General

This procedure should be used to troubleshoot the 200-3 Series Logic when used with the 207 Series Thermostat.

Equipment Required

1. HCC 207-TSA Thermostat Simulator
2. Digital Voltmeter (DVM) with a 0 – 20V DC span.

Pre-Troubleshooting

1. Determine if 24V AC power, (–15% to 20%), is wired to terminals #2 and #3 on the 200-3.
2. Determine if the minimum and maximum flow limits have been properly set.
3. Determine if the thermostat is wired correctly.
4. Space temperature must be between 70°F – 80°F.

Troubleshooting Thermostat Circuit for 207 Series Thermostats

1. Apply 24V AC power to Controller.
2. No airflow is required.
3. Measure voltage between terminals #4 (–) RED and terminal #5 (+) YEL on the Controller. (The reading should be 20V DC (±0.2V DC). If not replace Controller).
4. Turn setpoint on the thermostat to 65°F. Measure voltage between terminal #4 (–) and terminal #6 (+) on the Controller. (The reading should be 9.75V DC or less. If not, proceed to Step 5 and 6).
5. Turn setpoint on thermostat to 85° F. Measure voltage between terminals #4 (–) and #6 (+) on the Controller. (The reading should be 10.0V DC or more. If not, proceed to Step 6).
6. If either or both voltages in Steps 4 and 5 are not correct, the following voltages should be checked at the thermostat.
   - **a.** Voltage between RED (–) and YEL (+) should be 20V DC ± 0.2V DC.
   - **b.** Turn setpoint at thermostat to 65°F. Voltage between RED (–) test post and BLK (+) lead should be 9.5V DC or less.
   - **c.** Turn setpoint at thermostat to 85°F. Voltage between RED (–) test post and BLK (+) lead should be 10V DC or more.
   - **d.** If any of these voltages are not correct, check wiring between thermostat and controller for correct installation or shorts. If wiring is correct, replace the thermostat.

Troubleshooting Temperature and Velocity Circuits

This procedure should follow the thermostat circuit troubleshooting.

If the air volume requirement through the terminal box is between the minimum and maximum flow limits, and the terminal box is under control, the Vt and VV voltages will be equal within ±0.3V DC. These voltages are measured between terminals #4 (–) and terminal #7 (+) VV or #8 (+) Vt and should be between 11.1 and 16.5V DC.

If Vt and VV voltages are not approximately equal, check the following:

VV & Vt voltages are measured as follows:

VV = Terminals #7 to #4 (11.1V DC to 16.5V)Vt = Terminals #8 to #4 (11.1V to 16.5V)

If the air volume requirement through the terminal box is between the Min. and Max. flow limits, then the following should be realized: Vt = VV ± 0.3V DC

If Vt is not equal to VV, check the following:

1. If air damper is fully open and VV is below Vt, determine if there is enough air volume coming to the terminal box to satisfy the need.
2. If VV voltage is above 17V DC, replace controller.
3. Turn setpoint on thermostat to 65°F, VT should go to its high limit. If not, replace controller.
4. Turn setpoint on thermostat to 85°F, VT should go to its low limit. If not, replace controller.

5. Check the tubing between the velocity pickup in the duct and velocity sensor for leaks, kinks and plugging. If the tubing needs replacing, do not remove tubing from velocity sensor. Cut tubing and splice with coupling.
6. Check damper coupling to determine if it is loose on damper shaft. If loose, reposition damper to give full travel between mechanical stops and tighten set screws at its closed position.
7. If performing these Steps does not correct the problem, replace the controller.

Troubleshooting Actuator Circuit

1. Air box reversed from expected action.
   a. Adjust thermostat to 65°F.
   b. If damper closes instead of opens, reverse CW and CCW leads to the 200-3 terminals.
2. Damper shaft not coupled to Actuator.
   a. Close damper.
   b. Adjust thermostat to 85°F to put Actuator in closed damper position.
   c. Tighten screws on coupling to damper shaft.
3. Actuator turns for one direction only.
   a. Uncouple damper shaft from Actuator.
   b. Set thermostat at 65°F. Does the Actuator move to the open damper position? If not, replace Controller.
   c. Set thermostat at 85°F. Does Actuator move to the closed damper position? If not, replace Controller.
   d. If the Actuator checks-out fine as in "b" and "c" above, disconnect its CW and CCW leads from the controller and put one at a time to terminal #3. Does the motor turn CW or CCW? If not replace Actuator. If it does, then the damper is probably mis-adjusted. Re-adjust Actuator per instruction in Step 2.

Typical Installation Failure Conditions

1. **Possible Failure Mechanism:** Resistor "R1"

   Usual Cause: Short circuit between pins #4 and #5 of terminal block.

   Visual Check: Observe R-1 for any indication of discoloration of the resistor body. Discoloration is generally the result of the resistor having overheated due to an accidental short between pins # 4 and #5 of the 200-3 connector block.

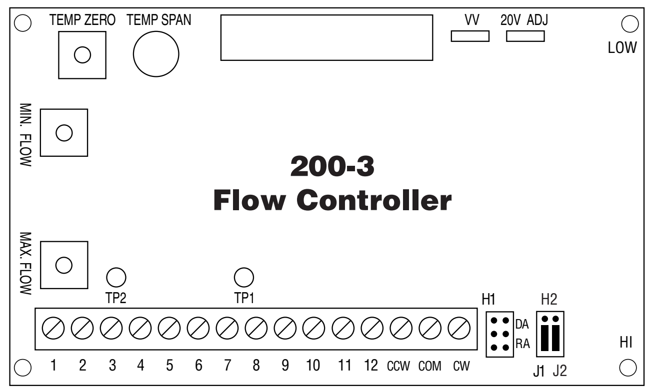
   Electrical Check: With power removed from the 200-3, use an ohmmeter to measure the resistance of R-1. The ohmmeter should indicate a value of 45 to 49 ohms. If the reading is outside this range, the 200-3 should be replaced.

2. **Possible Failure Mechanism:** Triacs "Q-2" & "Q-3"

   Usual Cause: Short circuit between "COM" and either "CW" or "CCW" terminals of the 200-3 terminal block.

   Visual Check: Observe triacs for any cracking of the plastic case or other deformation of the case. (Current levels through the triacs during this short circuit occurrence can be sufficient to cause the triac case to burst.)

   Electrical Check: With power removed from the 200-3, an ohmmeter check may be made between pin #4 on the terminal block and the "CW" and/or "CCW" pins.



200-3 Series Flow Control Board

NOTE

Triacs may fall into either a "shorted" or an "open" state. The normal state of the triac when turned off is also "open"…this can cause mis-diagnosis in the following electrical check.

With ohmmeter set to read values greater than 200 ohms measure the "CW" pin and the #4 pin of the terminal block. A reading less than 1 megohm should be considered a positive indication of a defective triac.

Conduct the same test with the ohmmeter connected between the "CCW" pin and the #4 pin of the terminal block. The same criterion applies.

A reading greater than 1 megohm, in this checkout is not necessarily indicative of good triacs (see note above).

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