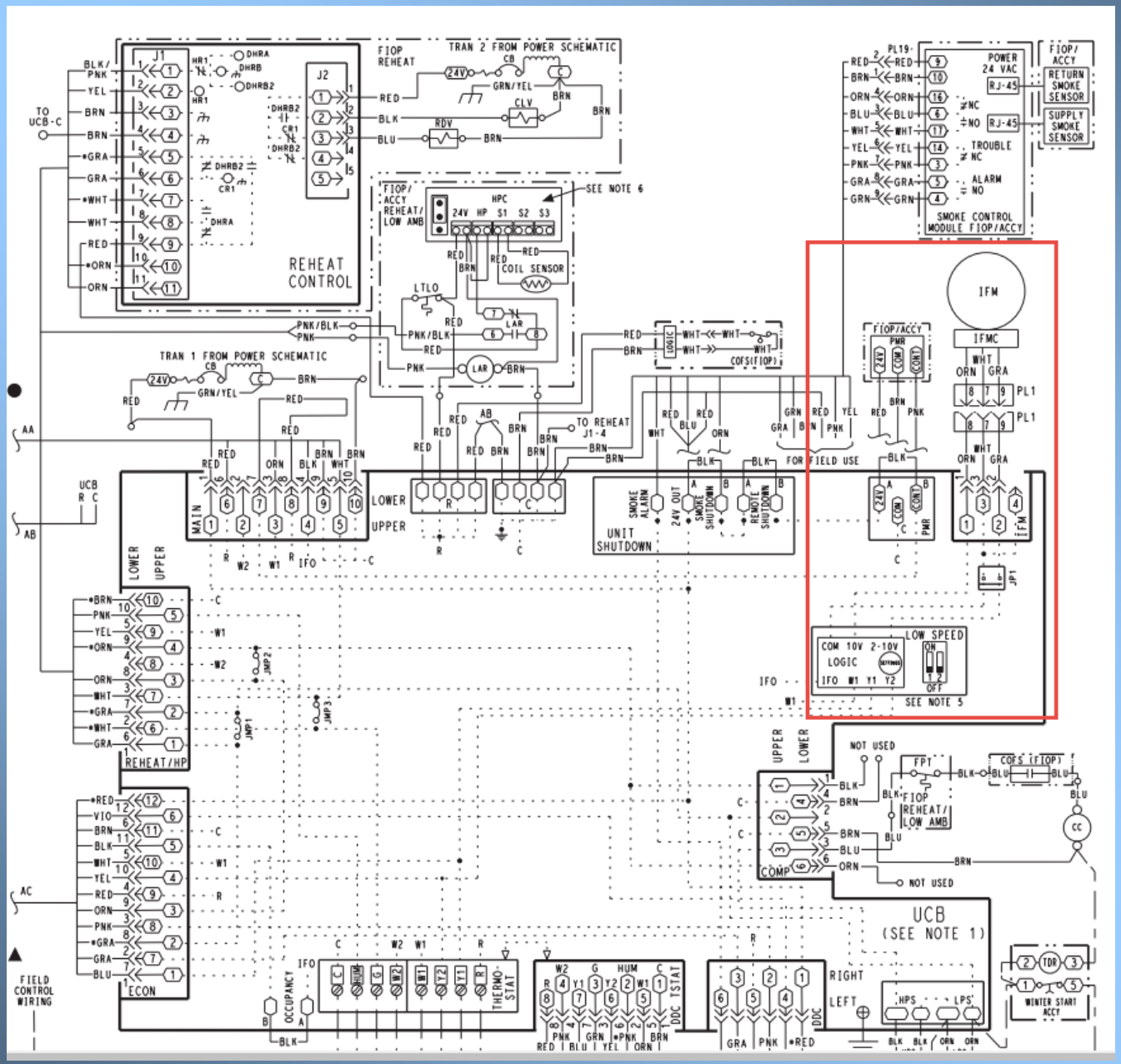


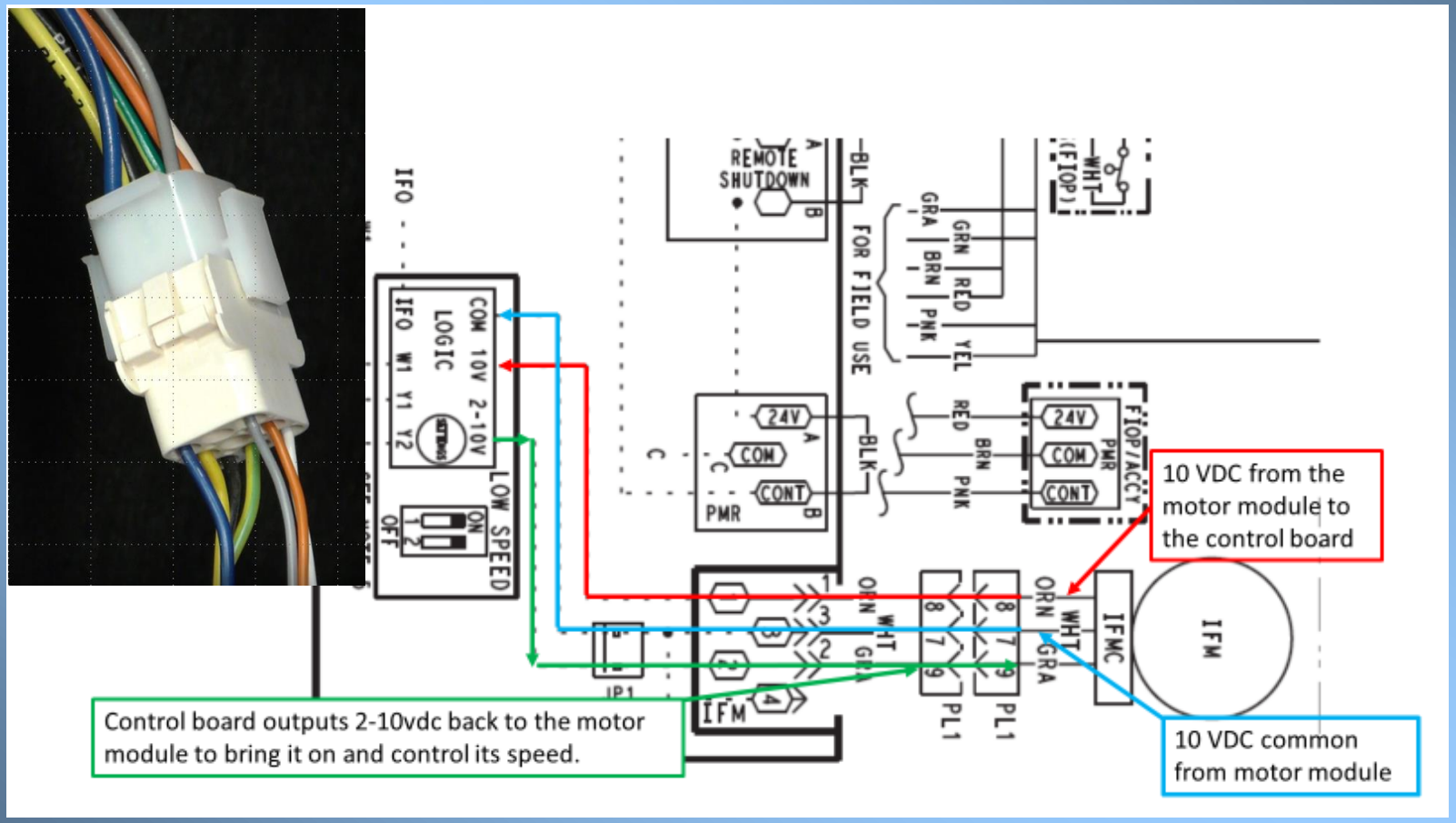


Manual reset limit removed

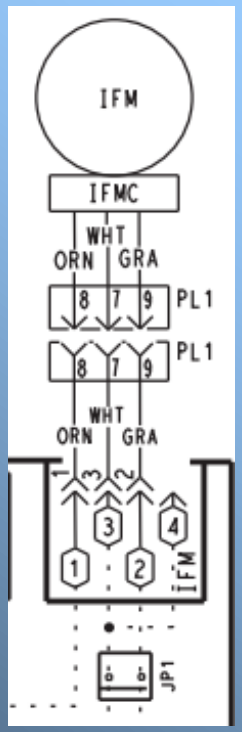


Full view of the circuit board connections



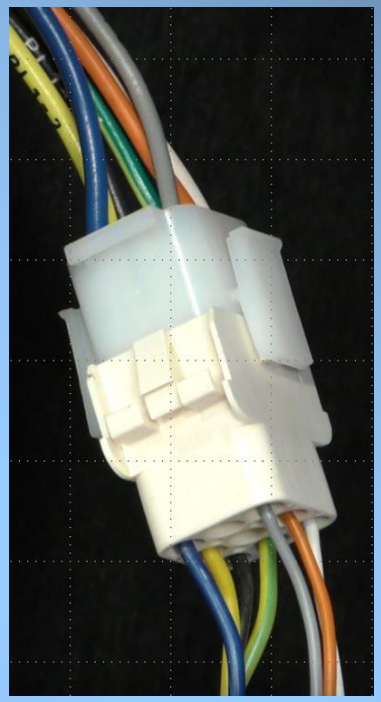

10 VDC from the motor module to the control board
10 VDC common from motor module
Control board outputs 2-10vdc back to the motor module to bring it on and control its speed.
REMOTE SHUTDOWN
FOR FIELD USE
IFO
COM 10V 2-10V
LOGIC
IFO W1 Y1 Y2
LOW SPEED
ON
OFF
24V
COM
CONT
PMR
FIOP/ACCY
IFM
IFMC
PL1
BLK
WHT
ORN
GRA
GRN
RED
BRN
PNK
YEL

Wiring diagram



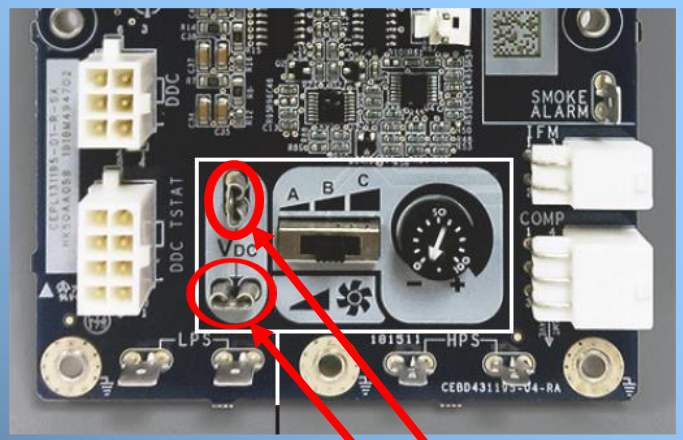
Plug location in the blower section

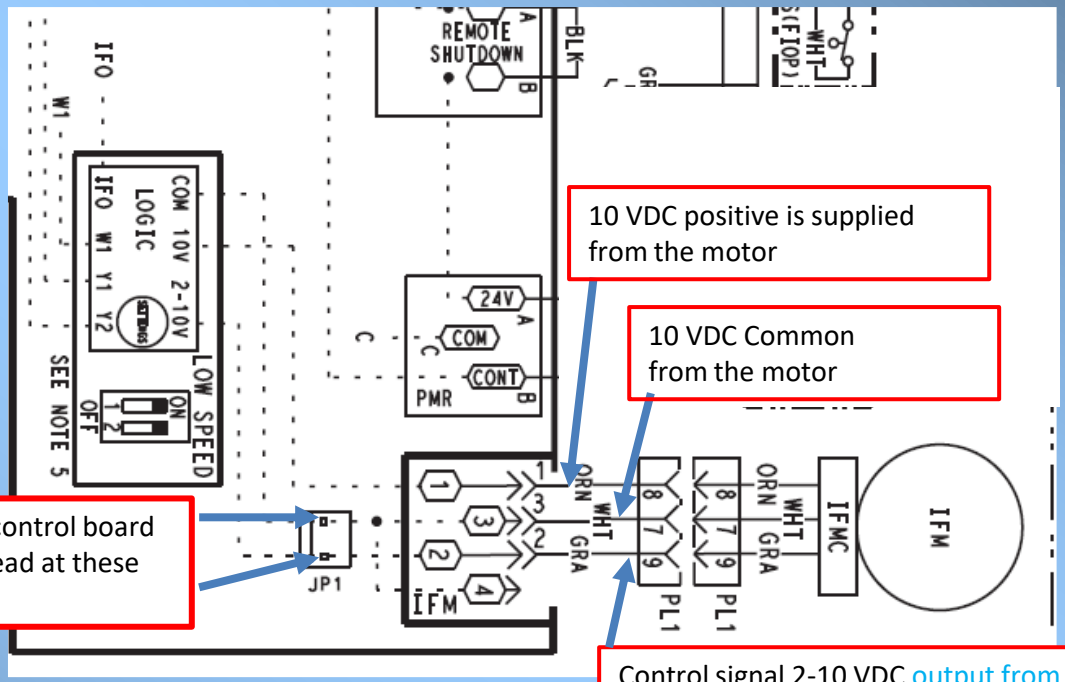
Close up of the motor plug



48FC07 with a 3 Phase blower motor

View of the control board test pins





Outputs from the control board to the motor are read at these test pins

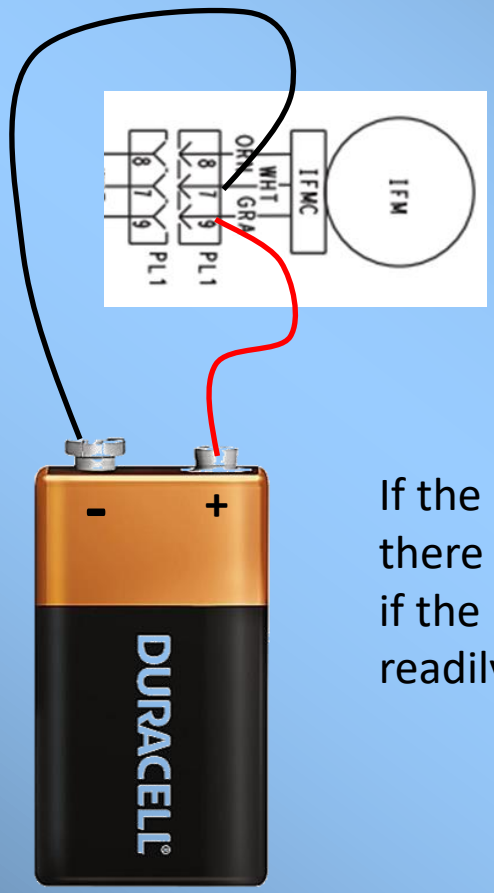
10 VDC positive is supplied from the motor

10 VDC Common from the motor

Control signal 2-10 VDC output from the control board to the motor

If the 10 Volt DC voltage power supply circuit from the motor has failed the motor will have to be replaced.

If the motor spins freely you can test the motor with a 9 volt battery



If the motor runs with the battery, there is a temporary fix you can use if the replacement motor is not readily available.

If the motor runs with a 9 Volt battery, as a temporary fix you can use a 24 VAC to 12 VDC power adapter until the replacement motor comes in.

BeElion 24V AC to 12V DC Convertor, 1.5 Amp Supply Current Power Adapter and 2.1 x 5.5mm DC Power Male Plug Pigtail for...

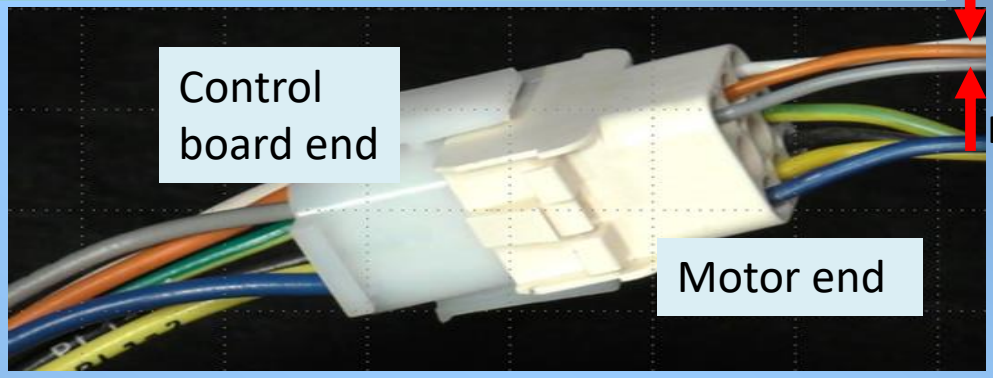
★★★★☆ 106

$13.59

prime

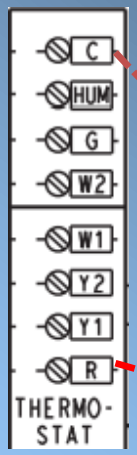
FREE delivery **Wed, Sep 28** on $25 of items shipped by Amazon

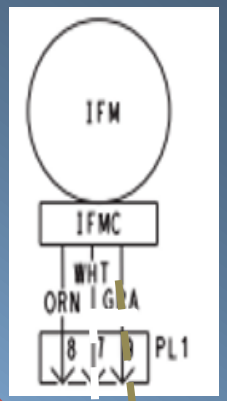
Installing the temporary voltage adapter.



A

B





To use the voltage adapter, follow these steps:

- Turn off the power to the unit.
- Locate the motor side of the 9 pin plug in the blower compartment.

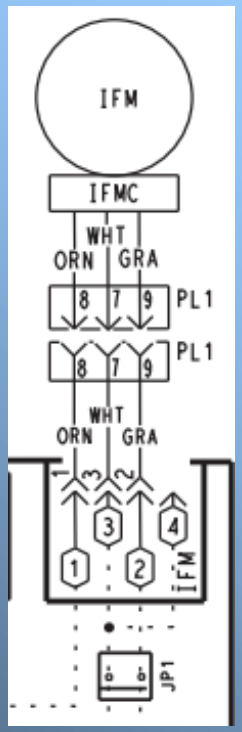
A. Cut the white wire 1” from the motor side of the plug and connect the wire from the motor to DC out -, on the adapter. Use a wire nut to cap off the remaining loose white wire from the plug.

B. Cut the gray wire 1” from the motor side of the plug and connect the wire from the motor to DC out +, on the adapter. Use a wire nut to cap off the remaining loose gray wire from the plug.

C. Connect the AC in on the adapter to R and C on the normal thermostat terminal block. These terminals are not polarity sensitive. You will have to run a 2-conductor wire a for this connection.

Where to mount the adapter.

Wiring diagram



Plug location in the blower section

Close up of the motor plug

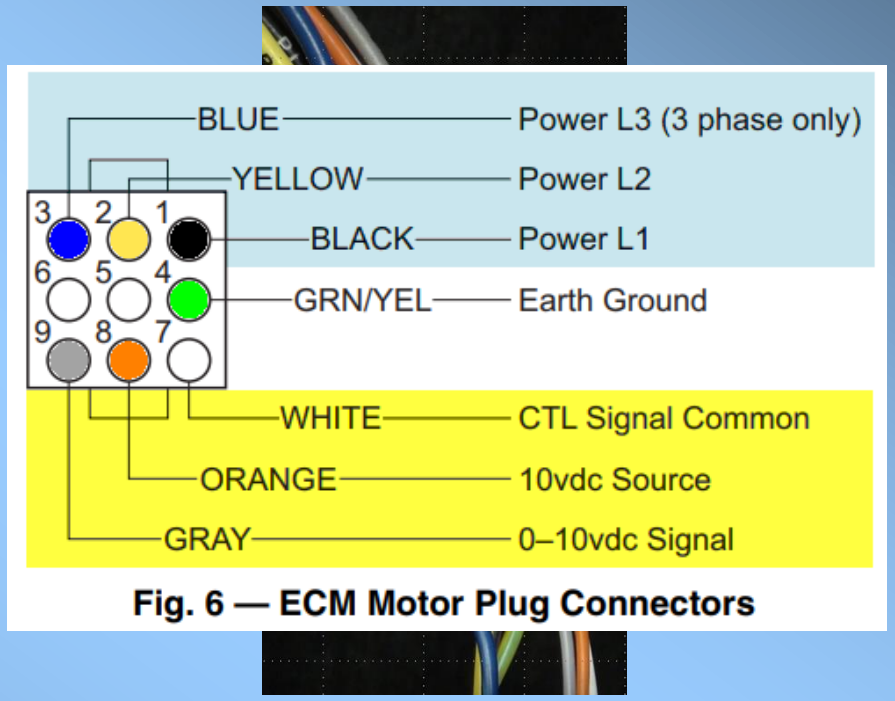
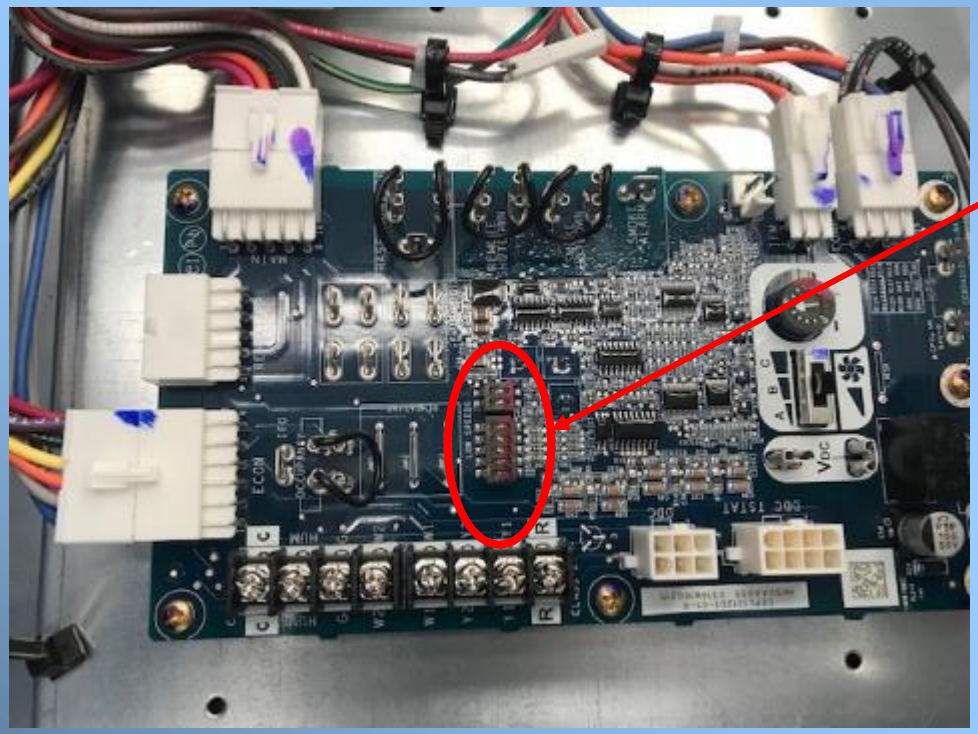


Fig. 6 — ECM Motor Plug Connectors

I would use a couple of wire ties to secure the voltage adapter to the motor wires in this location. Position the green connection plug on the top of the control as shown above.

Single Phase UCB

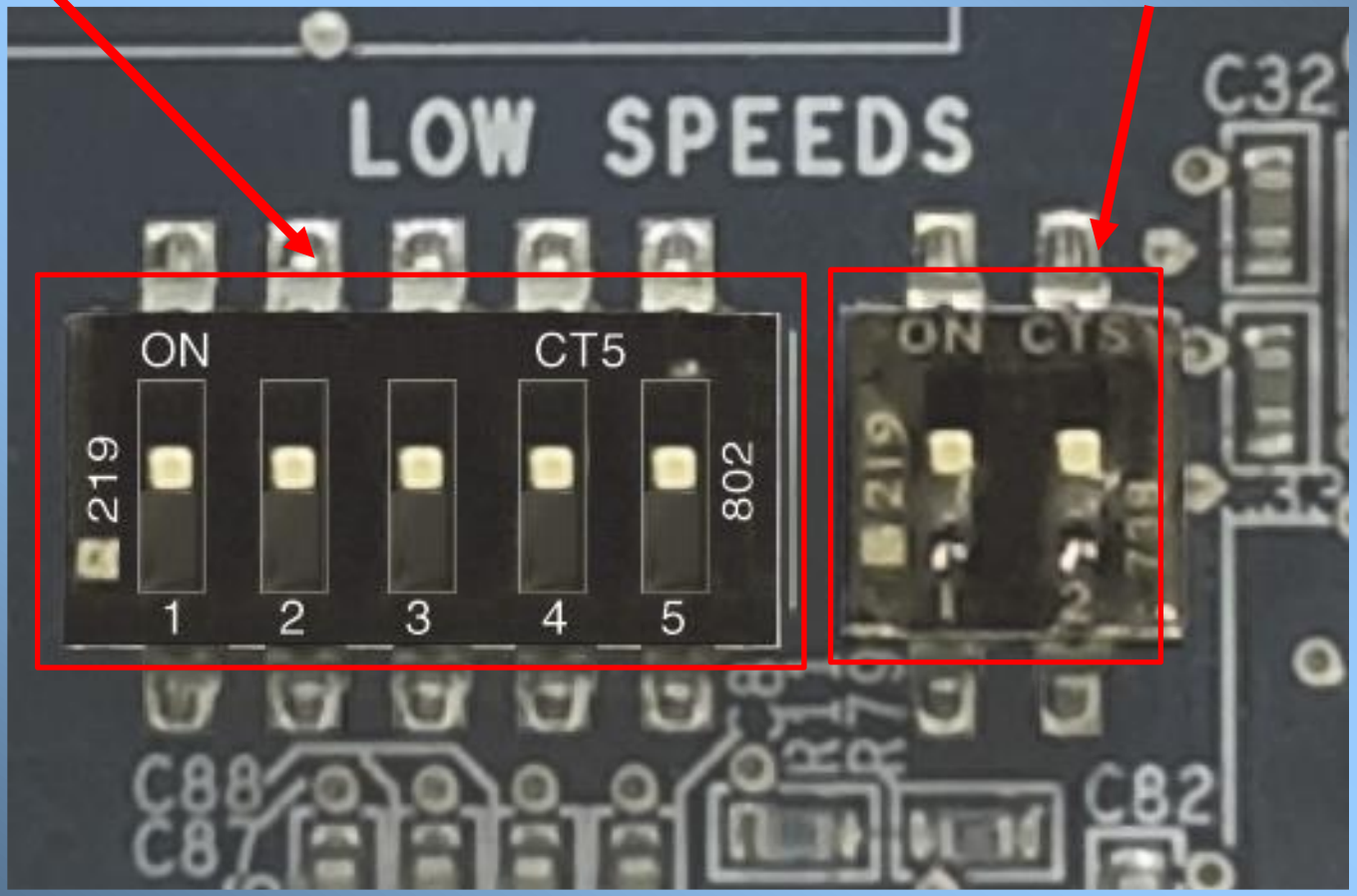


Has 7 dip switches

Single Phase UCB

Fan adjustment for low static

Low speed adjustment



LOW SPEED Dip 1 and Dip 2

Factory set "LOW SPEED" 2 pin DIP:

LOW SPEED		% of User Set Fan Speed
DIP1	DIP2	
0	0	100%
0	1	88%
1	0	75%
1	1	66%

5-Pin DIP Switch (Single Phase - 3, 4 and 5 ton units only)

On single phase units, the approximate static pressure of the ductwork must be set for optimal unit efficiency. The unit is factory set for greater than 1.0 in. wg. If the external static pressure is less than 1.0 in. wg, slide switch 1 on the 5-pin DIP to the "ON" position. See Fig. 10. Switches 2 and 3 are used to determine the unit tonnage. Switches 4 and 5 are used to match the motor and drive combination. Table 2 details the various settings for the 5-pin DIP switch.

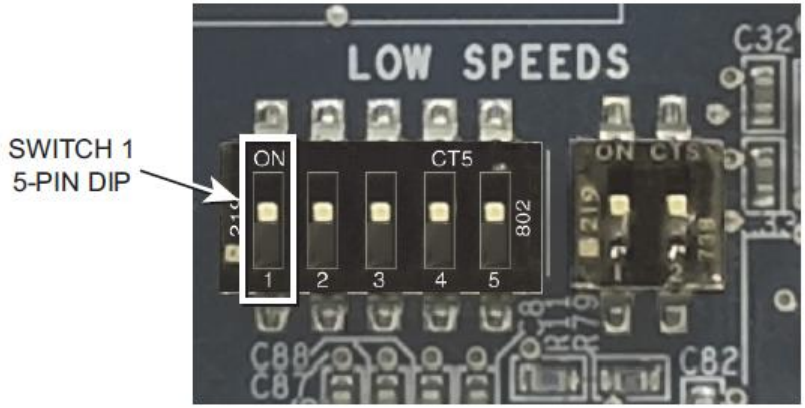


Table 2 — LOW SPEED 5-Pin DIP Switch Reference

QUICK ENABLE/DISABLE	UNIT TON REFERENCE		UNIT/MOTOR REFERENCE		UNIT APPLICATION REFERENCE
DIP1	DIP2	DIP3	DIP4	DIP5	
1	0	1	0	1	3 ton with Low static motor option
1	0	1	1	0	3 ton with Medium static motor option
1	0	1	1	1	3 ton with High static motor option
1	1	0	0	1	4 ton with Low static motor option
1	1	0	1	0	4 ton with Medium static motor option
1	1	0	1	1	4 ton with High static motor option
1	1	1	0	1	5 ton with Low static motor option
1	1	1	1	0	5 ton with Medium static motor option
1	1	1	1	1	5 ton with High static motor option

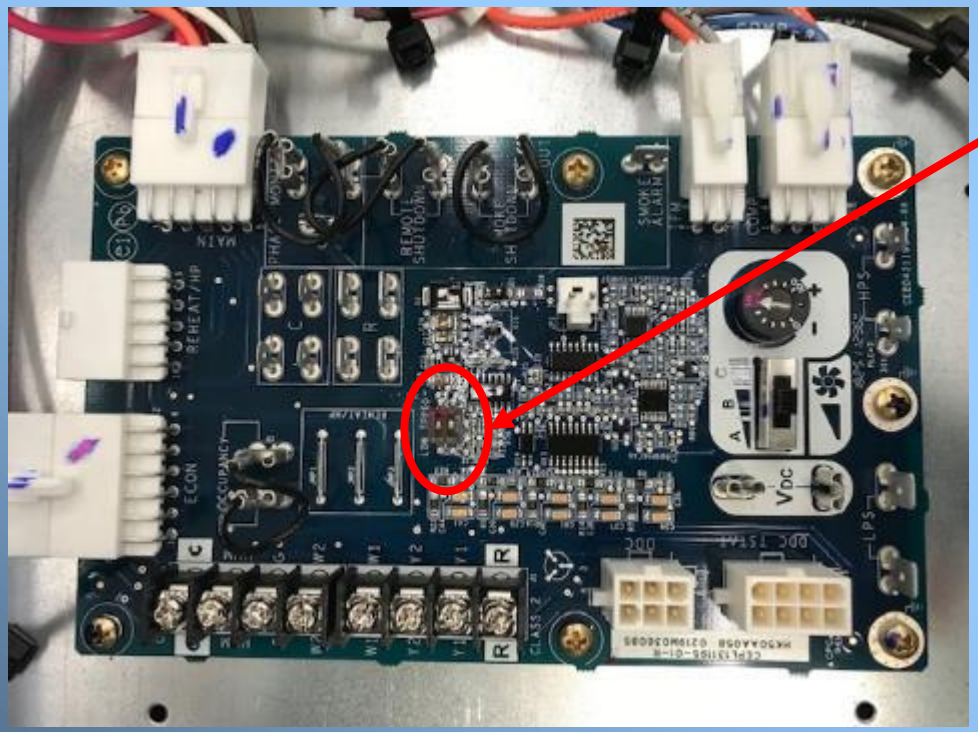
Single Phase UCB

Factory set "LOW SPEED" 5 pin DIP:

Quick Enable/ Disable	Unit Ton Ref		Unit Motor Option Ref		User Set Fan speed set within this range		Voltage Output during heat	Unit application Ref
DIP1	DIP2	DIP3	DIP4	DIP5	Lower V	Upper V		
0	DC	DC	DC	DC	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	0	0	0	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	0	0	1	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	0	1	0	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	0	1	1	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	1	0	0	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	0	1	0	1	8	9.5	8	3 ton with Low static motor option
1	0	1	1	0	6.9	8.2	6.9	3 ton with Medium static motor option
1	0	1	1	1	6.1	7.2	6.1	3 ton with High static motor option
1	1	0	0	0	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	1	0	0	1	8.6	10	8.6	4 ton with Low static motor option
1	1	0	1	0	7.5	9.7	7.5	4 ton with Medium static motor option
1	1	0	1	1	6.6	8.5	6.6	4 ton with High static motor option
1	1	1	0	0	DC	DC	Switch and POT	N/A - Heat Speed same as Cool speed
1	1	1	0	1	7.9	10	7.9	5 ton with Low static motor option
1	1	1	1	0	6.9	10	6.9	5 ton with Medium static motor option
1	1	1	1	1	6.4	9.2	6.4	5 ton with High static motor option

DC= Don't Care

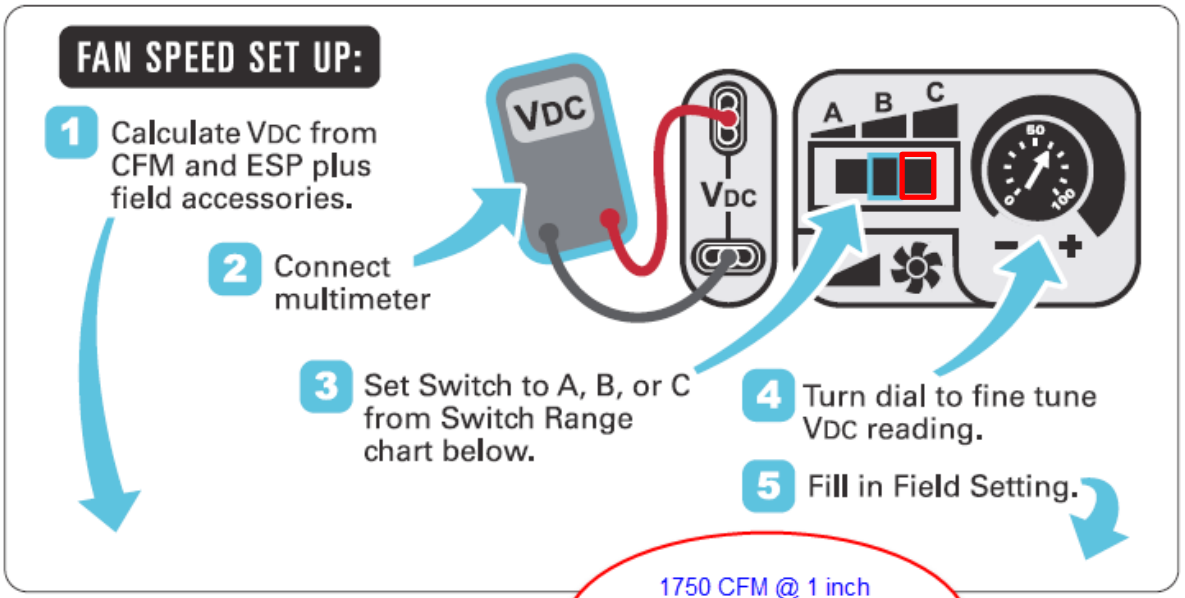
Three Phase UCB Board



Has 2 dip switches only
LOW SPEED

Factory set "LOW SPEED" 2 pin DIP:

LOW SPEED		% of User Set Fan Speed
DIP1	DIP2	
0	0	100%
0	1	88%
1	0	75%
1	1	66%



VDC Calculator

UNIT MODEL NUMBER CFM	ESP in. wg 0.2	0.4	0.6	0.8	1.0	1.2	
1500	6.0	6.7	7.4	8.0	8.5	9.0	
1625	6.3	7.1	7.7	8.3	8.8	9.2	9.7
1750	6.7	7.4	8.0	8.6	9.1	9.5	10.0
1875	7.1	7.7	8.3	8.9	9.4	9.8	
2000	7.5	8.1	8.7	9.2	9.7		
2125	7.9	8.4	9.0	9.5			
2250	8.3	8.8	9.4				
2375	8.7	9.2	9.7				
2500	9.1	9.5					
Field Accessories:							
Economizer	0.1	0.1	0.1	0.1	0.1	0.1	0.1

1750 CFM @ 1 inch ESP
Requires setting of 9.1 VDC

Slide switch will need to be set to position C

tory Setting: 7.8 VDC

Field Setting:

Record field setting here

_____ VDC

Switch Range: *

A	4.1 - 7.5
B	6.9 - 8.7
C	7.7 - 10.0

** Overlap in A, B, C switch range designed for maximum field adjustment potential. For example 7.2 can be set at either A or B.*

NOTE: Values in the Field Accessories section are VDC adders.

Fig. 9 — Example of Fan Speed Set Up Labels for Electro-Mechanical Controls

Service Manual Information

48FCFA06 THREE PHASE – MEDIUM STATIC — 5 TON HORIZONTAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	5.9	1593	6.7	1746	7.3	1883	7.9	2008	8.4
1625	1509	6.3	1673	7.0	1820	7.6	1954	8.2	2076	8.7
1750	1599	6.7	1755	7.3	1897	7.9	2026	8.5	2146	9.0
1875	1691	7.1	1839	7.7	1976	8.3	2102	8.8	2218	9.3
2000	1784	7.5	1924	8.1	2056	8.6	2178	9.1	2291	9.6
2125	1878	7.9	2011	8.4	2137	8.9	2256	9.4	2367	9.9
2250	1974	8.3	2099	8.8	2221	9.3	2335	9.8	—	—
2375	2070	8.7	2189	9.2	2305	9.6	—	—	—	—
2500	2166	9.1	2280	9.5	—	—	—	—	—	—

ECONOMIZERS

Integrated Economizer Basic Operation

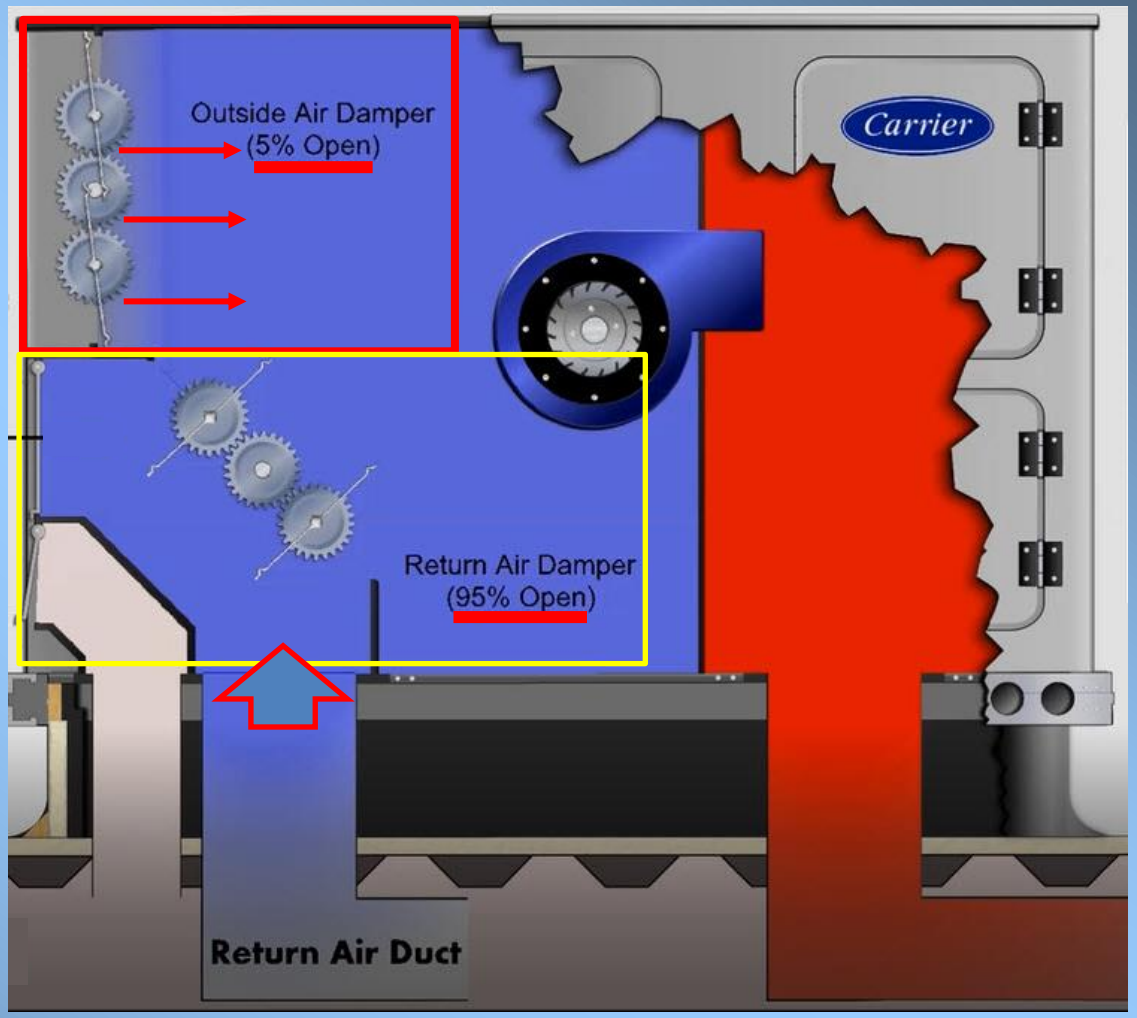
When free cooling is not available, the compressors will be controlled by the zone thermostat, the economizer will drive to the minimum position to bring in ventilation air.

When the outdoor air is cool enough, the outdoor air damper is modulated open by the economizer control and the return air damper closes to use the outside air for free cooling. The Y1 signal relay in the economizer control opens keeping the Y1 compressor off.

If the building load is high and Y2 is energized by the zone thermostat, the first stage of mechanical cooling (Y1) will be used to supplement the free cooling provided by the economizer. If mechanical cooling is utilized with free cooling, the outdoor-air damper will remain open, and the Y1 compressor is energized.

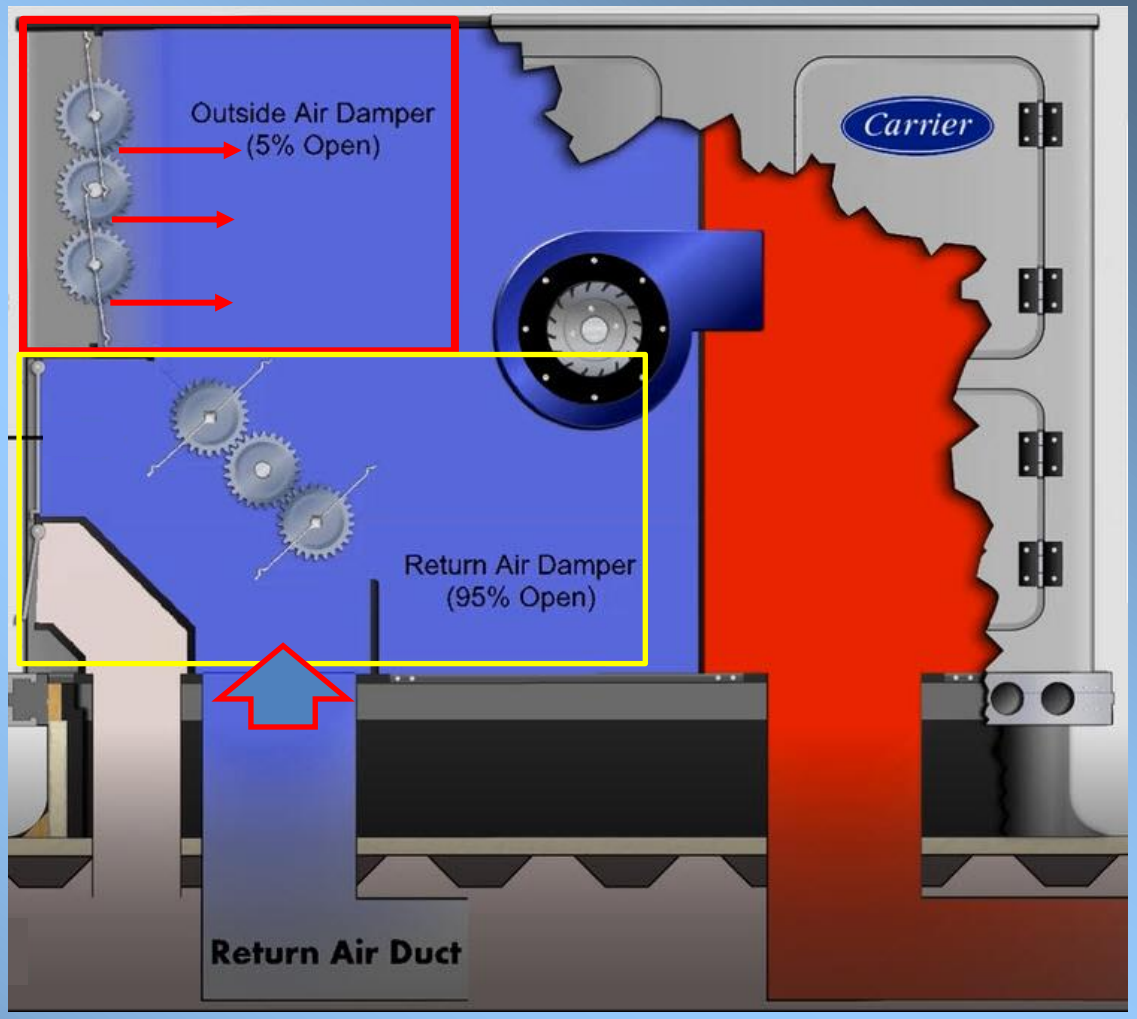
Any time the indoor fan comes on, the economizer opens, and the outside air damper moves to the minimum position set up on the control.

The outside air damper is in the minimum position and the return air damper is open.



On a call for cooling, if the outside temperature is not acceptable to use for free cooling:

- The outside air damper drives to the minimum position and the return air damper is open.
- The Y1 circuit thru the economizer control brings on the Y1 compressor.



When the outside air is acceptable enough to be used for cooling.

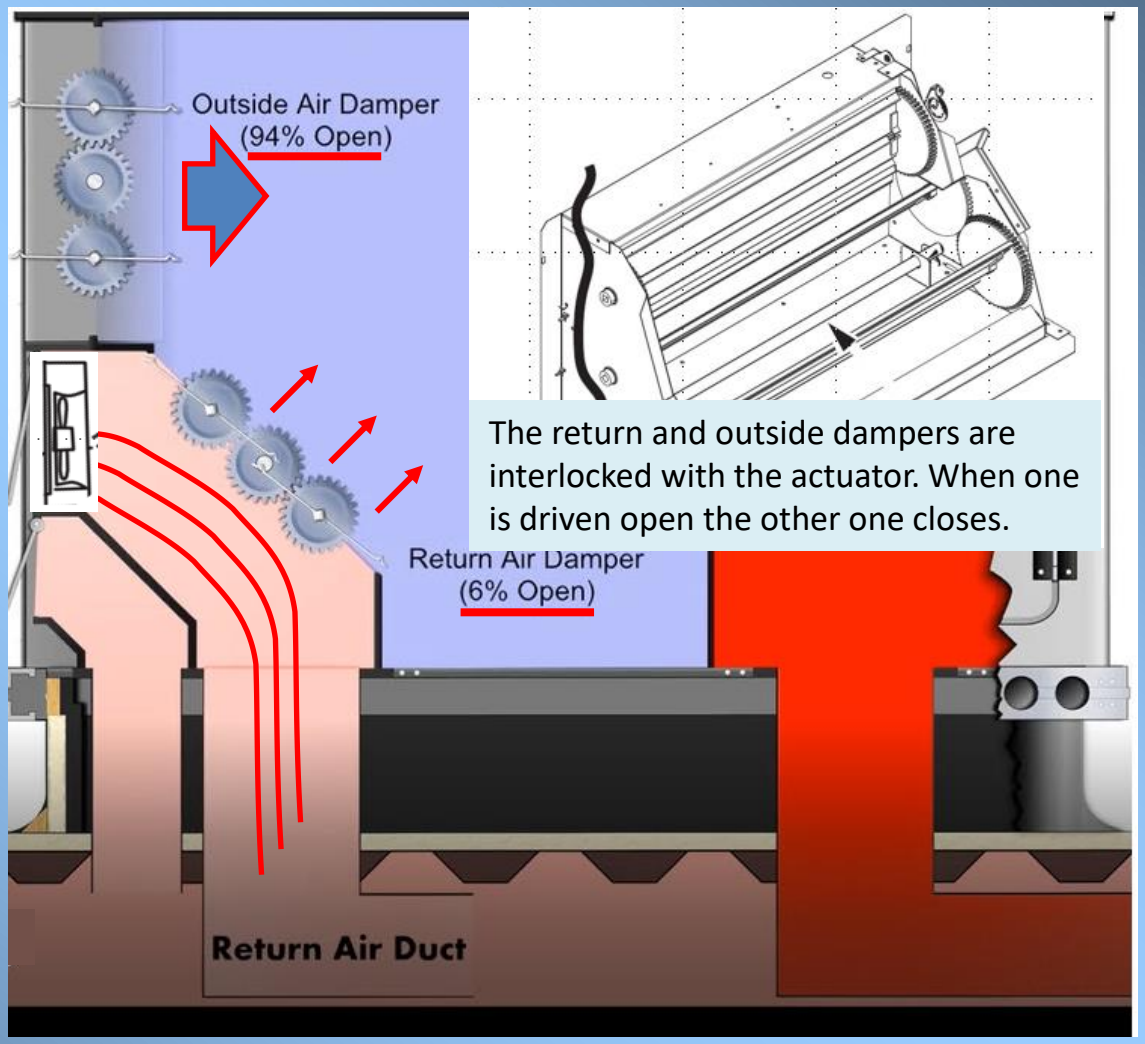
The outside air damper opens bringing in free cooling.

The return air damper closes, so most of the air is coming from the outside air damper.

When the outside air damper is open the building pressure will start to increase.

The standard economizer has a barometric damper built in to help relieve that pressure build up.

When required a powered exhaust assembly can take the place of barometric style to control building pressure.



The return and outside dampers are interlocked with the actuator. When one is driven open the other one closes.

The W7212 Economizer control is used in the Economizer IV

W7212 Economizer IV

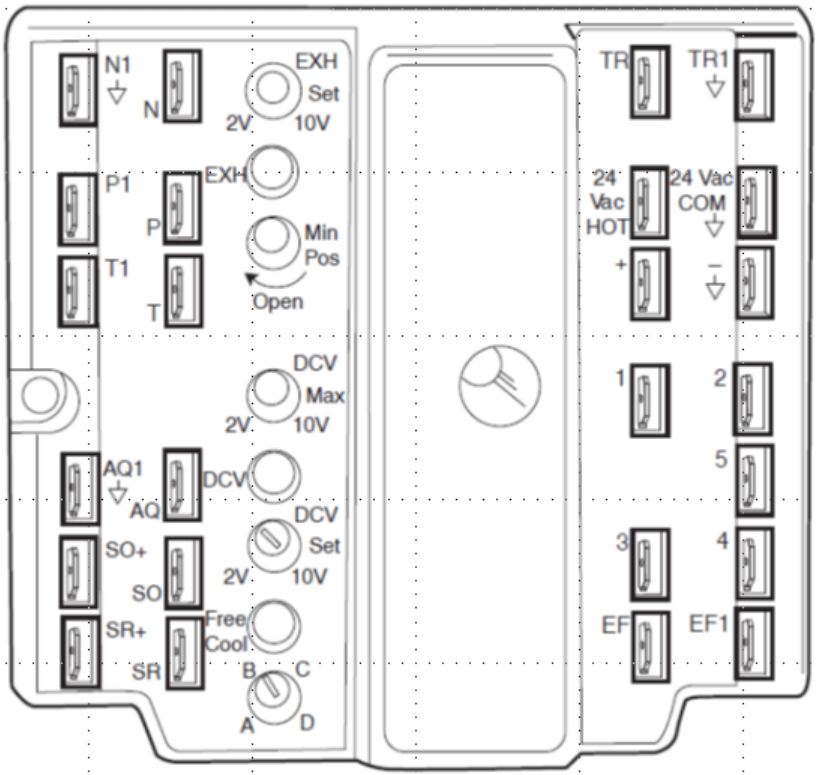
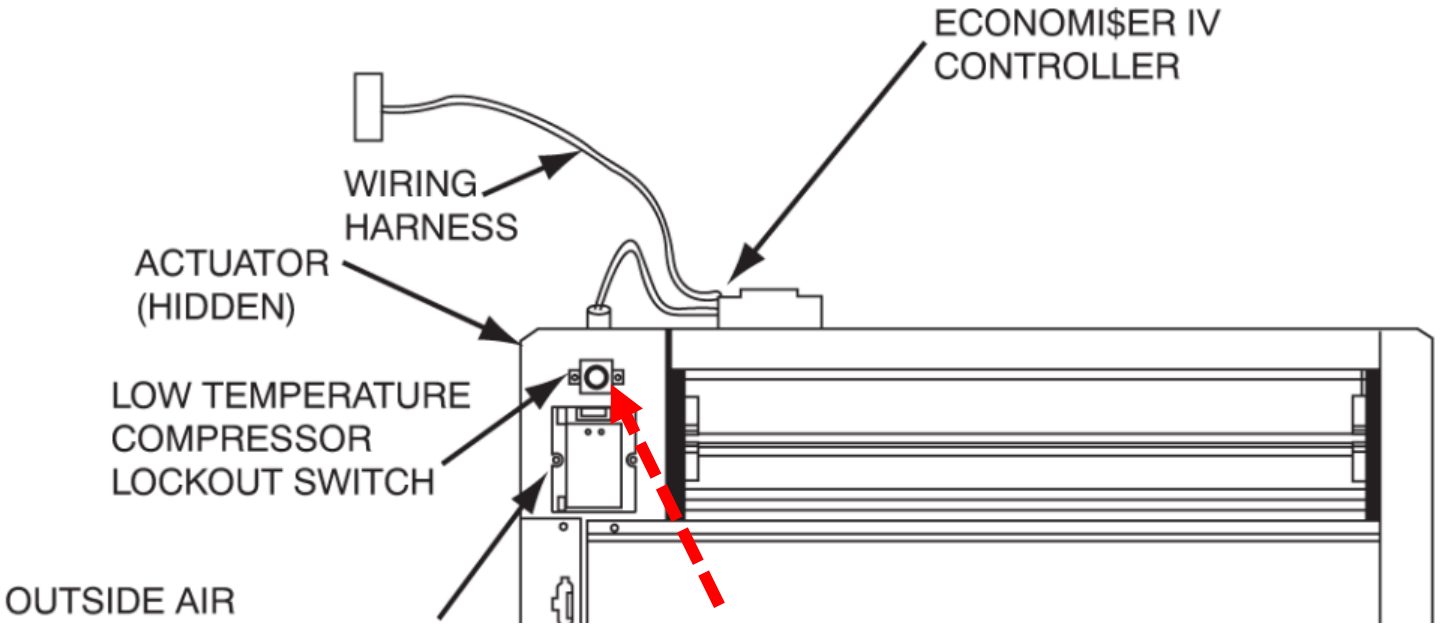


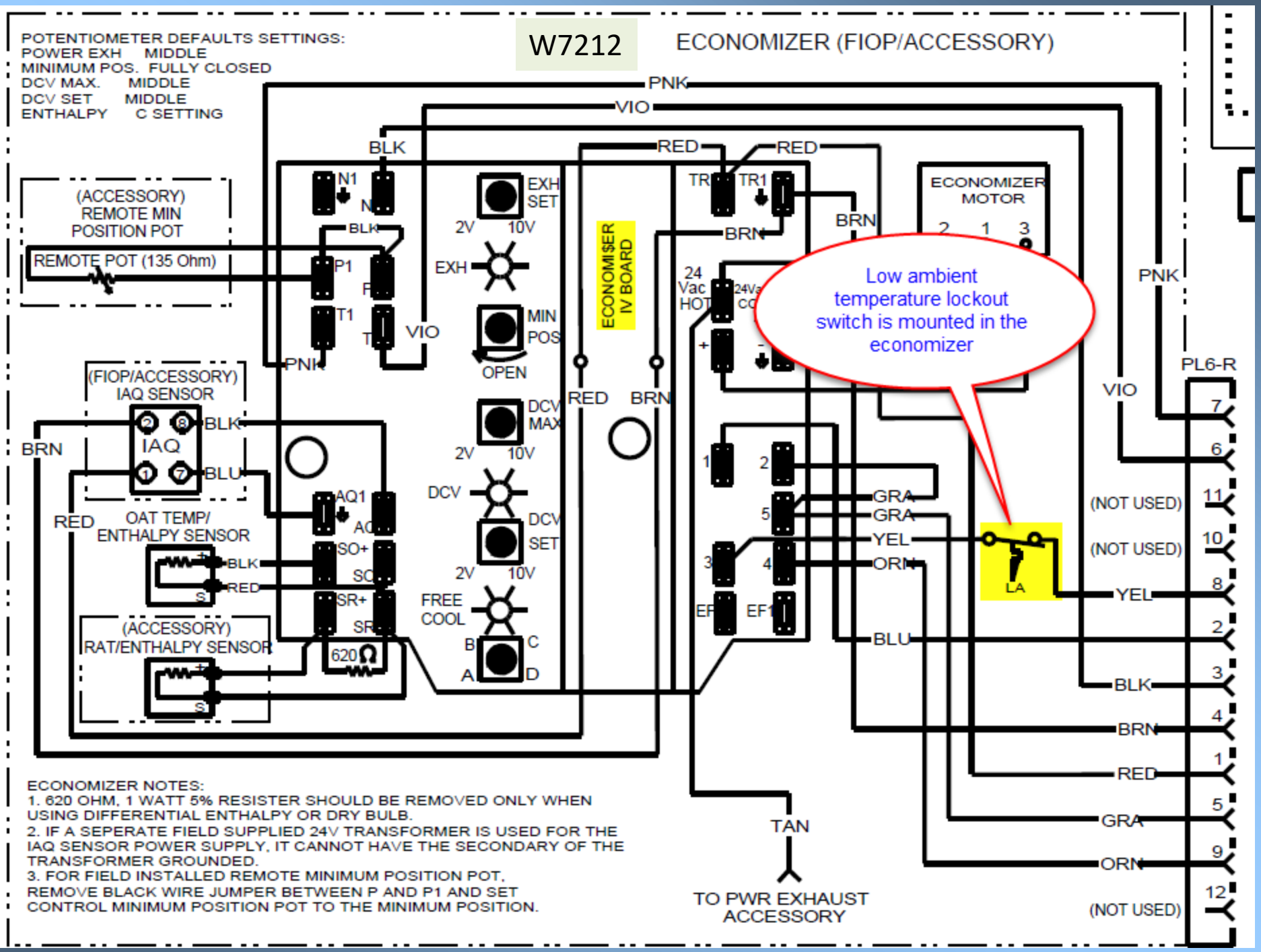
Fig. 26 - EconoMi$er IV Controller



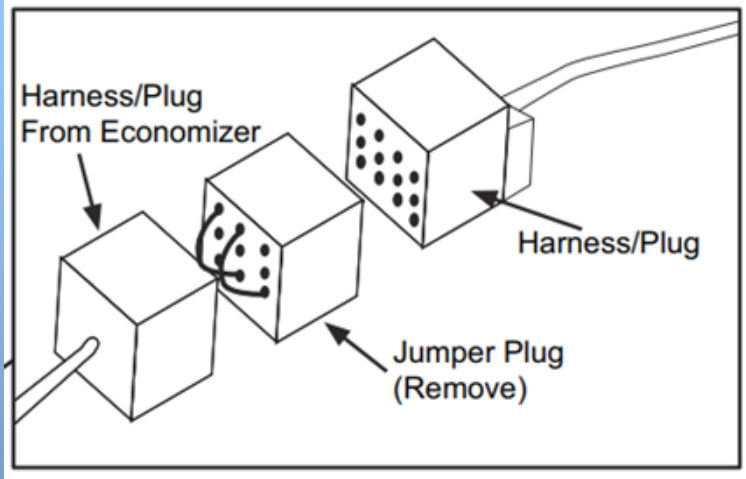
LOW TEMPERATURE COMPRESSOR LOCKOUT SWITCH

The EconoMi$er IV assembly is equipped with a low ambient temperature lockout switch located in the outdoor airstream which is used to lock out the compressors below a 42°F (6°C) ambient temperature.

Fig. 1 - EconoMi$er IV Component Locations

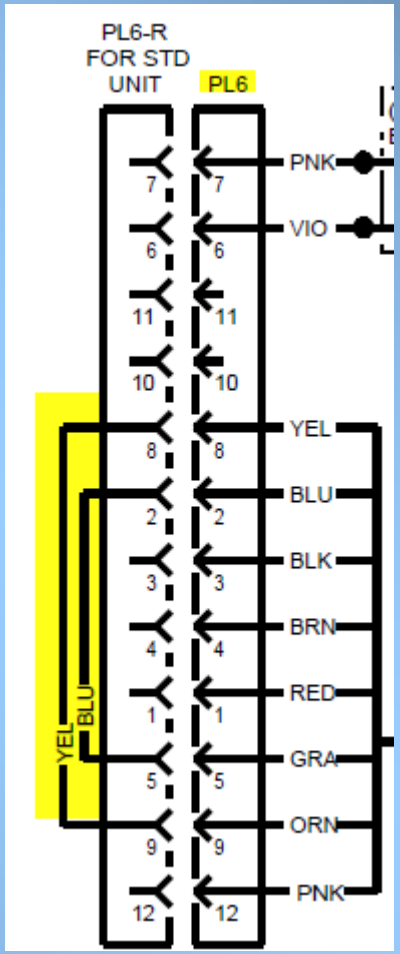

W7212
ECONOMIZER (FIOP/ACCESSORY)
POTENTIOMETER DEFAULTS SETTINGS:
POWER EXH MIDDLE
MINIMUM POS. FULLY CLOSED
DCV MAX. MIDDLE
DCV SET MIDDLE
ENTHALPY C SETTING
(ACCESSORY) REMOTE MIN POSITION POT
REMOTE POT (135 Ohm)
(FIOP/ACCESSORY) IAQ SENSOR
IAQ
OAT TEMP/ ENTHALPY SENSOR
(ACCESSORY) RAT/ENTHALPY SENSOR
620Ω
EXH SET
MIN POS
OPEN
DCV MAX
DCV SET
FREE COOL
2V
10V
ECONOMISER IV BOARD
ECONOMIZER MOTOR
24 Vac HOT
Low ambient temperature lockout switch is mounted in the economizer
LA
PL6-R
(NOT USED)
TAN
TO PWR EXHAUST ACCESSORY
PNK
VIO
RED
BRN
BLK
BLU
GRA
YEL
ORN
ECONOMIZER NOTES:
1. 620 OHM, 1 WATT 5% RESISTER SHOULD BE REMOVED ONLY WHEN USING DIFFERENTIAL ENTHALPY OR DRY BULB.
2. IF A SEPERATE FIELD SUPPLIED 24V TRANSFORMER IS USED FOR THE IAQ SENSOR POWER SUPPLY, IT CANNOT HAVE THE SECONDARY OF THE TRANSFORMER GROUNDED.
3. FOR FIELD INSTALLED REMOTE MINIMUM POSITION POT, REMOVE BLACK WIRE JUMPER BETWEEN P AND P1 AND SET CONTROL MINIMUM POSITION POT TO THE MINIMUM POSITION.

When you are installing an economizer remove the bypass plug to connect the economizer to the harness in the unit. SAVE THIS PLUG! You can use it to bypass an economizer for testing purposes.



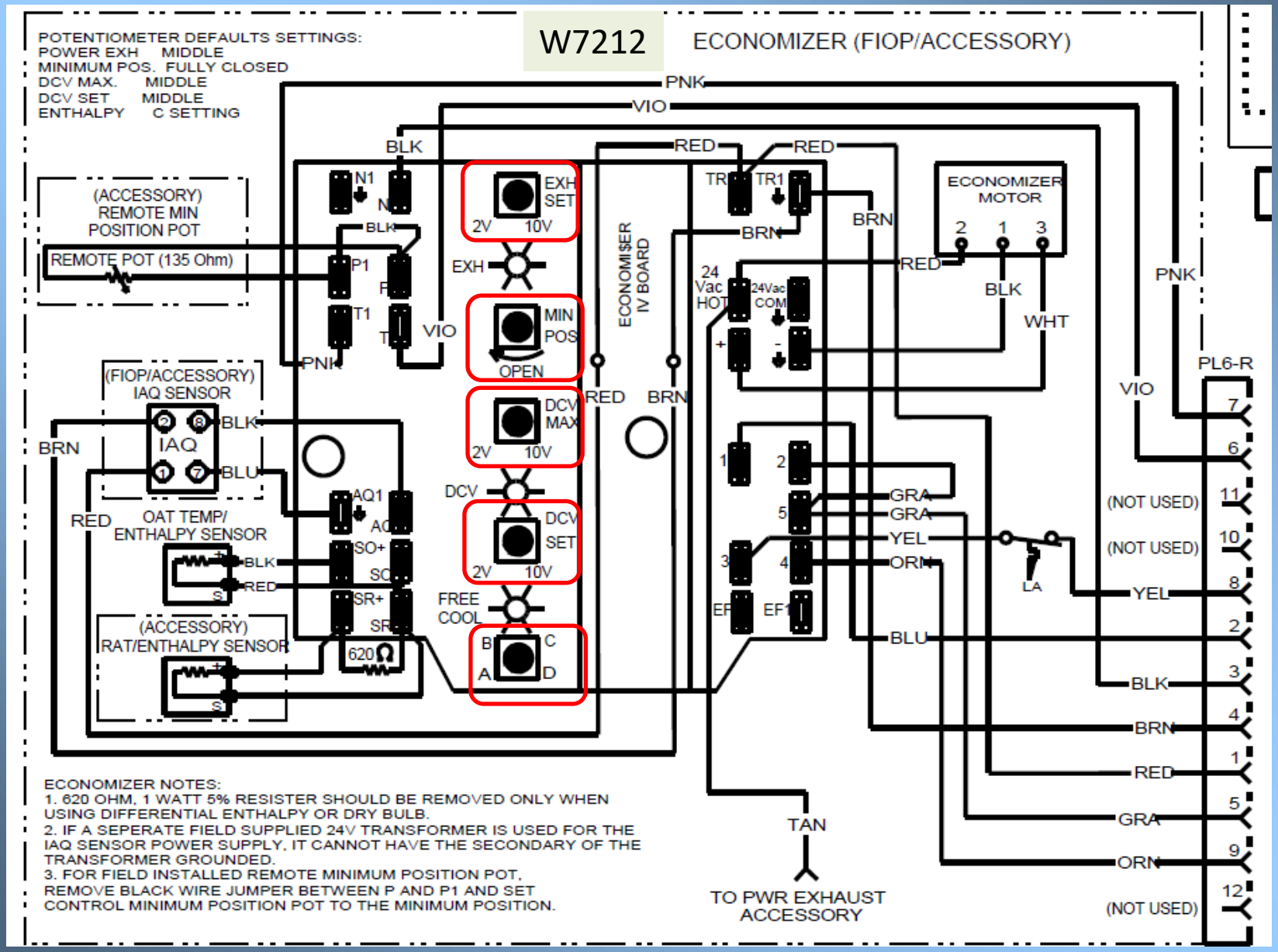
50HJ400345 ECONOMIZER BYPASS PLUG

Wiring diagram Bypass plug connected to the PL6 plug in the unit harness



Remove the filter access door to gain access to the economizer harness

Use a pocket screwdriver and a light touch when adjusting these settings



W7212 Economizer IV Sensors

Table 1 – EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER IV WITH OUTDOOR AIR DRY BULB SENSOR		
	Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.		
Differential Dry Bulb	CRTEMPSN002A00*		
Single Enthalpy	HH57AC078		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*		
CO_2 for DCV Control using a Wall–Mounted CO_2 Sensor	33ZCSENCO2 or CGCDXSEN004A00†		
CO_2 for DCV Control using a Duct–Mounted CO_2 Sensor	33ZCSENCO2 or CGCDXSEN004A00† and 33ZCASPCO2 or CGCDXASP001A00**	OR	CRCBDIOX005A00††

* CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.

† 33ZCSENCO2 and CGCDXSEN004A00 are accessory CO_2 sensors.

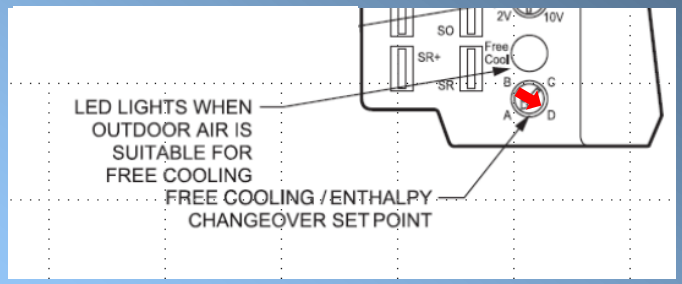
** 33ZCASPCO2 and CGCDXASP001A00 are accessory aspirator boxes required for duct–mounted applications.

††CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

NOTE: Some 48/50TC04–012 units may have factory–installed enthalpy sensor.

EconoMi$er IV Standard Sensors

OUTDOOR AIR TEMPERATURE (OAT) SENSOR — The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor air-stream on 3 to 12½ ton units and must be relocated on 13 to 25 ton units. See Fig. 1 and 15. The operating range of temperature measurement is 40 to 100 F.



Recommended setting for our area

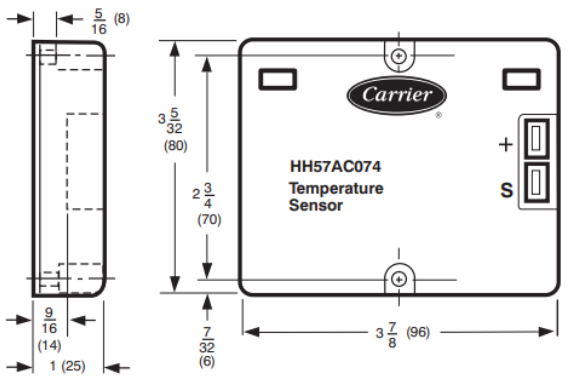


Fig. 6 - Temperature Sensor Specifications

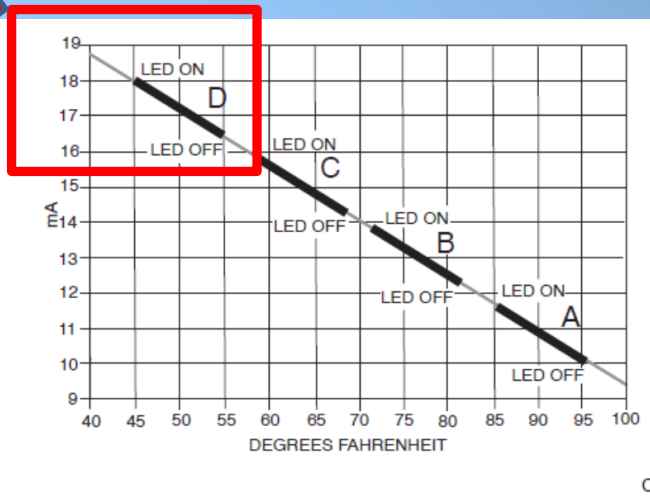


Fig. 21 - Outdoor Air Temperature Changeover Set Points

- When you have the economizer that is wide open and it is hot enough outside for it to be closed, you can pull one of the wires off the outside air temperature sensor.

- If the damper starts to drive closed, you have a bad outside air sensor.

- A failed sensor can create a high mA reading to the economizer control which would indicate the outside air is acceptable for free cooling.

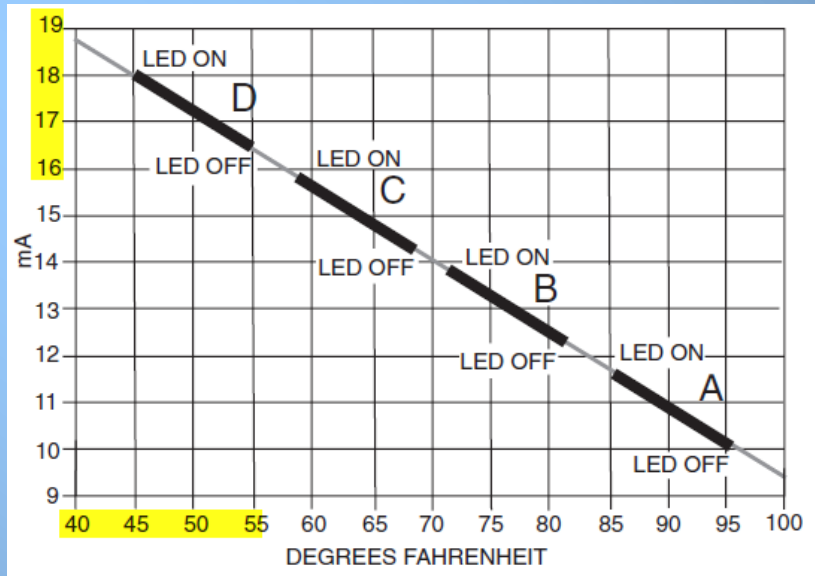


Fig. 21 — Outdoor Air Temperature Changeover Set Points

Additional outdoor temperature sensor option that uses dip switches for a set changeover point

C7660 Set Up

See fig. 6.

When outdoor air temperature is below the changeover setpoint, the sensor will provide a 20 mA signal to the economizer which translates to **OK to economize** positioning the damper open on a call for cooling. When the outdoor air is above the changeover setpoint, the sensor provides a 4 mA signal to the economizer which translates to **not OK to economize** and the outdoor damper drives to minimum position.

The C7660 temperature sensors replace the control function of the temperature changeover in the economizer control.

The A-B-C-D potentiometer on the economizer does not control the changeover point when a C7660 sensor is used in place of an enthalpy sensor. For single dry bulb set the potentiometer to D.

The factory default switch setting is 63°F. the changeover temperature can be field set by changing the positions of the switches using fig. 7.

C101070

Fig. 6 - C7660 Temperature Sensor

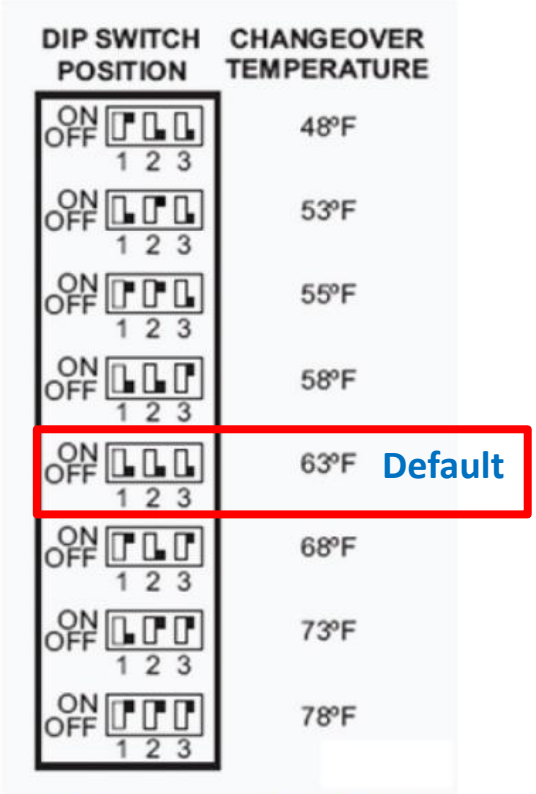


Fig. 7 - Changeover Switch Set Points

switches to the appropriate temperature required for application.

Set the free Cooling/Enthalpy Changeover Set Point potentiometer to "D" located on the face the economizer control.

W7212 Economizer IV

Single Enthalpy Sensor
Part # HH57AC078

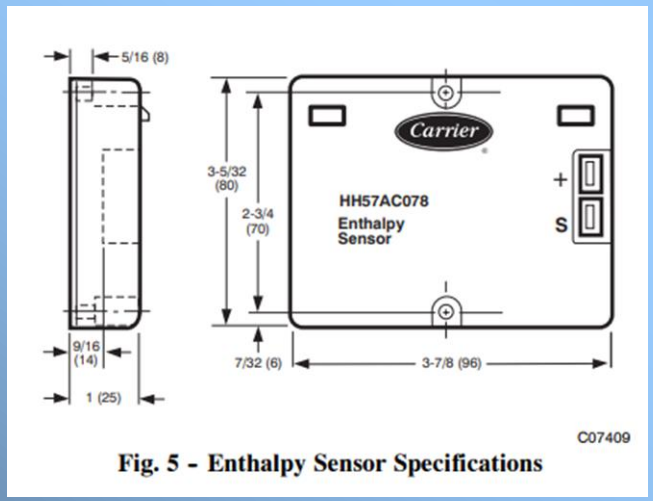


Fig. 5 - Enthalpy Sensor Specifications

I recommend using setting D for our area.

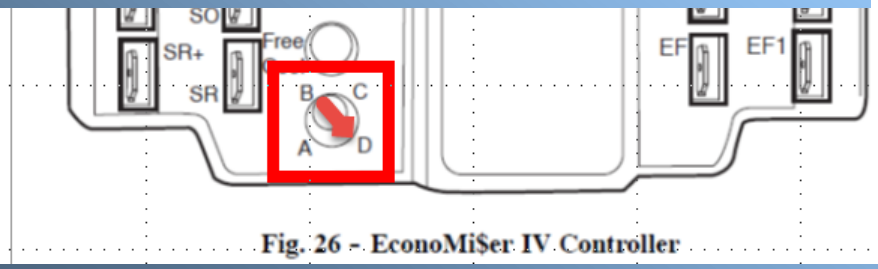


Fig. 26 - EconoMi$er IV Controller

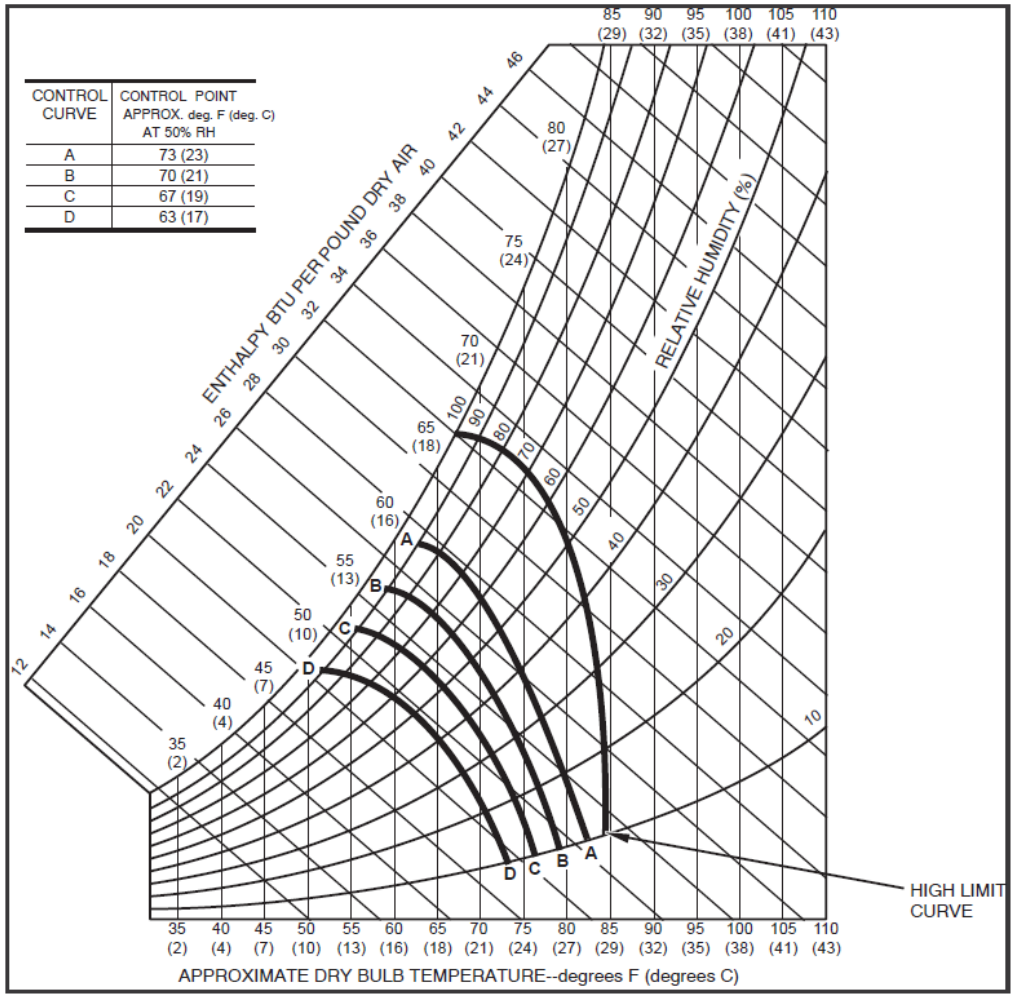
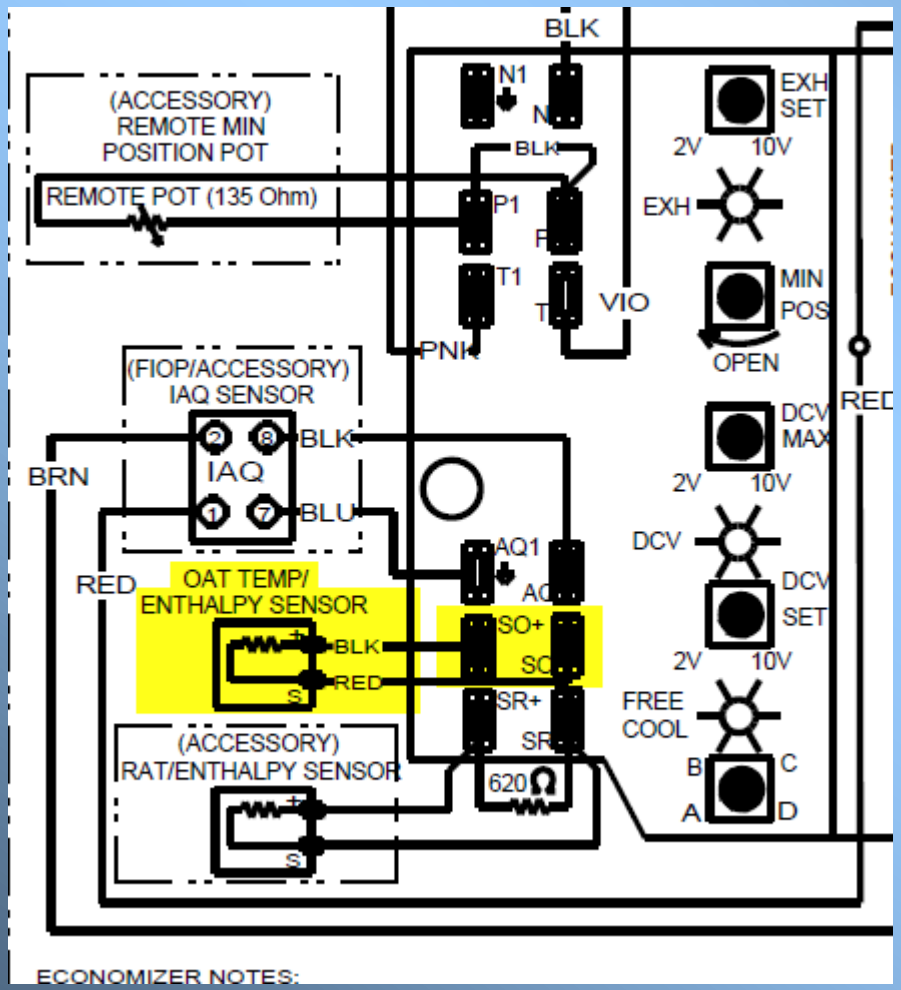


Fig. 91 - Enthalpy Changeover Setpoints

W7212 Economizer IV



Dry bulb sensor chart

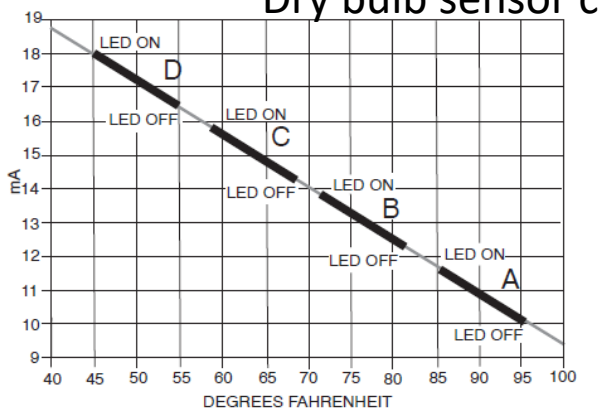


Fig. 21 - Outdoor Air Temperature Changeover Set Points

Or

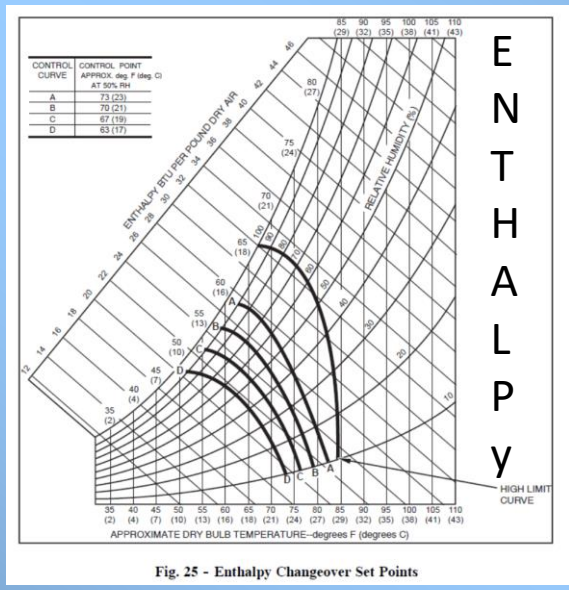


Fig. 25 - Enthalpy Changeover Set Points

W7212 Economizer IV

SUPPLY AIR TEMPERATURE (SAT) SENSOR — The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 9 and 16. This sensor is field installed. The operating range of temperature measurement is 0° to 158 F. See Table 5 for sensor temperature/resistance values.

The temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located in the "crimp end" and is sealed from moisture.

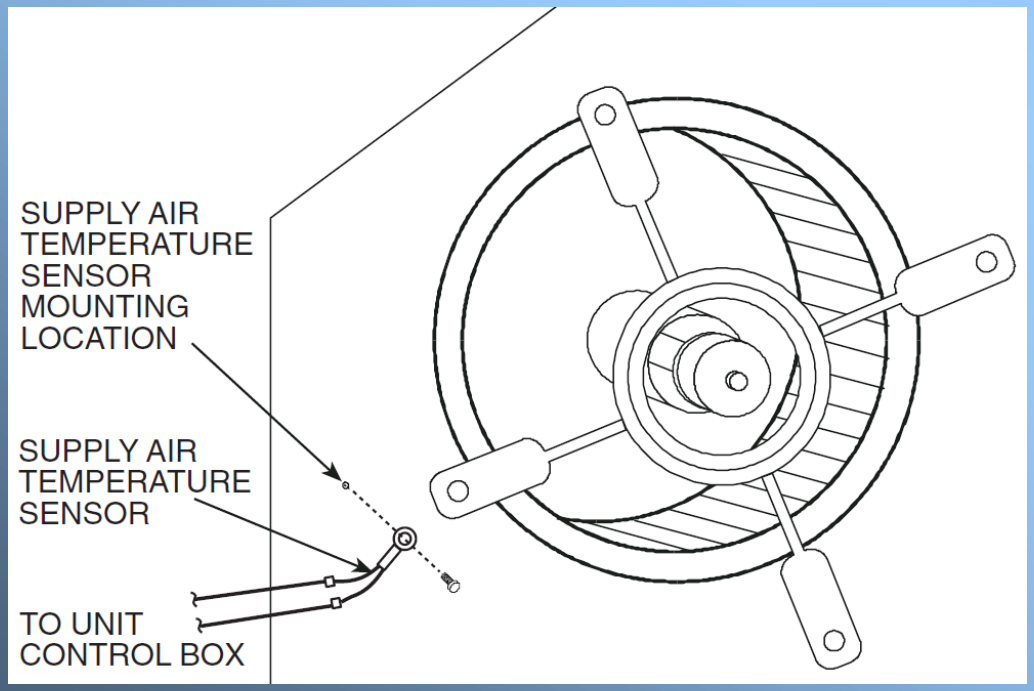


Table 5 — Supply Air Sensor Temperature/ Resistance Values

TEMPERATURE (F)	RESISTANCE (ohms)
–58	200,250
–40	100,680
–22	53,010
–4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

Economizer IV W7212

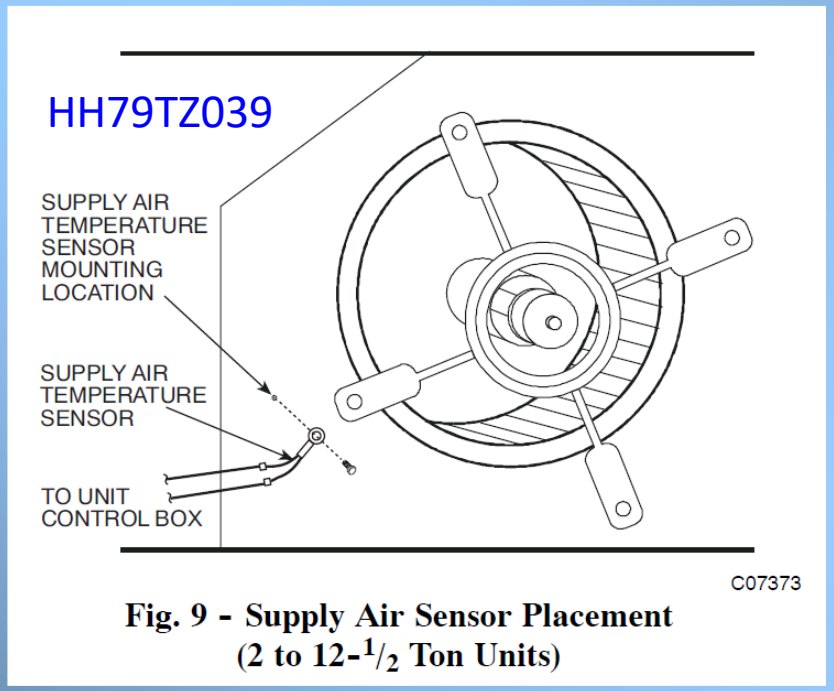
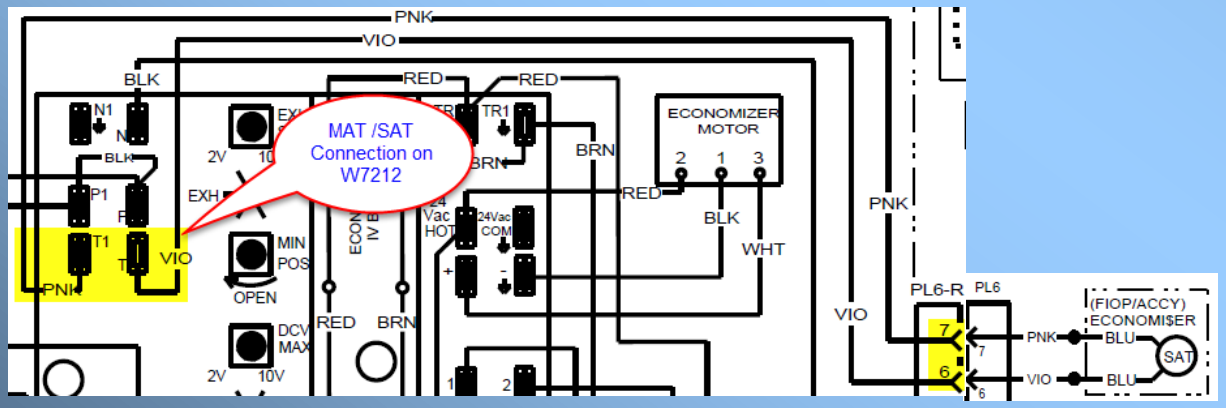


Fig. 9 - Supply Air Sensor Placement (2 to 12-1/2 Ton Units)



Economizer IV W7212

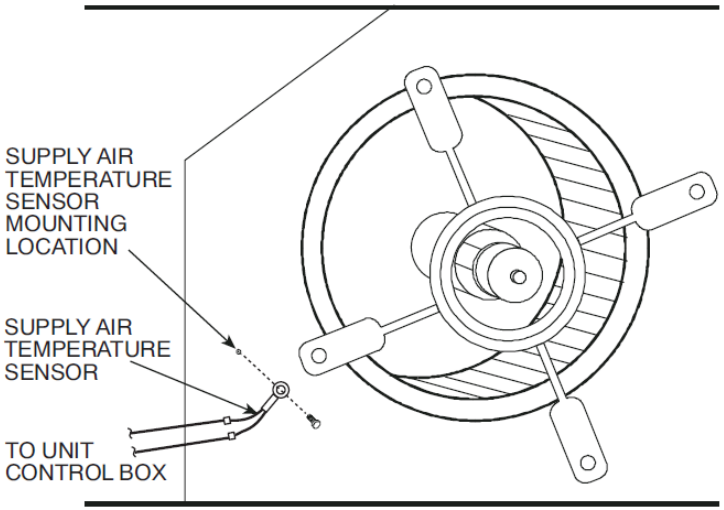
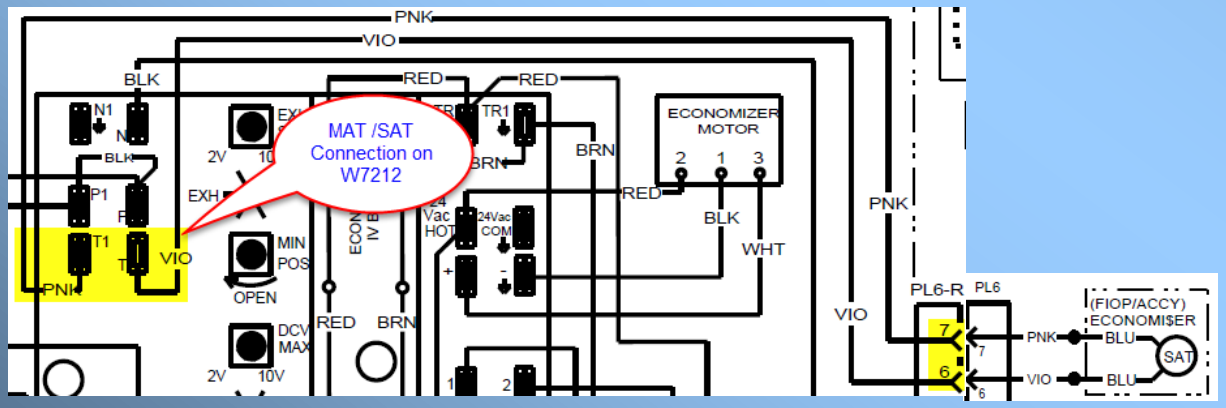


Fig. 9 - Supply Air Sensor Placement (2 to 12-$^{1}/_{2}$ Ton Units)



W7212 Economizer IV

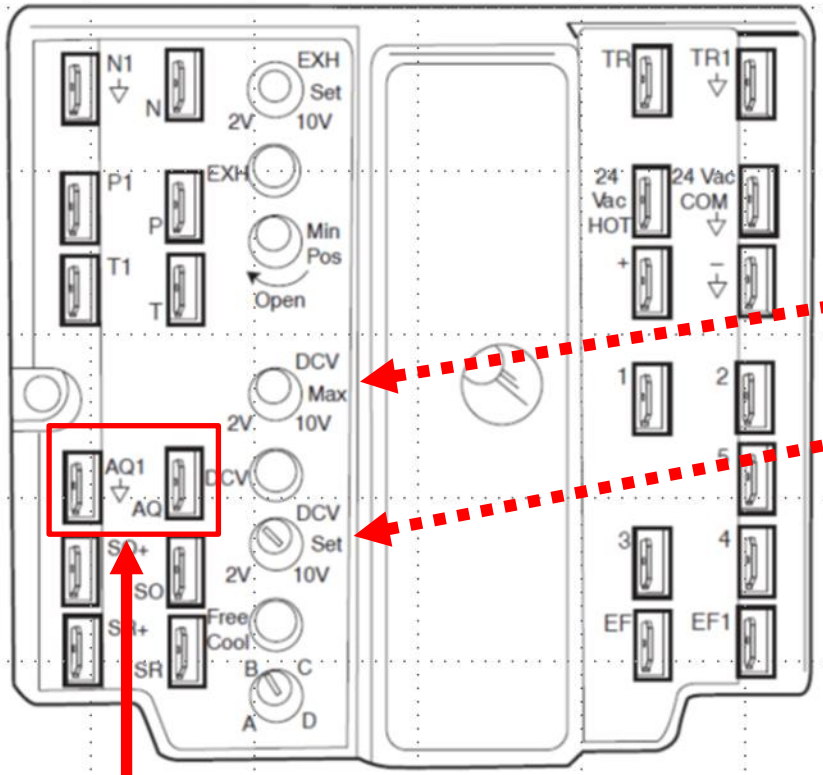


Fig. 26 - EconoMiSer IV Controller

CO2 Sensor connections 2-10 VDC

Demand Control Ventilation has 2 settings

Maximum open position

CO2 PPM setting

Typical starting point is midway or about 6 VDC for 1000 ppm

Demand Control Ventilation Setpoint

The logic module modulates the outdoor damper to provide ventilation based on the 2-10 Vdc DCV input (AQ-AQ1 terminals). With no cooling signal, the DCV overrides the outdoor air damper when ventilation requires additional outdoor air.

EXAMPLE: CO2 sensor with 2 to 10 Vdc output range 0 to 2000 ppm. Two (2) Vdc is equal to 0 ppm, 10 Vdc is equal to 2000 ppm, threshold is determined to be 1000 ppm. DCV potentiometer to be set at 6 Vdc.

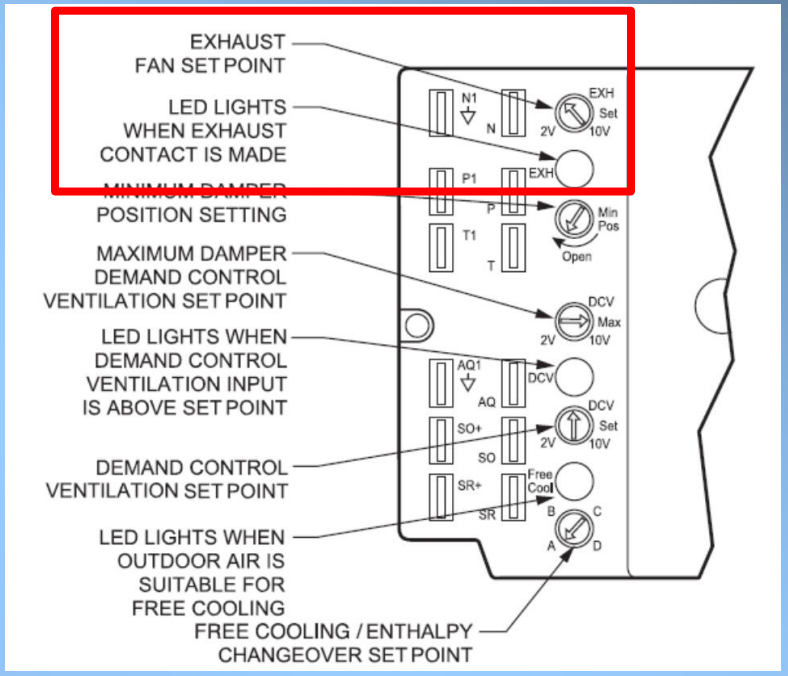
Adjust the potentiometer with a small screwdriver by turning the pot to the fully CCW then fully CW positions to determine the end stops. Set the pot for 6 Vdc in the mid position.

When using powered exhaust with the economizer this setting has to be addressed

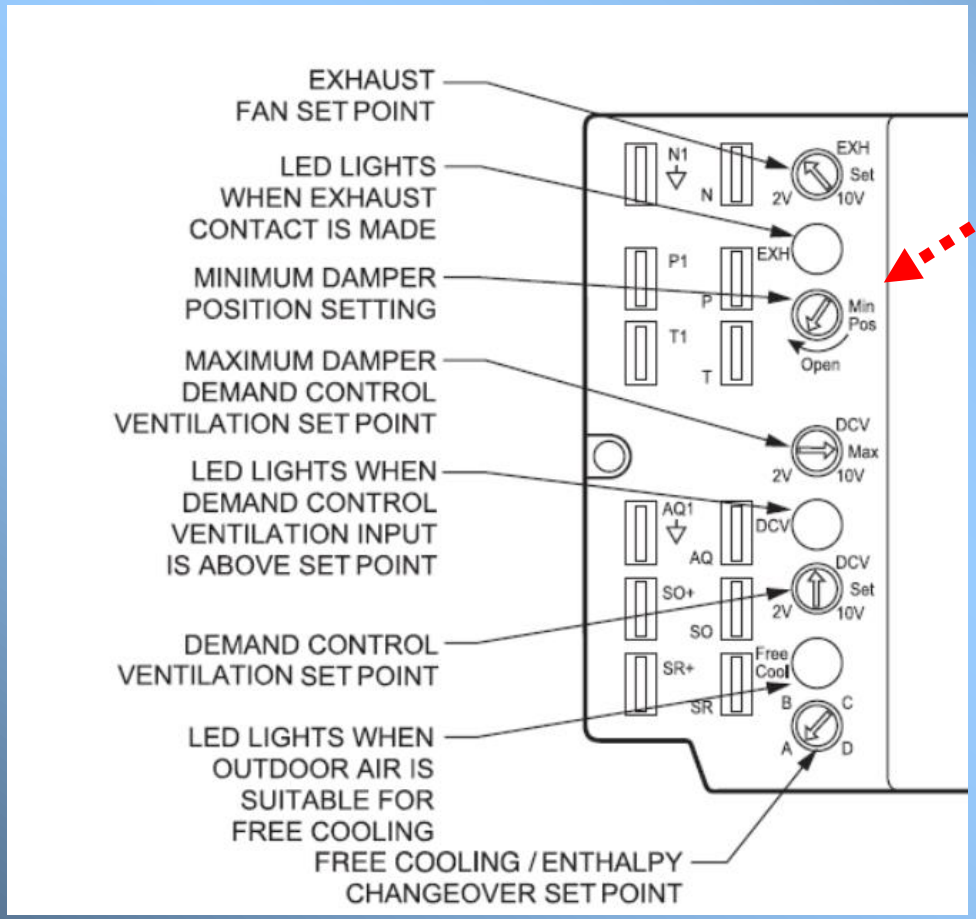
EXHAUST SET POINT ADJUSTMENT — The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 20. The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi$er IV controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

Test and balance usually adjusts this setting.

You can set it to 6 volts for a typical setpoint.
When the voltage to the economizer motor gets to 6 volts, the powered exhaust will activate. (about 50% open)
This keeps the building pressure from becoming too high.



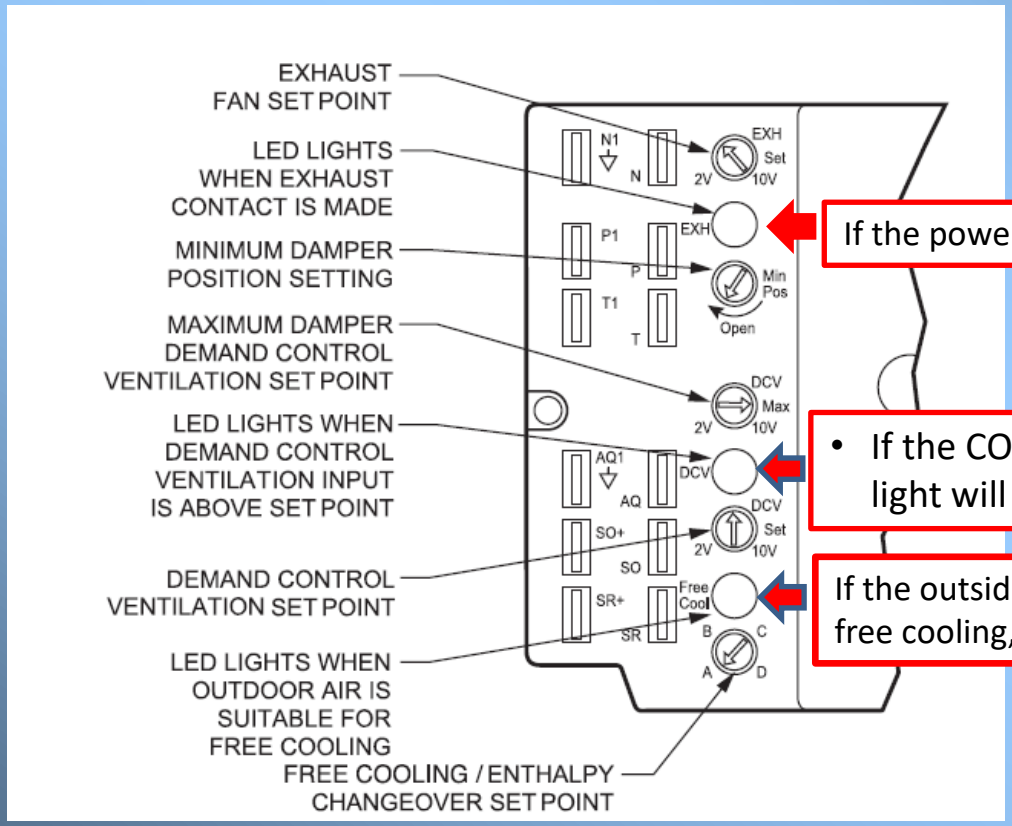
W7212 Economizer IV



Minimum position setting
When the indoor fan comes on the economizer will drive to this setting

Adjusting Minimum Position
The minimum position is defined by the minimum outdoor air flow required in the building during the occupied period.

W7212 Economizer IV

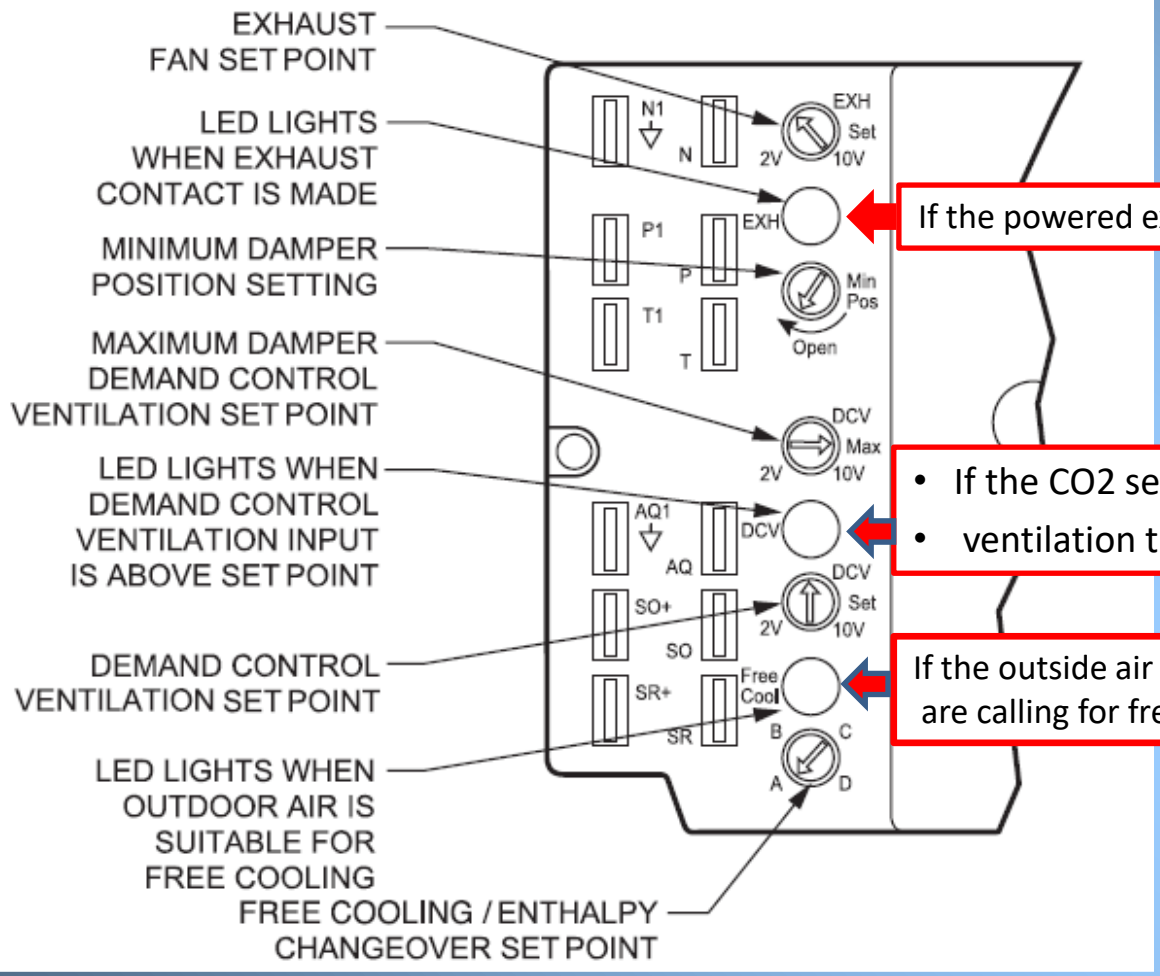


If the powered exhaust is activated this light will be on

- If the CO2 sensor is active and calling for ventilation this light will be on

If the outside air sensor or the enthalpy sensor are calling for free cooling, this light will be on.

W7212 Economizer IV



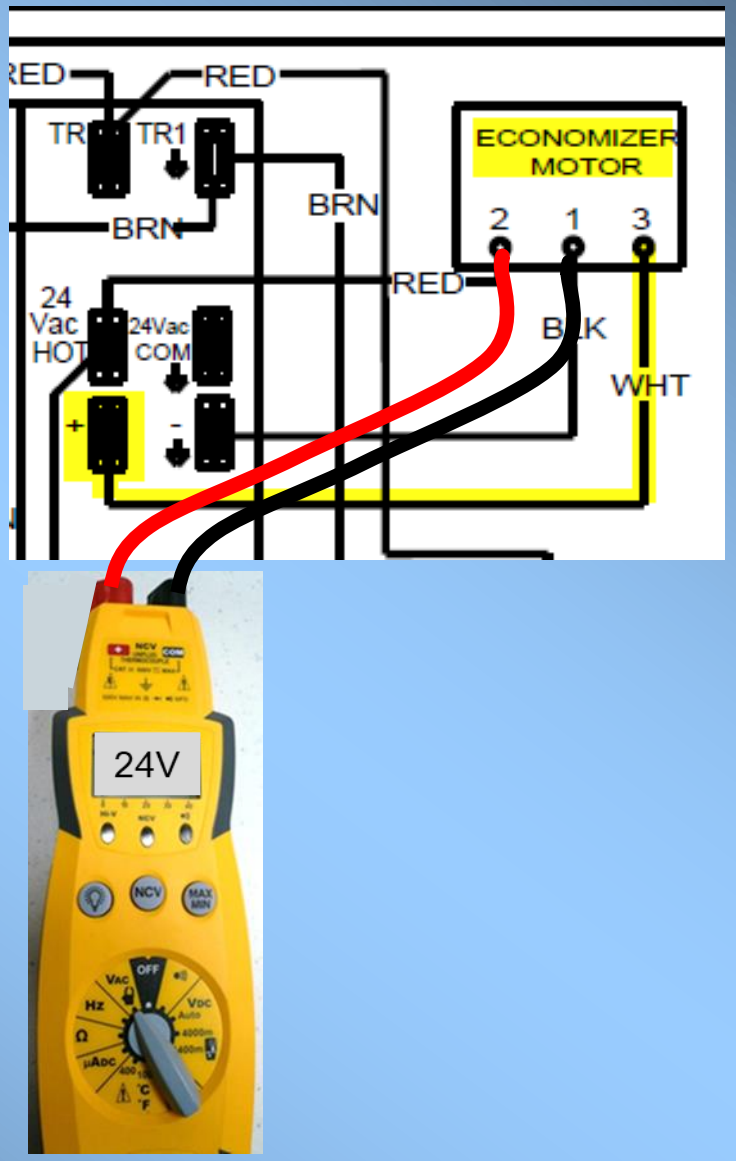
If the powered exhaust is activated this light will be on

- If the CO2 sensor is active and calling for
- ventilation this light will be on.

If the outside air sensor or the enthalpy sensor are calling for free cooling, this light will be on.

W7212 Outputs to the Economizer Motor

The motor requires a 24 Volt power supply

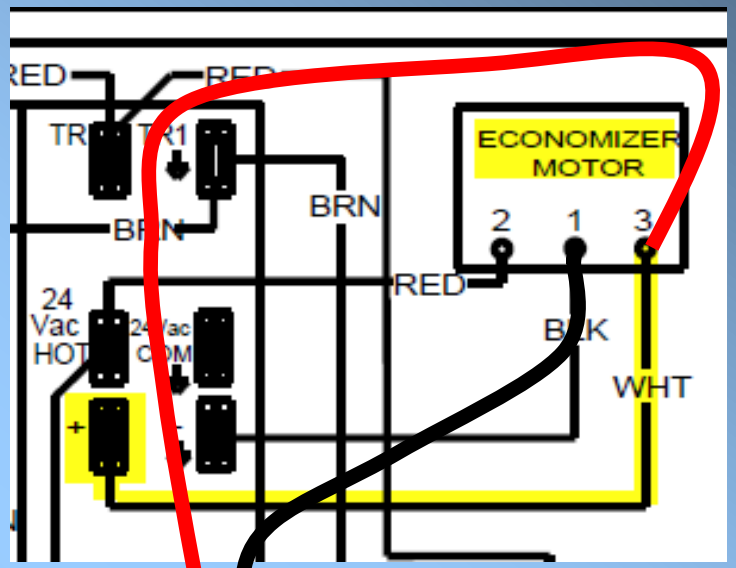


W7212 Outputs to the Economizer Motor

Actuator command position is defined in a 2-10 vdc value. 2.0-v is outside air damper position fully-closed (0% open); 10.0-v is damper position fully-open (100% open). See Table 6 to correlate control voltage values to outside air damper opening percentage.

Table 6 – Actuator Voltage vs. Damper Position

Vdc	% Open	Vdc	% Open	Vdc	% Open
2.0	0	4.8	35	7.6	70
2.4	5	5.2	40	8.0	75
2.8	10	5.6	45	8.4	80
3.2	15	6.0	50	8.8	85
3.6	20	6.4	55	9.2	90
4.0	25	6.8	60	9.6	95
4.4	30	7.2	65	10.0	100



On an earlier slide we discussed the power exhaust setting of 6 volts.
We can see on this chart 6 volts would be about 50% open.

W7212 Economizer IV

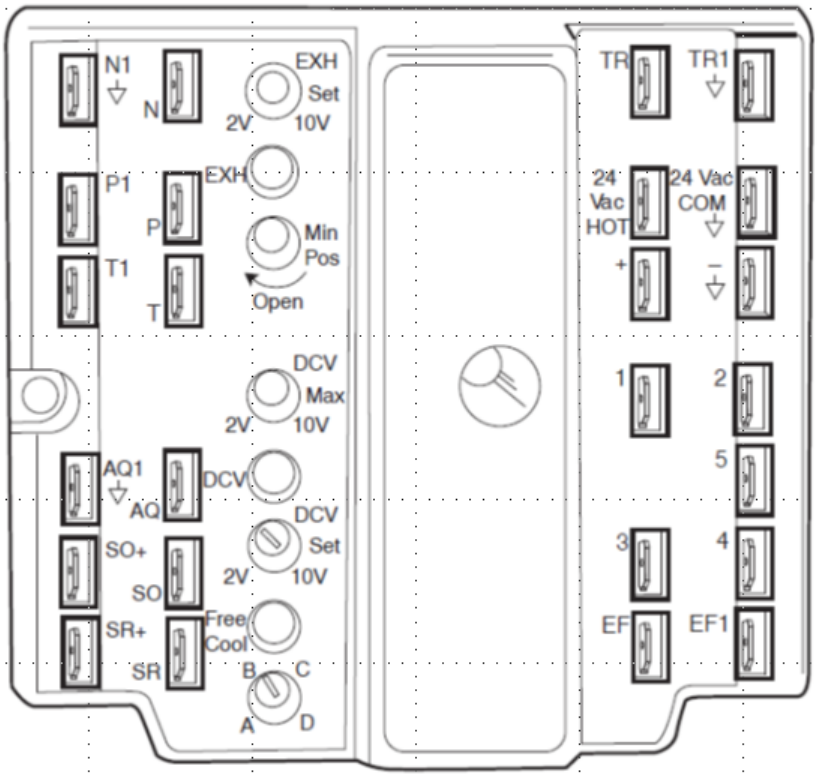


Fig. 26 - EconoMi$er IV Controller

W7220 Economizer X Control

W7220 Economizer X Control

Honeywell W7220 Title 24 compliant economizer control

Table 1. Economizer Module - Left hand terminal blocks.

Label	Type	Description
Top Left Terminal Block		
MAT MAT	20k NTC and COM	Mixed Air Temperature Sensor (polarity insensitive connection)
OAT OAT	20k NTC and COM	Outdoor Air Temperature Sensor (polarity insensitive connection)
S-BUS S-BUS	SYLK Bus	Sylk Bus sensor (polarity insensitive connection)
Bottom Left Terminal Block		
IAQ 2-10	2-10 Vdc	Air Quality Sensor Input (e.g. CO_2 sensor)
IAQ COM	COM	Air Quality Sensor Common
IAQ 24V	24 Vac	Air Quality Sensor 24 Vac Source
ACT 2-10	2-10 Vdc	Damper Actuator Output (2-10 Vdc)
ACT COM	COM	Damper Actuator Output Common
ACT 24V	24 Vac	Damper Actuator 24 Vac Source

Table 2. Economizer Module - Right hand terminal blocks.

Label	Type	Description
Top Right Terminal Block		
	n/a	The first terminal is not used
AUX2 I	24 Vac IN	Shut Down (SD) or Heat (W) Conventional only or Heat Pump Changeover (O/B) in Heat Pump mode.
OCC	24 Vac IN	Occupied / Unoccupied Input
E-GND	EGND	Earth Ground - System Required
EXH1	24 Vac OUT	Exhaust Fan 1 Output
AUX1 O	24 Vac OUT	Programmable: Exhaust fan 2 output or ERV or System Alarm output.
Bottom Right Terminal Block		
Y2-I	24 Vac IN	Y2 in - Cooling Stage 2 Input from space thermostat
Y2-O	24 Vac OUT	Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling

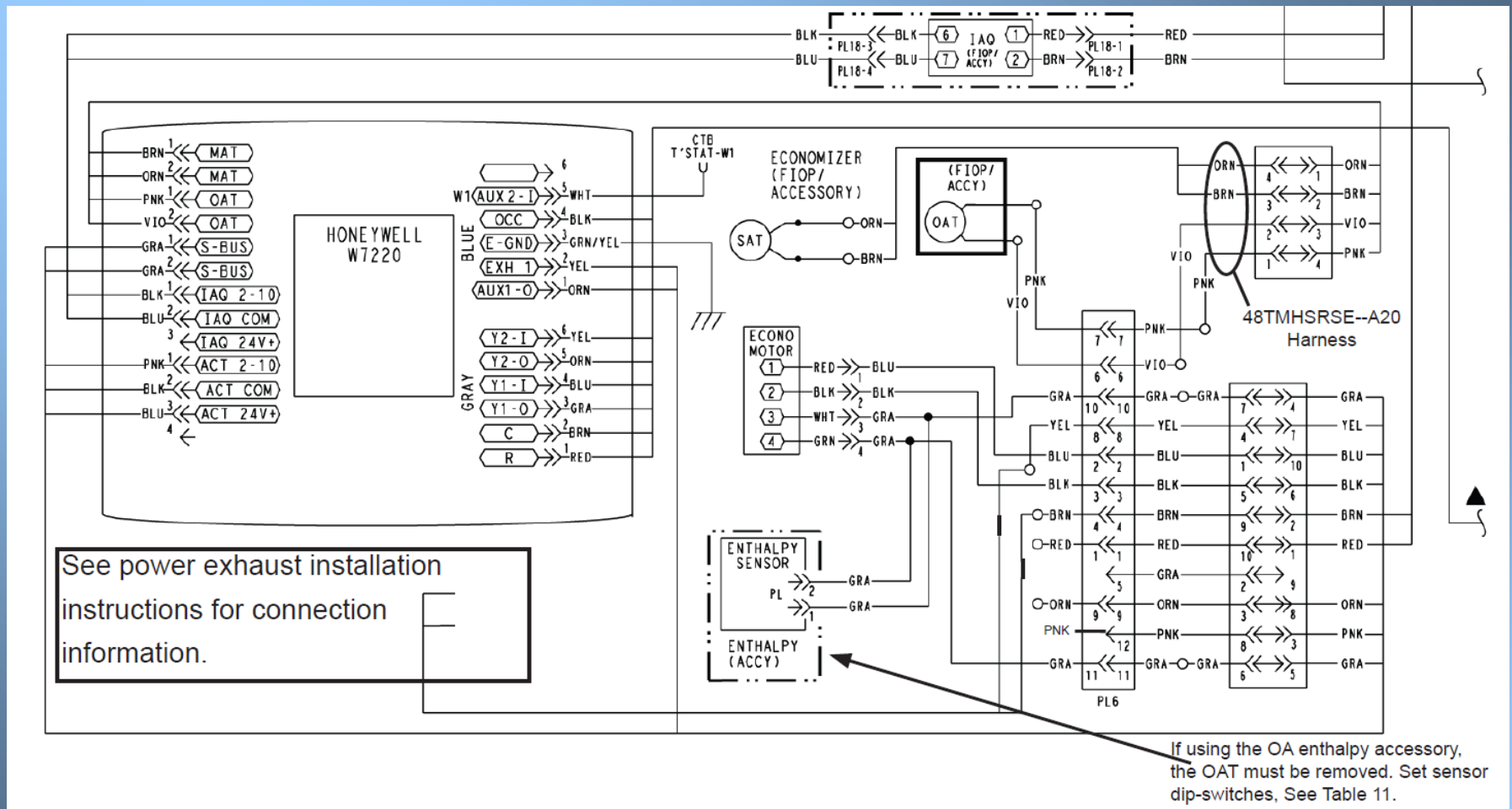
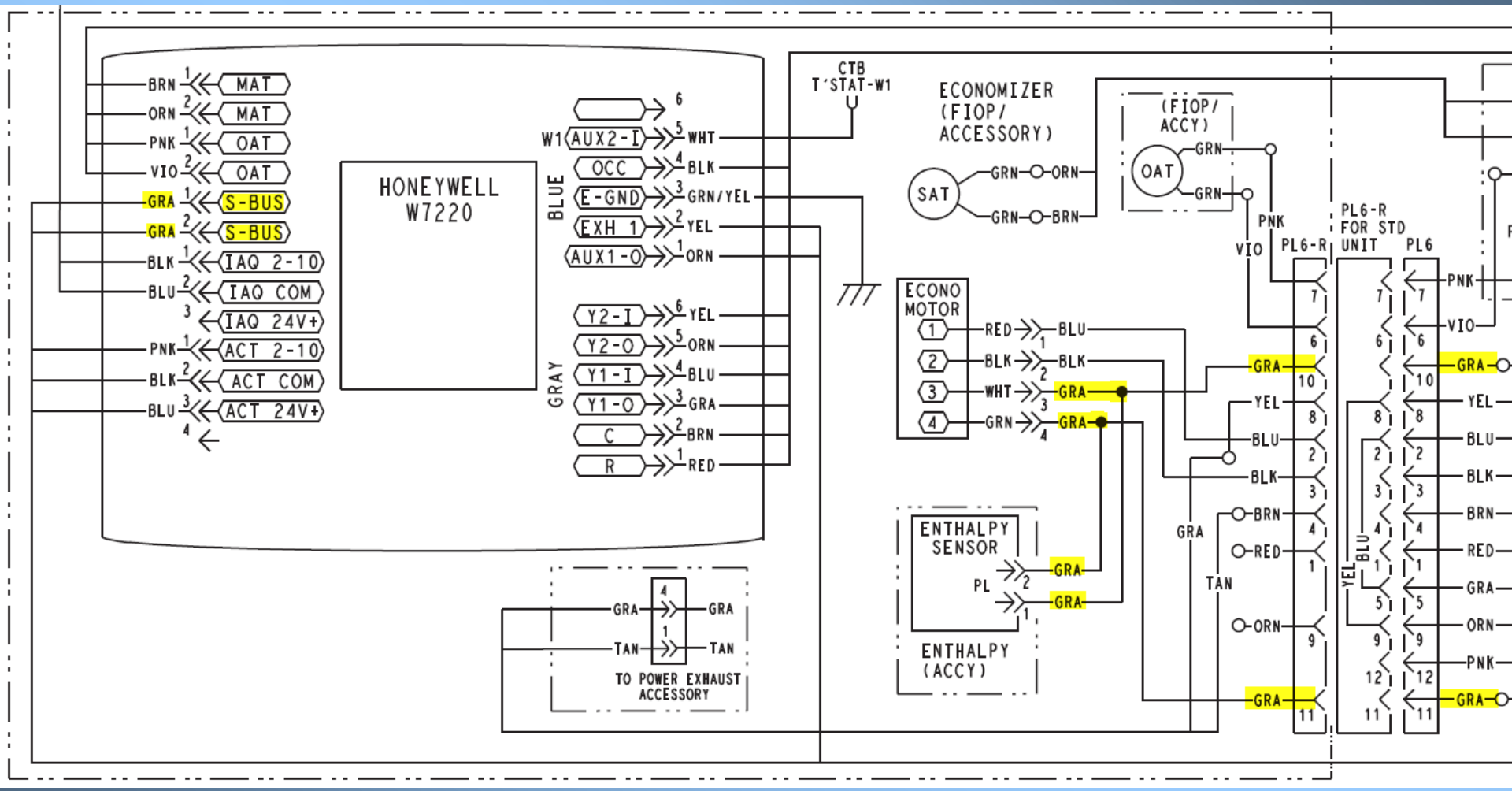
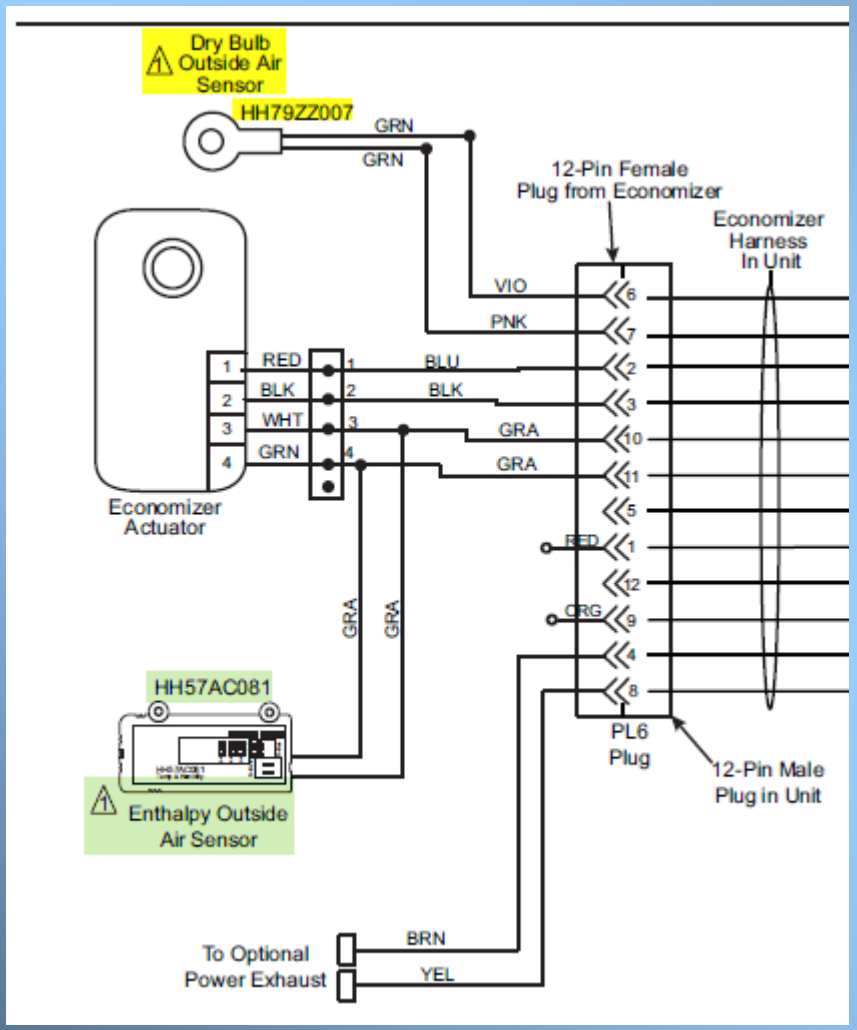
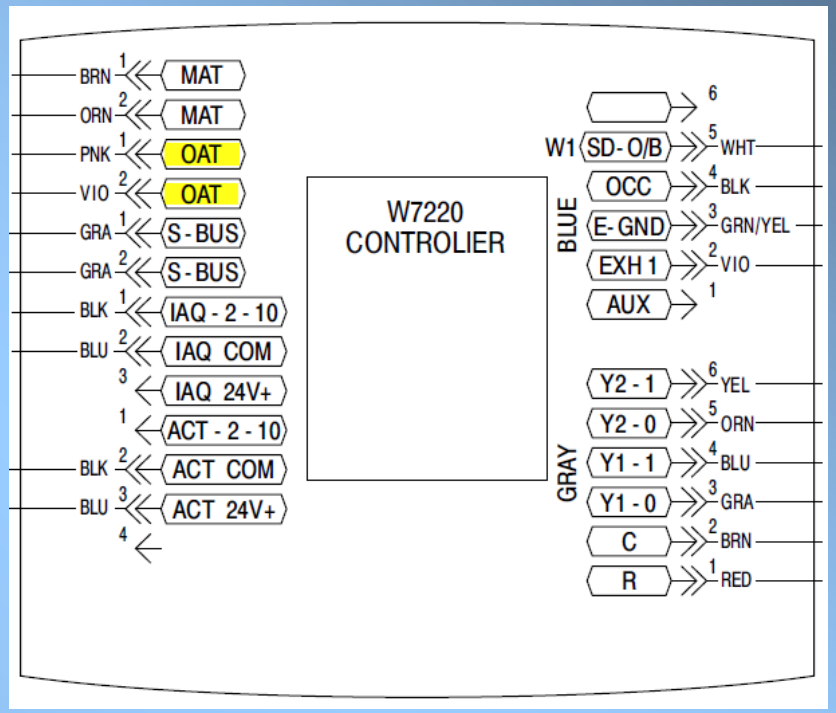


Fig. 10A - Typical Wiring Diagram For 1 and 2 Speed Units
(2 Speed Diagram Shown)


HONEYWELL
W7220
BRN MAT
ORN MAT
PNK OAT
VIO OAT
GRA S-BUS
GRA S-BUS
BLK IAQ 2-10
BLU IAQ COM
IAQ 24V+
PNK ACT 2-10
BLK ACT COM
BLU ACT 24V+
BLUE
W1 AUX2-I WHT
OCC BLK
E-GND GRN/YEL
EXH 1 YEL
AUX1-O ORN
GRAY
Y2-I YEL
Y2-O ORN
Y1-I BLU
Y1-O GRA
C BRN
R RED
CTB
T'STAT-W1
ECONOMIZER
(FIOP/
ACCESSORY)
SAT
GRN ORN
GRN BRN
(FIOP/
ACCY)
OAT
GRN
GRN
PNK
VIO
PL6-R
PL6-R
FOR STD
UNIT
PL6
ECONO
MOTOR
RED BLU
BLK BLK
WHT GRA
GRN GRA
ENTHALPY
SENSOR
PL
GRA
GRA
ENTHALPY
(ACCY)
GRA GRA
TAN TAN
TO POWER EXHAUST
ACCESSORY
BLU
YEL
GRA
TAN
BRN
RED
ORN
GRA
PNK
VIO
GRA
YEL
BLU
BLK
BRN
RED
GRA
ORN
PNK
GRA





⚠1 Either the OAT or the Enthalpy Sensor can be used but not both. Remove OAT if Enthalpy's used.

Supply Air Temperature Sensor

The W7220 controller uses a 20-k ohm analog sensor for Supply Air Temperature (SAT). The thermistor is attached to a ring terminal. The ring terminal is attached to the unit's supply fan housing, downstream of the unit's indoor coil. The SAT sensor is connected to the W7220 input terminals marked MAT. See Table 7 for sensor resistance to temperature correlations.

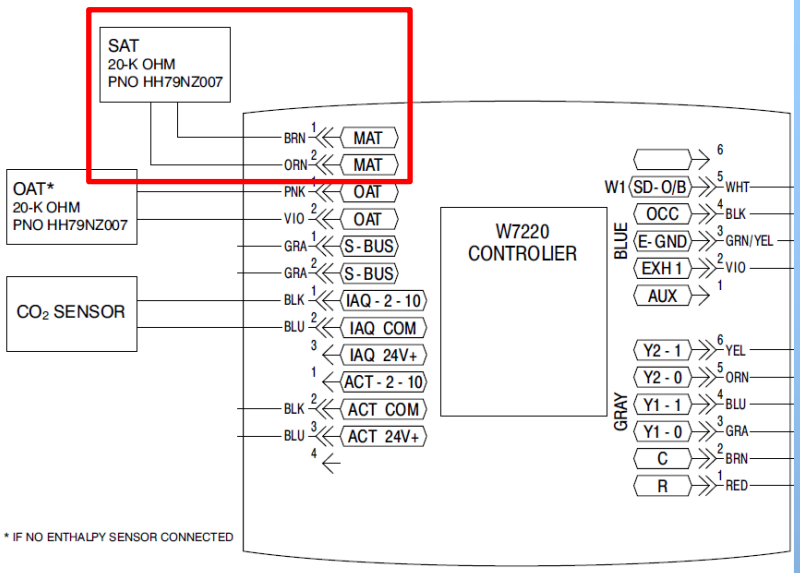


Fig. 4 - W7220 Sensor and Control I/O Connections

The W7220 controller requires a valid signal from its SAT channel in order to function. If the SAT connection to the W7220 is lost, the W7220 will initiate an alarm condition immediately. No economizing operation will be permitted until this alarm is cleared.

Table 7 – SAT/OAT Sensor Characteristics

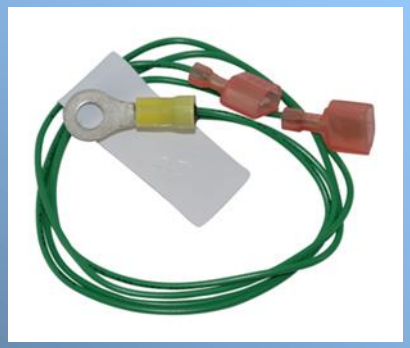
Deg C	Ohms
–30	415156
–25	301540
–20	221210
–15	163834
–10	122453
–5	92382
0	70200
5	53806
10	41561
15	32341
20	25346
25	20000
30	15886
35	12698
40	10212
45	8261
50	6720

Deg F	Ohms
–20	386130
0	193070
20	101820
32	70200
40	55420
45	47771
50	41258
55	35725
60	31035
65	27069
70	23719
77	20000
80	18473
100	11544
120	6768

Supply Air Temperature Sensor

The W7220 controller uses a 20-k ohm analog sensor for Supply Air Temperature (SAT). The thermistor is attached to a ring terminal. The ring terminal is attached to the unit's supply fan housing, downstream of the unit's indoor coil. The SAT sensor is connected to the W7220 input terminals marked MAT. See Table 7 for sensor resistance to temperature correlations.

HH79ZZ007



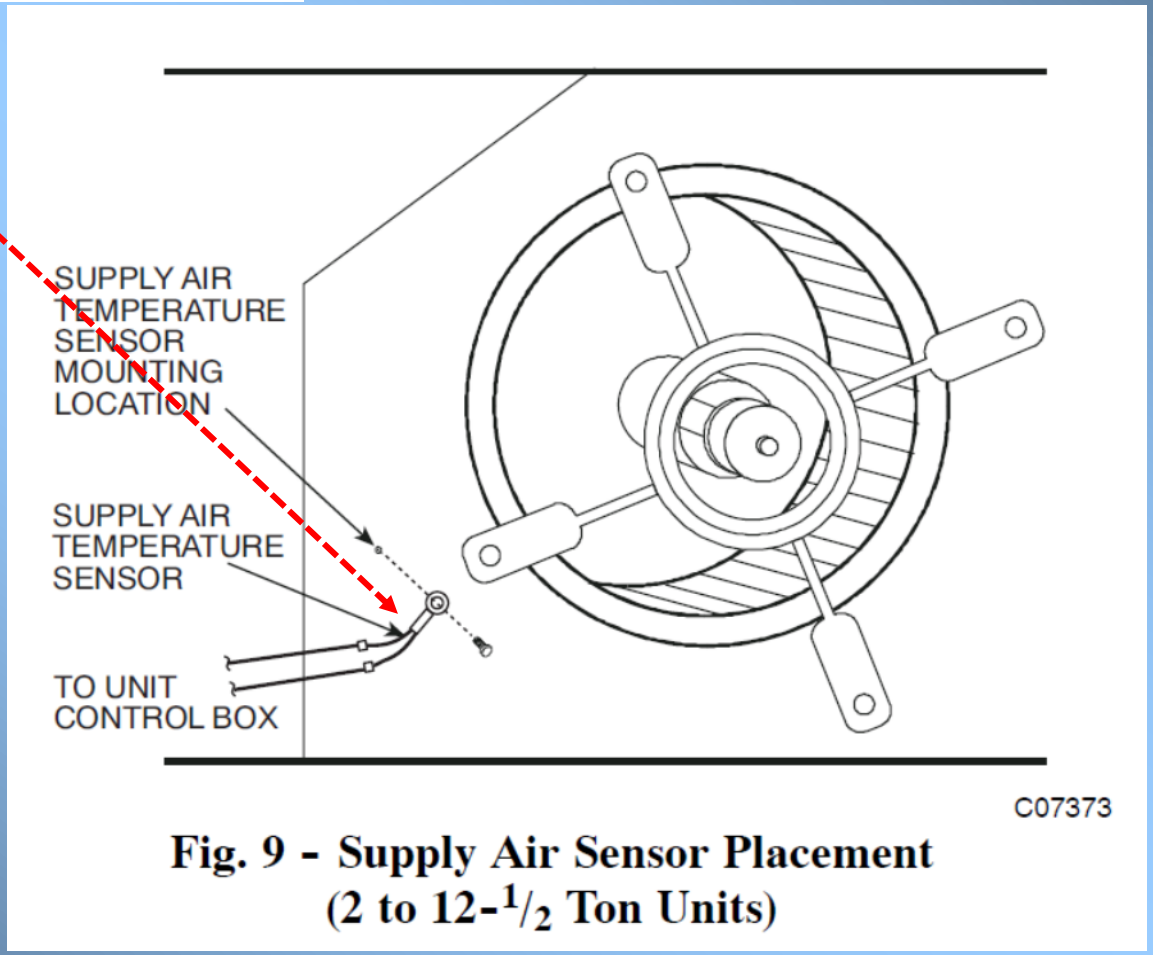


Fig. 9 - Supply Air Sensor Placement (2 to 12-1/2 Ton Units)

Honeywell - C7250A1001/U 20k Temperature Sensor for Mixed Air (MAT sensor option)

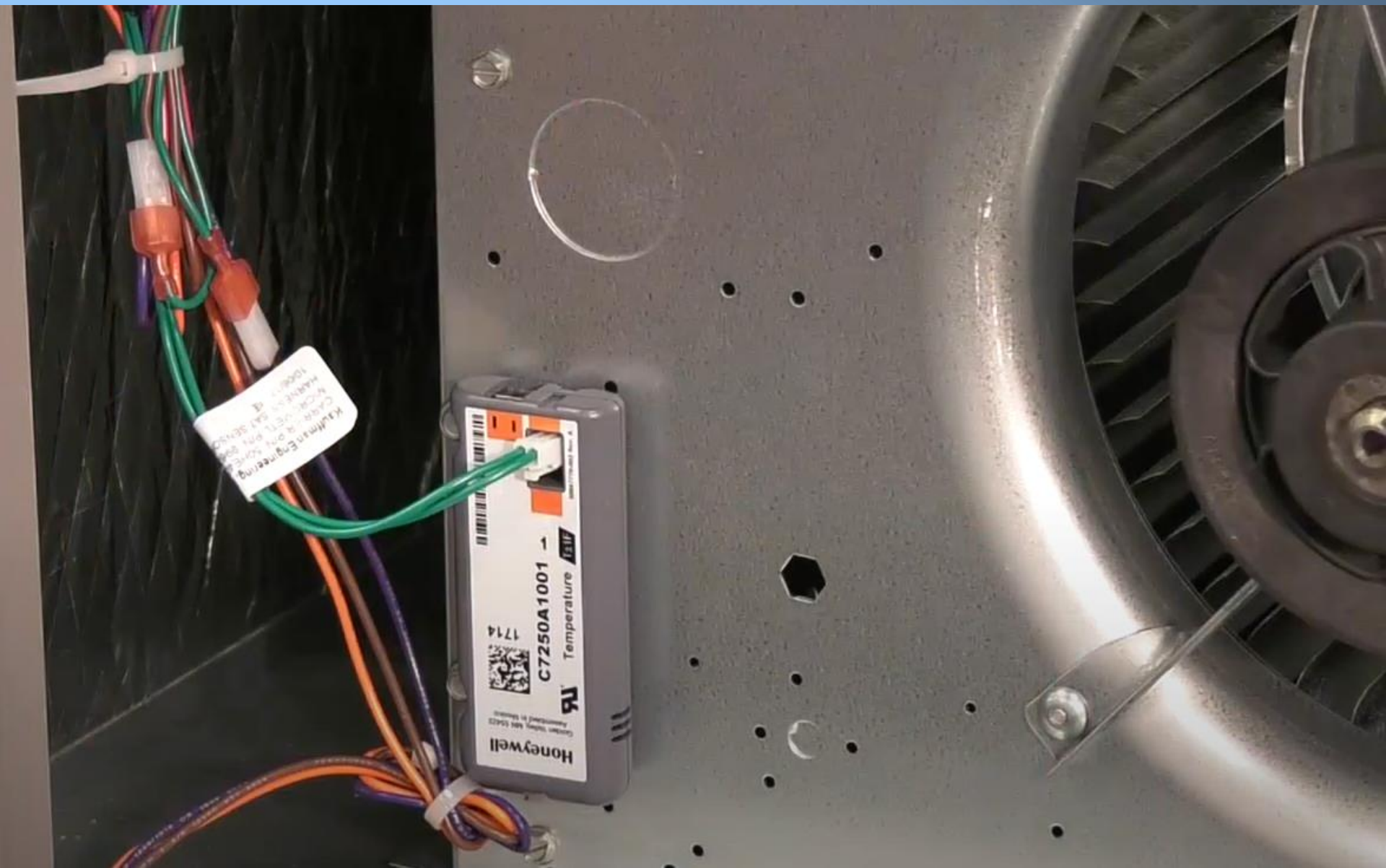


Table 8 – Enthalpy Control Sensor Wiring Terminations[a]

Terminal		Type	Description
Nbr	Label		
1	S–BUS	S–BUS	S–Bus Communications (Enthalpy Control Sensor Bus)
2	S–BUS	S–BUS	S–Bus Communications (Enthalpy Control Sensor Bus)

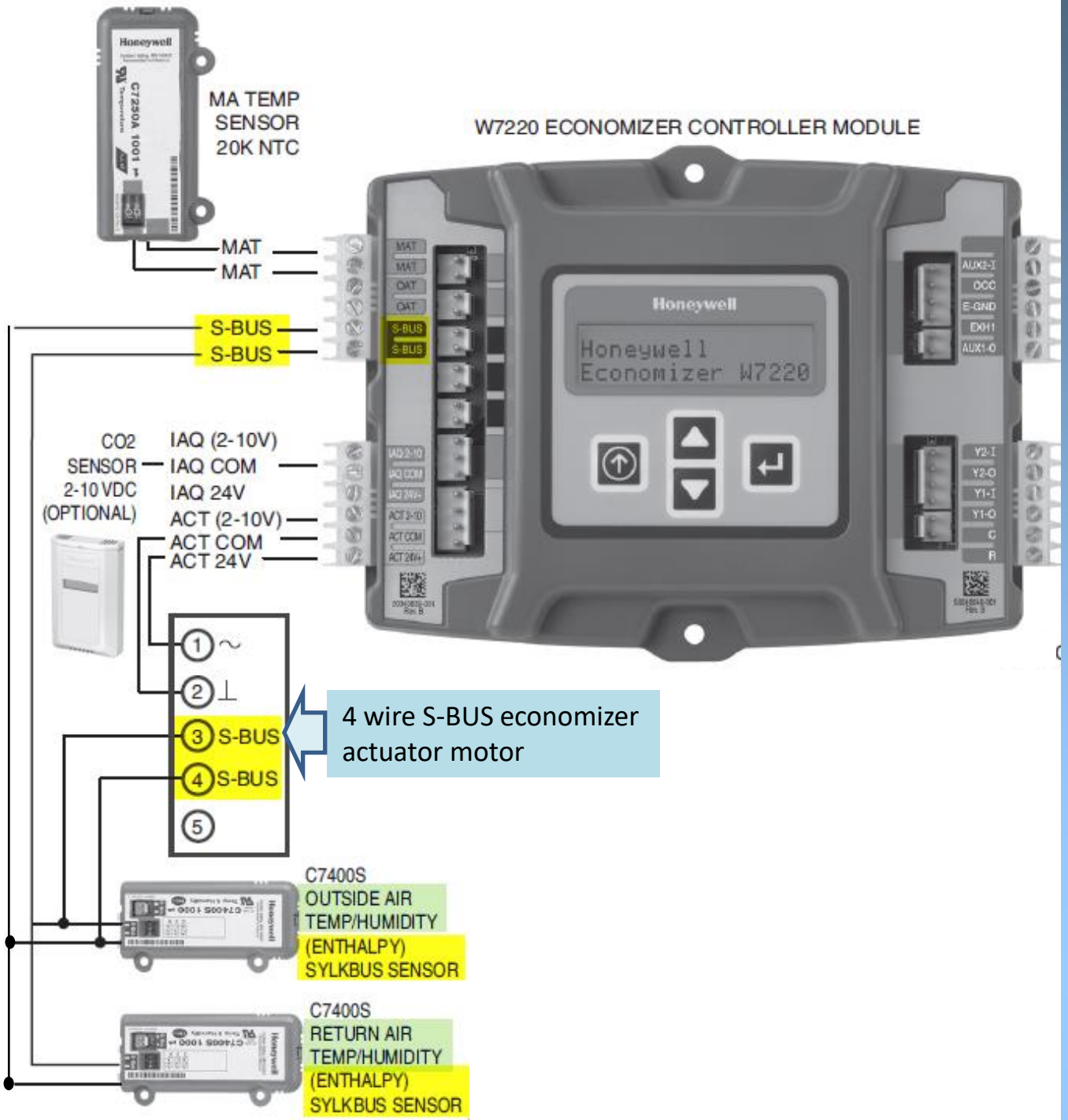
a Terminals are polarity insensitive.

Table 9 – Enthalpy Control Sensor DIP Switch Settings

Use	DIP Switch Positions for Switches 1, 2, & 3		
	1	2	3
DA[a]	OFF	ON	OFF
RA[b]	ON	OFF	OFF
OA[c]	OFF	OFF	OFF

a DA = Discharge Air
b RA = Return Air
c OA = Outside Air

Factory Default is Outside Air


MA TEMP
SENSOR
20K NTC
W7220 ECONOMIZER CONTROLLER MODULE
MAT
MAT
S-BUS
S-BUS
CO2
SENSOR
2-10 VDC
(OPTIONAL)
IAQ (2-10V)
IAQ COM
IAQ 24V
ACT (2-10V)
ACT COM
ACT 24V
Honeywell
Honeywell
Economizer W7220
1 ~
2 ⊥
3 S-BUS
4 S-BUS
5
4 wire S-BUS economizer
actuator motor
C7400S
OUTSIDE AIR
TEMP/HUMIDITY
(ENTHALPY)
SYLKBUS SENSOR
C7400S
RETURN AIR
TEMP/HUMIDITY
(ENTHALPY)
SYLKBUS SENSOR

When a S-bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor. During the 60 minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

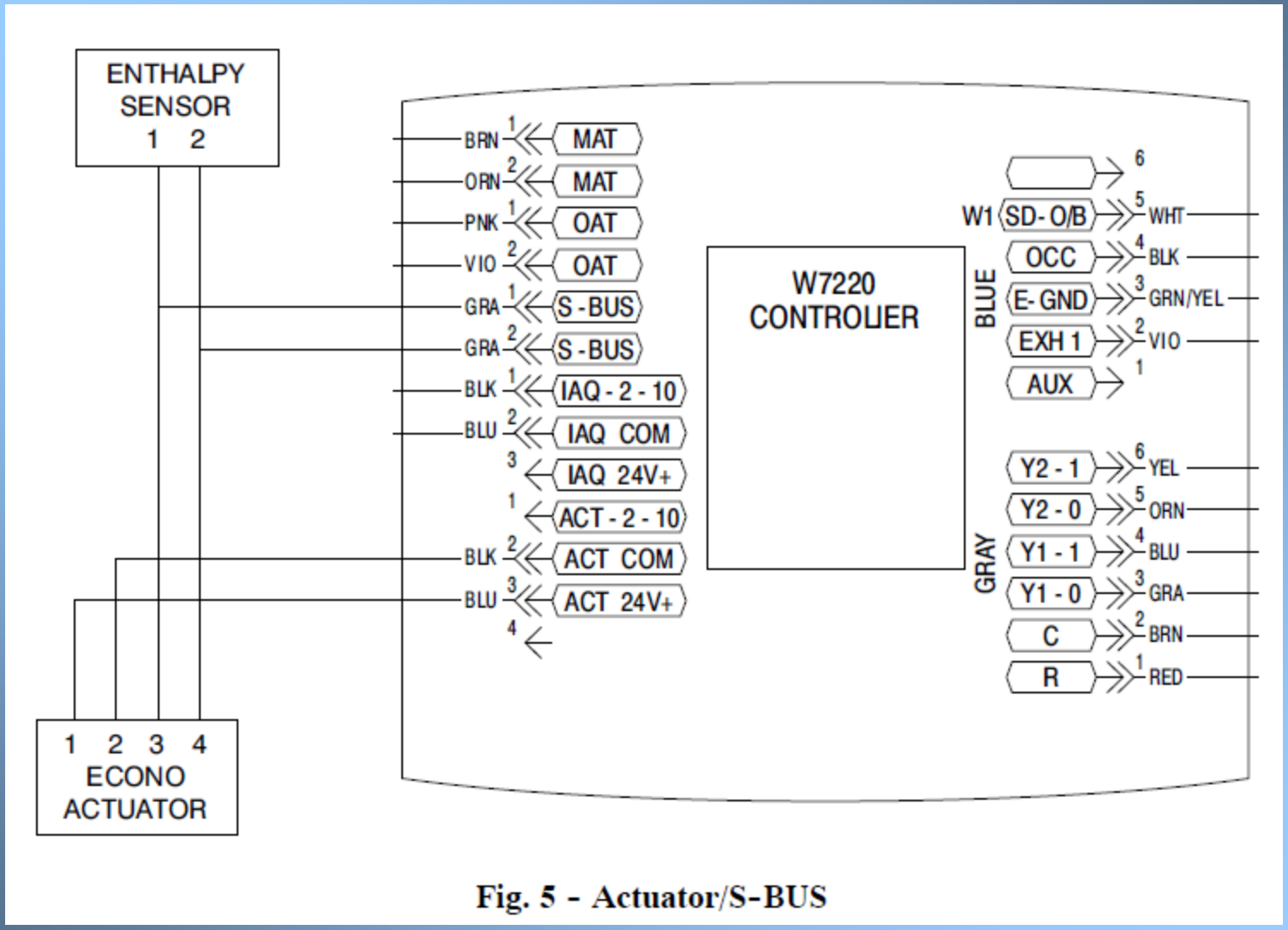


Fig. 5 - Actuator/S-BUS

Economizer IV
W7212

Economizer X
W7220

		ECONOMI$ER IV & X [1] IF YOU HAVE:		
DESIRED CONTROL METHOD		FIELD INSTALLED DRY BULB ACCESSORY ECONOMI$ER IV & X	FACTORY INSTALLED DRY BULB SENSOR ECONOMI$ER IV & X	FACTORY INSTALLED ENTHALPY SENSOR ECONOMI$ER IV & X
Single Dry Bulb Temperature Control		**None**: Outside Air dry bulb sensor is factory installed	**None**: Outside Air dry bulb sensor is factory installed	**None**: Outside Air dry bulb sensor is factory installed
Differential Dry Bulb Temperature Control		N/A on EconoMi$er IV (1)--HH-57AC-081 (EconoMi$er X)	N/A on EconoMi$er IV 1)--HH-57AC-081 (EconoMi$er X)	N/A
Single Enthalpy Control		(1) --HH--57AC-078 (EconoMi$er IV) or (1) --HH--57AC-081 (EconoMi$er X)	(1) --HH--57AC-078 (EconoMi$er IV) or (1) --HH--57AC-081 (EconoMi$er X)	**None**: Outside Air Enthalpy sensor is factory installed
Differential Enthalpy Control		(1) --HH--57AC-078 & (1) CRENTDIF004A00 (EconoMi$er IV) or (2) –HH-57AC-081 (EconoMi$er X)	(1) --HH--57AC-078 & (1) CRENTDIF004A00 (EconoMi$er IV) or (2) –HH-57AC-081 (EconoMi$er X)	(1) CRENTDIF004A00 (EconoMi$er IV) or (1) --HH--57AC-081 (EconoMi$er X)
To Add CO2 DCV Control with above:	Wall Mount	(1) 33ZCSPTCO2LCD-01[6] or 33ZCSPTCO2-01[6]		
	Duct Mount	(1) 33ZCSPTCO2LCD-01[6] or 33ZCSPTCO2-01[6] & (1) 33ZCASPCO2 or (1) CRCBDIOX005A00[3]		

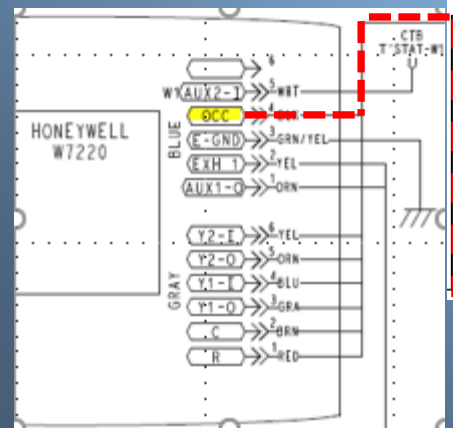
Honeywell W7220 Title 24 compliant economizer control

OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
	On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
	On	On	High	24-v/On	24-v/On	MIN POS	Closed
Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
	On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
	On	On	High	24-v/On	0-v/Off[a]	MIN POS to Full-Open	Closed to Full-Open

OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
	On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
	On	On	High	24-v/On	24-v/On	MIN POS	Closed
Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
	On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
	On	On	High	24-v/On	0-v/Off[a]	MIN POS to Full-Open	Closed to Full-Open

Circuit for the W7220 to open the economizer to the minimum position

IGC fan signal returns on black



W7220

To check out the operation of the W7220:

Use the Checkout menu in the table below to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↵ button to select the item.
3. RUN? appears.
4. Press the ↵ button to start the test.
5. The unit pauses and then displays IN PROGRESS.
6. When the test is complete, DONE appears.
7. When all parameters have been tested, press the ⓣ button (Menu up) to end the test (e.g. turn off the relay).

Honeywell W7220 Title 24 compliant economizer control

The checkout tests can all be performed at the time of installation or any time during the operation of the system.

TROUBLESHOOTING

Alarms

The Economizer module provides alarm messages that display on the 2-line LCD.

NOTE: JADE will be in the "set up" mode for the first 60 minutes after powered. If a sensor for OA air or Sylkbus device (sensor, actuator) is disconnected during the set up mode, the JADE will not alarm that failure. The MA sensor is a system "critical" sensor; if the MA sensor is removed during the set up mode, the JADE will alarm. After 60 minutes the JADE controller will change to operation mode and all components removed or failed will alarm in the operation mode.

You can also navigate to the Alarms menu at any time.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor), the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the ↵ button.
3. ERASE? displays.
4. Press the ↵ button.
5. ALARM ERASED displays.
6. Press the ↑ button (MenuUp/Exit) to complete the action and return to the previous menu.

SETPOINTS	MAT SET	53°F	38 to 70 °F; increment by 1	The economizer will modulate the OA damper to maintain the mixed air temperature at the setpoint.
	LOW T LOCK	32°F	-45 to 80 °F; increment by 1	Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the setpoint the Y1-O and Y2-O will not be energized on the controller.
	DRYBLB SET	63°F	48 to 80 °F; increment by 1	*Dry bulb setpoint will only appear if using dry bulb change over.* Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63 °F setpoint unit will economizer at 62 °F and below and not economize at 64 °F and above. There is a a 2 °F deadband.
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	*ES curve will only appear if using enthalpy changeover.* Enthalpy boundary "curves" for economizing using single enthalpy. See page 11 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm increment by 100	Displays ONLY if a CO2 sensor is connected. Setpoint for Demand Control Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the setpoint.
	MIN POS	2.8 V	2 to 10 Vdc	Displays ONLY if a CO2 sensor is NOT connected.
				With 2-speed fan units MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V.
	VENTMAX	2.8 V	2 to 10 Vdc	Displays only if a CO2 sensor is connected. Used for Vbz (ventilation max cfm) setpoint. VENTMAX is the same setting as MIN POS would be if you did not have the CO2 sensor.
			100 to 9990 cfm increment by 10	If OA, MA RA and CO2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 cfm.
			2 to 10 Vdc	With 2-speed fan units VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V.
	VENTMIN	2.25 V	2 to 10 Vdc	Displays only if CO2 sensor is connected. Used for Va (ventilation min cfm) setpoint. This is the ventilation requirement for less than maximum occupancy of the space.
			100 to 9990 cfm increment by 10	If OA, MA RA and CO2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 cfm.
			2 to 10 Vdc	With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V.

Honeywell W7220 Economizer Control, the following steps show how to increase the minimum position for low speed fan from 3.20 volts to 3.25 volts

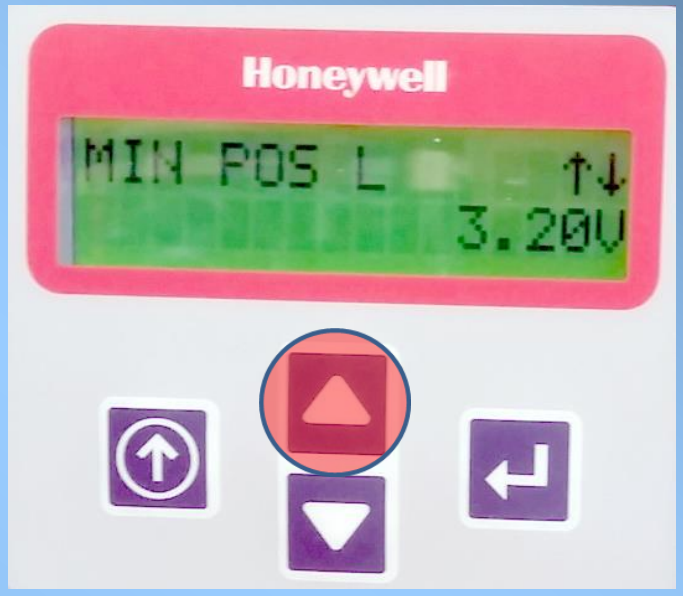
Increasing the volt setting will open the damper a little more and increase outside air CFM.


Honeywell
W7220 ↑↓
SETPOINTS


Honeywell
SETPOINTS ↓
MAT SET ↵53°F


Honeywell
SETPOINTS ↑↓
LOW T LOCK ↵32°F

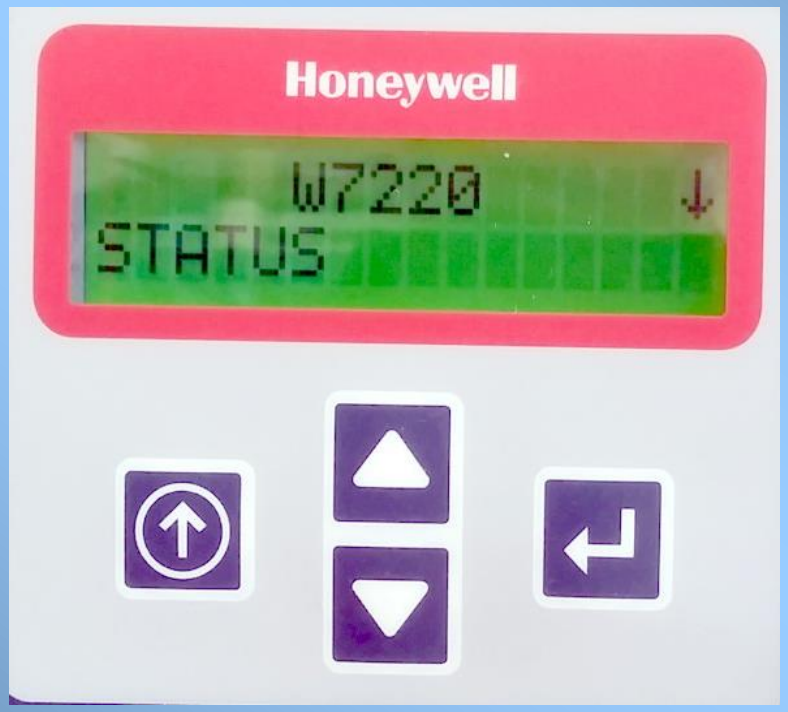

Honeywell
SETPOINTS ↑↓
MIN POS H ↵2.80V



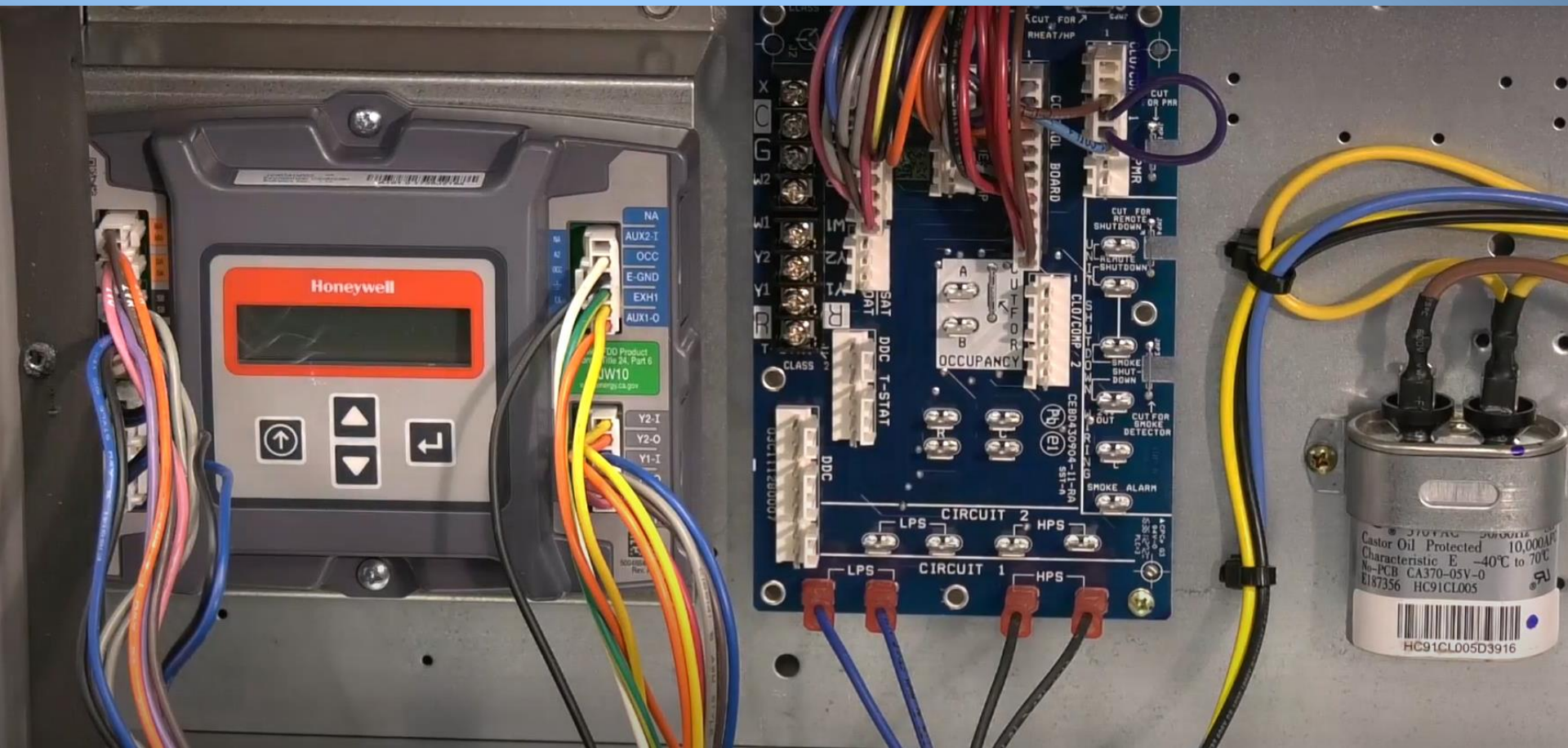
The adjustable range is from 2 volts (closed) to 10 volts (wide open)


Honeywell
MIN POS L ↑↓
3.25V


Honeywell
SETPOINTS ↑↓
MIN POS L ↵3.25V

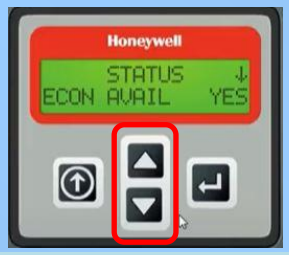

Honeywell
W7220
STATUS

W7220 Economizer X Mounting Location



W 7220 STATUS

Select the enter Button



Use the arrows to scroll thru the sensors and outputs

Checkout Tests

Use the Checkout menu (Table 5) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: See “Interface Overview” on page 18. for information about menu navigation and use of the keypad.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↵ button to select the item.
3. RUN? appears on the display.
4. Press the ↵ button to start the test.
5. The unit pauses and then displays IN PROGRESS.
6. When all parameters have been tested, press the  button (Menu up) to end the test (e.g. turn off the relay).

The checkout tests can all be performed at the time of installation or any time during the operation of the system as a test that the system is operable.

W 7220 CHECKOUT

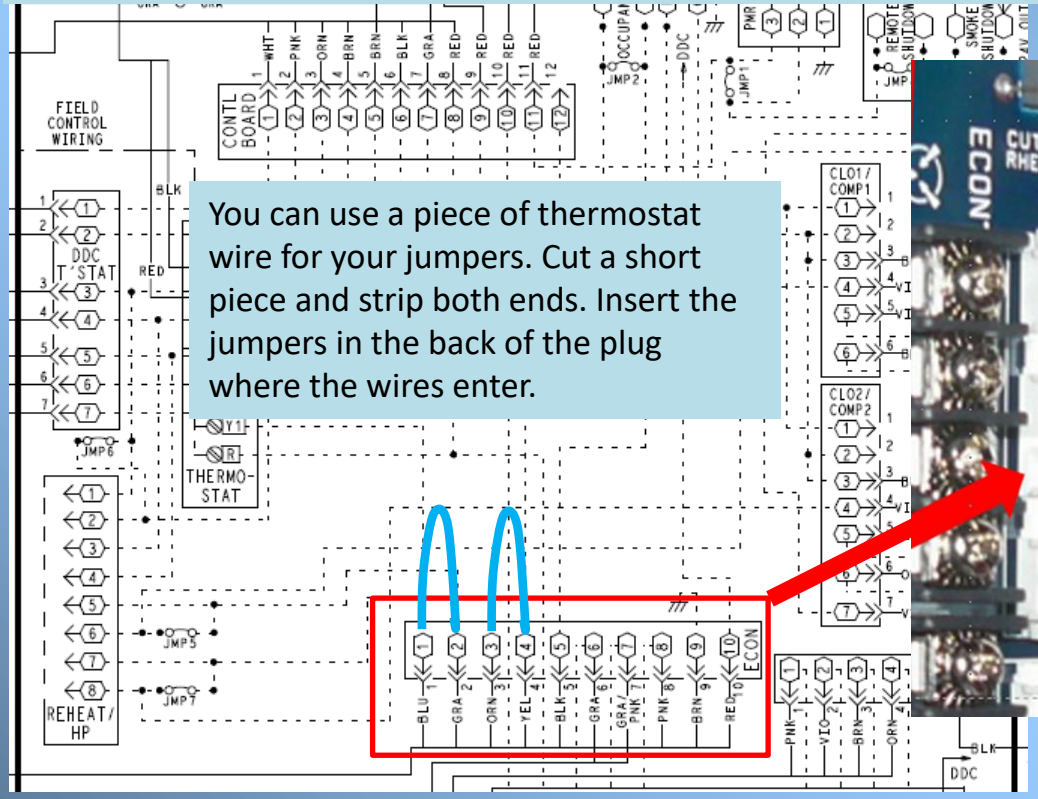
Checkout Menu

Checkout Item	Checkout Test
DAMPER VMIN-HS	Positions damper to VMIN position
DAMPER VMAX-HS	Positions damper to VMAX position
DAMPER OPEN	Positions damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure you pause in this mode to allow for exhaust contacts to energize due to the delay in the system.
DAMPER CLOSE	Positions damper to the fully closed position.
CONNECT Y1-O	Closes the Y1-O relay (Y1-O). See CAUTION on this page
CONNECT Y2-O	Closes the Y2-O relay (Y2-O). See CAUTION on this page
CONNECT AUX	Energizes the AUX output. If Aux setting is: • NONE – no action taken • ERV – 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are good for ERV operation.[a] • SYS – 24 Vac out. Issues a system alarm.

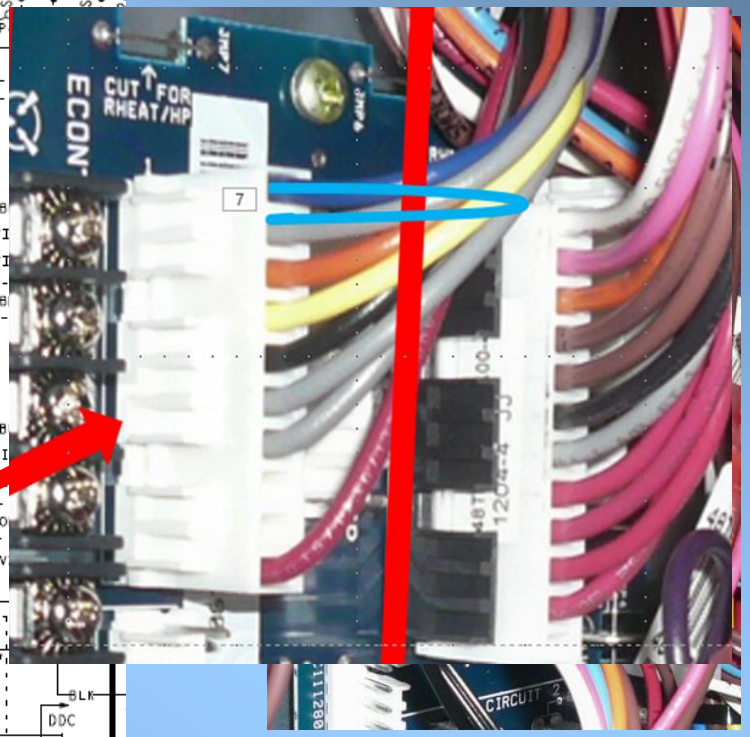
The following slides have additional information related to the control circuits

Typical 48-50TC and 48-50HC Wiring

If you have an economizer hooked up but you want to bypass the economizer circuit to check both stages of cooling, you can insert jumpers in the back of the economizer plug on the main control board.

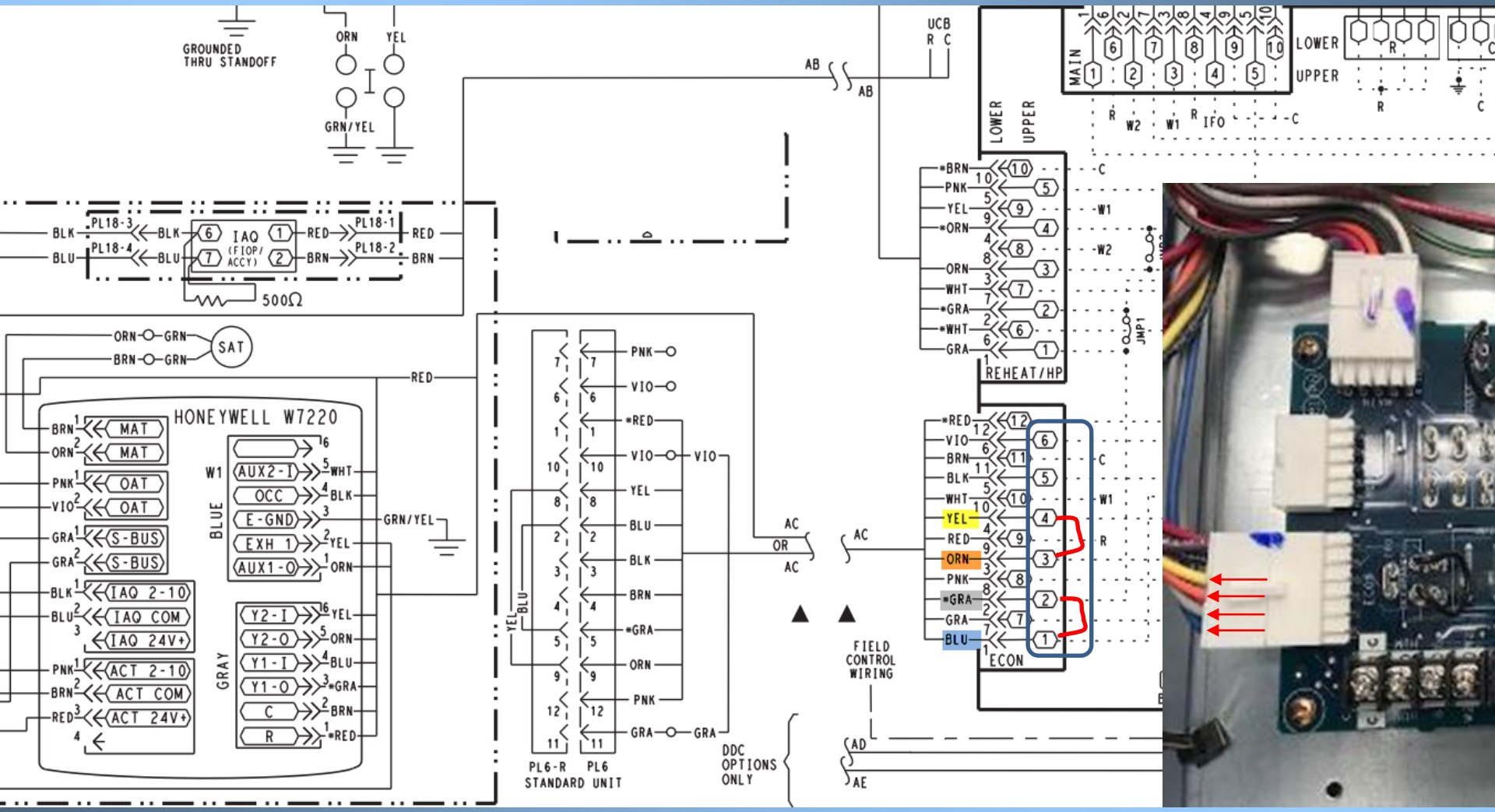


You can use a piece of thermostat wire for your jumpers. Cut a short piece and strip both ends. Insert the jumpers in the back of the plug where the wires enter.

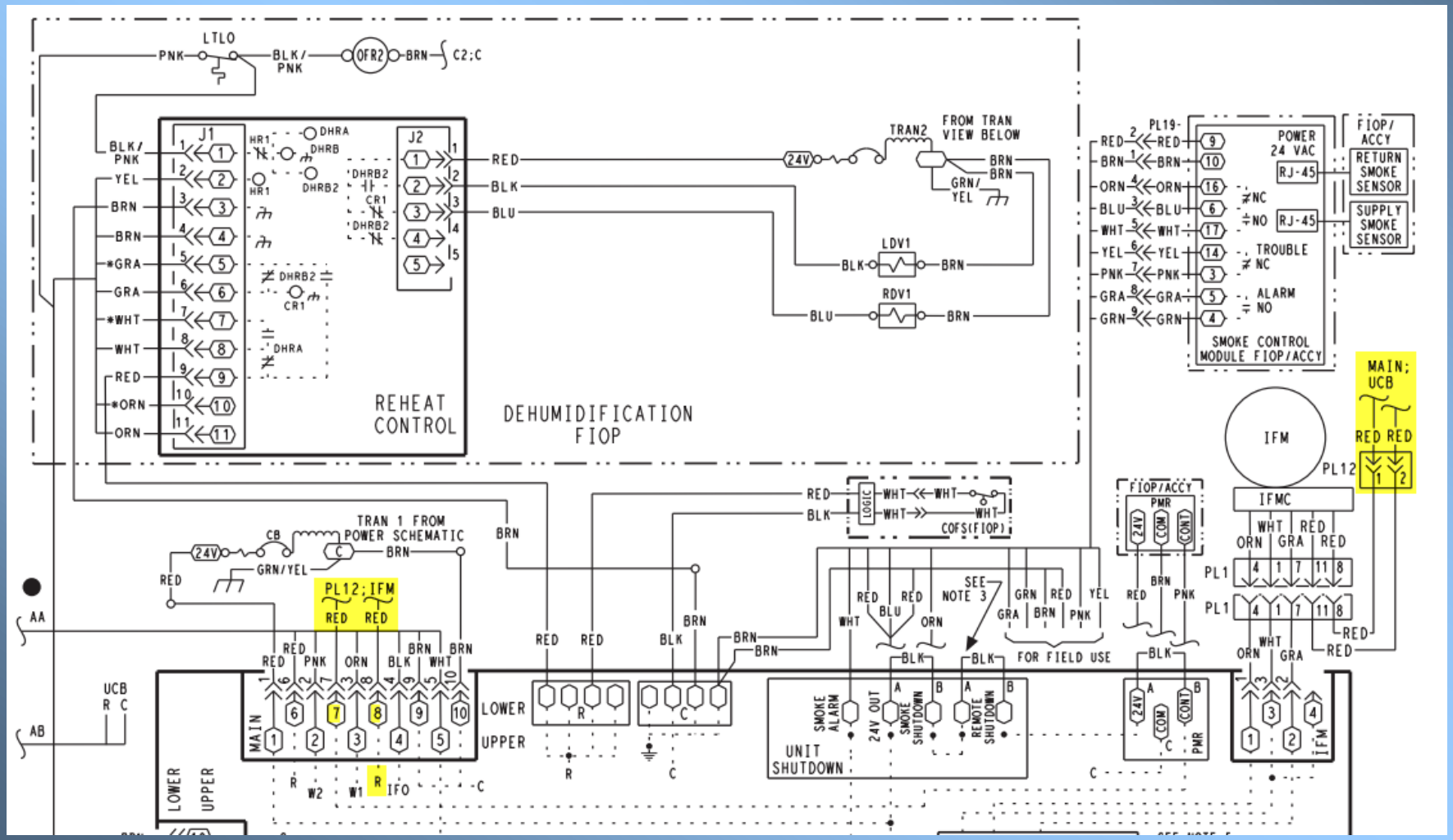


When you finish testing make sure you remove the wires, so the economizer is back in control.

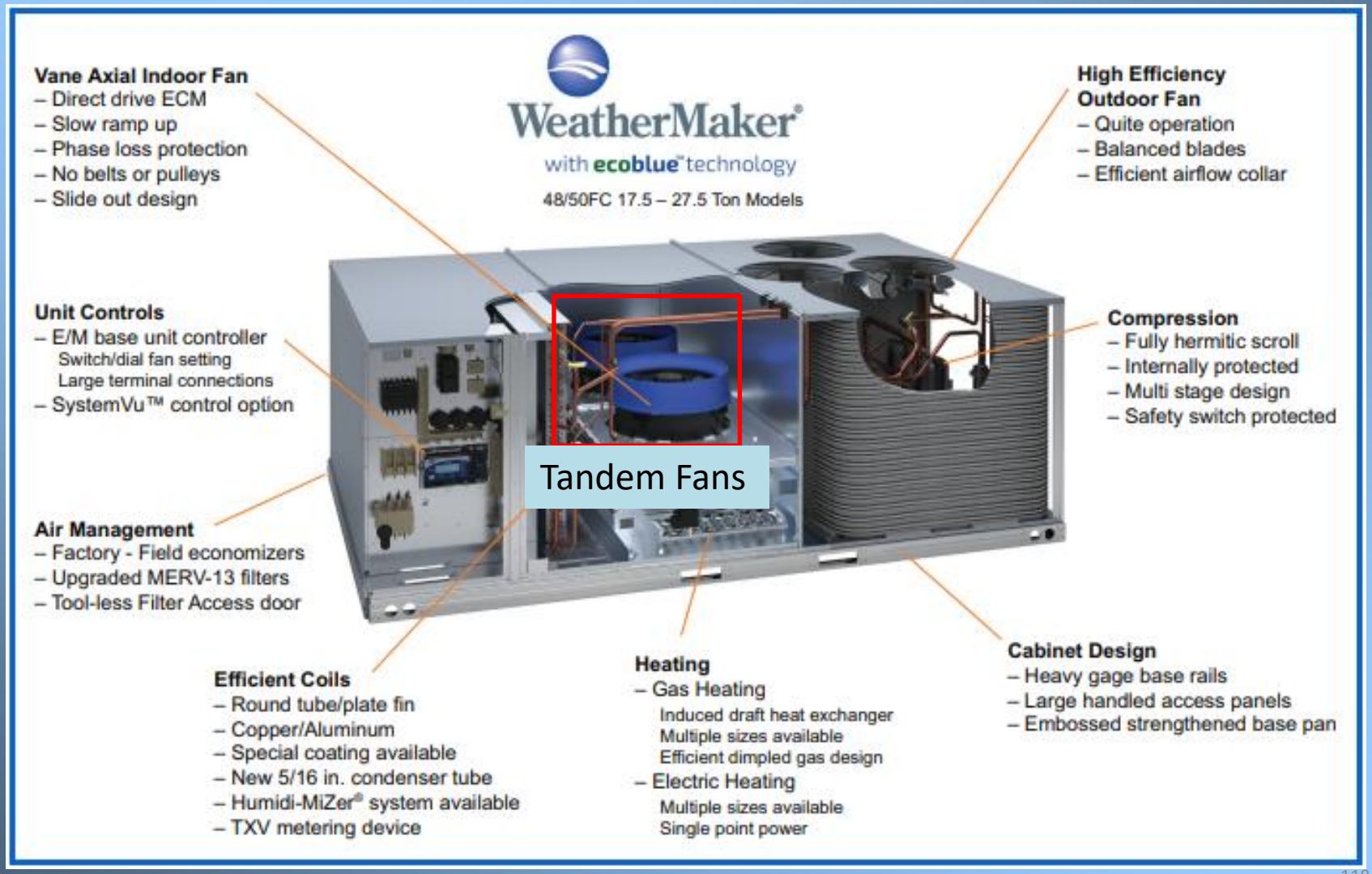
48-50 FC Economizer Circuit



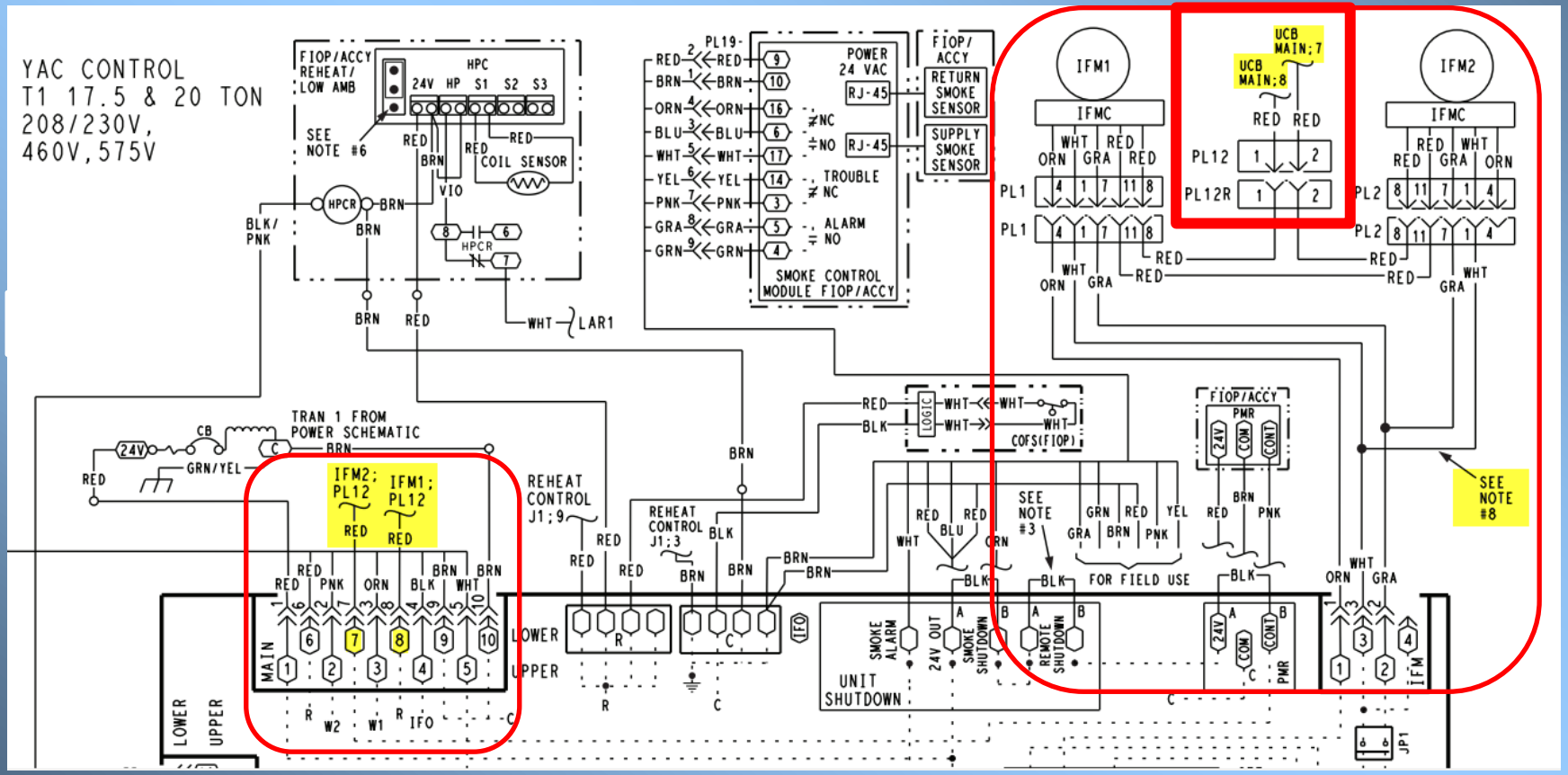
48FC 08-14 IFM ties into the 24 Volt safety circuit



WeatherMaker® 48FC**20-30 Single Package Rooftop with Gas Heat/Electric Cooling



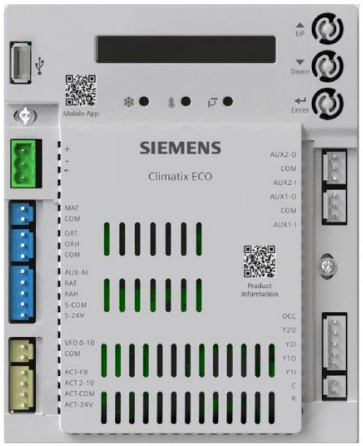
Twin Indoor Fan motors are tied into the 24 Volt safety circuit



8. ON HORIZONTAL SUPPLY UNITS, IFM2 GRA AND WHT WIRES WILL INCLUDE IN-LINE RESISTORS TO REDUCE IT'S SPEED.

New Economizer System

SIEMENS



POL224.00, POL224.05

Economizer RTU

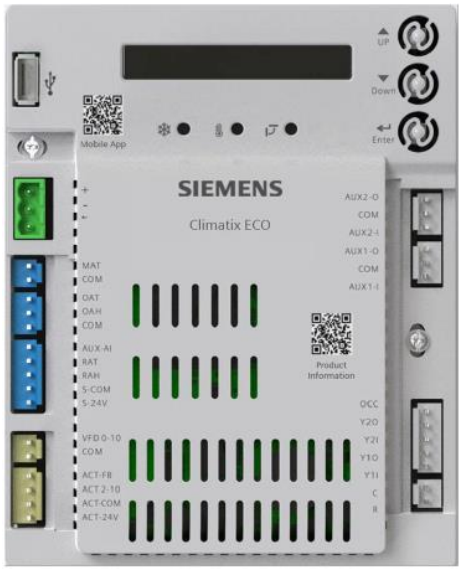
Carrier Turn to the experts

bryant Heating & Cooling Systems

Features

- Flexible sensor inputs accept Type II NTC 10K standard sensors, or Siemens QFM2160U or QFR9530 combination temperature/humidity sensor for enthalpy control
- Can be used with Siemens OpenAir® damper actuator GQD, GMA or GCA series
- 24Vac digital inputs for indication of occupancy, 3-stage Cooling Stage input, Shutdown, Heat Conventional, Heat Pump Changeover or Preoccupancy
- 24Vac relay outputs (digital) for 3-stage Cooling Stage output, Exhaust Fan, VFD On/Off (Variable Speed Supply Fan Enable), System Alarm output (Title 24) or Energy Recovery Ventilation (ERV)
- Anti-freeze protection
- Fault detection and alarming
- Brownout protection

- "Free cooling" based on single or dual dry bulb temperature, or combination temperature + humidity sensors
- Automatic switch-over for different control modes
- Parameter settings based on climate zone, using GPS functionality in the Climatix Mobile application
- LED indication for free cooling operation, sensor operation and damper operation
- Quick installation and easy commissioning with Climatix Mobile application
- User Interface for normal operation, parameter setup and alarm notifications with an LCD display and three operation buttons
- RS485 port for BACnet MSTP or Modbus RTU communication
- USB interface for firmware updates and WLAN connection
- QR codes for quick access to download Climatix Mobile application and user documentation



OAT NTC10K

MAT/DAT NTC10K

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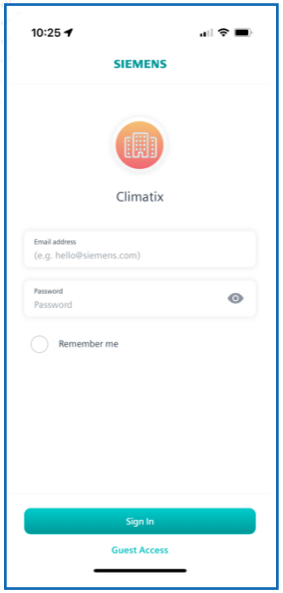
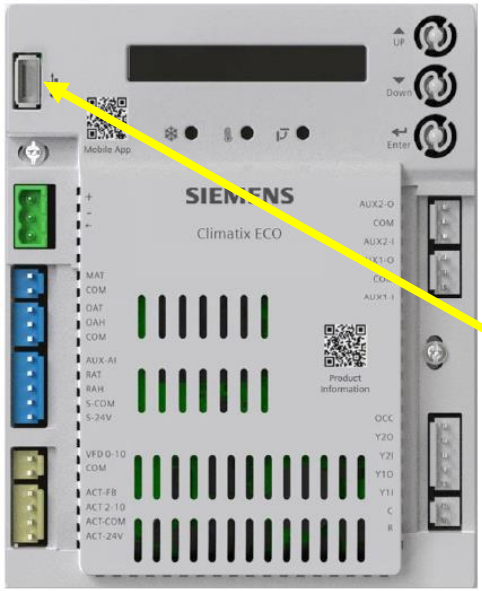
Mobile Application





Controller Password

Relevant data for POL224.00 Economizer commissioning:

- Username: Administrator
- Initial Password: OneBT
- Once logged in to the controller, a password change will be required to proceed with the commissioning process.

Accessories

A WLAN stick needs to be connected to the product via the USB host interface during commissioning with the Climatix Mobile application.

Type of unit		Product no.	Datasheet*
WLAN stick		POL903.00/100 S55803-Y130-A100	CC1N7219en

Relevant data for WLAN commissioning:

- SSID: Siemens-WLAN-Stick
- Password: SIBPAdmin
- DNS name: siemens.wlanstick

Siemens AG recommends changing the password as part of the commissioning process. Changes to all settings can be made via the web interface as required.

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