

## Techmark, Inc.

### SOP M303-1 Techmark Basic Trouble Shooting for Fancom Climate Control

April, 2014

As more Fancom control systems get installed, so do the questions about climate variations and trouble shooting. These variations are described below with simple items to check and investigate.

For us, oscillates is an acceptable control. It means that the mechanical system is operating correctly but there are variables occurring that allow it to be unsettled at times (not continuously). Variables would include but not limited to steam manifold pressure, damper integrity, harvester's in room, doors left open, outside temperature changes, etc. Corrective action would be to keep doors closed, insure mechanical systems are maintained regularly and be cognitive of the room's climate condition with regards to set points. Please remember, over control can be expensive mechanically on phase II rooms with a high minimum fresh air setting as well other rooms. For instance, when the room is switching from using outside air for temperature/rh control (efficiency) to mechanical control (energy consumption) one might see variations in CO2 levels, fluctuations in cooling and heating as well as fresh air dampers. However, when the system is fully switched over, the rooms should go back to normal control.

Oscillation is borderline unacceptable control. It means that the control is continuously hunting and never settles out on a set point due to mechanical factors that force this control. A good way to diagnose this is to break down each control setting versus measured (as the review report does). For instance, if CO2 is oscillating, then look to CO2 range set too small and check fresh air dampers. If RH is oscillating, then look to RH range set too small, room temperature, heating control and inlet air. Corrective action would be to check/verify via graphs and physically at the room what problems could be cause oscillation. Such as air handler sensor(s) pulled out of air handler (switched, location), rh box not mounted correctly, manual control on specific valve, too low of fan speed, loose dampers or improperly synchronized.

Things to check to verify when unacceptable control occurs:

- i. CO2 oscillation
  1. Graphs
    - a. Control CO2 and Measured CO2
    - b. Control Fresh air, minimum, maximum.
  2. Check CO2 sensor location and ensure it is near 3<sup>rd</sup> bed away from supply air.
  3. Fresh air dampers may require adjusting, lubricating and synchronized.
  4. Fan speed may be locked with fresh air and perhaps reacts too strong.
  5. Check exhaust damper for proper operation.
    - a. Blocked exhaust will not allow the CO2 to flushed out of the room.
- ii. Room Temperature oscillation
  1. Graphs
    - a. Control Air and Room Air (temperature)
    - b. Control Heat and Inlet Air
    - c. Control Cooling and Cool Temp
    - d. Control Fresh Air
    - e. Control Fan
    - f. Control Compost and Average Compost and all Compost Sensors.
    - g. Control RH and Measured RH
  2. Check Compost Temperature influence on Air Temperature.
    - a. A high correction value will force the Control Air to overreact. Try setting a lower margin and lower correction.
  3. Check dead zone heating, cooling and steam.
  4. Check RH box location and ensure it is near 3<sup>rd</sup> bed away from supply air. RH box contain room air and wet bulb.
    - a. Check to make sure 24vac fan is powered and spinning freely.
    - b. Check condition of RH Wick. Ensure it is clean, not slimy.
    - c. Check RH Wick installation. Ensure the capillary strands are not bunched up at bottom of wet bulb sensor.
    - d. Check reservoir. Ensure it has distilled water and is clean.
    - e. Check wet bulb and dry bulb sensors are inserted into rh box correctly.
  5. Air handling sensors (inlet, cooling, mixed) installed incorrectly inside sensor bracket and location inside air handler.

- a. Sometimes sensor wires get pulled and sensor tip goes inside bracket for delayed reading or in too far and touches coils or water.
- b. Use Techmark Sensor Bracket Drawing to install sensors correctly.
- 6. Check heating (inlet air) and compare to control temp and valve position.
  - a. Steam heating valves are the biggest culprit for oscillations in room air and rh. The flash heating properties of steam make smooth control more challenging.
  - b. If control temp and inlet air are oscillating then either there is a mechanical issue (i.e. boiler pressure change) or an installer setting change.
  - c. Check fan speed settings for being too low.
  - d. Check Dead Zone Heating. Should be around 1 degree F summer and 0.6 F degree for winter.
- 7. Check cooling (cool temp) and compare to control temp and valve position.
  - a. If control temp and cool temp are oscillating then either there is a mechanical issue or an installer setting change.
  - b. Also check for mechanical dehumidification/RH/Outside air influences. Wait time Mechanical Dehumidification can be set from 1 minute to 10 minutes and a low setting can cause oscillation.
  - c. Check fan speed settings for being too low.
  - d. Check Dead Zone Cooling. Should be around 0.2 degree F summer and 1 degree F winter.
- 8. For Preheat System, check Thermal (mixed air) and compare to control temp.
  - a. If control temp and mixed/thermal temp are oscillating, then either there is a mechanical issue (i.e. boiler pressure change) or setting change (too high/low setting for outside conditions), damper issues and sensor installation.
  - b. Winter settings should be set higher to ensure no freezing of coil liquid. However, if set point is too high, over control of cooling may occur.
  - c. Summer settings should be set lower to ensure preheat does not activate and waste energy.
  - d. Minimum Mixed Air Temperature. As the mixed air temperature approaches the Minimum Mixed Air Temperature setting (6f), automatically the fresh air damper will begin to close (giving up CO2 control). Once the Minimum Mixed Air Temperature is achieved, the controller shall provide a FROST ALARM, then shut down the fan, close fresh air and turn on heating (ALL AUTOMATICALLY). Once mixed air is above minimum setting, then room will restart by slowly increasing fresh air and fan speed.
- 9. Check Fresh Air control.
  - a. Minimum and Maximum settings.
    - i. Too high of minimum fresh air may cause over control of valves, wasting energy.
    - ii. Too low of maximum fresh air may keep a room from cooling or have high co2.
  - b. Fresh air controls air temperature for cooling. Check to see if outside conditions are correct and that the outside sensor is operational.
    - i. Check to see if you want it activated.
  - c. Fresh air controls relative humidity via cooling. Check to see if outside conditions are correct and that the outside sensor is operational.
    - i. Check to see if you want it activated.
    - ii. Check if Drying sub-phase is activated.
  - d. Fresh air controls CO2. Check CO2 levels to see if they are controlling correctly.
    - i. Check dampers for synchronization and adjustment.
    - ii. Check dampers for worn linkage and bushing.
  - e. Fan speed may be set to fresh air damper opening.
    - i. Check settings under Fan for Increase Fresh Air and Correction Factor. A high correction factor may cause over control.

10. Check Fan control
  - a. Fan speed settings have a direct influence on air exchanges in the room as well as the thermal transfer of heating and cooling from coil to air.
    - i. Too low of fan speed causes oscillation of controls.
    - ii. Too high of fan speed causes valves to open further than necessary, wasting energy.
  - b. Minimum/Maximum Fan
    - i. If set to 0, then no controls will operate.
    - ii. If Fan Trouble Alarm exists, then no controls will operate. This alarm is generated by the frequency, please check it.
- iii. Check Outside Air
  1. Graph
    - a. Outside Air and RH
    - b. Cold outside air has more cooling capacity therefore the minimum fresh air setting should be checked.
  2. Check if personnel doors are opened for long periods of time.
  3. Check if pickers are in room for long periods of time during oscillation.
    - a. Consider using Sub-phase Working Condition 1 or 2 to stabilize room during picking.
- iv. Alarms
  1. Set alarm values to reason numbers that alert you to a concerning situation. If values are set to low, then nuisance alarms occur. Nuisance alarms often get ignored.
  2. Do not set alarm value to 8 or 9. This **DISABLES** the alarm output.
  3. When an alarm occurs, please set to 7 to acknowledge the alarm.
  4. If a 5 is present, then an alarm occurred however the controller remedied the situation. Please set to 7 to clear.
    - a. Fan Trouble Alarm, all controls close until problem is cleared.
      - i. Check frequency drive and or motor.
      - ii. Under Alarm Settings, Button 12, make sure Fan Trouble is set to YES for this feature to activate with frequency drive.
    - b. Check Alarm History
      - i. Alarm button (red), shows last 10 logged alarms for your review.

Please note that the controller is constantly monitoring and controlling a room. By looking at the graphs/controls in a preventative view instead of a reactive view like the Partlow thermostats allows the rooms to operate more efficiently.