

## POL220 Series Economizer Controller

### Product Description

The Economizer Controller allows the use of unconditioned outside air to cool a building. The Free Cooling air determination is based on customer temperature and humidity selections, as well as optional Demand Control Ventilation (DCV) strategies with CO<sub>2</sub> level selection.

### Features

- Economizer control provides “free cooling” based on single or dual dry bulb temperature, or combination temperature + humidity sensors.
- Wide temperature shut-off setpoint range selection and Btu/lb selection range selectable by DIP switches.
- Potentiometers allow accurate adjustment of DCV, exhaust fan levels, and minimum damper position.
- Versions with remote minimum position damper adjustments accept either 0 to 10 Vdc or 135 Ohm potentiometer signals.
- Used with Siemens OpenAir<sup>®</sup> damper actuators.
- Flexible sensor inputs accept 10K or 3K standard NTC sensors, or Siemens QFM2160U combination temperature/humidity 0 to 10V sensor for enthalpy control.
- LED Indication when in Free Cooling operation, DCV operation and exhaust fan operation as well as during sensor failure.
- Quick installation and easy commissioning.
- Two-stage cooling control.
- Occupancy input with default capability.
- Quick connect I/O with 1/4” spade connections.
- Anti-freeze protection.
- Brownout protection.

### Product Numbers

Economizer Controller Single	Economizer Controller Multi-pack (20)	Remote Potentiometer Input Type
POL220.05	POL220.00	BSG61 (0-10 Vdc)
POL220.10	POL220.15	LVC2 (135Ω)

Item Number 125-1902, Rev. GA



### Contents

- Economizer Controller
- Two No. 6 3/4” self-tapping screws

### Accessory

985-960 Jumper Accessory

### Warning/Caution Notations

	<p><b>CAUTION/ATTENTION</b></p> <p>Equipment damage or loss of data may occur if you do not follow a procedure as specified.</p> <p>Risque de dégâts matériels ou de perte de données, en cas de non-respect des procédures à suivre.</p>
	<p><b>WARNING/AVERTISSEMENT</b></p> <p>Personal injury may occur if you do not follow a procedure as specified.</p> <p>Risque de blessures graves en cas de non-respect des procédures à suivre.</p>

### Prerequisites

For proper Economizer Controller operation, read this User Guide carefully, and follow the instructions in the *Economizer Controller Start-up/Commissioning Mode* section. Failure to do so may result in damage to the product or create a hazardous condition. Installation of this controller must be performed by a trained HVAC service technician.

## Basic Economizer Control Modes

- Control Mode 1:** Fixed Dry-bulb (Single dry-bulb)  
Outside air and mixed air temperature sensors are used.
- Control Mode 2:** Differential Dry-bulb (Dual Dry-Bulbs)  
Outside air, return air, and mixed air temperature sensors are used.
- Control Mode 3:** Combination Fixed Enthalpy and Fixed Dry-bulb Control  
Outside air temperature and humidity sensors, and mixed air temperature sensors are used.
- Control Mode 4:** Combination of Differential Enthalpy and Fixed Dry-bulb  
Outside air temperature and humidity sensors, return air temperature and humidity sensors, and mixed air temperature sensors are used.

## Specifications

### Electrical Ratings:

Input Voltage: 24 Vac  $\pm$ 25%; 50/60 Hz (Class 2).  
Nominal Power Consumption (at 24 Vac, 60 Hz):  
4 VA.

Relay Contact Rating at 30 Vac (maximum power from Class 2 input *only*): 1.5A run, 3.5A inrush.

### NOTE:

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 (non-condensing).

### Inputs:

Combination Temperature/Humidity Sensor (QFM2160U): 5-wire (18, 20, or 22 AWG cable) connection.

Dry Bulb Temperature Sensor 10K Ohm Type II NTC (QAM2030.010) or 3K NTC: 2-wire (18, 20, or 22 AWG cable) connection.

DCV (CO<sub>2</sub>) Sensor (QPA2000): 3-wire (18, 20, or 22 AWG cable)  
0 to 10 Vdc control signal

### Outputs:

Actuator (GCA151.1P GMA151.1P, GQD151.1P):  
4-wire (18 AWG)

Actuator Signal: 2 to 10 Vdc.

Actuator Input Resistance: 100K ohm.

The controller provides 7 VA max. to operate the damper actuator.

Exhaust Fan: Contact closure.

### Auxiliary Equipment:

- RDY2000 Commercial Thermostat
- LVC2 (135  $\Omega$ ) Control Board for remote minimum damper positioning (POL220.10 and POL220.15)
- BSG61 (0-10 Vdc) for remote minimum damper positioning (POL220.00 and POL220.05)

Wire the electrical connections using 1/4" female, insulated spade connections.

### Approvals:

UL listed per UL873.

CE

RCM

cUL Listed per CSA – C22.2 No. 24

Suitable for plenum installation

UL/NEMA Type 1

**Dimensions:** 5.10"  $\times$  4.70"  $\times$  1.10"  
(130 mm  $\times$  120 mm  $\times$  28 mm)

**Weight:** 0.49 lbs (221 g)

## Required Tool

Phillips Screwdriver

## Expected Installation Time

15 minutes

## Installation

Mount the controller to sheet metal ductwork or a panel using two self-tapping screws (provided). The mounting location must protect the controller from the elements and ultraviolet rays.

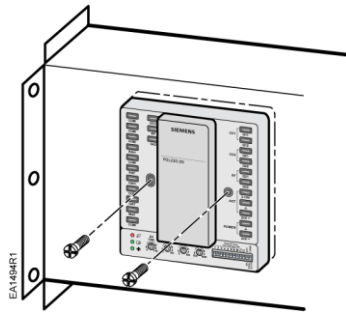


Figure 1. Controller Mounted to Ductwork.

## Outdoor, Return Air, and Mixed Air Sensor Operating and Mounting Instructions

### Location and Mounting

The Economizer Controller accepts signals from either the QAM2030.010 (10K, Type II) dry bulb temperature sensor, or 3K NTC temperature sensor. It provides single or differential temperature based economizer control or the QFM2160U combination temperature/humidity sensor for single or dual enthalpy-based economizer control.



#### CAUTION/ATTENTION:

Do not mix sensors. Temperature sensors must all be either 10K Ohm Type II NTC, or 3K NTC.

Ne mélangez pas de détecteurs. Les détecteurs de température doivent tous être l'un ou l'autre le Type II d'Ohm de 10 Ko NTC, ou 3 Ko NTC.

For differential dry bulb operation, use two QAM2030.010 (10K Type II NTC) or 3K NTC temperature sensors.

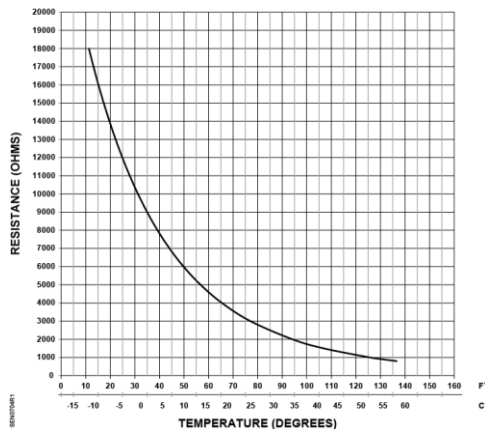


Figure 2. 3K NTC Curve.

**NOTE:** 3K NTC sensors must follow this curve.

### Sensor Mounting

- Mount the sensor in any orientation, exposing it to freely circulating air, using the two mounting screws provided with the sensor. Choose a location that protects it from rain, snow, and direct sunlight.
- Connect the appropriate Type II NTC 10K or 3K sensor for:
  - Outside Air: Connect to the OAT and COM terminals of the device.
  - Return Air (Differential): Connect to the RAT and COM terminals of the device.
  - Mixed Air: Connect to the MAT and COM terminals of the device.

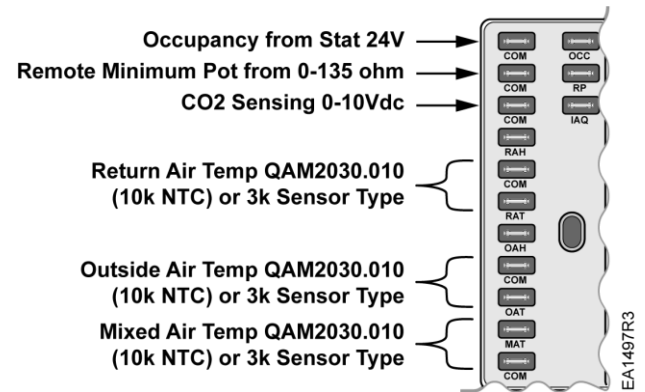


Figure 3. Type II NTC 10K or 3K Sensor Connections.

- Connect the QFM2160U Combination Temperature/Humidity sensor for Enthalpy control.
  - Outside Air: Connect to the OAT, COM, and OAH terminals of the device.
  - Return Air (Differential): Connect to the RAT, COM, and RAH terminals of the device.

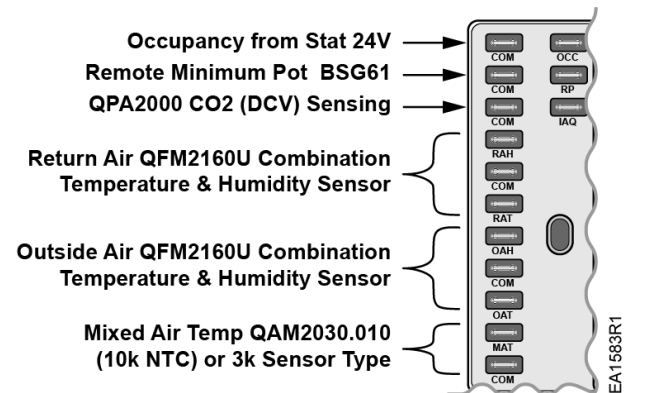


Figure 4. QFM2160U Combination Temperature/Humidity Sensor Connections.

**NOTE:** QFM2160U Combination Temperature/  
 Humidity Sensors must be powered by an  
 external 24 Vac power supply.

### CO<sub>2</sub> Sensor – Demand Control Ventilation (DCV)

1. Mount the QPA2000 CO<sub>2</sub> Sensor in an area with unobstructed air circulation. See *QPA...Series Indoor Air Quality Room Sensors Installation Instructions* (129-435).
2. Connect the sensor to the IAQ and COM terminals of the controller. See Figure 4.

**NOTE:** CO<sub>2</sub> sensors must be powered by an external 24 Vac power supply.

### Powering the Economizer Controller

To power the Economizer Controller, connect a 24 Vac external power supply source.

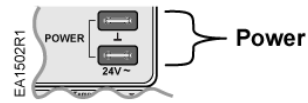


Figure 5. Connecting to Power Supply Source.

### Damper Actuator Connection to the Economizer Controller

1. Connect the appropriate Siemens OpenAir Damper Actuator to the controller actuator input as shown.
2. Select the appropriate modulating (2 to 10 Vdc) spring return damper actuator to operate the Economizer damper. See Table 1.



Figure 6. Damper Actuator Connections.

Table 1. Damper Actuator Selection.

Damper Actuator Part Number	Torque Rating	Description
GQD151.1P	20 lb-in	Spring Return, 2 to 10 Vdc Signal, Plenum-rated
GMA151.1P	62 lb-in	Spring Return, 2 to 10 Vdc Signal, Plenum-rated
GCA151.1P	160 lb-in	Spring Return, 2 to 10 Vdc Signal, Plenum-rated

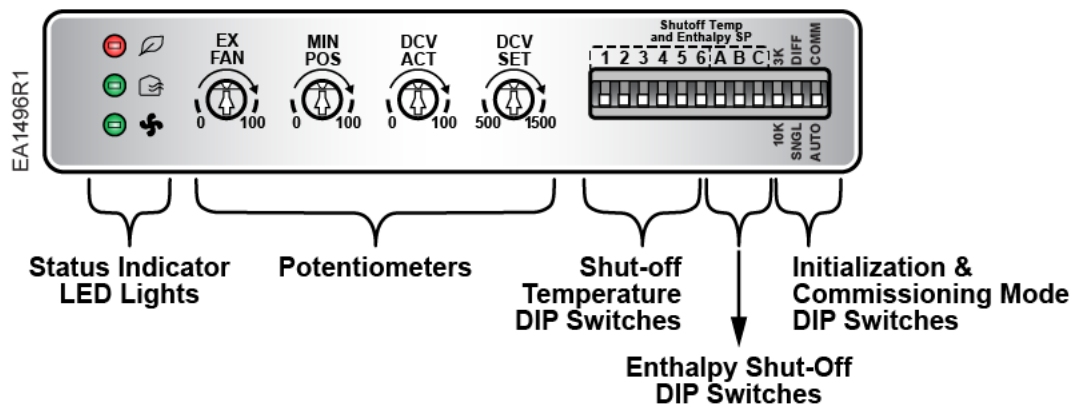


Figure 7. Economizer Control Adjustments.

## Economizer Controller Startup/Commissioning Mode

Factory default settings:

All DIP switches are in the OFF (down position).

### NOTE:

Use a small, flat-blade screwdriver to select DIP switches. Ensure that the switches are fully in the **ON** or **OFF** position.

All potentiometers are in the middle position (arrow pointing upwards).

### Initialization

1. Connect the sensor inputs and other auxiliary equipment.
2. Use the DIP switch to select a 3K or 10K sensor (see Figure 7).
3. Use the DIP switch to select Single (**SNGL**) or Differential (**DIFF**) mode (see Figure 7).
4. Apply power to the controller (see Figure 5).
5. The controller will perform up to a 20-second auto detection to determine the type of sensor input(s).

If you experience a transient power failure during initialization, the compressors will not suddenly restart because the outputs are deactivated.

### Commissioning Mode

This Commissioning mode (COMM) adjusts the Minimum Position of the outside air damper. In the Commissioning mode, the damper will be overridden by Effective **MIN POS**, or **DCV ACT**, whichever is greater.

Effective MIN POS is determined by either the onboard MIN POS potentiometer or the Remote MIN POS potentiometer:

Move the DIP switch on the bottom of the controller to the **COMM** position (see Figure 7) to enter the Commissioning mode. When the Free Cooling LED and DCV LED blink red, this indicates that the controller is in the Commissioning mode. CC1 and CC2 are energized in the Commissioning mode, and the exhaust fan responds to the outside air damper.

### Determining Required Airflow

The Consulting Engineer defines the minimum damper position by the minimum outdoor airflow required in the building during the occupied period. To determine the minimum amount of outside air to bring in the building, use these basic guidelines:

- The OA rate can be calculated by this formula:

$$OA\% = \frac{MAT-RAT}{OAT-RAT}$$

A minimum 10°F temperature differential between OA and RA must be maintained; otherwise, this formula doesn't work well.

OR

- An airflow measuring station can be used to directly tune the outdoor airflow volumetric rate to designed value. OA rate can be calculated from formula  $OA\% = \frac{OAV}{SAV} = \frac{OAV}{OAV+RAV}$ , where minimum differential temperature between OA and RA is not required.

### Setting Minimum Position in Commissioning Mode

If a **Remote Positioning Potentiometer** is being used:

1. Turn the **MIN POS** potentiometer to the fully closed, **0** position.
2. Turn the **DCV ACT** potentiometer to the fully closed, **0** position
3. Adjust the Remote **MIN POS** Potentiometer until the designed OA flow rate is met.
4. After the Remote **MIN POS** Potentiometer adjustment is complete, turn the **DCV ACT** potentiometer until designed DCV OA flow rate is met. The **DCV ACT** setting should be greater than the Remote **MIN POS** Potentiometer setting.
5. **When these adjustments are completed**, set the DIP switch to **AUTO** to resume normal operation.

If the onboard MIN POS Potentiometer is being used:

1. Turn the Remote **MIN POS** Potentiometer to the fully closed, **0** position.
2. Turn the **DCV ACT** potentiometer to the fully closed, **0** position,
3. Turn the **MIN POS** potentiometer until designed OA flow rate is met.
4. After MIN POS adjustment is complete, turn the **DCV ACT** potentiometer until designed DCV OA flow rate is met. The **DCV ACT** should be greater than MIN POS.
5. After all **MIN POS** and **DCV ACT** adjustments are completed, set the DIP switch to **AUTO** to resume normal operation.

## Selecting the Shut-off Temperature and Enthalpy Setpoint

The damper will be open and will allow for free cooling below the temperature shut-off setpoint selected from one of the six DIP switches located on the bottom right corner of the controller cover (see Figure 7).

The numbered DIP switches correspond to the shut-off temperature values (see Table 2). When all of the DIP switches are in the down position and no number is selected (factory default), the default temperature shut-off setpoint value is 75°F.

**Table 2. Shut-off Temperature Values.**

Default	1	2	3	4	5	6
75°F	50°F	55°F	60°F	65°F	70°F	80°F

For Economizer operation based on both temperature and humidity, the enthalpy shut-off setpoint value may be selected from the following lettered DIP switches. When the three DIP switches are in the down position, the default enthalpy shut-off value is 28 Btu/lb.

**Table 3. Enthalpy Shut-Off Values.**

Default	A	B	C
28 Btu/lb	22 Btu/lb	24 Btu/lb	26 Btu/lb

For further assistance in determining these shut-off setpoint values, see *ASHRAE 90.1.2014* for a guideline for shutoff control types for specific climate zones.

## Selecting Single or Differential (Dual) Sensors

### Basic Economizer Control Modes

#### Control Mode 1: Fixed Dry-bulb (Single Dry-Bulb)

- OA temperature sensor and MA temperature sensor are used.
- Set the DIP switch to **SNGL** (single) mode. See Figure 7.
- The outside-air dry-bulb temperature is compared to a shut-off dry-bulb temperature. If the outside-air dry-bulb temperature is below the shut-off dry-bulb temperature, then the outside air is used to meet all or part of the cooling demand.

#### Control Mode 2: Differential Dry-bulb (Dual Dry-Bulbs)

- OA temperature sensor and RA temperature sensor, MA temperature sensors are used.
- Set the DIP switch to **DIFF** (Differential) mode. See Figure 7.

- The outside-air dry-bulb temperature is compared with the return-air dry-bulb temperature. If the outside-air dry-bulb temperature is less than the return-air dry-bulb temperature, then the outside air is used to meet all or part of the cooling demand.

#### Control Mode 3 - Combination Fixed Enthalpy and Fixed Dry-bulb Control

- OA temperature and Humidity sensor, and MA temperature sensor are used.
- Set the DIP switch to **SNGL** (Single) mode. See Figure 7.
- Determine the shut-off setpoint by a combination of two parameters:
  - Enthalpy shut-off SP
  - Dry-bulb shut-off SP
- Determine if the outside air can be used for Free cool:
  - If the outside-air enthalpy is lower than the shut-off enthalpy setpoint, and the outside air dry bulb temperature is lower than the shut-off dry bulb setpoint, then the outside air can be used.

#### Control Mode 4 - Combination of Differential Enthalpy and Fixed Dry-bulb

- OA temperature and humidity sensor, and return temperature and humidity sensor, and MA temperature sensor are used.
- Set the DIP switch to **DIFF** (Differential) mode. See Figure 7.
- Determine if outside air can be used for Free cooling: If outside-air enthalpy is lower than the return air enthalpy, and the outside air dry bulb temperature is lower than the dry bulb temperature shut-off setpoint, then outside air can be used.

### Demand Control Ventilation Setpoint (DCV Only)

The controller will modulate the outside air damper based on the CO<sub>2</sub> level through the ppm value selected by the DCV SET potentiometer between the range of 500 and 1500 ppm, on the controller, as shown in Figure 7.

To disable the DCV, turn the **DCV ACT** potentiometer counter-clockwise to **0%**.

If a CO<sub>2</sub> sensor is not used with the controller, the OA damper will modulate based on the Free Cooling logic.

If the CO<sub>2</sub> sensor has failed, the damper will be controlled by the Free Cooling logic.

## Exhaust Fan Operation and Setting



Figure 8. Relay Connection.

The exhaust fan contacts are 24V dry contacts only, and are labeled **Q31** and **Q32**. An external line voltage contactor is required to operate the exhaust fan.

If the **EX FAN** potentiometer is turned fully counter-clockwise to **0%**, the **EX FAN** feature is disabled. This feature allows the exhaust fan operation to be disabled instead of being operated at constant ON.

The exhaust fan shut-off point is selected by setting the **EX FAN** potentiometer to the desired level. See Figure 7.

When the damper position reaches the exhaust fan setpoint, the exhaust fan relay will be energized. A Green exhaust fan LED indicates that the exhaust fan is **ON**.

## Cooling Stage Operation

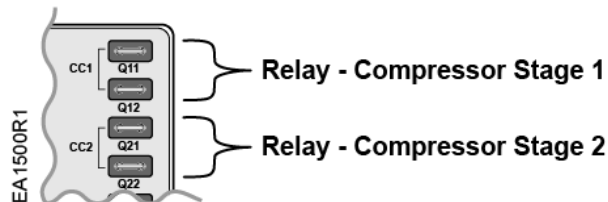


Figure 9. Cooling Stage Operation.

The Economizer Controller accepts inputs for single- and two-stage cooling inputs, and reroutes to the RTU through the relay connection CC1 and CC2.

The operation of the cooling stages is determined by the availability of Free Cooling provided by the economizer operation mode. See Table 4.

Based on the use of Free Cooling, the operating modes are as follows:

- Y1 is Stage 1 Cooling Demand.
- Y2 is Stage 2 Cooling Demand.
- Free Cooling is always the first cooling stage.
- The Cool Stage 1 call from the Commercial Thermostat (Y1) energizes the CC1 input to the Economizer Controller.
- The Cool Stage 2 call from the Commercial Thermostat (Y2) energizes the CC2 input to the Economizer Controller.

Table 4. Cooling Stage I/O Logic.

Economizer	Y1 Thermostat	Y2 Thermostat	Cooling Stage 1	Cooling Stage 2
OFF	ON	ON	ON	ON
OFF	ON	OFF	ON	OFF
OFF	OFF	OFF	OFF	OFF
ON	ON	ON	ON	OFF*
ON	ON	OFF	OFF	OFF
ON	OFF	OFF	OFF	OFF

\* If  $OAT \leq 56^{\circ}F$ , then Relay 2 is always **OFF** to disable Cooling Stage 2. Otherwise, if both stages of cooling (Y1 and Y2) are **ON** for more than 5 minutes, Y2 remains **ON**, and the OAT is greater than  $56^{\circ}F$ , then Relay 2 will energize to allow Y2 pass-through to enable Cooling Stage 2.

## Remote Positioning Potentiometer

**BSG61, 0 to 10 Vdc for POL220.00 and POL220.05**

The BSG61 Remote Positioning Potentiometer can be used to remotely set the minimum damper position and connect the RP and COM terminals of the device.



Figure 10. RP and OCC Terminals.

This input offsets the damper minimum position setting (MIN POS).

**NOTE:** The BSG61 Remote Positioning Potentiometer must be powered by an external 24 Vac power supply.

When the remote potentiometer is installed, set the MIN POS potentiometer to **0%**; the damper position will receive positioning signals from the BSG61 Remote Potentiometer.

**LVC2, 135 Ohm for POL220.10 and POL220.15**

The LVC2 Control Board can be used to remotely set the minimum damper position and connect the RP and COM terminals of the device.

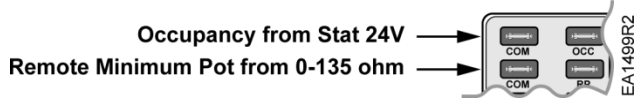


Figure 11. RP and OCC Terminals.

This input offsets the damper minimum position setting (MIN POS).

When the remote potentiometer is installed, set the MIN POS potentiometer to **0%**; the damper position will receive positioning signals from the LVC2 Control Board.




**Occupancy Input**

The Economizer Controller can input an occupancy signal from the commercial thermostat on inputs OCC and COM. If an occupancy signal is not available, order Jumper Accessory 985-960, and connect to these inputs to default the occupancy status to **ON**.

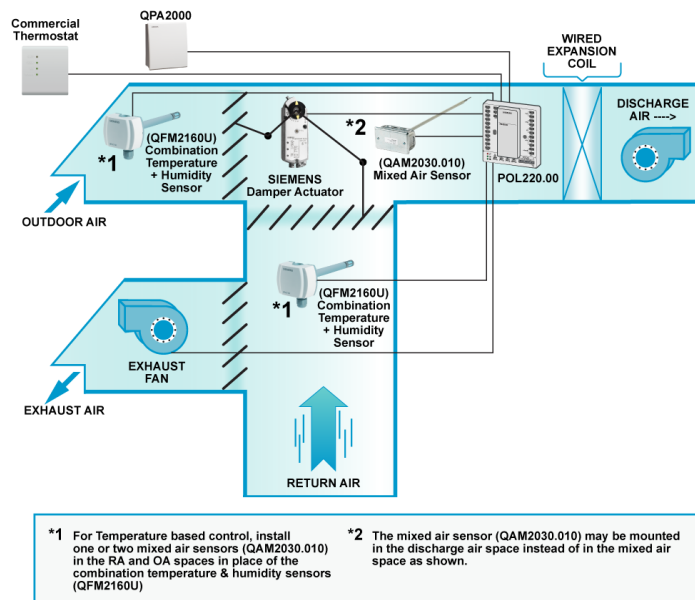
When **OFF**, the minimum damper position is **0%**.

**LED Fault Detection and Diagnostics**

Table 5. LED Pattern Summary.

Status	Free Cooling LED 	Demand Control Ventilation LED 	Exhaust Fan LED 
Commissioning mode	Red Blinking	Red Blinking	–
Power-Start-up	Orange	Orange	Green
MA/OA Sensor failure in SNGL mode	Red On	–	–
MA/OA/RA Sensor failure in DIFF mode	Red On	–	–
MIN POS potentiometer Failure	Red On	–	–
CO2 Sensor failure when DCV is enabled	–	Red On	–
DCV SET/DCT ACT potentiometer failure	–	Red On	–
DCV SET position is inappropriate	–	Fast Red Blinking	–
Brownout	Red On	Red On	–
Failure to detect valid FC Sensor mix during initialization	Red On	–	–

**Application**



\*1 For Temperature based control, install one or two mixed air sensors (QAM2030.010) in the RA and OA spaces in place of the combination temperature & humidity sensors (QFM2160U)  
 \*2 The mixed air sensor (QAM2030.010) may be mounted in the discharge air space instead of in the mixed air space as shown.

Figure 12. Connected Economizer System Components Location Example.



# Wiring Guide

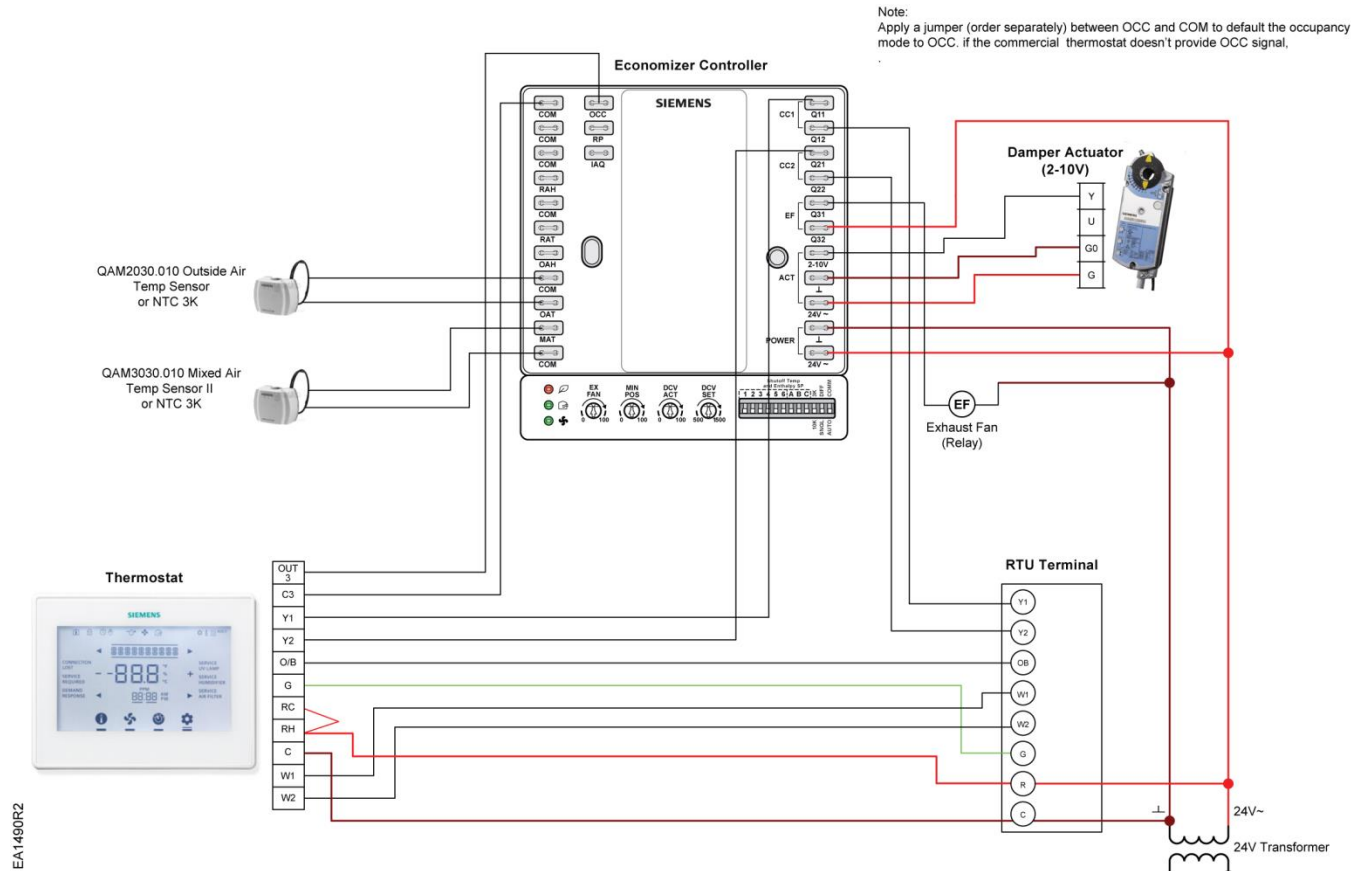
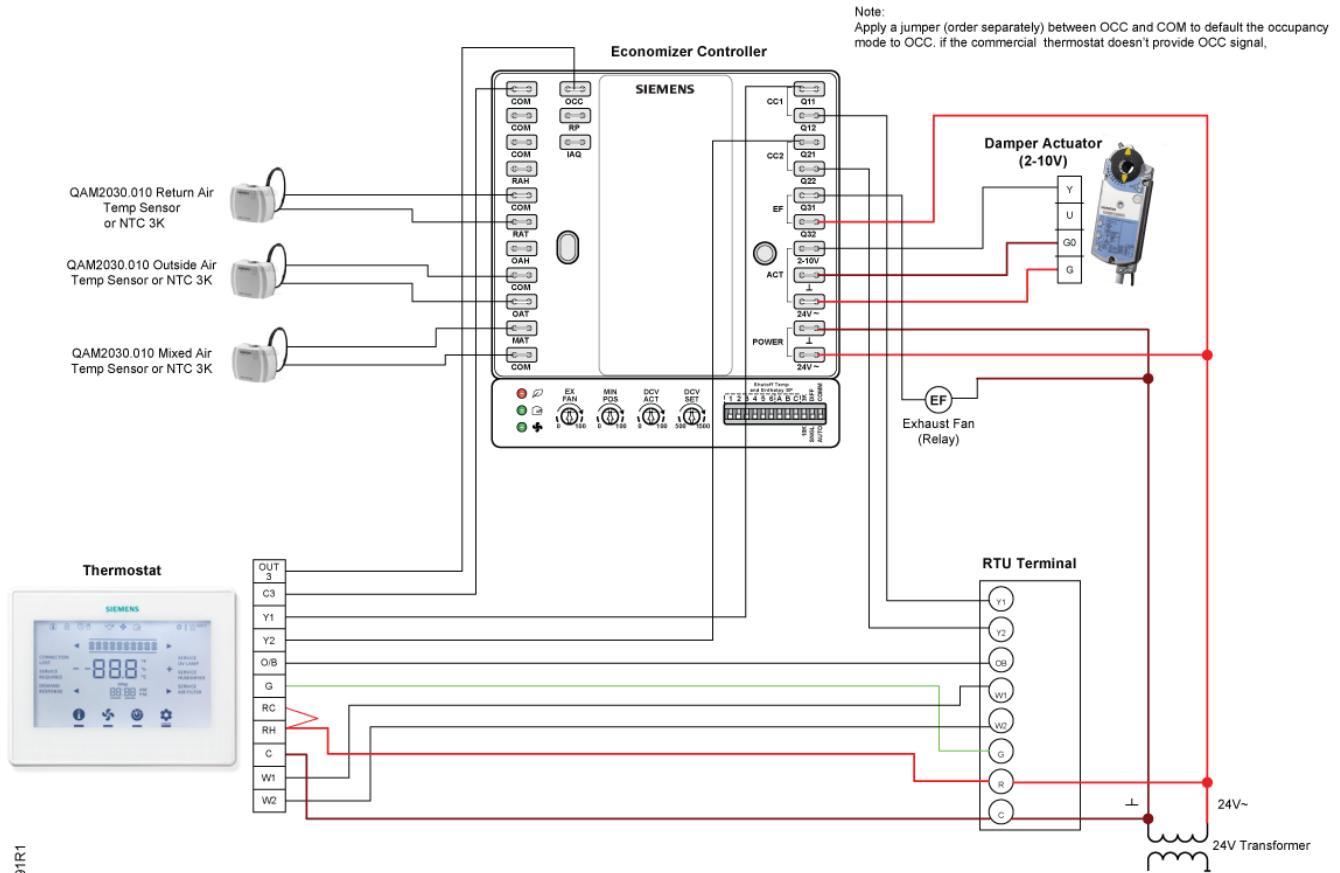


Figure 13. Two-Stage Cooling System with Single Dry-Bulb Changeover Control Mode.



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Figure 14. Two-Stage Cooling System with Dual Dry-Bulb Changeover Control Mode.

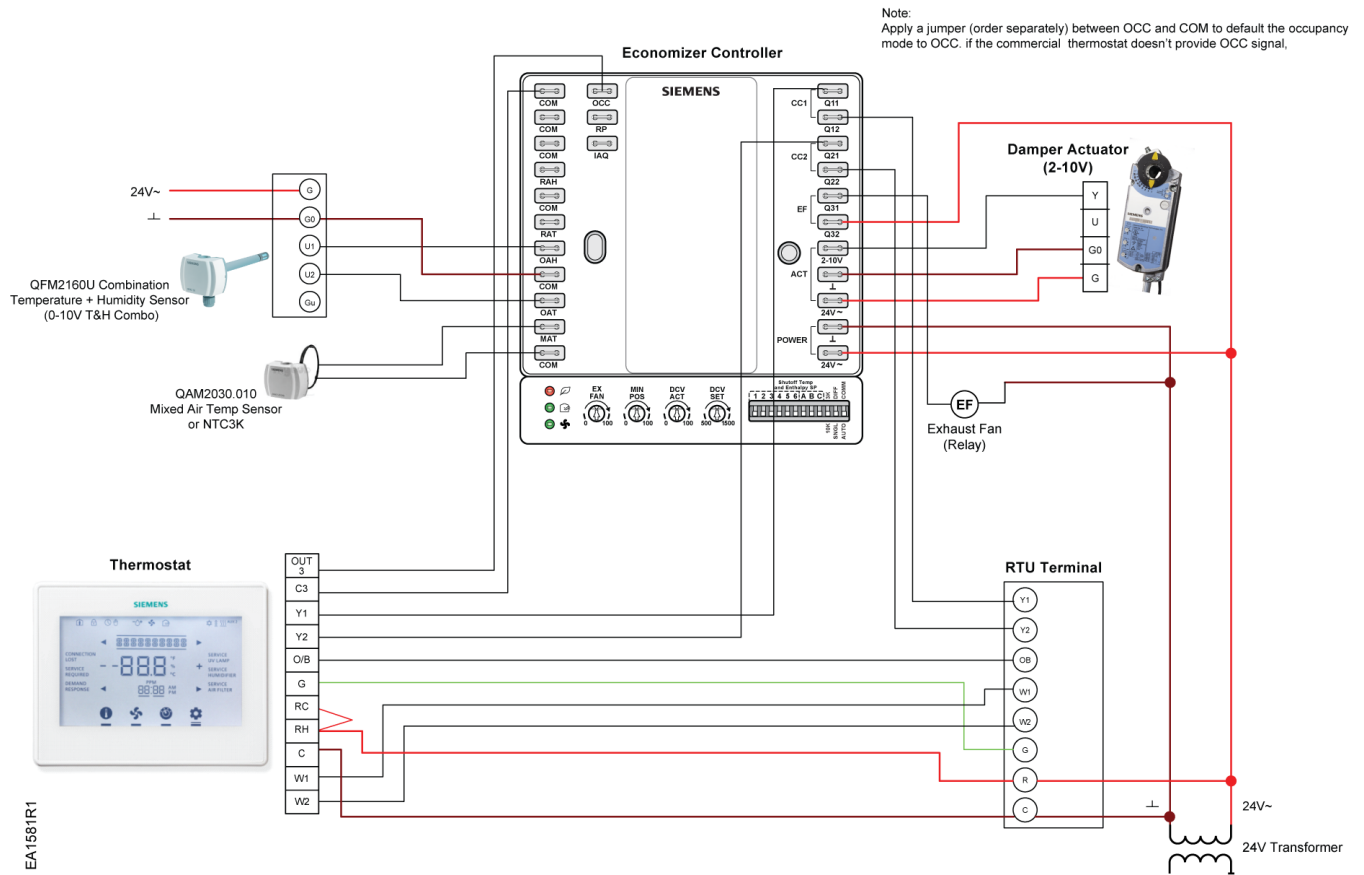


Figure 15. Two-Stage Cooling System with Single Enthalpy Changeover Control Mode.

Note:  
 Apply a jumper (order separately) between OCC and COM to default the occupancy mode to OCC. If the commercial thermostat doesn't provide OCC signal.

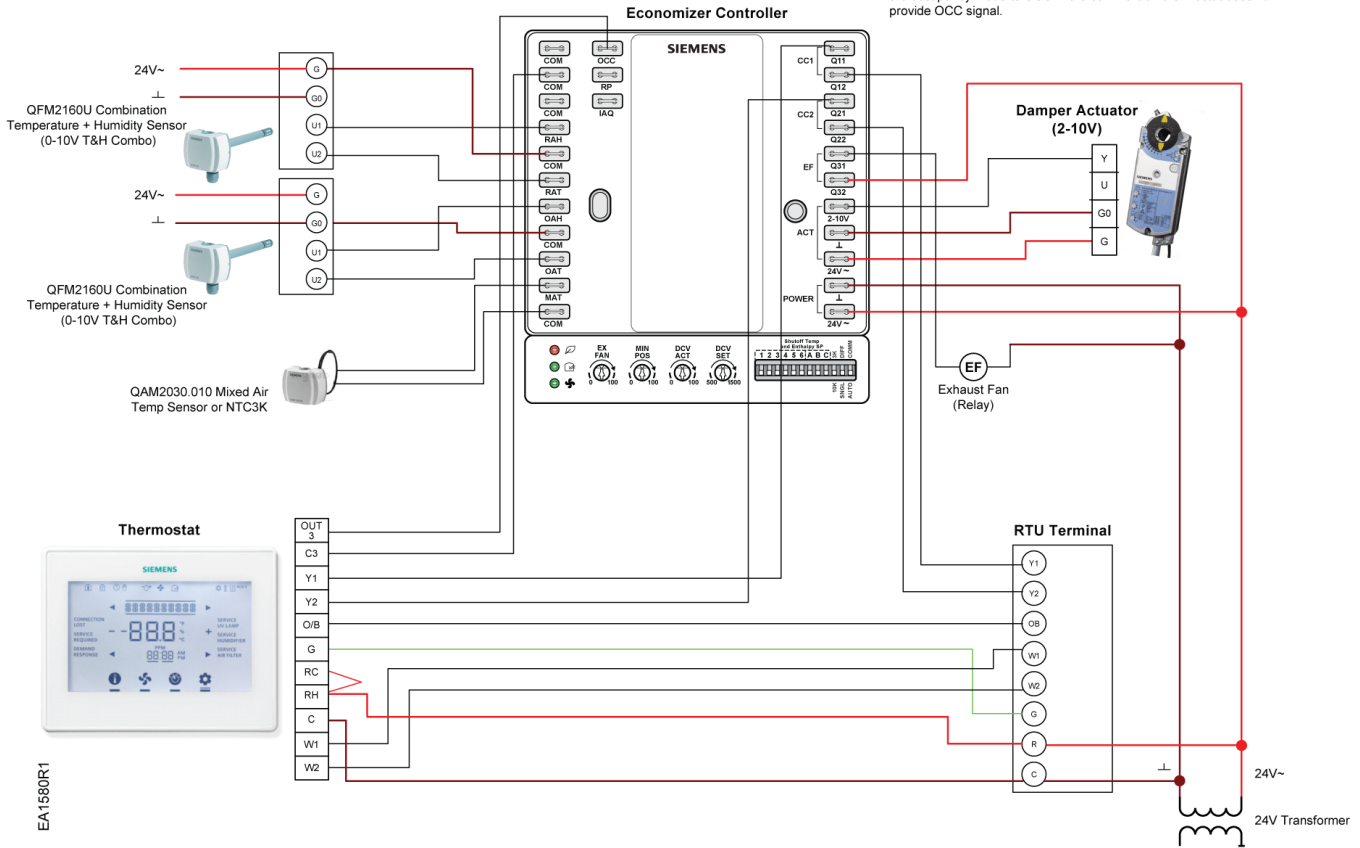
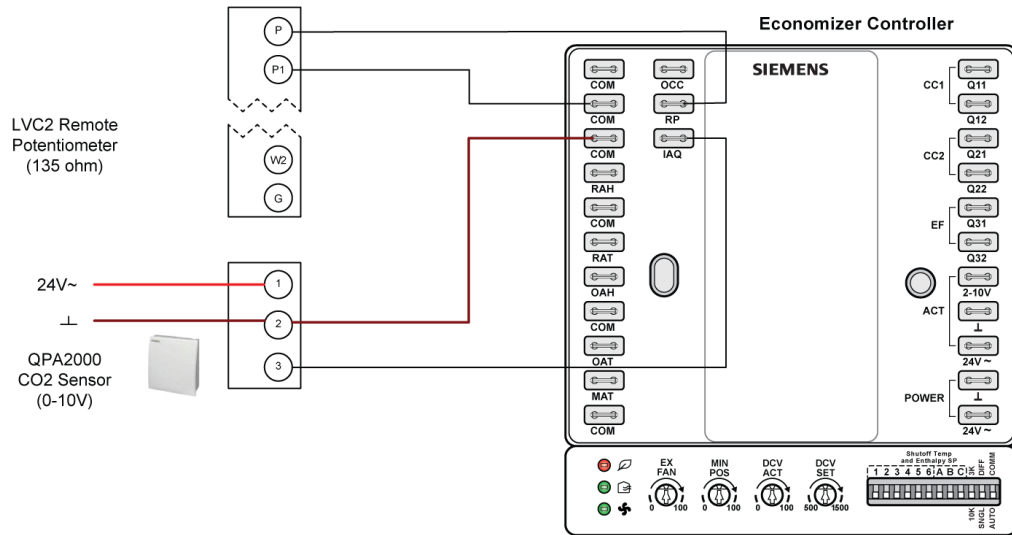


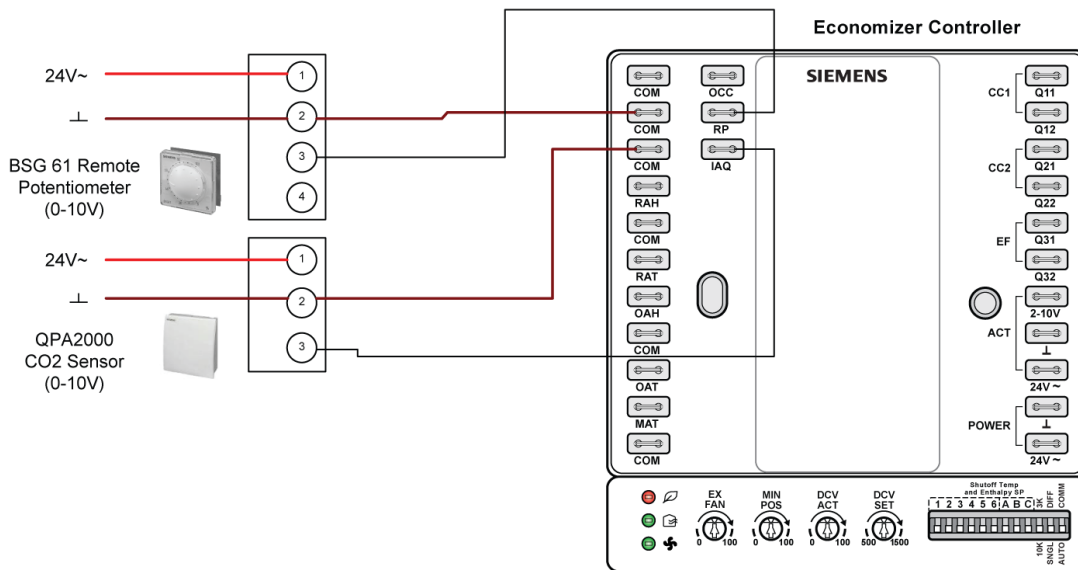
Figure 16. Two-Stage Cooling System with Dual Enthalpy Changeover Control Mode.



EA1487R2

- Note:
1. Turn the DCT ACT potentiometer to the full CCW position (0%) to disable DCV feature if DCV feature is not going to be used.
  2. Turn the MIN POS potentiometer to the full CCW position (0%) if the remote potentiometer is being used.

**Figure 17. Optional CO2 Sensor and Remote Potentiometer LVC2, 135 Ohm.**



EA1544R1

- Note:
1. Turn the DCT ACT potentiometer to the full CCW position (0%) to disable DCV feature if DCV feature is not going to be used.
  2. Turn the MIN POS potentiometer to the full CCW position (0%) if the remote potentiometer is being used.

**Figure 18. Optional CO2 Sensor and Remote Potentiometer BSG61, 0 to 10 Vdc.**

The installation is now complete.

## Dimensions

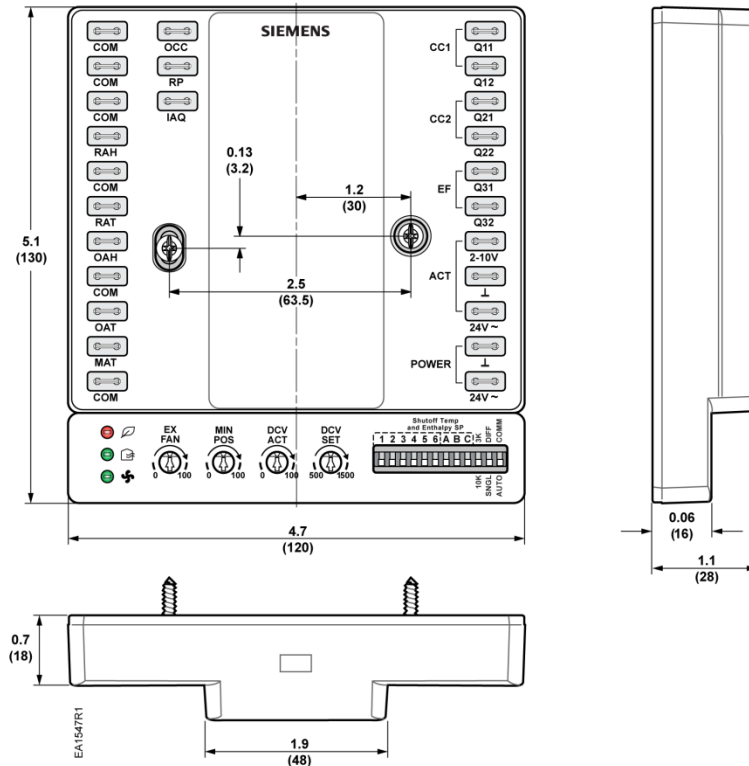


Figure 19. Dimensions in Inches (Millimeters).

## Troubleshooting



### WARNING/AVERTISSEMENT:

Do not open the actuator.  
 Ne pas ouvrir le servomoteur !

Symptom	Reason	Solution
The Economizer Controller/ Mechanical Cooling is not operating	No input power	Use a multi-meter to check if there is 24 Vac +/- 25% (18 Vac – 30 Vac) at the POWER terminals.  If there is no voltage or if the voltage is significantly low, check the transformer output voltage at the RTU. If 24 volts is not present at the transformer secondary side, check the primary line voltage to the transformer.  If the line voltage is not present at the transformer primary side, check the primary power to the RTU, fuses, circuit breaker, and so on.
	Brownout	If voltage is below 18 Volts, the Economizer Controller may be in Brownout Protection mode. This mode disables all of the relay outputs.  When the power is back to 18 Vac or higher, the Economizer Controller and RTU will operate normally.
	Y1/Y2 signal is missing from the thermostat	Mechanical Cooling doesn't run until there is cooling demand (Y1/Y2 Active). Check the wiring from CC1, Q11 and CC2, Q21 terminals to the commercial thermostat. 24V should present between CC1.Q11/CC2.Q21 and COM.
	24 Vac~ and 24 Vac ⊥ are incorrectly wired	24 Vac power supply has polarity when all devices are powered by the same 24 Vac transformer; reversing polarity may cause a short circuit that can damage the system.  Follow the transformer polarity mark; check the wiring of 24V~ (or G or 24V+) and ensure that they are tied to the same polar of 24 Vac power supply; while checking the wiring of ⊥ (or G0 or 24V- or COM) and ensure that they are all tied to another polar of 24 Vac power supply.

Symptom	Reason	Solution
Free Cooling LED is solid RED	Mixed Air (MA) sensor error	Check the MA sensor, it must be either a 10K Type II NTC, or 3K NTC sensor.
	Outside Air (OA)/Return Air (RA) sensor error	Check the OA sensor. If in DIFF mode, check the RA sensor too. The following sensor signals are valid: <ul style="list-style-type: none"> <li>• 10K Type II NTC temperature</li> <li>• 3K NTC temperature</li> <li>• 0–10V temperature and 0–10V humidity</li> <li>• 10K Type II NTC temperature and 0-10V humidity</li> <li>• 3K NTC temperature and 0-10V humidity</li> </ul> In Differential (DIFF) mode, OA and RA sensors must be of the same sensor type.
	MIN POS potentiometer has been damaged by excessive force	Check if <b>MIN POS</b> potentiometer has been damaged; if so, replace the Economizer Controller.
	Sensor Auto Detection error	Ensure that the sensors have been correctly wired prior to controller power-up. Power-up the active sensors first, or power-up the controller and the active sensors simultaneously. Otherwise, the controller may not capture the sensor type in time.  Don't change the DIP switch settings (10K/3K or SINGL/DIFF) when the controller is running. The controller must be rebooted after any changes to the sensor or sensor setting for the new sensor configuration to be implemented.
DCV LED is solid RED	CO2 sensor error	Check the CO2 sensor signal; the valid signal must be 0-10V.
	<b>DCV ACT</b> or <b>DCT SET</b> potentiometer has been damaged by excessive force	Check if <b>DCV ACT</b> or <b>DCT SET</b> potentiometer has been damaged by excessive force; if so, replace the Economizer Controller.
	<b>DCV ACT</b> is not being turned to the <b>0</b> position	The DCV feature should not be enabled, but it was not turned off. Adjust the DCV ACT potentiometer to full CCW position if you are not using DCV.
Exhaust Fan LED is not working	The Ex FAN potentiometer hasn't been set up correctly, or has been damaged by excessive force.	In its full CCW position, the <b>EX FAN</b> control is disabled; therefore, the Exhaust Fan LED is OFF, and the EF relay is inactive. To use this feature, the <b>EX FAN</b> potentiometer must be turned to a non-zero position.  If the <b>EX FAN</b> control is enabled, but the Exhaust Fan doesn't work correctly, check if the <b>EX FAN</b> potentiometer has been damaged. If so, replace the Economizer Controller.
Both Free Cooling and DCV red LEDs are blinking	The Economizer Controller is set to COMM mode	The Economizer Controller is set to COMM mode, and must be set back to AUTO mode to resume normal operation.
DCV red LED is blinking	The DCV feature is enabled, but the <b>DCV ACT</b> potentiometer is improperly set.	Ensure that the DCV ACT is greater than the MIN POS setting.
The controller has no alarm, but the Free Cooling LED never turns on even though the OA seems to be suitable for Free Cooling	Shut-off SP setting error	The shut-off temperature and/or enthalpy setpoint is incorrectly set up. Consult an HVAC professional to set up the shut-off setpoint correctly.
	OA temp is too low	The OAT is too low; therefore, there is no cooling demand. This could possibly enable anti-freeze protection.
	OA temp is too high or too humid	In DIFF mode, even though OA temperature is lower than RA temperature, if both OA and RA temperatures exceed the high limit, Free Cooling will turn off.  In Differential Enthalpy control mode, even though OA enthalpy is lower than RA enthalpy, if both OA and RA enthalpy exceed the high limit, Free Cooling will turn off.

- Link to EULA and OSS Read Me File:  
[http://w3.usa.siemens.com/buildingtechnologies/us/en/legal\\_information/Pages/eula-and-oss.aspx](http://w3.usa.siemens.com/buildingtechnologies/us/en/legal_information/Pages/eula-and-oss.aspx)

## FCC NOTE:

This device complies with Part 15 of the FCC Rules. Changes or modifications not expressly approved by Siemens Industry Inc. could void the user's authority to operate the equipment.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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