

# W7212, W7213, W7214 Economizer Logic Modules FOR VENTILATION CONTROL

## PRODUCT DATA



## FEATURES

- Operates from thermostat and DCV (CO<sub>2</sub>) sensor to provide a totally integrated control system.
- Solid state control package provides accurate, reliable and stable control.
- Mounts on M7215 Motor or ductwork.
- Control can be tempered by DCV and fan cycling.
- Used with Honeywell actuators.
- Combines minimum and DCV maximum damper position potentiometers with compressor staging.
- Solid state enthalpy or dry bulb changeover control.
- Terminals included for switching between Occupied and Unoccupied operation.
- Terminals included for connecting optional S963B1128 Remote Potentiometer for remote minimum damper position control.
- LED indicates when free cooling is available.
- LED indicates when module is in DCV mode.
- LED indicates when exhaust fan contact is closed.
- On CO<sub>2</sub> sensor failure defaults to DCV maximum damper position for minimum position. This feature was added with the series 2 version of the product. See Table 1.
- W7213 is used with heat pump B terminal.
- W7214 is used with heat pump O terminal.
- W7212C is used for applications requiring low temperature and humidity and has the “E” enthalpy curve.

## APPLICATION

W7212, W7213, and W7214 Economizer Logic Modules are used with C7232 (CO<sub>2</sub>) Demand Control Ventilation (DCV) Sensors, and solid state C7400 Enthalpy Sensors or C7660 Dry Bulb Temperature Sensors. All models proportion outdoor and return air dampers for control of free cooling in commercial HVAC equipment.

## Contents

Application .....	1
Features .....	1
Specifications .....	2
Ordering Information .....	2
Installation .....	3
Settings and Adjustments .....	8
Checkout and Troubleshooting .....	20



## SPECIFICATIONS

**Models:** W7212A, W7213A, W7214A Logic Modules: for use with any Honeywell 2-10 Vdc actuator; includes DCV (CO2) input; adjustable exhaust fan setpoint.

**NOTES:**

- All models include a minimum damper position potentiometer, and setpoints for: enthalpy or dry-bulb, occupied/unoccupied control, DCV (CO2) operation, CO2 sensor failure mode and DCV maximum (DCV MAX).
- Occupied/Unoccupied overrides minimum damper position setting when building is unoccupied.
- On CO2 sensor failure the damper outdoor damper defaults to DCV maximum position. See table 1 for economizer functions based on occupancy, CO2 input and damper positions for adjustments of potentiometers for MIN POS and DCV MAX. This feature was added with series 2 version of the product; series 1 does NOT default to DCV MAX, series 1 defaults to MIN POS on failure of CO2 sensor.

**Dimensions:** See Fig. 1.

**Electrical Ratings:**

Input Voltage: 24 Vac  $\pm$ 20%; 50/60 Hz (Class 2).

Nominal Power Consumption (at 24 Vac, 60 Hz): 11.5 VA.  
Relay Contact Rating at 30 Vac (maximum power from class 2 input *only*): 1.5A run, 3.5A inrush.

**IMPORTANT**

*All inputs and outputs must be 24 Vac Class 2.*

**Ambient Ratings:**

Temperature: -40°F to +149°F (-40°C to +65°C).  
Humidity: 5 to 95 percent RH (noncondensing).

**Inputs:**

Enthalpy (C7400): 2-wire (18,20,22 AWG) connection.  
Dry Bulb Temperature (C7660): 2-wire (18,20,22 AWG) connection.  
Discharge Air (C7046): 2-wire (18,20,22 AWG) connection.  
Mixed Air (C7150): 2-wire (18,20,22 AWG) connection.  
DCV (CO2) Sensor (C7232): 0/2-10 Vdc control signal; 100K ohm input impedance.

**Outputs:**

Actuator Signal: 2-10 Vdc.  
Minimum Actuator Impedance: 1K ohm.  
Exhaust Fan: Contact closure.  
24 Vac Out: 25 VA maximum.

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care  
1885 Douglas Drive North  
Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Toronto, Ontario M1V 4Z9.

International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

**Approvals:**

Underwriters Laboratories Inc.: UL873 listed.  
 Flammability Rating: UL94-5VB.  
 Plenum Rated.

CE.  
 C-tick.

**Accessories:**

4074EJM Bag Assembly. Consists of: Checkout jumper, 620 ohm, 1.2K ohm, 5.6K ohm, and 6.8K ohm checkout resistors.  
 C7046A Discharge Air Temperature Sensor.  
 C7150B Mixed Air Temperature Sensor.  
 C7232A,B Carbon Dioxide Sensors.  
 C7400A Solid State Enthalpy Sensor for use with W7212A, W7213 and W7214.  
 C7400C for use with W7212C models.  
 C7660 Dry Bulb Temperature Sensor.  
 S963B1128 Remote Potentiometer to provide remote control of damper minimum position.  
 ST6008 Energy Management Timer for occupied/unoccupied control.

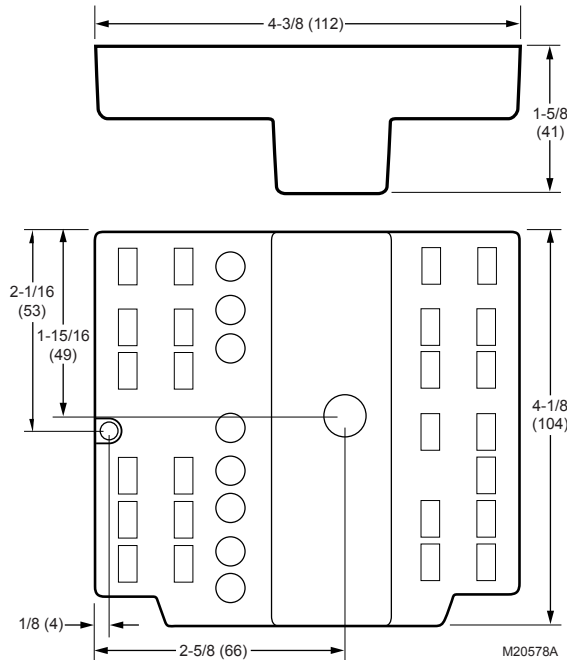


Fig. 1. Logic module dimensions in in. (mm).

**INSTALLATION**

**When Installing this Product...**

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.

3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.
5. When adding a CO2 sensor (DCV sensor) in the field, the MIN POS and DCV MAX position potentiometers must be adjusted by the installer. The MIN POS potentiometer must be closer to the fully CCW position than the DCV MAX potentiometer for the damper to modulate between the two settings on a call for DCV.

**Location and Mounting**

The logic modules mount on an M7215 or a sheet metal duct or panel. When planning the installation, allow enough clearance for maintenance and service (see Fig. 1 for dimensions). Mount device in a location protected from rain, snow, and direct sunlight. Secure device to sheet metal using the two supplied mounting screws, see Fig. 3.

**CAUTION**

**Equipment Damage Hazard.**  
**Mounting screws longer than 5/8 in. can damage internal motor components.**  
 When mounting the module to an M7215 use only the included #6 5/8 in. thread-forming screw.

NOTE: See Fig. 4 for representative locations of connected system devices.

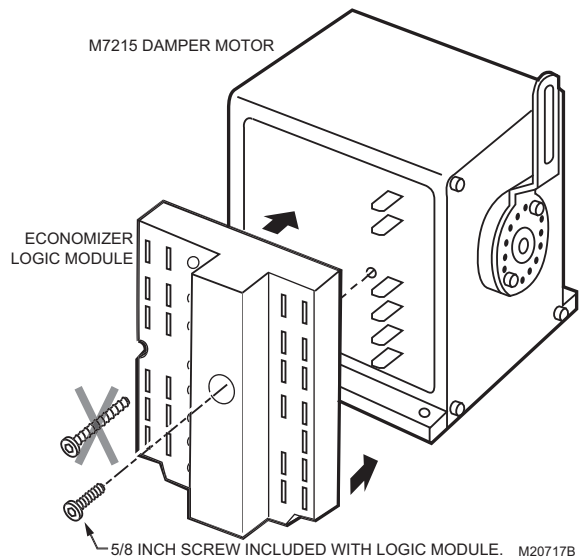


Fig. 2. Direct mounting of module.

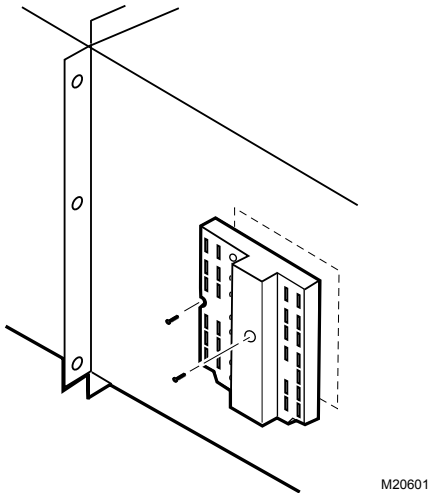


Fig. 3. Mounting the module on sheet metal.

### C7400 Enthalpy Sensor and C7660 Dry Bulb Temperature Sensor

W7212, W7213, W7214 Logic Modules accept signals from either the C7400 Enthalpy Sensor or the C7660 Dry Bulb Temperature Sensor. The W7212A, W7213 and W7214 models are used with the C7400A sensor and the W7212C models are used with the C7400C sensor. The wiring is the same for either sensor.

**IMPORTANT**

*When using differential sensing, both sensors must be of the same type.*

*For differential dry bulb operation use two C7650 sensors. Note for referential dry bulb use only the C7660 dry bulb sensor for the most energy savings.*

### OUTDOOR AIR SENSING

1. Mount sensor in any orientation exposing it to freely circulating air while protecting it from rain, snow, and direct sunlight.
2. Connect it to the SO and SO+ terminals of the device.

### RETURN AIR SENSING

1. Ensure differential enthalpy control has a second enthalpy sensor in the return air duct.
2. Connect this sensor to the SR and SR+ terminals.
3. Ensure sensor is mounted in the return air duct for proper operation.

### Demand Control Ventilation

The DCV CO2 sensor must provide a 2-10 Vdc output. Less than 1Vdc input assumes a sensor failure and the action of the outdoor air dampers defaults to < 1Vdc operation in Table 1. The DCV (CO2) modulates the outdoor damper to provide ventilation based on occupancy. The DCV setpoint potentiometer is adjusted to provide ventilation based on the output of the CO2 sensor. The DCV LED lights when the DCV (CO2) signal is above setpoint. If the CO2 sensor should fail, the W7212 will default to the DCV MAX position which is the minimum position design for 100% occupancy of the space.

Table 1. W7212 Terminal Power and Action.

Occupied Terminal N has 24 VAC power	Input on AQ-AQ1 terminals <sup>a</sup>	Action with 24 VAC power applied to W7212 (TR-TR1)
Yes	1 Vdc	Drives to MIN POS
No	1 Vdc	No movement of motor
Yes	<1 Vdc	Drives to MIN POS or DCV MAX (highest)
No <sup>b</sup>	<1 Vdc	Drives to DCV MAX
Yes	>DCV set pt	Drives to up to MIN POS or DCV MAX (highest)
No	>DCV set pt	Drives to DCV MAX

<sup>a</sup> <1 Vdc = no CO2 sensor or failed sensor; 1 Vdc = CO2 sensor working but below CO2 set point and CO2 sensor working and above set point.

<sup>b</sup> Economizer should be powered by fan, if fan is off economizer will spring return damper closed, if fan is on and no occupancy damper will drive to DCV MAX position.

Mount the CO2 sensor according to the manufacturer specifications. If not available, use the following guidelines:

1. Mount sensor in an area with unobstructed air circulation.
2. Connect it to the AQ and AQ1 terminals of the W7212 (see Wiring section for details).

3. Adjust the DCV potentiometer setpoint to correspond to DCV voltage output at the threshold.

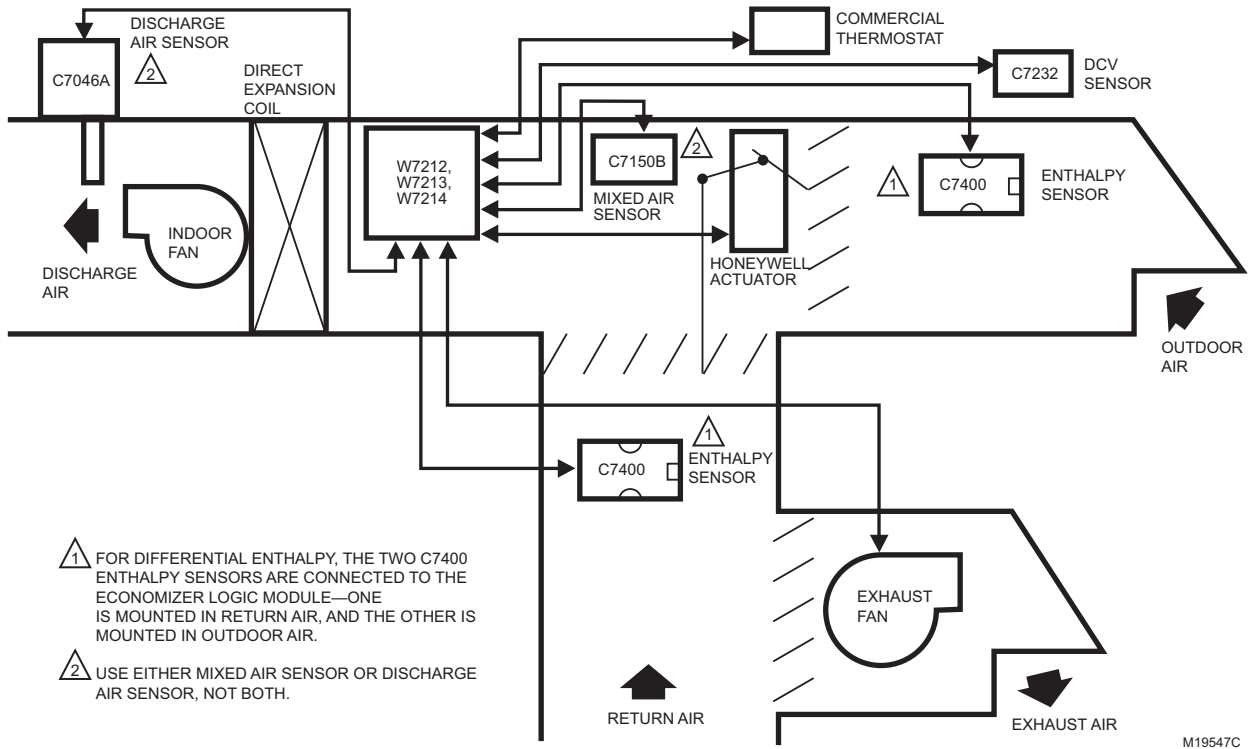


Fig. 4. Representative locations of connected economizer system devices.

## Wiring



### CAUTION

**Electrical Shock or Equipment Damage Hazard. Can shock individuals or short equipment circuitry.**  
Disconnect power supply before installation.

### IMPORTANT

1. All wiring must comply with applicable local codes, ordinances and regulations.
2. Refer to Table 2 for a list of the wiring diagrams and corresponding Figure numbers in this document.
3. All device inputs and outputs must be 24 Vac Class 2.
4. Ensure proper polarity of sensor connections. Incorrect polarity negates the sensor signal.

## Optional Applications

### Heat Pump Changeover (W7213, W7214 only)

In heat pump applications, the controller must have control of the changeover valve. To provide the logic module with the information necessary for proper information, there must be a connection to the logic module O/B terminal. This terminal alerts the logic module as to when the system operates in cooling (the only time the economizer is used).

### IMPORTANT

*During heating applications with defrost, make sure to break the connection to the economizer using an isolation relay.*

### W7213 (CHANGEOVER TERMINAL B)

Connect the B terminal according to the following details:  
— 24V power to B: System is in heating mode.  
— No power to B: System is in cooling mode.

### W7214 (CHANGEOVER TERMINAL O)

Connect the O terminal according to the following details:  
— 24V power to O: System is in cooling mode.  
— No power to O: System is in heating mode.

**Table 2. Applicable Wiring Diagrams.**

Actuator	Enthalpy Changeover	Comments	Figure	Economizer
Honeywell MS7XXX	Single	Single-stage cooling system.	12	W7212
	Single or Differential	Two-stage cooling system.	13	
			Two-stage heat pump system.	15
Honeywell M7215	Single	Direct mount Logic Module to Motor and T7300 thermostat.	9	W7212
n/a	n/a	S963 remote damper control.	6	
Honeywell Series 72	Single or Differential	Honeywell Series 72.	14	W7212
Honeywell M7215	Single or Differential	With T7300 thermostat	9	W7212
Honeywell M7215	Single or Differential	With T7350 thermostat	10	
Honeywell M7215	Single or Differential	With TB7220 or TB8220 thermostat	11	

## OPERATION

The purpose of the economizer is to use outdoor air for cooling, whenever possible, to reduce compressor operation.

Power at the N terminal determines the Occupied/Unoccupied setting:

— W7212:

- 24 Vac (Occupied).
- No power (Unoccupied).

— See Fig. 9 through 15 for controller hookup.

**NOTE:** When module is operating in Occupied mode, the minimum position is defined by the potentiometers. When the module is operating in Unoccupied mode, and there is no call for cooling, the damper drives fully closed.

When wired as shown in Fig. 9 through 15, the logic module responds to the cooling thermostat signal. The system uses C7400 Solid State Enthalpy Changeover Sensor(s) or C7660 Dry Bulb Temperature Sensor(s). The C7400 responds to both dry bulb temperature and humidity, allowing use of outdoor air at higher temperatures for free cooling when humidity is low. The C7660 responds only to dry bulb temperature; use only in dry, arid climates and only in single dry bulb changeover. Do not use the C7660 in differential dry bulb applications.

The logic module functions as a true first stage of cooling providing maximum energy economy during the cooling cycle. It automatically locks out free cooling during heating; holding the outdoor air damper at the minimum position setting (or if using Demand Control Ventilation and the space CO<sub>2</sub> level is above the set point, the damper will be between the MIN POS and DCV MAX position).

The logic module can operate as either a basic free cooling controller, or it can incorporate additional functions. Table 3 details the input/output (I/O) logic of the module.

**Table 3. W7212 Economizer I/O Logic.**

INPUTS					OUTPUTS			
Demand Control Ventilation (DCV)	Enthalpy <sup>a</sup>		Y1	Y2	Compressor		N Terminal <sup>b</sup>	
	Outdoor	Return			Stage 1	Stage 2	Occupied <sup>b</sup>	Unoccupied <sup>b</sup>
			Damper					
Below set (DCV LED Off)  See Table 1 for outdoor damper action if input on AQ-AQ1 terminals is 1Vdc or < 1Vdc. This is the fault for CO2 sensor failure. If no sensor or Vdc input is added to AQ-AQ1 terminals then use the DCV MAX potentiometer to adjust the minimum position.	High (Free Cooling LED Off)	Low	On	On	On	On	Minimum position	Closed
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating <sup>c</sup> (between min. position and full-open)	Modulating <sup>c</sup> (between closed and full-open)
			On	Off	Off	Off		
			Off	Off	Off	Off	Minimum position	Closed
Above set (DCV LED On)	High (Free Cooling LED Off)	Low	On	On	On	On	Modulating <sup>d</sup> (between min. position and DCV maximum)	Modulating <sup>d, g</sup> (between closed and DCV maximum)
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating <sup>e</sup>	Modulating <sup>f</sup>
			On	Off	Off	Off		
			Off	Off	Off	Off		

<sup>a</sup> For single enthalpy control, the module compares outdoor enthalpy to the ABCD setpoint.

<sup>b</sup> Power at N terminal determines Occupied/Unoccupied setting:

- W7212: 24 Vac (Occupied), no power (Unoccupied).
- W7213,W7214: No power (Occupied), 24 Vac (Unoccupied).

<sup>c</sup> Modulation is based on the mixed air sensor signal.

<sup>d</sup> Modulation is based on the DCV signal. If the CO2 sensor input (AQ-AQ1) terminals is < 1Vdc or the sensor has failed, the motor will drive to MIN POS or DCV MAX whichever is highest.

<sup>e</sup> Modulation is based on the greater of DCV and mixed air sensor signals, between minimum position and either maximum position (DCV) or fully open (mixed air signal).

<sup>f</sup> Modulation is based on the greater of DCV and mixed air sensor signals, between closed and either maximum position (DCV) or fully open (mixed air signal).

<sup>g</sup> Modulation is based on the DCV signal, if the CO2 sensor input (AQ-AQ1) terminals is < 1Vdc or the sensor has failed, the motor will drive DCV MAX in the occupied mode. When power is cut to the economizer (fan is off) then the damper will spring return closed.

**NOTES:**

- Power Exhaust, DCV and Free Cooling have set-points and LED indications.
- For models with a B terminal (W7213):  
No power to B: cooling mode, free cool enabled. Module follows logic detailed above.  
24V power to B: heating mode, free cool disabled. Actuator drives to minimum position or DCV MAX whichever is the higher of the two. When power is cut to the economizer (fan is off) then the damper will spring return closed.

- For models with an O terminal (W7214):  
24V power to O: cooling mode, free cool enabled. Module follows logic detailed above.  
No power to O: heating mode, free cool disabled. Actuator drives to minimum position or DCV MAX whichever is the higher of the two. When power is cut to the economizer (fan is off) then the damper will spring return closed.

# SETTINGS AND ADJUSTMENTS

## CAUTION

**Equipment Damage Hazard.**  
**Excessive force can damage potentiometer controls.**

Use a small screwdriver or the plastic tool provided with the economizer when adjusting all potentiometers located on the unit.

Potentiometers with screwdriver adjustment slots, located on device face, provide adjustments for several parameters (see Fig. 5 for locations on device):

- DCV setpoint.
- Minimum damper position.
- DCV maximum damper position.
- Enthalpy changeover.
- Exhaust setpoint.

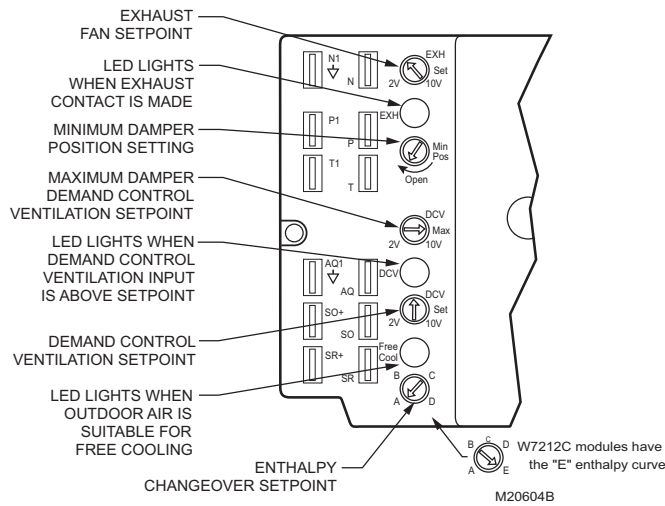


Fig. 5. Potentiometer and LED locations (W7212 shown).

## 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.

## Adjusting Minimum and Maximum Positions

The minimum position is defined by the minimum outdoor air flow required in the building during the occupied period. The MIN POS and DCV MAX position potentiometers allow the installer to set the proper ventilation based on occupancy

established by ASHRAE standard 62.1. When used with a CO2 occupancy sensor the minimum position will modulate between the MIN POS pot setting and the DCV MAX pot setting based on the CO2 input to the AQ-AQ1 terminals from the CO2 sensor located in the space. When a CO2 sensor is NOT USED with the unit, the OA dampers will modulate based on the actions in Table 1. Setting the DCV maximum position of the damper prevents the introduction of large amounts of hot or cold air into the space by preventing the dampers from opening 100% during a call for additional ventilation. On a call for cooling AND the OA is good for economizing, the unit will override the DCV MAX setting and allow the dampers to drive full open.

### IMPORTANT

*With the DCV maximum position set below the minimum position, the minimum position overrides the maximum position with the series 2 units.*

### NOTES:

- When the mixed air sensor takes control based on an increased requirement for cooling, it overrides the DCV maximum position potentiometer and can drive the damper full-open.
- If the mixed air temperature drops to 45°F, the mixed air sensor overrides the DCV and closes the damper to protect from freezing the hot or chilled water coils. Control returns to normal once the mixed air temperature rises to 48°F. Some models of the W7212 close the damper fully and others close the damper to minimum position. Check the label on the box for position of damper on freeze protection. If the CO2 sensor should fail, the W7212 defaults to DCV maximum, providing minimum ventilation for the maximum design occupancy.

## Minimum Position Adjustment

For detailed assistance in minimum position selection reference the Economizer Application Guide (form 63-8594) Ventilation section. The following provides basic guidelines for minimum position selection and adjustment:

### IMPORTANT

- Adjust the minimum position potentiometer to allow the minimum amount of outdoor air for building effluents, as required by local codes, to enter the building.
- This procedure requires use of a quality thermometer capable of reading to 0.5°F [0.25°C].

NOTE: Make ventilation adjustments with at least a 10°F [6°C] temperature difference between outdoor and return air.

1. Calculate the appropriate mixed air temperature, see Equation 1.  
 Equation 1 will be used to set the damper positions for MIN POS and DCV MAX. Without a DCV sensor connected to AQ-AQ1, use the MIN POS pot and this procedure to adjust the damper positions for minimum OA when the space is occupied. When using a DCV sensor you will need to set the MIN POS and DCV MAX positions using this procedure. DCV MAX will be the same as the MIN POS above (without a DCV sensor) and the MIN POS will lower than the DCV MAX %.
2. Disconnect mixed air sensor from terminals T and T1.
3. Place a jumper across terminals T and T1.



4. Ensure that either the factory-installed jumper is in place across terminals P and P1 or, if remote damper position is required, that it is wired according to Fig. 6 and the MIN POS potentiometer is turned fully clockwise.
5. Connect 24 Vac across terminals TR and TR1.
6. Carefully adjust the potentiometer on the face of the device with a small screwdriver until the mixed air temperature reaches the calculated value.

NOTE: Ensure that the sensed air is well mixed.

7. If all minimum (MIN POS) and maximum position (DCV MAX) adjustments are complete, remove the T-T1 jumper and reconnect the mixed air sensor.

**Equation 1. Formula to aid minimum position adjustment.**

$$(T_O \times OA) + (T_R \times RA) = T_M$$

Where:

T<sub>O</sub> = Outdoor air temperature

OA = Percent of outdoor air

T<sub>R</sub> = Return air temperature

RA = Percent of return air

T<sub>M</sub> = Resulting mixed air temperature

NOTE: The following sample calculation uses only Fahrenheit temperature.

EXAMPLE: Assume local codes require 10% outdoor air during occupied conditions, outdoor air is 60°F and return air is 75°F. Under these conditions, what is the temperature of the mixed air?

$$(0.1 \times 60^\circ\text{F}) + (0.9 \times 75^\circ\text{F}) = 6.0^\circ\text{F} + 67.5^\circ\text{F} = 73.5^\circ\text{F}$$

Mixed air will be 73.5°F when OA is 60°F and RA is 75°F with 10 percent outdoor air entering the building.

NOTE: If setting MIN POS and DCV MAX position, you will need to adjust the MIN POS for the building effluent (low occupancy) airflow and adjust the DCV MAX using the minimum airflow for maximum occupancy.

## Enthalpy Changeover Setpoint

### Outdoor Enthalpy Changeover Setpoint (Single Enthalpy)

Single enthalpy compares the outdoor air conditions to a set A,B,C, or D (E) curve for humidity and temperature conditions. The installer must set the onboard potentiometer to the desired curve. The outdoor enthalpy changeover setpoint returns the outdoor air damper to minimum position. Enthalpy setpoint scale markings, located in the device, are A, B, C, and D for the W7212A, W7213 and W7214. See Fig. 7 for the corresponding control point. Enthalpy setpoint scale markings for the W7212C are A,B,C,D and E. See Fig. 8 for the corresponding control points. The factory-installed 620-ohm jumper must be in place across terminals SR and SR+. Temperature and humidity conditions to the left of the selected curve will allow the dampers to open for free cooling, temperature, and humidity conditions to the right of the curve

will return the OA damper to minimum position (this is either MIN POS if using a CO2 sensor or DCV MAX if a CO2 sensor is NOT used).

### Differential Enthalpy Changeover Setting

Differential enthalpy control uses two C7400 Enthalpy Sensors connected to one logic module. The logic module compares outdoor air to return air.

NOTE: Turn the enthalpy setpoint potentiometer fully clockwise to the D (or E setting for W7212C) setting.

The logic module selects the lower enthalpy air (return or outdoor) for cooling. For example, when outdoor air has lower enthalpy than return air, the module calls to open the outdoor air damper to bring in outdoor air for free cooling.

### Exhaust Setpoint

The exhaust setpoint determines when the exhaust fan runs based on damper position. When the exhaust fan call is made, the module provides a 60 ±30 second delay before exhaust fan activation. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

NOTES:

- EF and EF1 are 24V dry contacts only. An external line voltage contactor is required to operate the exhaust fan.
- When the exhaust fan is deactivated the EF and EF1 contacts open immediately.

### Adjustable Exhaust Setpoint

These logic modules have an adjustable exhaust setpoint. This potentiometer allows the installer to adjust the damper position at which the EF and EF1 exhaust fan contacts are made.

NOTE: The 60 ±30 second delay allows the outdoor damper to reach the exhaust setpoint prior to the EF and EF1 contacts being made.

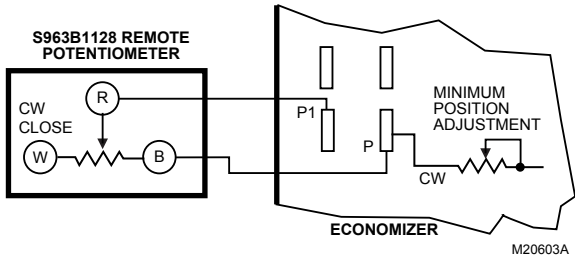
### Remote Minimum Position Control

Remote control of outdoor air dampers is desirable when requiring temporary additional ventilation. The addition of a S963B1128 Remote Potentiometer allows occupants to open or close the dampers beyond minimum position for modified ventilation. Connect the potentiometer as shown in Fig. 6. For economizer applications using remote position potentiometers, the action of the outdoor damper matches the MIN POS action in Table 1.

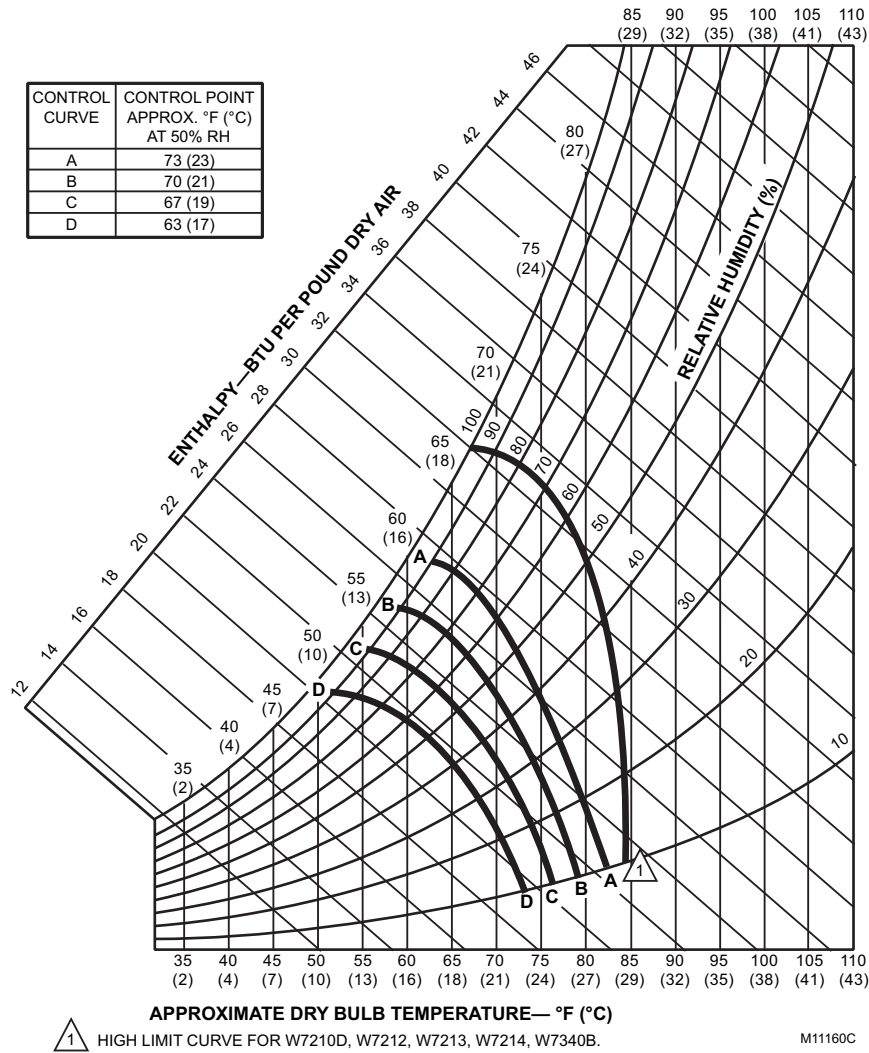
**IMPORTANT**

*Freeze protection logic takes priority over all signals. For details, see the notes in the Adjusting Minimum and Maximum Positions section.*

NOTE: For additional wiring applications, refer to the Design and Application Guide for Honeywell Economizers (form 63-8594).



**Fig. 6. S963B1128 Remote Potentiometer used with logic module for remote damper control.**



**Fig. 7. W7212A, W7213, W7214 performance characteristics for enthalpy changeover settings.**

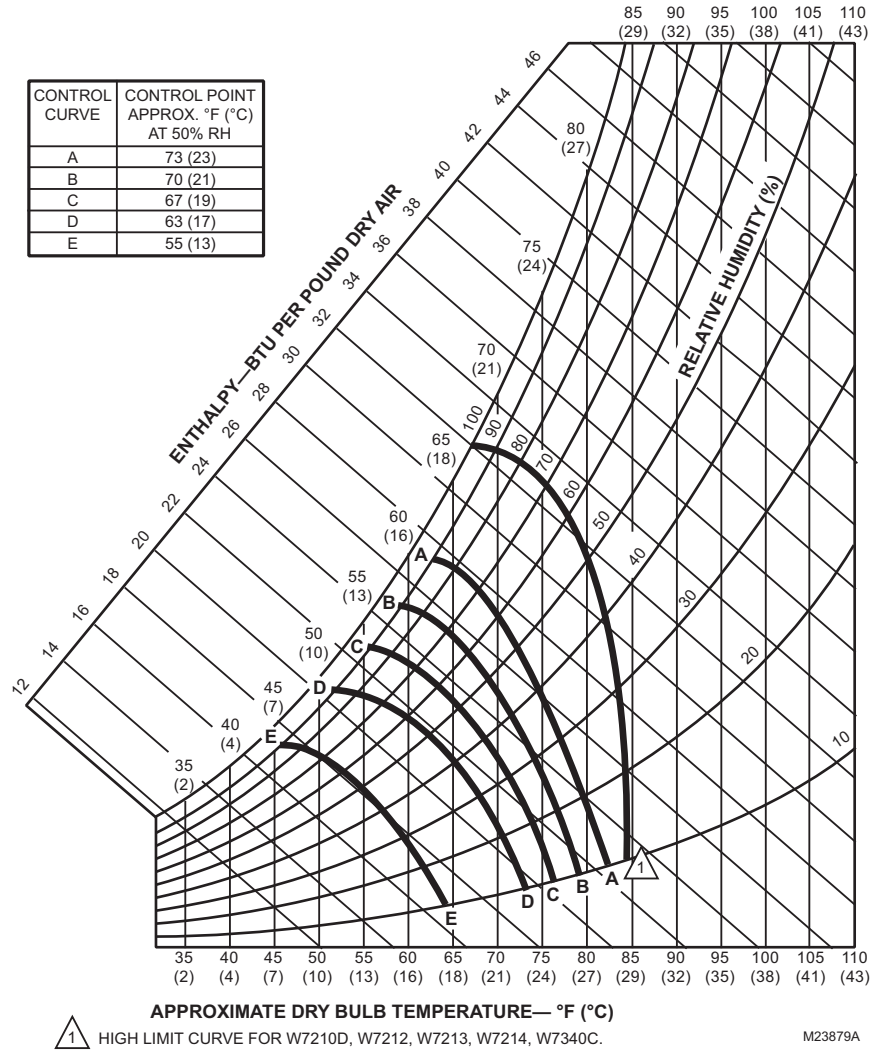
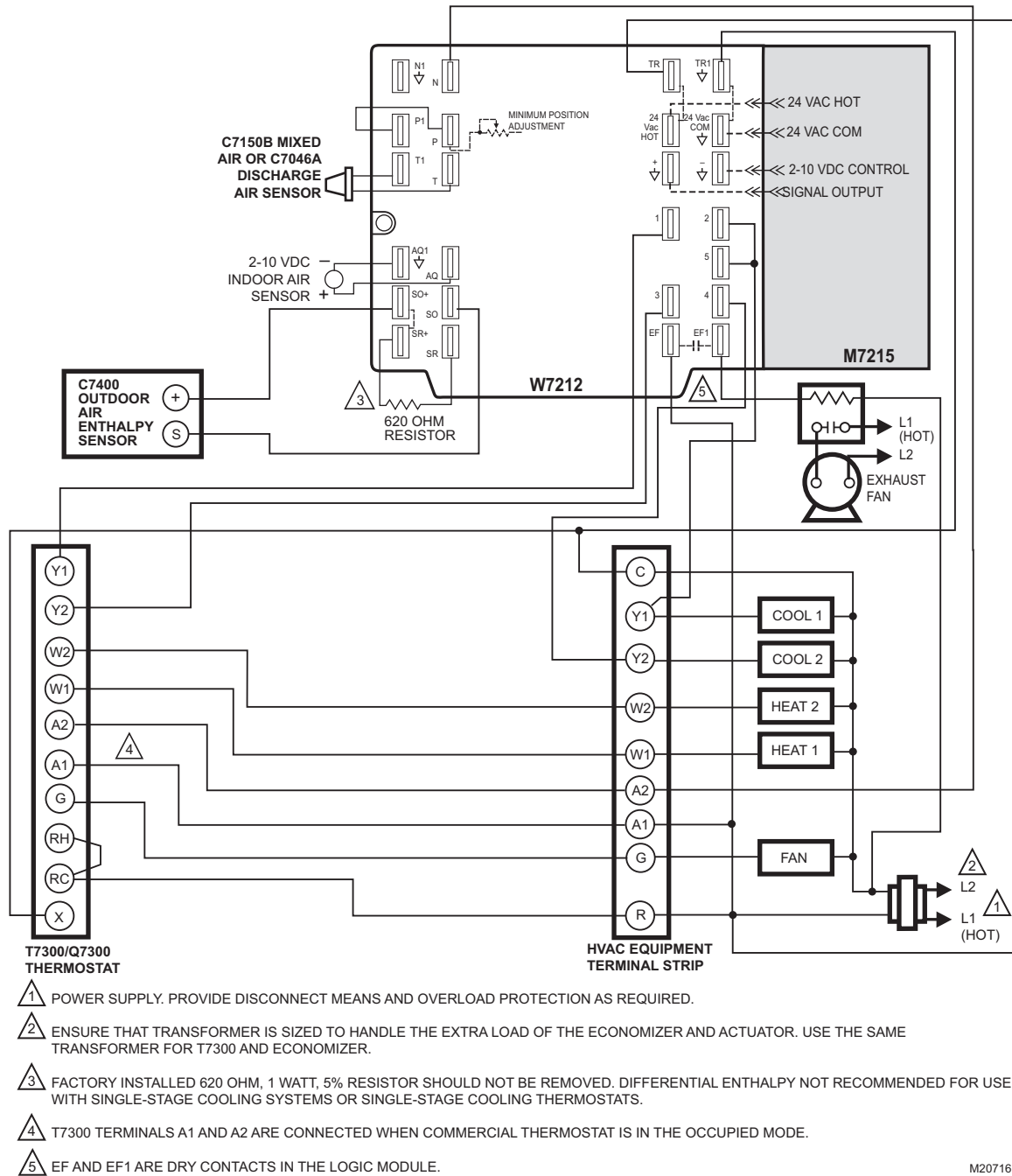
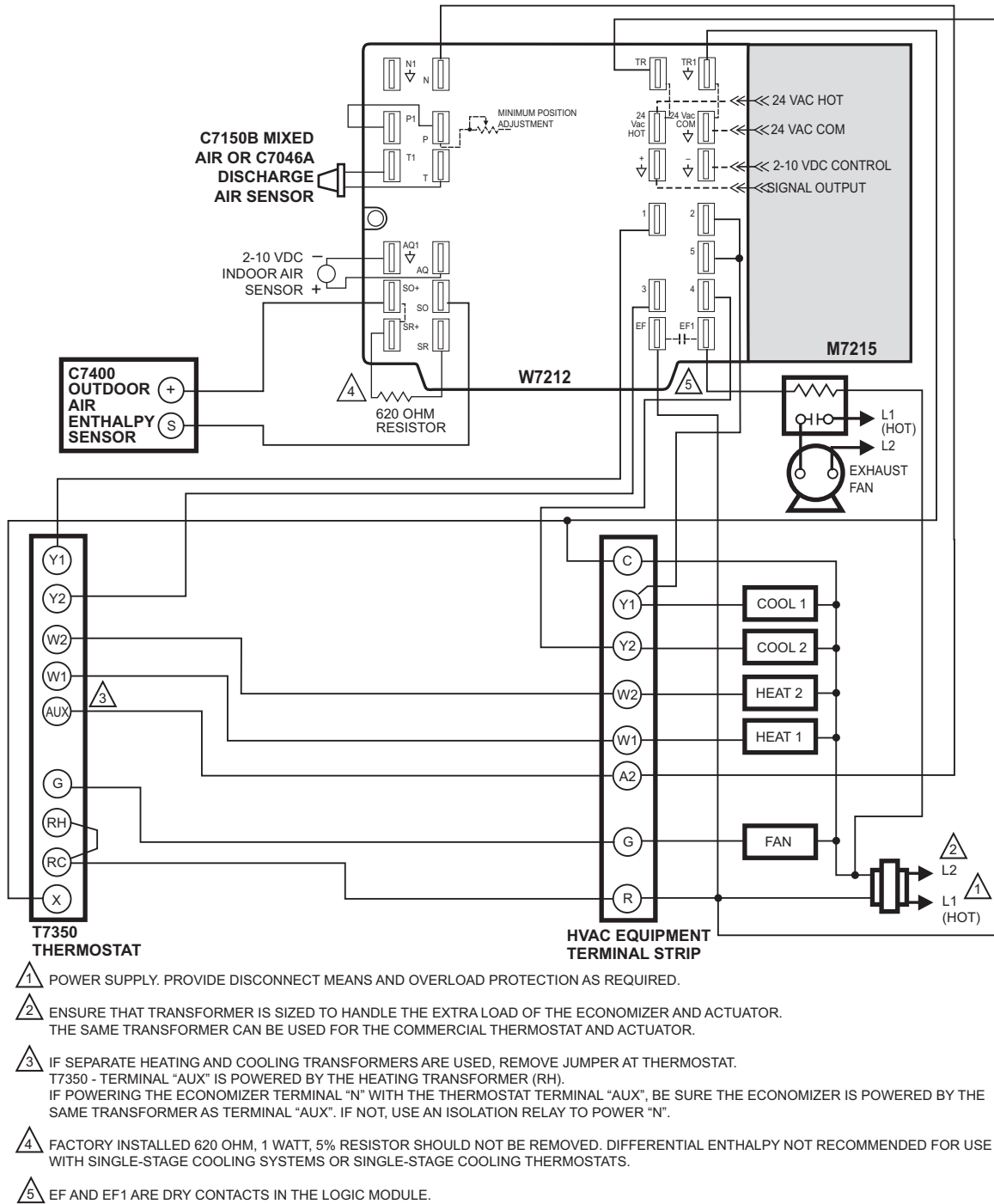


Fig. 8. W7212C performance characteristics for enthalpy changeover settings

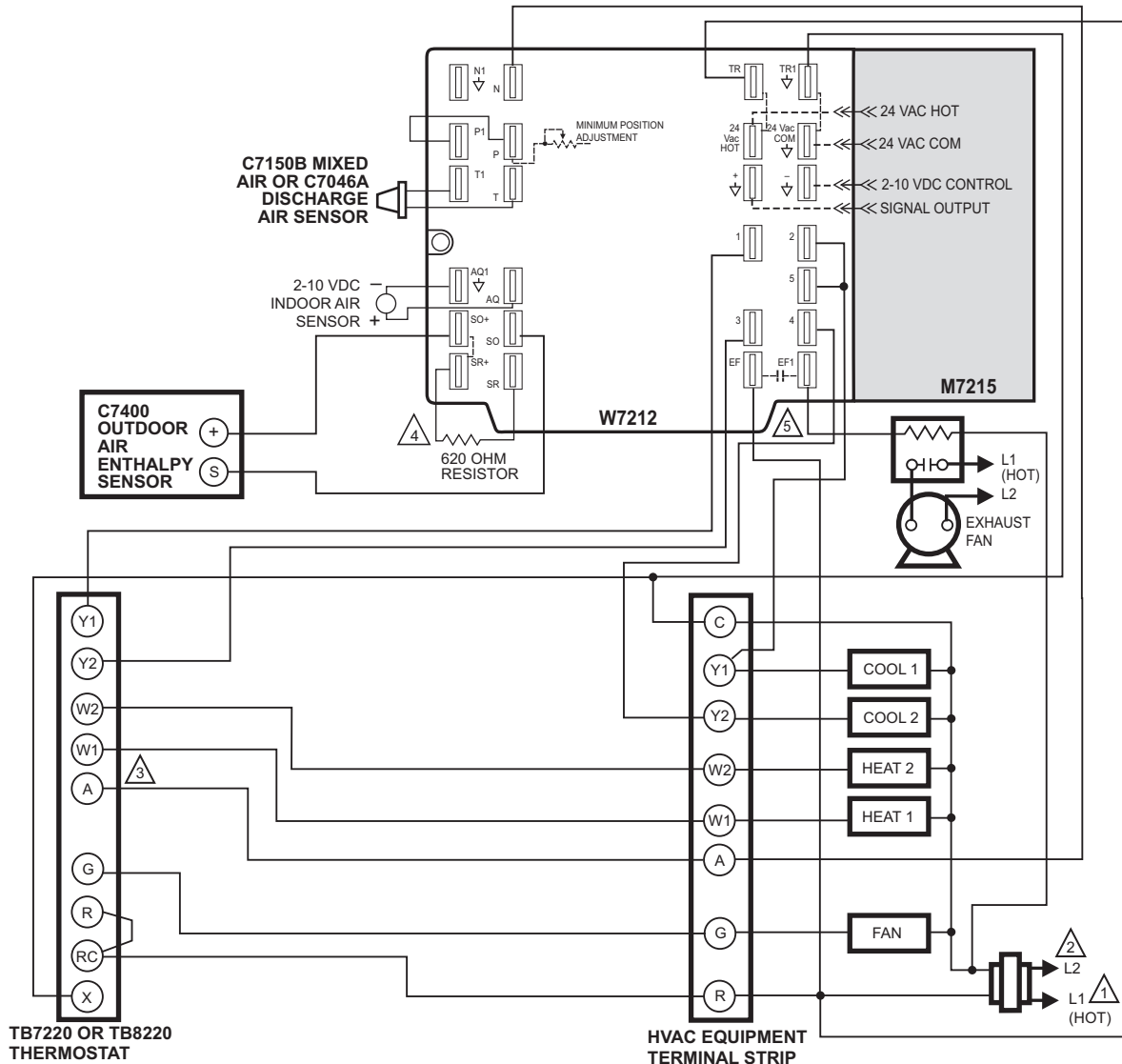


**Fig. 9. W7212 used with M7215 Damper Motor and T7300 Thermostat.**



M13657B

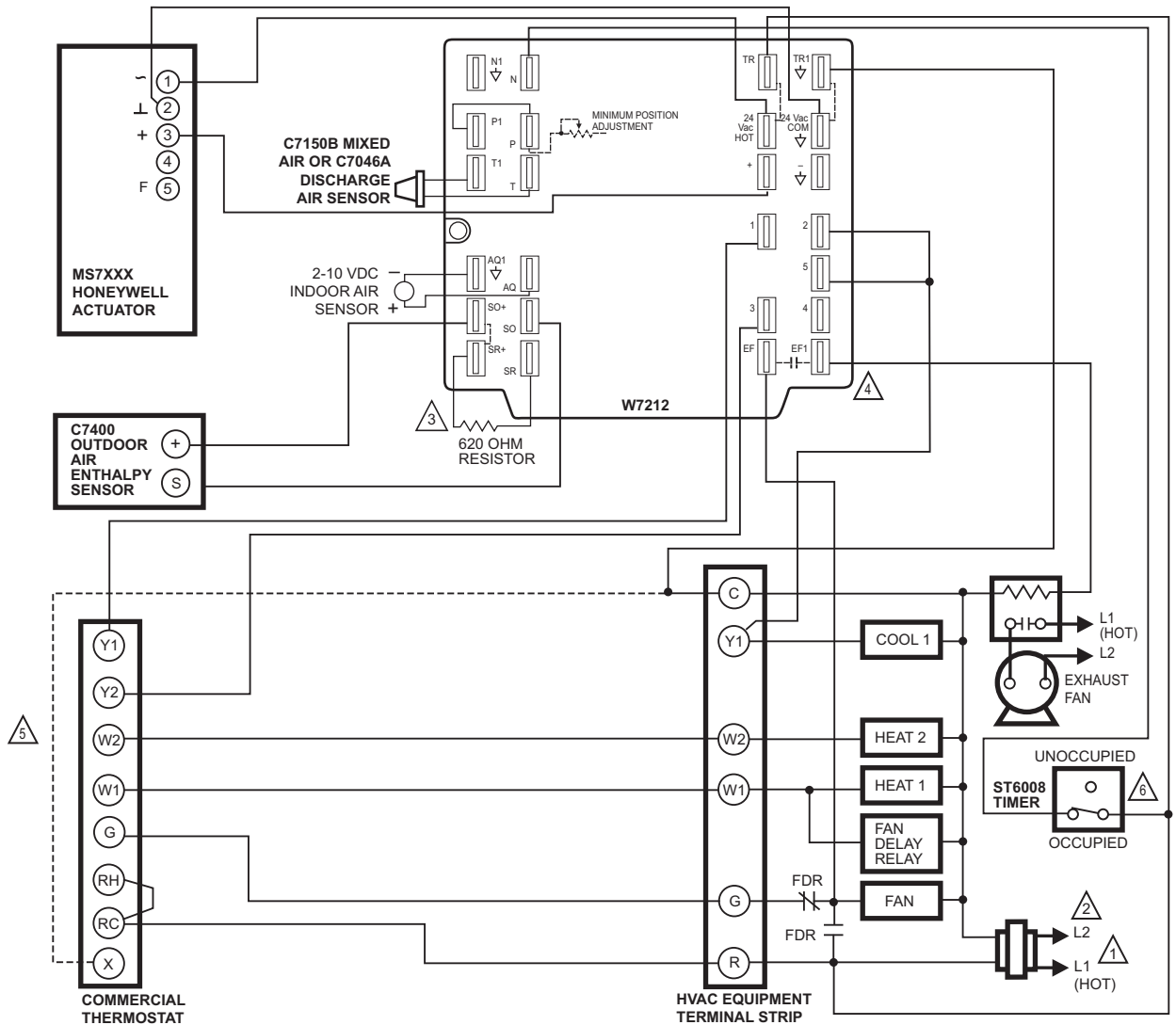
Fig. 10. W7212 used with M7215 Damper Motor and T7350 Thermostat.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ENSURE THAT TRANSFORMER IS SIZED TO HANDLE THE EXTRA LOAD OF THE ECONOMIZER AND ACTUATOR. THE SAME TRANSFORMER CAN BE USED FOR THE COMMERCIAL THERMOSTAT AND ACTUATOR.
- 3 IF SEPARATE HEATING AND COOLING TRANSFORMERS ARE USED, REMOVE JUMPER AT THERMOSTAT.  
 TB7220 - TERMINAL "A" IS POWERED BY THE COOLING TRANSFORMER (RC).  
 TB8220 - TERMINAL "A" IS POWERED BY THE HEATING TRANSFORMER (R).  
 IF POWERING THE ECONOMIZER TERMINAL "N" WITH THE THERMOSTAT TERMINAL "A", BE SURE THE ECONOMIZER IS POWERED BY THE SAME TRANSFORMER AS TERMINAL "A". IF NOT, USE AN ISOLATION RELAY TO POWER "N".
- 4 FACTORY INSTALLED 620 OHM, 1 WATT, 5% RESISTOR SHOULD NOT BE REMOVED. DIFFERENTIAL ENTHALPY NOT RECOMMENDED FOR USE WITH SINGLE-STAGE COOLING SYSTEMS OR SINGLE-STAGE COOLING THERMOSTATS.
- 5 EF AND EF1 ARE DRY CONTACTS IN THE LOGIC MODULE.

M13658B

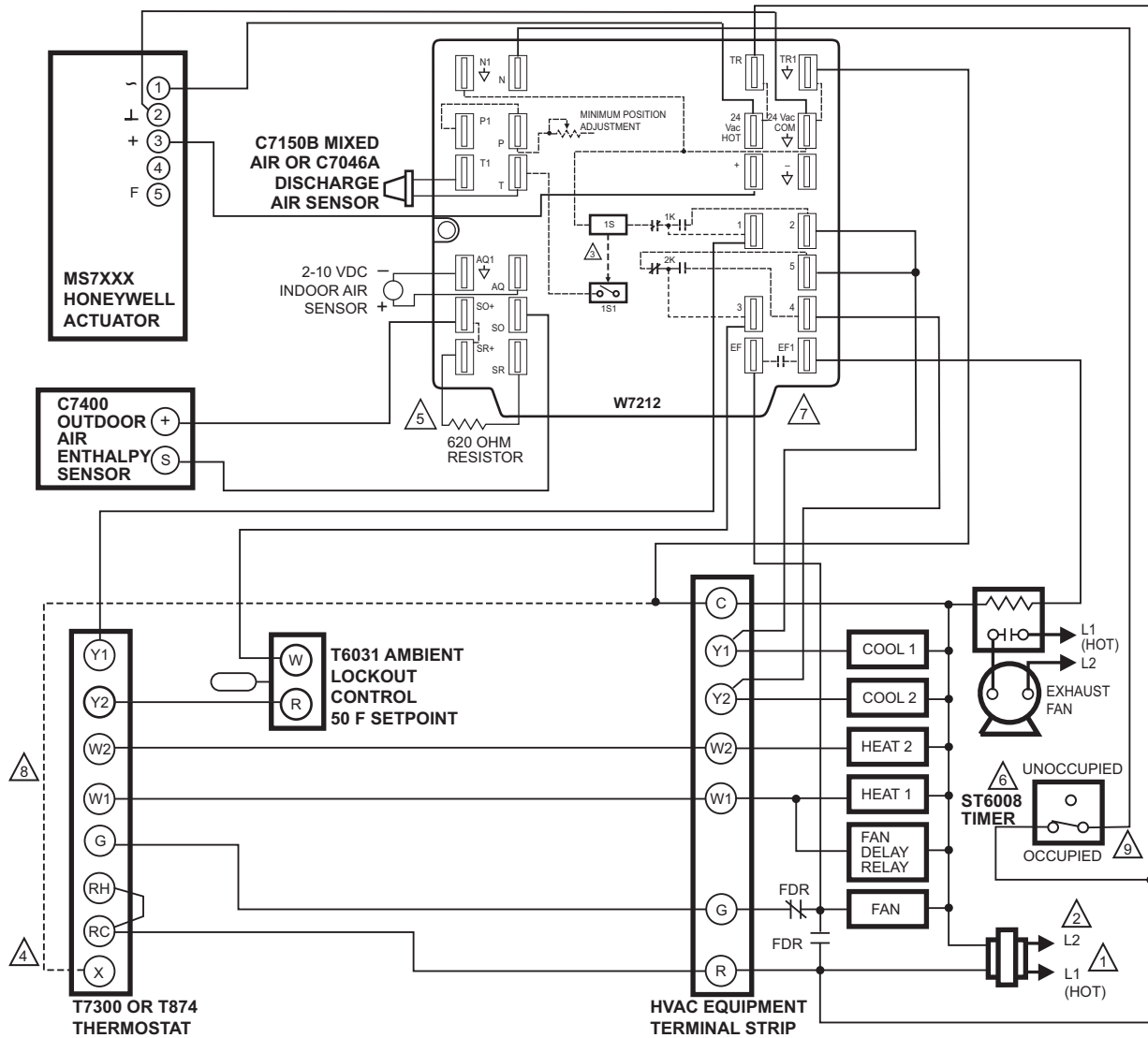
Fig. 11. W7212 used with M7215 Damper Motor and TB7220 or TB8220 Thermostats.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ENSURE THAT TRANSFORMER IS SIZED TO HANDLE THE EXTRA LOAD OF THE ECONOMIZER AND ACTUATOR.
- 3 FACTORY INSTALLED 620 OHM, 1 WATT, 5% RESISTOR SHOULD NOT BE REMOVED. DIFFERENTIAL ENTHALPY NOT RECOMMENDED FOR USE WITH SINGLE-STAGE COOLING SYSTEMS OR SINGLE-STAGE COOLING THERMOSTATS.
- 4 EF AND EF1 ARE DRY CONTACTS IN THE LOGIC MODULE.
- 5 SEE WIRING DIAGRAMS FOR T7350 AND TB7220/TB8220.
- 6 TIME CLOCK IS AN OPTION TO USING OCCUPIED CONTACTS ON THE COMMERCIAL THERMOSTAT.

M13659C

**Fig. 12. W7212 used in single-stage cooling system with single enthalpy changeover and Honeywell actuator and time clock for occupancy.**



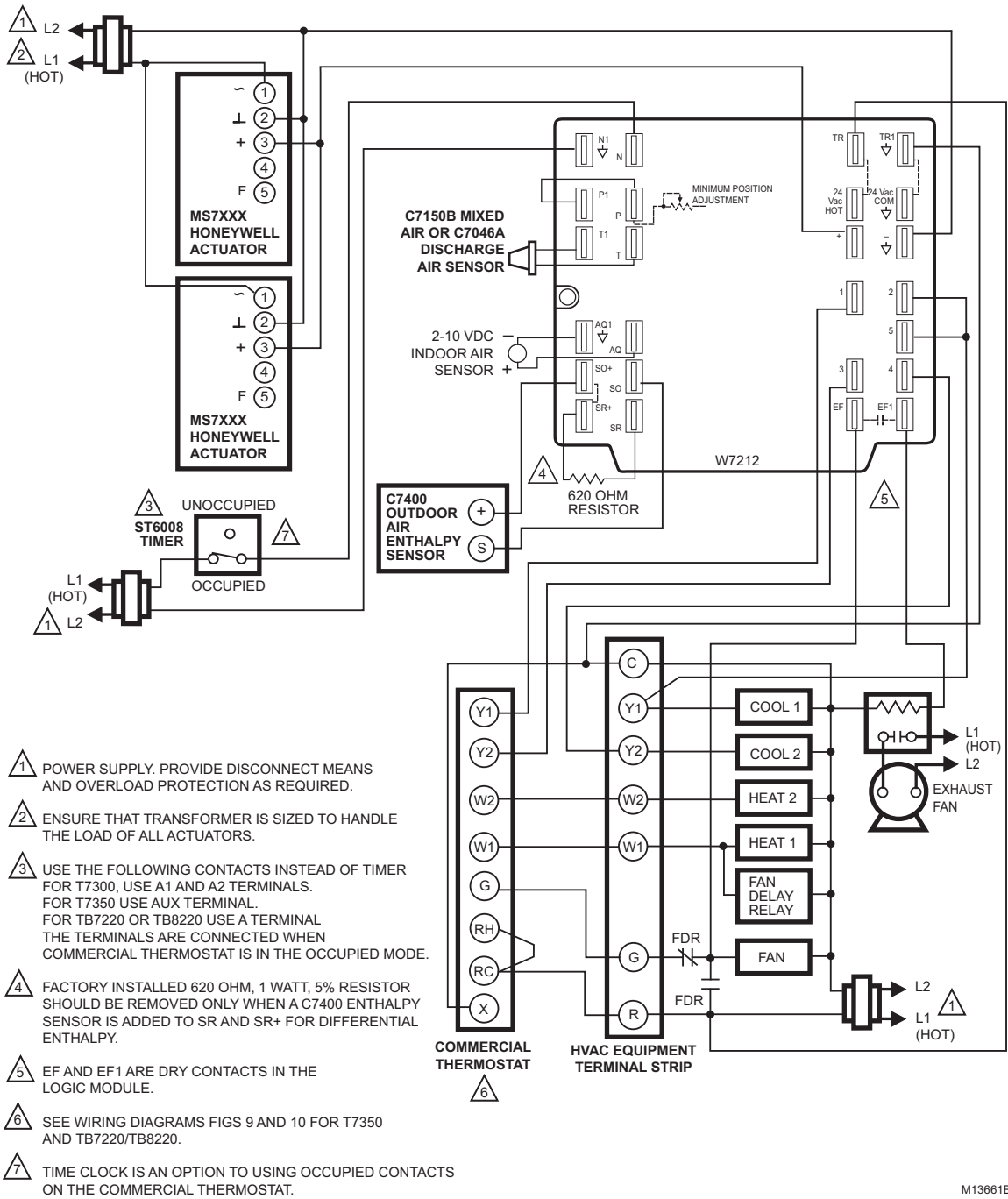
- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ENSURE THAT TRANSFORMER IS SIZED TO HANDLE THE EXTRA LOAD OF THE ECONOMIZER AND ACTUATOR.
- 3 1S IS AN ELECTRONIC SWITCH THAT CLOSES WHEN POWERED BY A 24 VAC INPUT.
- 4 FOR T7300 ONLY
- 5 FACTORY INSTALLED 620 OHM, 1 WATT, 5% RESISTOR SHOULD BE REMOVED ONLY WHEN A C7400 ENTHALPY SENSOR IS ADDED TO SR AND SR+ FOR DIFFERENTIAL ENTHALPY.

- 6 USE THE FOLLOWING CONTACTS INSTEAD OF TIMER FOR T7300, USE A1 AND A2 TERMINALS. FOR T7350 USE AUX TERMINAL. FOR TB7220 OR TB8220 USE A TERMINAL THE TERMINALS ARE CONNECTED WHEN THERMOSTAT IS IN THE OCCUPIED MODE.
- 7 EF AND EF1 ARE DRY CONTACTS IN THE LOGIC MODULE.
- 8 SEE WIRING DIAGRAMS FIGS 9 AND 10 FOR T7350 AND TB7220/TB8220.
- 9 TIME CLOCK IS AN OPTION TO USING OCCUPIED CONTACTS ON THE COMMERCIAL THERMOSTAT.

M13660B

Fig. 13. W7212 used in two-stage cooling system with Honeywell Series 72 Actuator and time clock for occupancy.





M13661B

**Fig. 14. W7212 controlling parallel-wired Honeywell Series 72 Actuators and time clock for occupancy.**

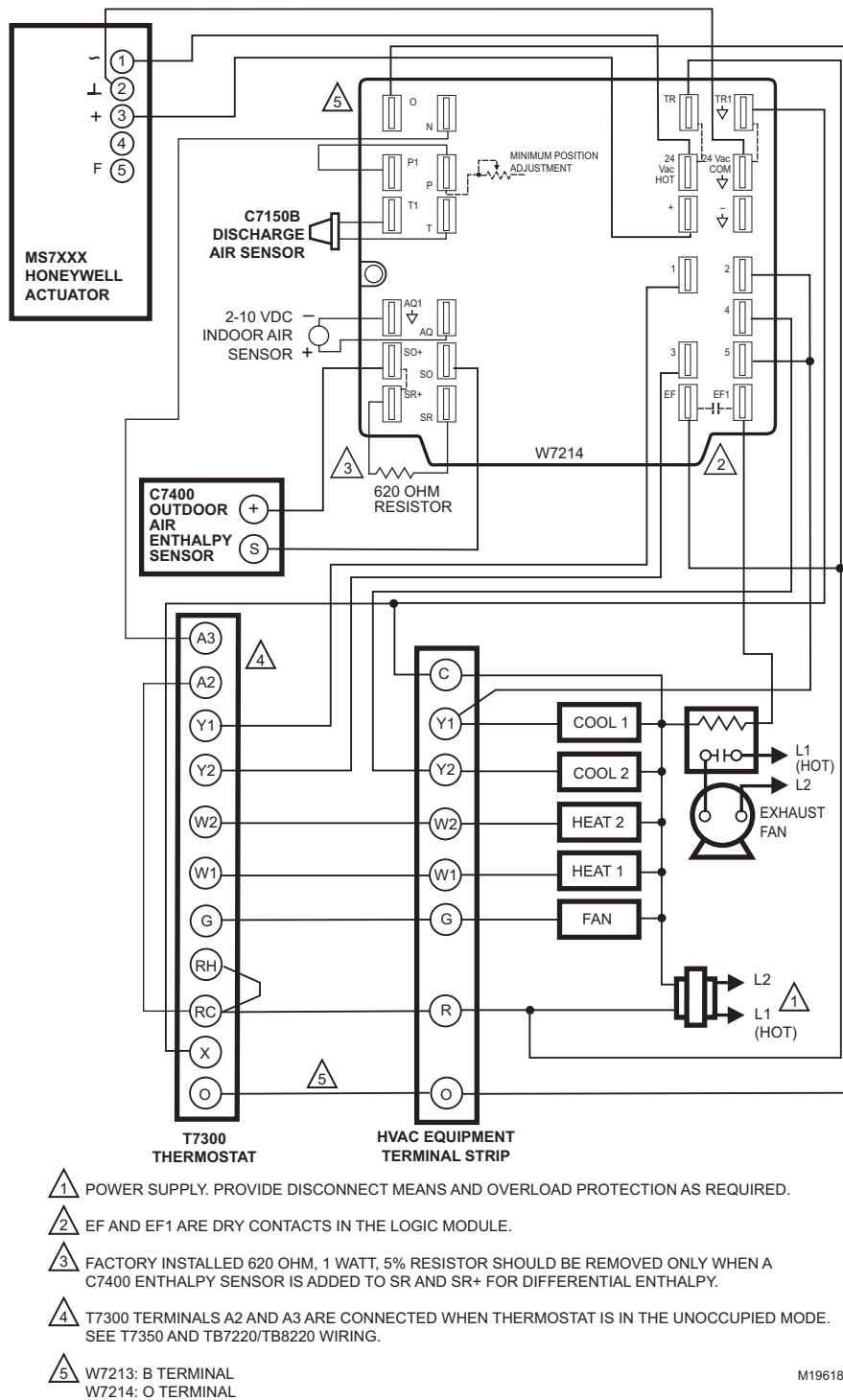


Fig. 15. W7213, W7214 controlling heat pump system.

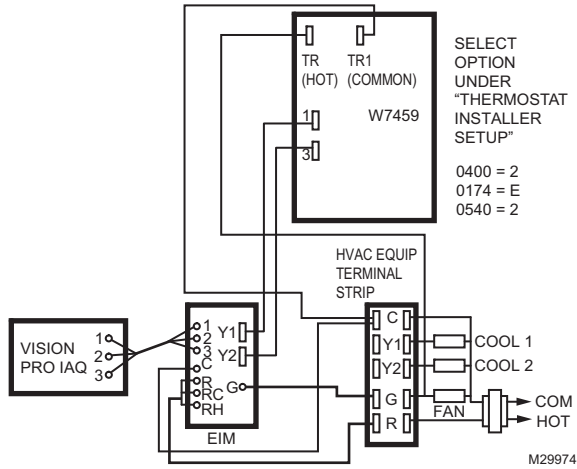


Fig. 16. Vision Pro IAQ with EIM connected to a W7459 Economizer

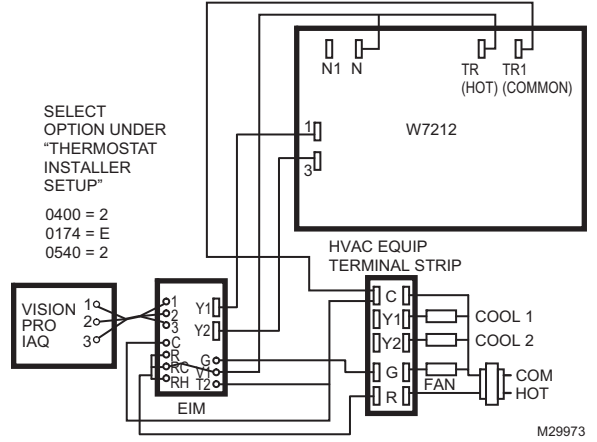
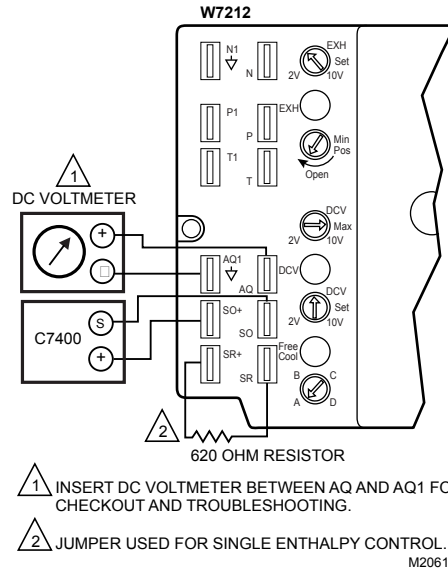


Fig. 17. Vision Pro IAQ with EIM connected to a W7212 Economizer (With Morning Warm-up Enabled)

# CHECKOUT AND TROUBLESHOOTING

Checkout requires a 9V battery, 620 ohm, 1.2K ohm, 5.6K ohm, and 6.8K ohm resistors. Use Table 4 and Fig. 18 for checkout.

**CAUTION**  
**Equipment Damage Hazard.**  
**Excessive force can damage potentiometer controls.**  
 Use a small screwdriver when adjusting enthalpy changeover and minimum damper position controls.



**Fig. 18. Meter location for checkout and troubleshooting (W7212 shown).**

**Table 4. Checkout for W7212, W7213, W7214 Economizers Connected to Honeywell Actuator.**

Step	Checkout Procedure	Proper Response
1.	<b>CHECKOUT PREPARATION FOR ECONOMIZING ONLY</b>	
	Disconnect power at TR and TR1.	All LED are off; Exhaust Fan contacts are open.
	Disconnect devices at P and P1.	
	Jumper P to P1 (defaults to on board MIN POS potentiometer).	
	Place 5.6K ohm resistor across T and T1 (Blue sleeve- provides input to economizer that the MAT is between 50-55F).	
	Jumper TR to 1 (call for cooling from the thermostat).	
	W7212 only: Jumper TR to N (places economizer in occupied mode).	
	If connected, remove C7400 Enthalpy Sensor from terminals S <sub>O</sub> and +.	
	Connect 1.2K ohm, from 4074EJM Checkout Resistor kit, (purple sleeve) across terminals S <sub>O</sub> and + (makes OA enthalpy high).	
	Place 620 ohm resistor (white sleeve) across S <sub>R</sub> and + (makes return enthalpy lower than OA).	
	Set MIN POS and DCV MAX potentiometers fully CCW.	
	Turn DCV setpoint potentiometer mid position (this sets the DCV ventilation at approximately 1000 ppm).	
	Turn exhaust potentiometer to mid position (motor will be approximately 50% open when the exhaust fan contacts make).	
	Set enthalpy potentiometer to D.	
	W7214 only: Jumper TR to O.	
	Apply power (24 Vac) to terminals TR and TR1.	

**Table 4. Checkout for W7212, W7213, W7214 Economizers Connected to Honeywell Actuator. (Continued)**

Step	Checkout Procedure	Proper Response
2.	<b>DIFFERENTIAL ENTHALPY</b>	
	Execute step one, Checkout Preparation.	—
	Turn DCV MAX to mid position.	
	Place 620 ohm resistor across S <sub>O</sub> and + (white sleeve resistor makes OA enthalpy low).	—
	Place 1.2K ohm resistor across S <sub>R</sub> and + (purple sleeve resistor makes RA enthalpy high).	Free cool LED turns on; motor drives to approximately 45 degrees (half) open.
	Remove 620 ohm resistor from S <sub>O</sub> and +.	Free cool LED turns off; motor drives closed
3.	<b>SINGLE ENTHALPY</b>	
	Execute step one, Checkout Preparation.	—
	Turn DCV MAX to mid position.	
	Set enthalpy potentiometer to A (fully CCW).	Free cool LED turns on; motor drives to approximately 45 degrees (half) open.
	Set enthalpy potentiometer to D or E for W7212C (fully CW).	Free cool LED turns off; motor drives closed
4.	<b>DCV AND EXHAUST</b>	
	Execute step one, Checkout Preparation.	—
	LED for both DCV and Exhaust should be off.	
	Turn DCV MAX to mid position.	Motor drives to mid position, 45 degrees open.
	Turn MIN POS fully CW.	Motor drives fully open.
	Turn MIN POS and DCV MAX to fully CCW.	Motor drives closed.
	Turn DCV MAX to mid position. Connect 9V battery positive to AQ and negative to AQ1.	LED for both DCV and Exhaust turn on. Actuator drives to 45 degrees open.
	Remove jumper from N terminal (economizer goes into not occupied mode).	Motor remains at 45 degrees open.
	Adjust DCV MAX towards CW.	Motor will move to position set by DCV MAX pot.
	Adjust DCV MAX to fully CCW.	Motor will drive closed.
	Reconnect jumper to N terminal.	
	Adjust DCV MAX and MIN POS pots.	Motor will drive to the most open position of the pots.
	Adjust DCV MAX and MIN POS pots to fully CCW.	
Remove power from N terminal adjust MIN POS towards CW	Motor should not move.	
Adjust DCV MAX towards CW.	Motor will move to position set by DCV MAX pot.	
5.	<b>MINIMUM AND MAXIMUM POSITION</b>	
	Execute step one, Checkout Preparation.	—
	Connect 9V battery positive to AQ and negative to AQ1. Adjust DCV MAX potentiometer to mid position.	DCV LED turns on. Actuator drives to 45 degrees open.
	Turn DCV maximum position potentiometer to fully CCW.	Actuator drives fully closed.
	Turn minimum position potentiometer to midpoint.	Actuator drives to 45 degrees open.
	Turn minimum position potentiometer fully CW.	Actuator drives fully open.
	Turn MIN POS to fully CCW.	Actuator drives fully closed.
	W7212: Remove jumper from TR and N. W7214: Jumper TR to O.	Actuator drives fully closed.
6.	<b>MIXED AIR INPUT</b>	
	Execute step one, Checkout Preparation.	—
	Turn DCV MAX to mid position; set enthalpy potentiometer to A.	Free cool LED turns on. Actuator drives to 45 degrees open.
	Remove 5.6K ohm resistor (green sleeve) and place jumper from T and T1.	Actuator drives to 45 degrees open.
	Remove jumper from T and T1 and leave open.	Actuator drives fully closed.

**Table 4. Checkout for W7212, W7213, W7214 Economizers Connected to Honeywell Actuator. (Continued)**

Step	Checkout Procedure	Proper Response
7.	HEAT PUMP INPUT - W7213, W7214 ONLY	
	Execute step one, Checkout Preparation.	—
	Turn DCV MAX to mid position; set enthalpy potentiometer to A.	Free cool LED turns on. Actuator drives to 45 degrees open.
	W7213: Jumper TR to B. W7214: Remove jumper from TR and O.	Free cool LED turns off. Actuator drives fully closed.



**Automation and Control Solutions**

Honeywell International Inc.  
1985 Douglas Drive North  
Golden Valley, MN 55422

Honeywell Limited-Honeywell Limitée  
35 Dynamic Drive  
Toronto, Ontario M1V 4Z9  
[customer.honeywell.com](http://customer.honeywell.com)

® U.S. Registered Trademark  
© 2010 Honeywell International Inc.  
63-2596—09 M.S. Rev. 03-10  
Printed in U.S.A.

**Honeywell**