Troubleshooting Autopilot Controllers

PLEASE READ ENTIRE INSTRUCTIONS (FOR YOUR SPECIFIC CONTROLLER) BEFORE ATTEMPTING TO TROUBLESHOOT. JUMPING AHEAD WILL RESULT IN IMPROPER TESTING.

Summary of features and applications:

APCECOTH: Controls temp, humidity, and CO2 with digital accuracy, as well as an outlet that comes on during Lights Off (Night output). Ideal for sealed rooms with air cooled lights and an AC unit, although has settings to work with non-sealed rooms as well.

APCETHD: Controls temp and humidity with digital accuracy. The CO2 outlet is a recycle timer, so the proper on and off times must be calculated dependent on room size etc. Ideal for sealed rooms with air cooled lights and an AC unit, although has settings to work with non-sealed rooms as well.

APCETHA: Controls temp and humidity with the accuracy of a knob (less than digital). The CO2 outlet comes on whenever the grow lights are on, and the Cooling outlet is **not** on. Ideal for non-sealed room, with an exhaust fan controlling temp, although can work with sealed rooms as well.

APCET: Analog thermostat, with separate Day and Night temp setting knobs.

APCECOD: Controls CO2 with digital accuracy. More customizable CO2 control than the APCECOTH, including the capability of increasing or decreasing CO2. Ideal for a sealed room that already has a controlled environment (temp/humidity), although will work with a non-sealed room as well.

APCECO: Analog version of the APCECOD. Current CO2 level displayed via blinking lights.

APCTMDT: Controls lights with an internal clock, has a recycle timer, and a High Temp Shutoff, all controlled with digital accuracy. Night output comes on when lights are off.

APCTART: Analog Recycle timer, separate ON and OFF time knobs. For example, use for controlling a pump to come on for 5 minutes every 30 min, or 30 seconds every 10 minutes, etc. No internal clock, turns on and off based on the ON/OFF time settings, and whether on Daytime mode, Nighttime mode, or 24 hour mode.

Troubleshooting Digital Autopilot Controllers

Digital Controllers: APCETHD, APCECOTH, APCECOD, APCTMDT

1) **Check Screen**: Plug controller into outlet, flip breaker switch at bottom of controller to ON position. LED screen should light up, starting with an "8" moving across the screen.

This will allow you to make sure there aren't any dead spots.
Here is an example of a dead spot:

←This should say "50.5 rH", but there is a dead spot in the 0 digit. This dead spot would make the "8" during startup look like a "6" or a "G".

2) **Testing buttons**: Hold "↑" button until KEY_ 0 is displayed. Begin pressing each button in sequence, they should display the corresponding numbers below (screen will display "KEY_1", "KEY_2", etc.). If a button isn't working, it won't display its number. Don't forget the arrow buttons are numbered too. Note the APCECOD is missing some of these buttons, but the numbers will still follow the diagram below.
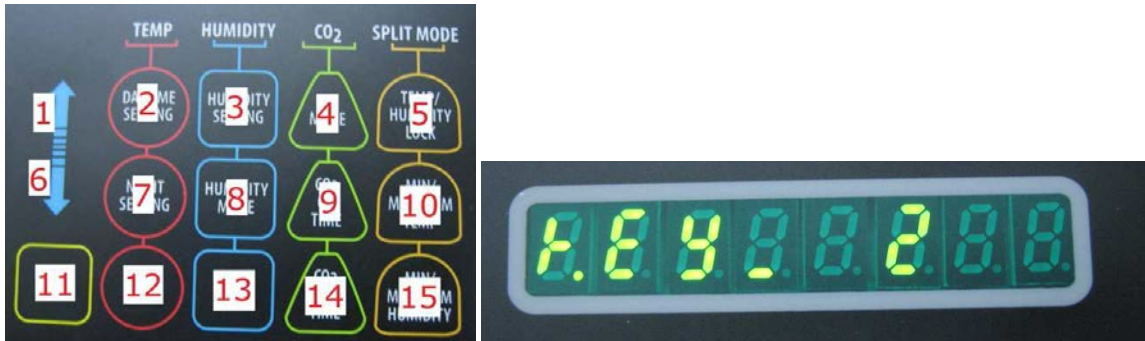
3) **Check photocell** by covering up the photocell on the sensor with your hand or thumb (make sure to fully cover it). After 30 seconds or so, the small LED next to "DAYTIME MODE" should turn OFF.

Photocell on sensor

Flashing "Status" light on CO2 sensor means normal operation.

If DAYTIME MODE doesn't come on 30 seconds after startup, make sure it is getting plenty of light on it, and you can adjust the sensitivity by holding the "↓" button until "PHOtO_ _9" appears. 9 is highest sensitivity, and is the factory setting.

4) **Checking Temp, Humidity, CO2 ppm**:
    a. Examples of readings: Temp (F), Humidity (rH), and CO2 (PP).
    NOTE: CO2 sensor needs to heat up after startup, screen will read "CO2_HEAT" during warm up.

    NOTE: Different models monitor different parameters, as follows:
    APCECOTH: reads Temp, Humidity, & CO2
    APCECOD: reads **only** CO2
    APCETHD: reads **only** Temp & Humidity
    APCTMDT: reads **only** Temp *
    b. The display will cycle through these readings*. Make sure the Temp & Humidity readings are correct by comparing them with *at least two* separate, calibrated monitors.
    Temp: within +/- 3 F
    Humidity: within +/- 10% RH
    c. To check CO2 calibration, take the controller and sensor outside. Wait 20 minutes for sensor to stabilize, then the reading should be within 380-475ppm (CO2 levels outside are fairly constant). ***NOTE: The sensor is factory calibrated and doesn't need calibration for at least the first 2 years.*** A common mistake is to calibrate right out of the box.
    (Please note that doing a Factory Reset **does NOT** affect the CO2 calibration)
    d. *The Master Digital Timer will only show the Temp reading when the "Press for Temp" button is held down.

 *This button is only on the APCTMDT, Master Digital Timer.

5) **Checking timer / clock**:
    a. APCTMDT: has clock, and cycle timer.
    APCETHD: has cycle timer.
    b. Clock: Set to current time, then after five minutes, using stop watch or separate digital clock, compare the time.
    c. Cycle Timer: Set ON time for 10 sec ("00:00:10 N"), and OFF time for 10 sec ("00:00:10 F"). Outlet should come on for 10 sec, then off for 10 sec, screen will show a countdown.

6) **Testing Relays**:
    a. Plug small devices into each outlet (such as small fans, etc.), in order to test power at the outlet.
    b. Hold "↓" and "Enter/Reset" until "F.Set" is displayed. Immediately when you see this, release the buttons then hold "Enter/Reset" again. The controller will go into factory reset. Each outlet should come on in sequence, one at a time.

Digital AP Controller Error Codes:

"Err.EEP" -   Error with Memory Chip. Return/RMA entire unit and sensor.

"Err.tMP" or "Err.tEP" -   Error with Temperature sensor. Make sure plug is fully inserted, and connection isn't damaged. Return/RMA entire unit and sensor.

"Err.Hul" -   Error with Humidity sensor. Make sure plug is fully inserted, and connection isn't damaged. Return/RMA entire unit and sensor.

"Err.SEn" -   Error with sensor probe. Make sure plug is fully inserted, and connection isn't damaged. Return/RMA entire unit and sensor.

"Err.Lig" -   Photocell sensor. Return/RMA entire unit and sensor.

"Err.rtc" -   Real time clock error (APCTMDT only). Return/RMA entire unit and sensor.

Troubleshooting Analog CO2 Controller APCECO

1) Plug the controller into a power outlet (vertical), and plug a small fan (or other small 120V device) into the controller.
2) Change "SET POINT" knob to 1500 ppm and "DEADBAND" knob to 100 ppm.
3) **Test photocell,** by covering up the photocell on sensor face.

> The Daytime light on controller face should turn off after about 20 seconds. The "RELAY ON" light should also turn off. If the Daytime light doesn't come on 1 minute or so after startup, make sure the photocell is receiving enough light.

4) **Test CO2 ppm level,** by counting the flashing lights. Each time the red lights blinks (labeled "X1K") represents 1000 ppm. Each time the yellow light blinks (labeled "X100") represents 100 ppm. For example, if the red light flashes once and the yellow flashes four times, that means the sensor is reading 1400 ppm in that particular area. Or, if the red light doesn't flash, and the yellow light flashes five times, that means the sensor is reading 500 ppm.

   To check the CO2 calibration, take the controller and sensor outside. After 10 minutes, the reading should be within 300-500 ppm. **Do not breath on the sensor during this process!** *NOTE: the CO2 sensor is factory calibrated and doesn't need calibration for at least the first 2 years.* A common mistake is to calibrate a brand new unit.

   However, if not within 300-500 ppm, calibrate the unit: While still outside, turn SETPOINT knob fully counterclockwise and the DEADBAND knob fully clockwise. The red light will turn on while it goes into **Calibration mode. Again, do not breathe on the sensor during this process!** After 10 minutes the yellow light will turn on, indicating calibration is finished.

5) **Test the relay,** by turning the SETPOINT knob to 2500 ppm. The RELAY ON light should turn on, and the small fan plugged into the controller should turn on. Make sure DAYTIME light is on and PHOTOCELL is receiving enough light (the controller only releases CO2 during Lights ON).

Troubleshooting Analog Temp Controller APCET

1. Plug controller into 120V, 60Hz power outlet. Unit should be vertical, without a heating source nearby.
2. **Test photocell** by covering up the PHOTOCELL with your hand or thumb (make sure to fully cover it). After 20 seconds or so, the small LED next to "DAYTIME MODE" should turn OFF.

   If DAYTIME MODE doesn't come on 30 seconds after startup, make sure it is getting plenty of light.
3. **Testing Relay**
   While DAYTIME light is on (photocell is receiving light), and in COOL mode, turn SET DAY knob fully counterclockwise. The OUTPUT ON light should turn on, confirm the outlet has power (plug in small device, fan etc). Then turn SET DAY knob fully clockwise and relay should shut off power to the outlet.
4. **Testing Temp Sensor**
   While DAYTIME light is on (photocell is receiving light), and in COOL mode, turn SET DAY knob fully counterclockwise (same as above). The OUTPUT ON light will turn on. Slowly turn the knob clockwise until the OUTPUT ON light turns off. Then, turn it slowly counterclockwise until OUTPUT ON light turns on again. This temperature is the current room temperature.
   NOTE: Current room temperature can be off by several degrees when comparing to another thermometer. For increased accuracy use Digital Environmental Controller.

COOL or HEAT mode

Turn knobs, wait for 5 sec, lights will blink. Then return knob to desired set point.

COOL: ↺ ↺

HEAT: ↻ ↻

Error Codes:

Abnormal Temperature: Red LED blinks twice every second

Max. Amperage Exceeded: Red and Yellow LED blink alternately

Troubleshooting Analog Temp/RH Controller APCETHA

1) **Test photocell** by covering up the photocell on the sensor with your hand or thumb (make sure to fully cover it). After 30 seconds or so, the small LED next to "DAYTIME MODE" should turn OFF, and NIGHT OUTPUT should come on.

Photocell on sensor
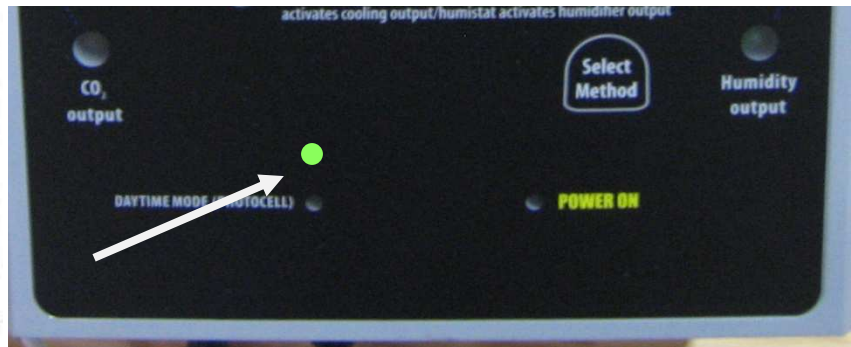
Daytime mode indicator light

If DAYTIME MODE doesn't come on 30 seconds after startup, make sure it is getting plenty of light on it.

2) **Testing Temperature sensor**:

Turn on the unit and allow the sensors to stabilize for five minutes.

While on Method 1, slowly turn the knob clockwise until the Cooling output light turns off (Fig. 1). Then, turn it slowly counterclockwise until Cooling output light turns on again (Fig. 2). This temperature is the current room temperature.

Make sure the Temp reading is correct by comparing it with *at least two* separate, calibrated monitors. Temp should be within +/- 5F.

Fig. 1   Fig. 2

3) **Testing Humidity Sensor**:

Turn on the unit and allow the sensors to stabilize for five minutes.

This test is the same as the Temp test above, but with the Humidity knob.

While on Method 1, slowly turn the knob clockwise until the Humidity output light turns off. Then, turn it slowly counterclockwise until Humidity output light turns on again. This reading is the current Relative Humidity in the room.

Make sure the Humidity reading is correct by comparing it with *at least two* separate, calibrated monitors. Humidity should be within +/- 7%RH.

4) **Testing Relays:**

Plug small devices (fan etc.) into each outlet.

While on Method 1, turn Temp knob and Humidity knob fully counterclockwise. The Cooling output and Humidity output should turn on, confirm that these outlets have power.

Turn the Temp knob fully clockwise, the Cooling output should turn off, and the CO2 output should turn on. Confirm CO2 outlet has power.

Cover up photocell for 30 sec, until DAYTIME MODE light turns OFF. The Night output should turn on. Continue covering the photocell, and confirm the Night outlet has power.

5) **Test button:**

To make sure the "Select Method" button works, press it to cycle through Methods 1, 2, and 3.
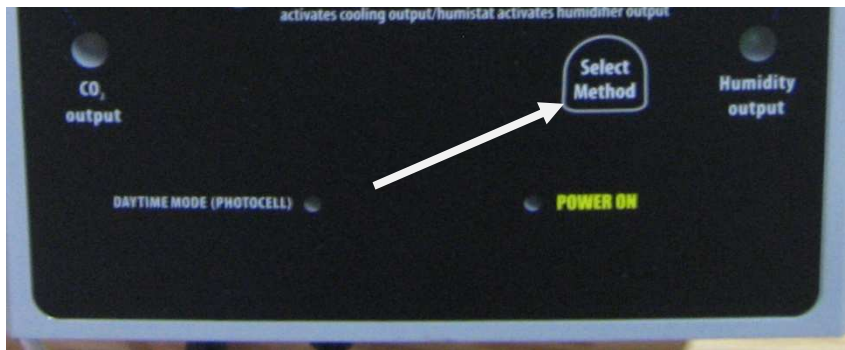
Method explanations:

Method 1: Equivalent to "Split" mode on the APCETHD, Temp and Humidity outlets turn on **independently**. This is the most common method used, for sealed rooms with AC and dehumidifier.

Method 2: Equivalent to "Connect" mode on the APCETHD, Temp and Humidity outlets turn on **dependently**. This is used when an <u>exhaust fan</u> is functioning as the Cooling <u>and</u> Dehumidifying unit.

Method 3: Like "Split" mode, but for use with an AC unit and <u>humidifier</u>, for <u>dry environments</u>.

Troubleshooting Analog Cycle Timer APCTART

1. Plug controller into 120V, 60Hz power outlet. Unit should be vertical, without a heating source nearby.
2. **Test photocell** by covering up the PHOTOCELL with your hand or thumb (make sure to fully cover it). After 20 seconds or so, the LED next to "DAYTIME MODE" should turn OFF.

   If DAYTIME MODE doesn't come on 30 seconds after startup, make sure it is getting plenty of light.
3. **Testing Cycle Time and Relay**
   While on 24 Hour mode (Day – Red, and Night – Yellow, lights are on), set both knobs to 15 sec.

   Plug a small device into the outlet. When the OUTPUT ON light (green LED) comes on, the outlet should have power.

   The accuracy of the fixed scale will vary, especially at the lower time settings. If greater accuracy is needed, use a stopwatch to measure the ON and OFF times, and adjust the knobs to get closer to the desired time. For example, while set on 15 sec, the outlet may turn on for 40 sec. Slightly adjust the knob down, and measure again until 15 sec is reached.

DAY/NIGHT/24 HR Modes

Turn knobs, wait for 5 sec, lights will blink. Then return knob to desired set point.

DAY: ⤾ ⤾

NIGHT: ⤿ ⤿

24 HR: ⤾ ⤾

Error Codes:

Max. Amperage Exceeded: Red and Yellow LED blink alternately