Aprilaire Dehumidifier Troubleshooting Manual
Models 1830 & 1850

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Instruments you will need to complete troubleshooting:

1. Digital Multi-Meter (DMM) capability of measuring
    - AC and DC voltage
    - Resistance
    - Capacitance

Minimum tools needed to complete troubleshooting:

1. Torx T20 and T25 screwdrivers or driver bits
2. Small (terminal) flat head screwdriver
3. Needle nose pliers
4. Level (to troubleshoot water leak claims)

WARNING: 120-volts can cause serious injury or death. Do not touch live, exposed 120-volt wiring or wiring terminals.

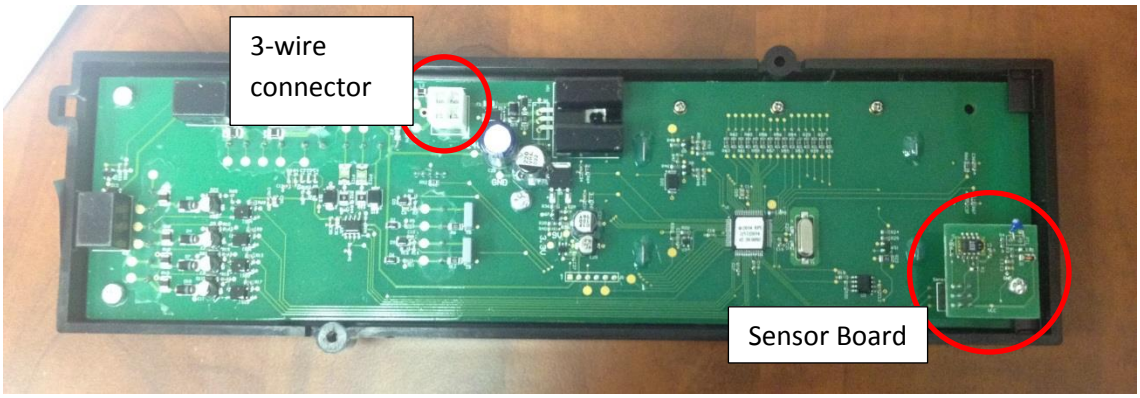
Troubleshooting must be performed by a qualified HVAC service person trained to take the proper safety precautions when performing service on 120-volt equipment.

Troubleshooting Diagnostic Codes

The display on the dehumidifier will show the diagnostic code and "SERVICE REQUIRED" when the unit is turned ON. If more than one code is detected, they are displayed consecutively:

E1 - **Internal RH/Temperature Sensor open or shorted:** The User Interface Assembly is not receiving a good signal from the temperature/RH sensor.

1. Turn off power to the dehumidifier using the ON/OFF toggle switch. Remove the User Interface Assembly by first removing the four screws securing it to the housing. Carefully pull the User Interface Assembly away from the housing and disconnect the three wire cable from the back of the User Interface Assembly to be able to pull the User Interface Assembly totally away from the dehumidifier. The small circuit board screwed to the back of the User Interface Assembly is the sensor board. Check the connection between the sensor board and control board. If connection okay, replace the RH Sensor board (5460).



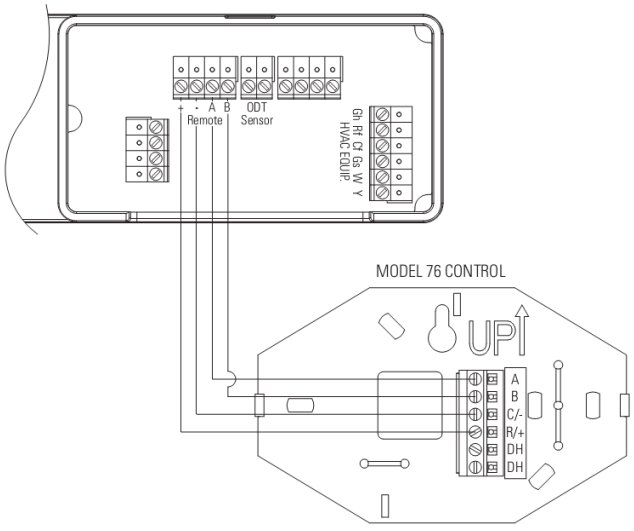
E2 – High Refrigeration Pressure: The temperature of the discharge line exceeds 190°F. This is self-correcting unless it occurs for five consecutive compressor starts. This is usually caused by the inlet air temperature being too high (i.e. greater than 100°F), or very low airflow through the dehumidifier.

1. Turn the ON/OFF toggle switch OFF to reset the diagnostic code.
2. If the fan is not working, see "Fan does not Function" section on page 15.
3. Verify backflow damper swings freely and ductwork is not blocked or restricted.
4. Consider the following for the application:
    1. If ducting to the HVAC system, make sure the inlet to the dehumidifier is not ducted to the supply side of the HVAC system.
    2. Attic installations – Inspect the ductwork attached to the inlet of the dehumidifier for leaks if the ambient temperature is high.
    3. Ventilation applications – High temperatures may be offset by mixing air from the home into the dehumidifier.

E3 – Model 76 Remote Control Communication Loss: A Model 76 control, wired to the Remote terminals of the User Interface Assembly, had communication, but has now stopped communicating.

> **Note**: For E3 to be displayed, the method of control had to have been set up for a Remote control. This is done by selecting Remote Enabled in the set-up menu.

1. Use the color of the wire connected to the A, B, + and – (on the Model 76, the "+" and "-" terminals are labeled "R/+" and "C/-") terminals on both the base of the Model 76 and the dehumidifier User Interface Assembly to verify that they are wired correctly. Make sure the terminal screws on both the User Interface Assembly and the Model 76 base are tight.
2. Remove the Remote terminal block from the User Interface Assembly and measure the DC voltage across the + and – pins on the User Interface Assembly – this should read approximately 35 V DC (±3V for voltage variation and load). If there is 0 volts, the User Interface Assembly (5445) must be replaced. If in range, reinstall the Remote terminal block.
3. If connections are correct and secure, turn off the dehumidifier and remove the Model 76 control. Use a short section of 4-wire cable to reconnect the Model 76 to the User Interface Assembly to see if there is a problem with the existing wire. Turn the dehumidifier back on. If the "E3" code continues, the Model 76 must be replaced, if the code is gone, then the wire between the Model 76 and the dehumidifier must be replaced.



E4 – Insufficient Capacity: The temperature of the suction line, as sensed by the low temp sensor (Frost Sensor), has not dropped at least 5°F in 20 minutes from the temperature it was when the compressor started. One reason this would happen is if the dehumidifier went from a cold condition to a warm condition very quickly (e.g. coming off a cold truck into a warm home) AND there was little airflow through the unit prior to the compressor starting. If this is

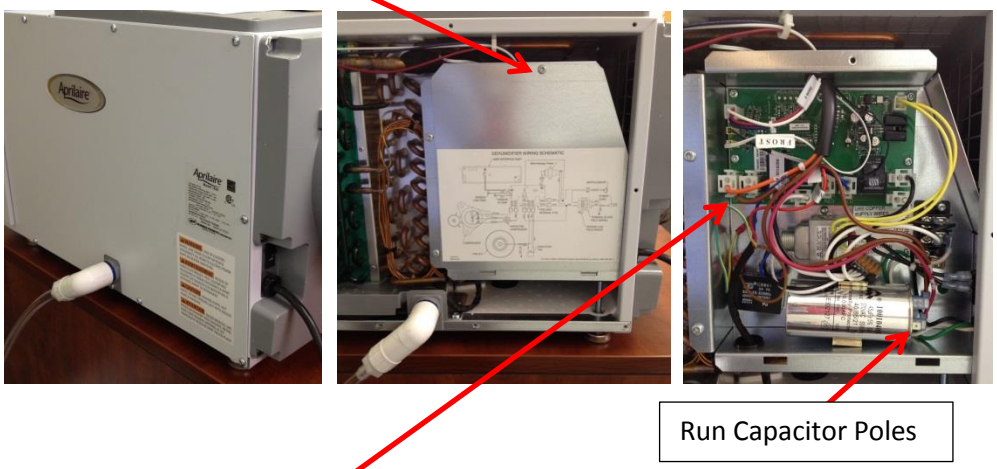
possibly the case, then allow the dehumidifier to acclimate to the conditions for one hour before restarting.

Other reasons this code would be displayed is if the compressor is not running or if the refrigeration system is not operating properly.

1. Use the ON/OFF button on the User Interface Assembly to turn the mode to OFF, then flip the ON/OFF toggle switch to OFF, to reset the diagnostic code.
2. Turn the ON/OFF toggle switch back ON. With the mode still OFF, Press and hold the MODE button and ON/OFF button to enter the Installer Test Mode.
3. The fan will run for 3 minutes with the display showing "AIR SAMPLING" and "TEST", and the inlet air RH. After three minutes, the "DEHUMIDIFYING" will replace "AIR SAMPLING" on the display and the compressor will start – you should be able to hear this. The compressor will run for one minute, and then the display will show "TEST DONE" and return to the OFF mode**.**

   If the compressor didn't start (go to step 4), there is an electrical issue to address. **If the compressor did start (go to step 5)**, then you will need to verify that the refrigeration system is working properly.

4. **If the compressor doesn't start**
   a. Turn the ON/OFF toggle switch to OFF.
   b. Remove the panel on the side of the dehumidifier where the drain tube comes out, and then remove the insulation piece. Inside the dehumidifier, remove the electrical box cover.



   c. Verify that the brown and orange wires are connected to the Internal Control board. Verify that two brown wires are connected to one pole of the run capacitor and one red wire is connected to the other pole. Give each wire a light tug to make sure all connections are sound.
      - **If any of the wires were disconnected**, place the side panel back on (do not secure with screws yet), and repeat steps 2 and 3 above. If it starts, go to step 5

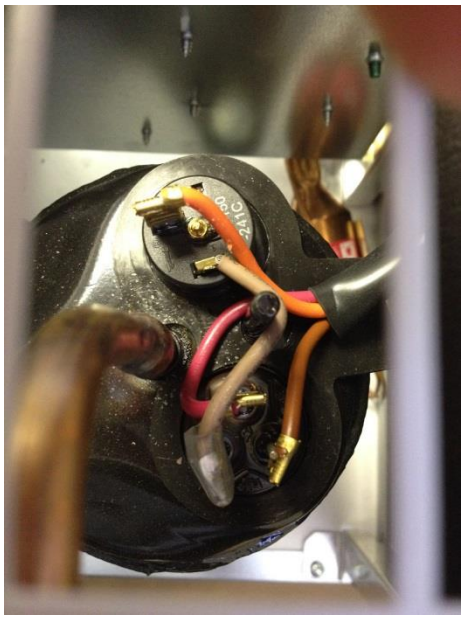
to verify the performance of the refrigeration system before leaving. If it still does not start, continue to the next step (d.).

- **If none were disconnected**, continue to the next step (d.).

d. Turn the ON/OFF toggle switch back ON. With the side panel still off, stay clear of the fan motor and repeat steps 2 and 3 above.

e. **If the COMP LED is on but the compressor is not**, remove the locking tab connectors from the compressor BRN and ORG terminals and measure the voltage at the pins on the Internal Control board:

- **If the voltage is 120VAC** (nominal) then the problem lies with the run capacitor, the connections at the compressor or the current limiting switch under the compressor cap. Turn the ON/OFF toggle switch OFF and unplug the unit.
  - Disconnect the wires connected to the run capacitor and the orange wire connected to the Internal Control board. Measure the capacitance of the run capacitor – it should be 45 microfarads ± 5%. If not, replace the capacitor (5458).
  - Measure the resistance across the compressor harness wires. Actual measurements may be a little different, but should be approximately: Orange – Red: 1.1Ω, Orange – Brown: 1.9Ω, Red – Brown: 2.7Ω. If the Orange-Red **and** Orange-Brown measurements are open (infinite) but the Red-Brown measurement is normal, then the compressor overload switch (5547 70pt / 5548 95pt) under the compressor cap needs to be replaced. If just one is open, then it is likely a connection at the compressor has come loose – remove the compressor cap and check the terminal connections.



- **If the voltage is 0 VAC**, replace the Internal Control board (5444).

5. **If the compressor does start,** there are three reasons why an E4 diagnostic code would appear: the system has lost refrigerant, sudden changes to the environment or turning on too soon after having turned off.

    a. If applicable, disconnect the duct from the discharge of the dehumidifier. Verify that the flap damper on the outlet of the dehumidifier opens/closes freely.

    b. Verify that there is not a lengthy amount of ductwork (more than 50 feet) attached to the inlet side, that the ductwork is free of obstructions and kinks and that the filter is clean – remove the filter for this test if dirty.

    c. Ensure all of the dehumidifier panels are in place and assembled with screws. DO NOT REMOVE PANELS DURING THIS TEST.

    d. Turn the ON/OFF toggle switch ON and have the mode set to OFF.

    IMPORTANT: MAKE SURE THE AIR ENTERING THE DEHUMIDIFIER IS WARMER THAN 50°F AND COOLER THAN 100°F TO GET USEFUL INFORMATION

    e. Turn the mode to ON using the ON/OFF button on the User interface Assembly. Lower the RH setting to as low as it will go. The fan will run for three minutes and then the compressor will turn on.

    f. After two minutes (one minute before the compressor turns on), press and hold the MODE and UP buttons for three seconds then release. Use the UP or DOWN buttons to scroll through the inlet air temperature (display shows value and "AIR SAMPLING"), inlet air RH (display shows value and "% RH") and suction line temperature (display shows value only). The inlet air temperature and suction line temperature should be within a few degrees of each other.

    g. Perform the same series of button presses again after 15 minutes of compressor run time to determine if the suction line temperature has dropped fifteen degrees (15°F) or more. If the inlet air temperature is cold (i.e. around 60°F or below) or the air is very humid (i.e. 60% or higher) the drop may be less than 15°F, but should be more than 10°.

        - **If there is no temperature drop** then there is likely a refrigerant leak and the unit will need to be replaced.
        - **If the temperature drop is 15° or more**, than the reason for the E4 diagnostic code was likely that there was a sudden change in environment or the unit was cycled too quickly. The dehumidifier records the temperature of the suction line just prior to the compressor starting, and compares this value to the suction line temperature 20 minutes after the compressor has been running. If the initial reading were artificially low, the difference between initial and final would also be artificially low. During normal operation, the environment does not change quickly enough for this to be an issue, but can be on initial installation or if turning the unit on/off using the ON/OFF button to override normal time between cycles.

On first installation, allow the dehumidifier to acclimate to the environment before completing the installation. On the User Interface Assembly, use the ON/OFF button to turn the unit on. Press the MODE and UP buttons to check the inlet air temperature, inlet air RH and suction line temperature. If the suction line temperature is not within a few degrees of the inlet air temperature, allow the unit to sit for at least one hour and then recheck.

If cycled too rapidly, the suction line will not have adequate time to reach room conditions. After completing system checkout, allow the dehumidifier to sit for at least 15 minutes before turning it on to the desired operating setting.

E5 or E6 – Temperature Thermistor Failure: The signal from the High Temperature Sensor (E5) or Low Temperature Sensor (E6) is open or shorted. The most likely reason for this code is a loose connection at the Internal Control board or a failed sensor.

1. Turn the ON/OFF toggle switch OFF. Remove the side panel, insulation and electrical box cover.
2. Remove the connectors for the Low Temperature Sensor (Frost Sensor) and High Temperature Sensor, measure the resistance across the terminals of the connector and make sure it is in the range shown in the table at the right depending on the temperature in the space.

Temp (°C)	Temp (°F)	Resistance (kΩ)
0	32	32.6
10	50	19.8
20	68	12.5
30	86	8.1
40	104	5.3
60	140	2.5

3. Reinstall the sensor connectors on the Internal Control board and turn ON/OFF toggle switch ON to reset the code.

E7 – Float Switch Open: The Float Switch input to the User Interface Assembly is open. This will occur if there is a float switch installed, and there is sufficient water in the secondary drain pan to cause the float switch to open, or if the installed float switch is faulty or not the appropriate type (must be a normally open switch that is not powered). If a float switch is not installed, the jumper in the Float Switch terminals is missing or not properly seated.

1. Leave the unit ON with the code showing. It will self-correct without having to turn the unit OFF to reset when the source that initiated the code has been repaired.
2. If a float switch is installed, drain any water out of the secondary drain pan.
3. Remove the Float Switch terminal block from the User Interface Assembly and inspect the terminal block to ensure the wires are properly seated. If a float switch is installed, do a continuity check between the float switch terminals – there should be continuity. Reset/replace the float switch if needed.
4. If a jumper is installed, remove the jumper and reinstall paying particular attention to the retention of the wire within the terminal.

E8 – Inlet Air Temperature or Dew Point Out of Range: The temperature of the incoming air is less than 50°F or is higher than 104°F, or the dew point is below 40°F when the compressor is attempting to start. The most likely cause for this diagnostic code is that the dehumidifier is installed in an application with temperatures outside of the specification for this product or there are leaks in the ductwork causing temperature extremes at the dehumidifier inlet. THIS CODE IS SELF-CORRECTING AND WILL RETURN TO NORMAL OPERATION THE NEXT TIME THE AIR IS SAMPLED AND IS WITHIN THE ALLOWABLE RANGE. If this is event driven (i.e. used for ventilation and the outdoor air is particularly hot, or used for crawl space dehumidification and the outdoor air is particularly cold), simply allow the unit to reset itself. To reset the code before it resets itself and/or to investigate the cause, perform the following:

1. Turn the ON/OFF toggle switch OFF and to reset the diagnostic code.
2. Consider the following for the application:
    - All installations – If ducting to the HVAC system, make sure the inlet to the dehumidifier is not ducted to the supply side of the HVAC system.
    - Attic installations – Inspect the ductwork attached to the inlet of the dehumidifier for leaks if the ambient temperature is high.
    - Basement installations – Low temperature may be offset by mixing air from the home into the dehumidifier.
    - Crawlspace space applications – The dehumidifier will correct itself when the low temperature conditions stop.
    - Ventilation applications – High or low temperatures may be offset by mixing air from the home into the dehumidifier.

E9 – Outdoor Temperature Sensor open or shorted: The signal from the Outdoor Temperature Sensor is out of range. This will show only if the ventilation feature has been enabled, and temperature limits have been selected. While this code is self-correcting, it was likely initiated by a problem that must be fixed. The most likely reason for this diagnostic code is a loose connection at the User Interface Assembly or a failed sensor.

1. Remove the wiring access cover of the User Interface Assembly located next to the display.
2. Remove the ODT Sensor terminal and measure the resistance across the terminals to make sure it is in the range shown in the table below depending on the temperature outside. If the sensor is shorted (zero resistance) or open (infinite resistance), replace the outdoor temperature sensor (8052).

Temp (°F)	Resistance (kΩ)
0F	84.5
20F	46.0
40F	26.0
60F	15.5.
80F	9.5
100F	6.0

3. Reinstall the terminal block on the User Interface Assembly and turn ON/OFF toggle switch ON to reset the code.

Verifying Capacity

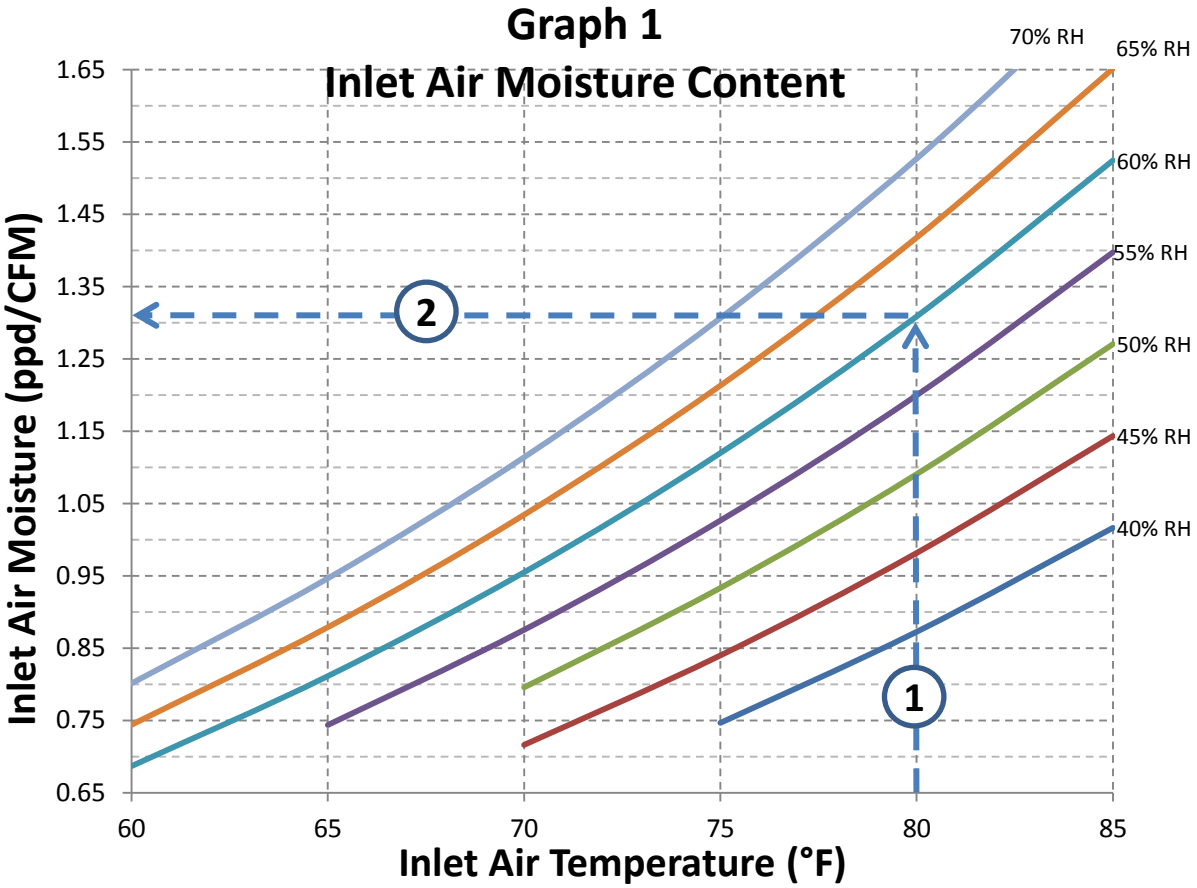
If the unit is functioning properly, and there are no diagnostic codes present, this procedure can be used if there is concern that the dehumidifier is not removing sufficient moisture. **This procedure requires that the external static pressure of the dehumidifier be known and that the user has measuring equipment capable of measure air conditions between 50°F – 100°F, and 5% RH to 70% RH.** If ducted from the return to the supply of the HVAC system, make sure the HVAC system is not operating during this test; the HVAC system must be on if the unit is ducted return to return. If the unit is not ducted to the HVAC system, then it does not matter. Use the graphs and airflow performance tables provided to convert the inlet/outlet air conditions and airflow to air moisture removal rates. If the inlet air conditions are not within those listed on the table(s), contact Aprilaire Technical Support Monday through Friday from 7:00 a.m. to 5:00 p.m. CST at (800) 334-6011 for assistance in determining performance.

1. Verify that the flap damper on the outlet of the dehumidifier opens/closes freely.
2. Verify that the ductwork is free of obstructions and kinks and that the filter is clean – remove the filter for this test if dirty.
3. Ensure that all panels are in place and assembled with screws. DO NOT REMOVE PANELS DURING THIS TEST.
4. Adjust the control lowest setting 40% (do not put the unit in TEST mode as this will allow the compressor to run for only one minute) to initiate a dehumidifier call. **Note:** If the dew point of the air is below 40°F, the dehumidifier compressor will not turn on.
5. Measure the static pressure between the inlet and outlet of the dehumidifier and record the corresponding airflow from the tables below (use an 1830 @ 0.20" w.c. static for example):

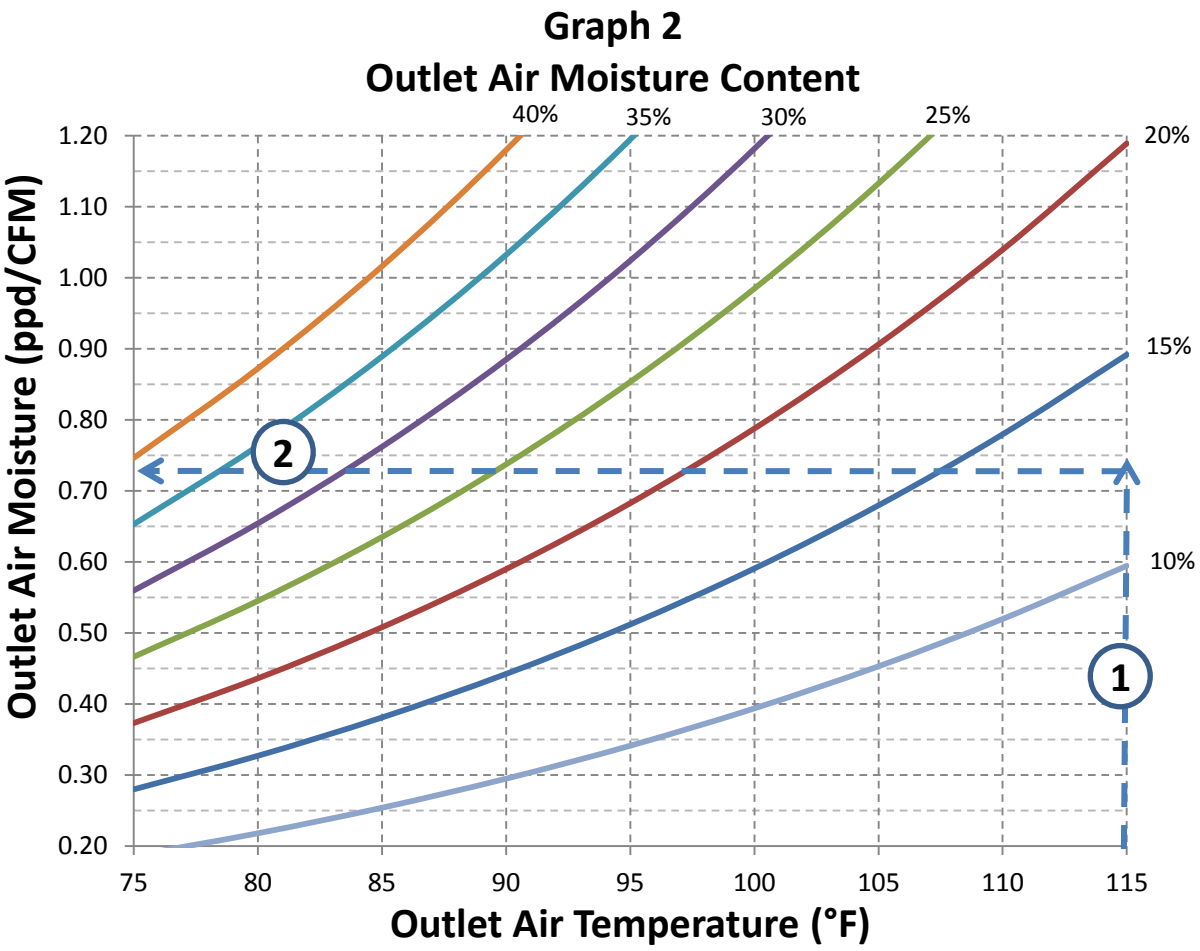
Table 1: Model 1830	
Static Pressure ("w.c.)	Airflow (CFM)
0.0	160
0.1	140
0.2	120
0.3	100

Table 2: Model 1850	
Static Pressure ("w.c.)	Airflow (CFM)
0.0	245
0.1	230
0.2	215
0.3	200

6. Allow the dehumidifier to run long enough to get a good, stable reading – 15 minutes minimum.
7. Press and hold the MODE button and UP button for 3 seconds. Use the UP or DOWN button to scroll to and record the inlet air temperature (display shows "AIR SAMPLING" along with the value) and RH of the inlet air.
8. Find the inlet air moisture content in Graph 1 below. Locate the inlet air temperature at the bottom of the graph and draw a straight line up until you meet the inlet air RH curve then read the moisture content at the left (1.31 ppd/CFM @ 80°, 60% RH for Model 1830 example shown).



9. Move a temperature/humidity measuring instrument to the outlet of the dehumidifier.
10. Allow time for the measuring instrument to get a good, stable reading.
11. Record the outlet air temperature and RH.
12. Find the outlet air moisture content in Graph 2 below. Locate the outlet air temperature at the bottom of the curve and draw a straight line up until you meet the outlet air RH curve then read the moisture content where the two intersect at the left (.72 ppd/CFM @ 115°, 12% RH example shown).



13. Subtract the outlet air moisture content from the inlet air moisture content to determine the amount of moisture being removed by the dehumidifier.

EXAMPLE:

Measured Static Pressure = *0.2"w.c.*
Airflow from Table 1 or 2 = *120 CFM*
Inlet Air Temperature = *80°F*
Inlet Air %RH = *60%*
Inlet Air Moisture Content (Graph 1) = *1.31 ppd/CFM*
Measured Outlet Temperature = *115°F*
Measured Outlet %RH = *12%*
Outlet Air Moisture Content (Graph 2) = *0.72 ppd/CFM*

Dehumidifier Capacity = (Inlet Air Moisture Content – Outlet Air Moisture Content) * Airflow
*(1.31 ppd/CFM – 0.72 ppd/CFM)*120 CFM = 70ppd*

14. Compare the capacity to the approximate performance in the table below. Performance should be within about 20% of the capacity listed below due to the estimation of airflow through the unit:

1830 Capacity				
Inlet Air RH	Inlet Air Temperature (°F)			
	60	65	70	80
60%	40 ppd	50 ppd	57 ppd	70 ppd

1850 Capacity				
Inlet Air RH	Inlet Air Temperature (°F)			
	60	65	70	80
60%	53 ppd	61 ppd	73 ppd	95 ppd

WORKSHEET:

Measured Static Pressure = _____*"w.c.*

Airflow from Table 1 or 2 = _____*CFM*

Table 1

Model 1830	
Static Pressure ("w.c.)	Airflow (CFM)
0.0	160
0.1	140
0.2	120
0.3	100

Table 2

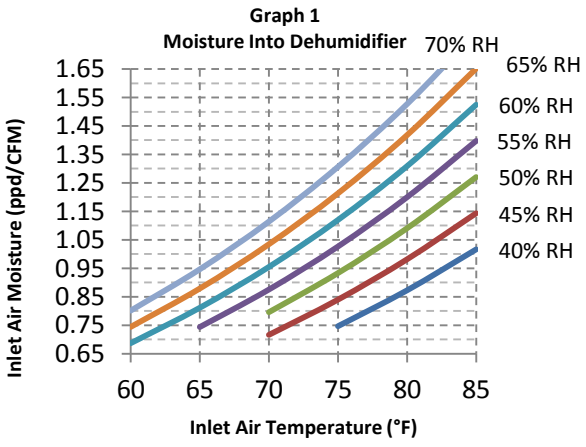
Model 1850	
Static Pressure ("w.c.)	Airflow (CFM)
0.0	245
0.1	230
0.2	215
0.3	200

Inlet Air Temperature = _____*°F*

Inlet Air %RH = _____*%*

Inlet Air Moisture Content (Graph 1) = _____*ppd/CFM*

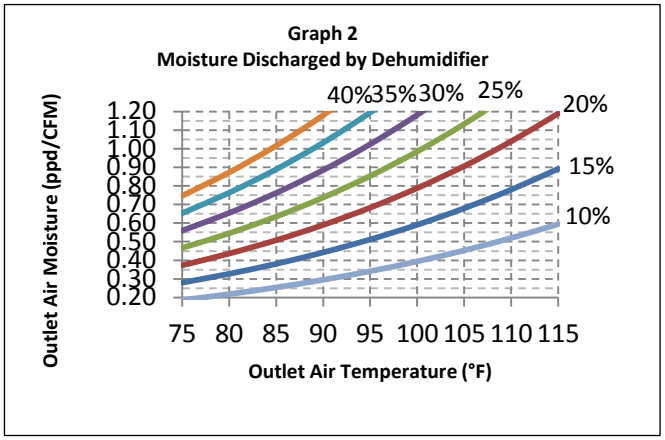
Graph 1



Measured Outlet Temperature = _____ *°F*

Measured Outlet %RH = _____*%*

Outlet Air Moisture Content (Graph 2) = _____*ppd/CFM*



Dehumidifier Capacity = (Inlet Air Moisture Content – Outlet Air Moisture Content) * Airflow

_____ppd = *(_____ ppd/CFM – _____ppd/CFM)*_____CFM*

Performance should be within about 20% of the capacity listed in the tables below.

1830 Capacity						1850 Capacity			
Inlet Air RH	Inlet Air Temperature (°F)					Inlet Air Temperature (°F)			
	60	65	70	80		60	65	70	80
60%	40 ppd	50 ppd	57 ppd	70 ppd		53ppd	61ppd	73ppd	95ppd

Water Leaks

Water collects in the drain pan below the coils and is directed through the drain tube to the outlet at the outlet side of the dehumidifier.

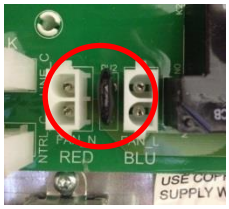
1. **Level the unit front to back, and side to side.**
2. Clean or replace the drain tubing. The drain tubing must have a continual downward slope to the drain.

> **IMPORTANT**: If using ½" vinyl tubing for the drain line, ensure that there are no upward bends in the tube that could act as a secondary trap – this will cause an air-lock that could prevent the flow of water to the drain.

3. Remove the side panel (on the same side as the drain tube); slowly pour a pint of water into the drain pan near the return bends of the coils. After the running trap fills, the water should flow out the drain tube to the drain.
4. Plug or raise the drain tube sufficiently high to prevent water from pouring out of the drain tube. Slowly pour in an additional pint of water until the bottom of the drain pan is filled. Allow 15-20 minutes for the water to stand in the drain pan and look for any signs of leaks from the drain pan and drain tube. Unplug the drain and allow the water to drain out.
5. Reinstall the side panel.

Fan Does Not Function

1. Make sure the outlet the dehumidifier is plugged into is live (120 VAC).
2. Turn the User Interfaced Assembly and the ON/OFF toggle switch OFF.
3. Remove the side panel and disconnect the blue and yellow fan wires from the Internal Control board.
4. Inspect the large disk-like component (this is a varistor and it is usually blue or black in color) on the Internal Control board right next to the fan terminals. If this component looks scorched or cracked, replace the Internal Control board (5444).



5. Turn the ON/OFF toggle switch to ON and the User Interface Assembly to ON; the fan should start right away with the display showing "AIR SAMPLING". Measure the AC voltage at the fan terminals on the Internal Control board. Use caution as this is line voltage.
    - **If the FAN LED on the Internal Control board is lit and there is 120 VAC** at the fan terminals, disconnect the fan run capacitor and measure the capacitance – this should be 8 µF (microfarad) ±5% for the 1830 and 12 µF ±5% for the 1850. If the capacitor is bad, replace it (5459 70pt / 5468 95pt); if the capacitor is good then replace the fan (5453 70pt / 5467 95pt).

    - **If the FAN LED on the Internal Control board is lit and there is 0 VAC**, the Internal Control board will need to be replaced (5444).
    - **If the FAN LED on the Internal Control board is not lit and the display shows "AIR SAMPLING",** the User Interface Assembly will need to be replaced (5445).

Circuit Breaker Trips

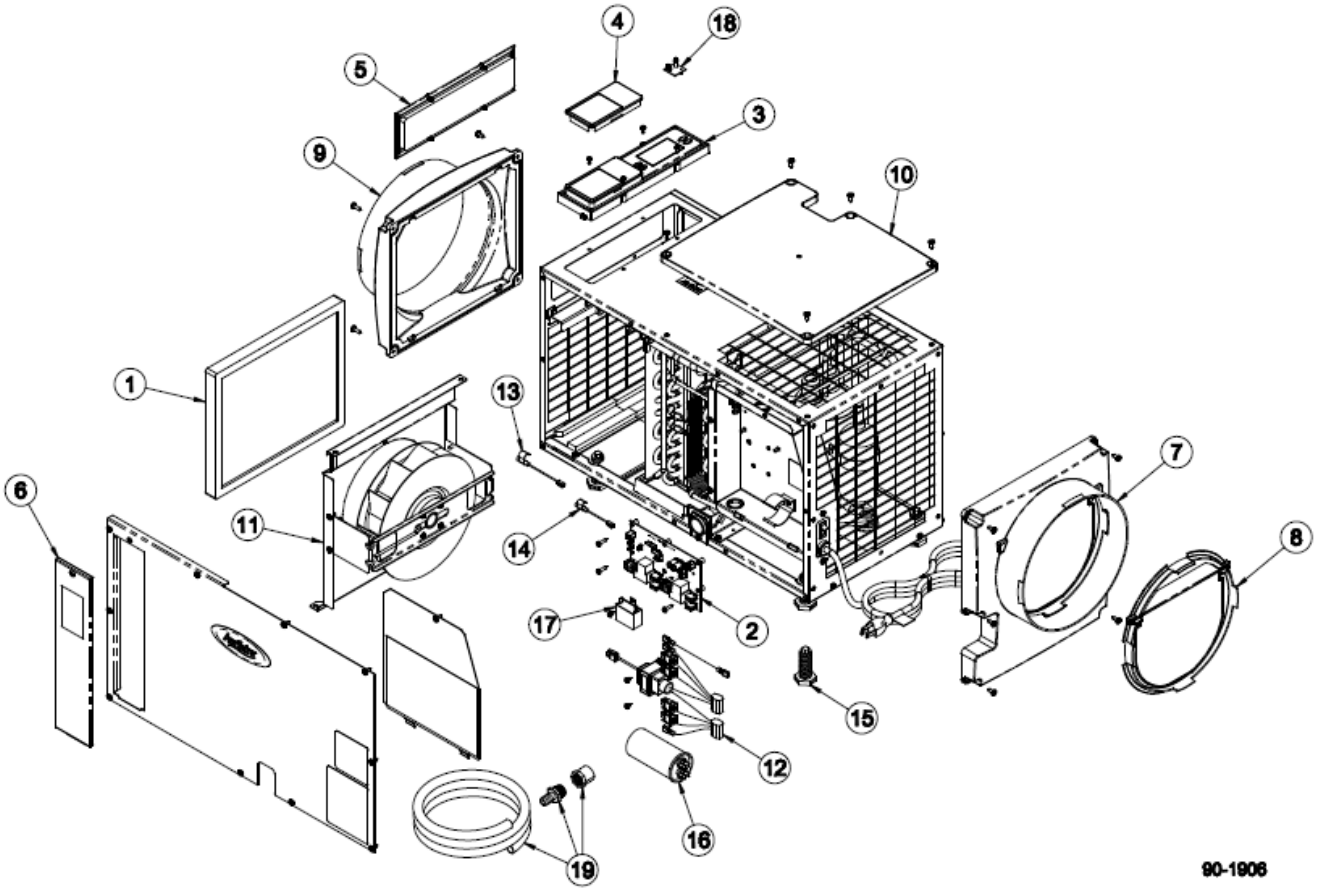
The 1830 and 1850 must be plugged into an outlet served by a 15 amp circuit breaker. The 1850 dehumidifier uses approximately 8 amps at high load (i.e. hot and humid) conditions and less at low load conditions. The 1830 dehumidifier uses approximately 6 amps at high load and less at low load.

If there are other electrical components that draw a lot of current connected to the same circuit breaker, the circuit may be overloaded and a new circuit should be run to serve the dehumidifier. Consult with a qualified electrical contractor if there are questions as to the suitability of the circuit into which the dehumidifier is plugged.

If the electrical service is sound, there are two primary reasons why a circuit breaker would trip: a wire has disconnected or the compressor run capacitor is faulty.

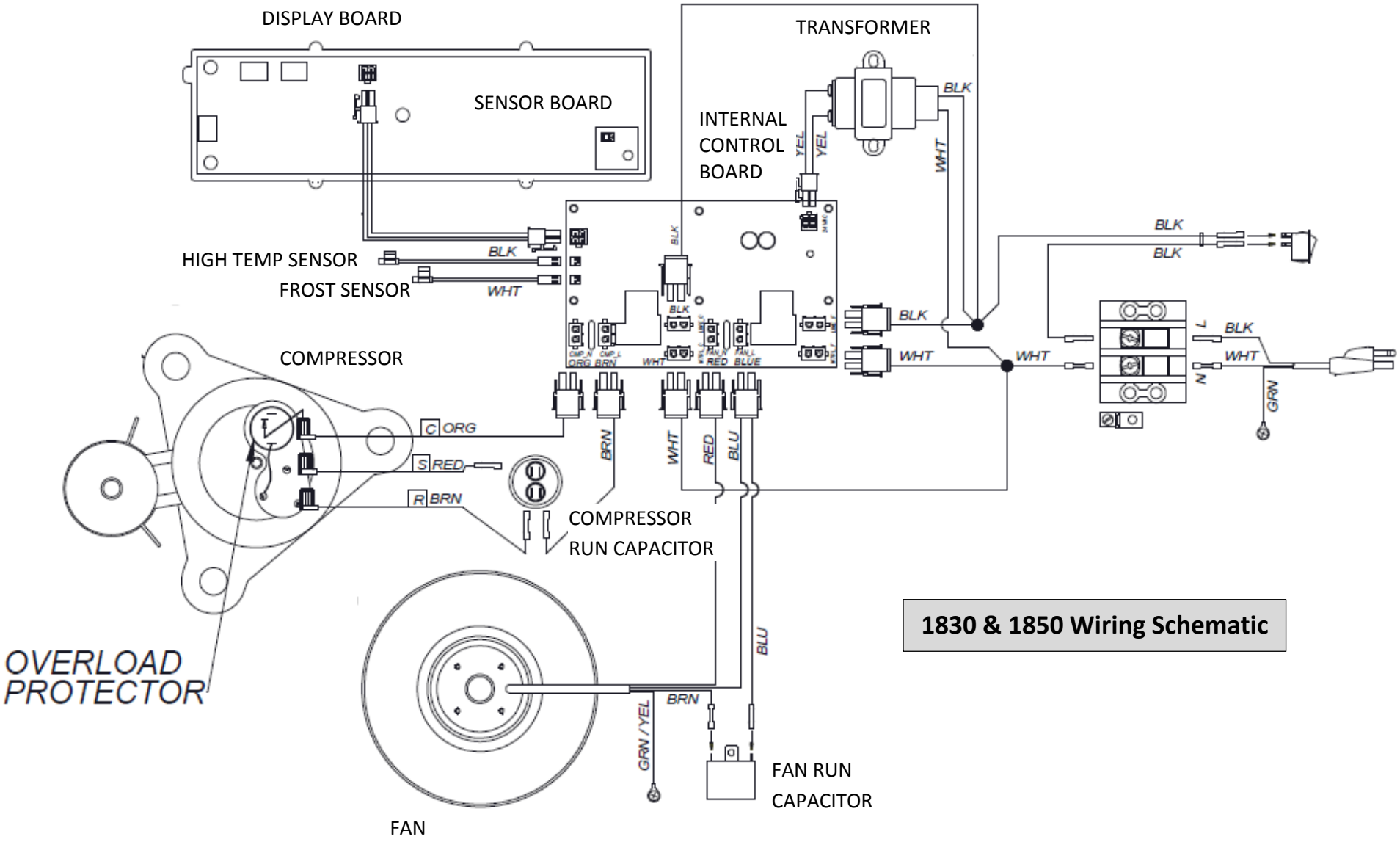
1. Turn the ON/OFF toggle switch OFF, unplug the dehumidifier, and remove the side panel from the dehumidifier.
2. Inspect the electrical connections at the power switch, Internal Control board and run capacitors.
3. If none of the wires have been disconnected, remove the wires connected to the run capacitor.
4. Measure the capacitance of the compressor run capacitor, it should be 45 µF (microfarad) ±5%.

1830/1850 Parts List



No.	Part Description	Part No.
1	Filter 10” x 12” x 1” EZK	5443
2	Internal Control Board	5444
3	User Interface Assembly	5445
4	Wiring Access Door	5446
5	Hole Cover, UI Ctrl	5447
6	Door, Filter Access	5448
7	Outlet Duct Panel	5449
8	Backflow Damper, 10”	5450
9	Inlet Duct Panel	5451
10	Cover, Outlet	5452

No.	Part Description	Part No.
11	Fan, 70pt	5453
	Fan, 95pt	5467
12	Wire Harness, Power	5454
13	Sensor, Low Temperature	5455
14	Sensor, High Temperature	5456
15	Leveling Foot	5457
16	Capacitor, 45MFD, 370VAC, 70pt/95pt	5458
17	Capacitor, 8MFD, 450VAC, 70pt	5459
	Capacitor, 12MFD, 450VAC, 95pt	5468
18	RH Sensor	5460
19	Drain Tube + Fittings	5461
Not Shown	Compressor Overload Switch, 70pt	5547
	Compressor Overload Switch, 95pt	5548



1830 & 1850 Wiring Schematic