

#### ENERVEX<sup>®</sup> VENTING DESIGN SOLUTIONS

# 66 WOOD-FIRED FIREPLACE SCALE: NTS



#### 5 FAN POWERED TERMINAL UNIT CONTROL DIAGRAM SCALE: NTS



DUCTLESS AIR CONDITIONING UNIT SYSTEM DIAGRAM 4 DUCTL SCALE: NTS



### **SEQUENCE OF OPERATIONS**

- A. SYSTEM OFF: 1.FAN OFF.
- 2.PRIMARY AIR DAMPER CLOSED. 3.HEATING WATER CONTROL VALVE CLOSED.
- B. SYSTEM START: 1.AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES. 2.0PERATOR ENTERED COMMAND AT THE BMS. 3.AUTOMATICALLY ON LOW SPACE TEMPERATURE ALARM.
- 4.AUTOMATICALLY BY TENANT OVERRIDE PUSHBUTTON. C. SYSTEM OPERATION:
- 1.FAN CONTROL: a. OCCUPIED AND WARM-UP/COOL-DOWN MODES - THE FAN SHALL RUN CONTINUOUSLY. b. THE FAN DISCHARGE FLOW RATE SHALL BE CONTROLLED TO TRACK WITH THE PRIMARY AIR FLOW RATE. WHEN THE PRIMARY AIR IS AT THE MAXIMUM COOLING FLOW RATE, THE FAN SHALL OPERATE AT THE MAXIMUM COOLING DISCHARGE FLOW RATE. WHEN THE PRIMARY AIR IS AT THE MINIMUM COOLING FLOW RATE, THE FAN SHALL OPERATE AT THE MINIMUM COOLING DISCHARGE FLOW RATE.
- c. UPON THE REQUIREMENT TO GO TO THE HEATING MODE, THE PRIMARY FAN DISCHARGE FLOW RATE SHALL BE RAMPED UP OVER AN OPERATOR DEFINED PERIOD OF TIME UNTIL THE HEATING FLOW RATE IS REACHED. d. WHEN THE SPACE TEMPERATURE IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE FAN DISCHARGE FLOW RATE
- SHALL BE RAMPED DOWN TO THE MINIMUM COOLING FAN DISCHARGE FLOW RATE AND THE HEATING COIL VALVE SHALL BE CLOSED. e. THE MAXIMUM AND MINIMUM COOLING FAN DISCHARGE FLOW RATES AND THE HEATING FAN DISCHARGE FLOW RATES SHALL BE AS SCHEDULED. THE MAXIMUM AND MINIMUM PRIMARY AIR FLOW RATES SHALL BE AS SCHEDULED. f. THE BMS SHALL BE ABLE TO COMMAND:
- AN INDIVIDUAL FAN TO OPERATE AT A CONSTANT DISCHARGE FLOW RATE, REGARDLESS OF THE SPACE TEMPERATURE. THIS DISCHARGE FLOW RATE SHALL BE THE MAXIMUM COOLING FAN DISCHARGE FLOW RATE. • ALL FANS ASSOCIATED WITH A PARTICULAR AIR SYSTEM TO OPERATE AT A CONSTANT DISCHARGE FLOW RATE BY ENTERING A SINGLE COMMAND. THIS DISCHARGE FLOW RATE SHALL BE THE MAXIMUM COOLING FAN DISCHARGE FLOW RATE. 2.PRIMARY AIR DAMPER CONTROL:
- a. OCCUPIED AND COOL-DOWN MODES DAMPER SHALL MODULATE TO PROVIDE PRIMARY AIRFLOW BETWEEN MINIMUM (20 PERCENT (ADJ.) OF COOLING MAXIMUM), AND COOLING MAXIMUM AIRFLOW SETPOINT TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON HEATING DEMAND, PRIMARY AIR FLOW SHALL BE AT MINIMUM. ON COOLING DEMAND, INCREASE AIR FLOW FROM MINIMUM UP TO MAXIMUM AIR FLOW TO MAINTAIN SPACE SETPOINT.
- b. FOR DEMAND CONTROLLED VENTILATION (DCV), A SPACE CO2 SENSOR SHALL OVERRIDE THE MINIMUM PRIMARY AIRFLOW SETPOINT AND INCREASE AIR FLOW TO MEET CO<sub>2</sub> CONCENTRATION SETPOINT OF 1,000 PPM OR LOWER. FAILURE OF CO<sub>2</sub> SENSOR SHALL REVERT TO STANDARD PRIMARY DAMPER MINIMUM POSITION. MONITOR AND RECORD THE CO2 CONCENTRATION VALUES AT THE BMS. c. WARM-UP MODE – DAMPER SHALL BE CLOSED.
- 3.HOT WATER HEATING COIL: a. OCCUPIED MODE: WHEN THE SPACE TEMPERATURE SENSOR IS CALLING FOR HEATING AND THE PRIMARY AIR DAMPER IS AT MINIMUM POSITION OR DCV POSITION, THE VALVE SHALL MODULATE TO INCREASE THE TERMINAL UNIT DISCHARGE AIR TEMPERATURE UP TO THE MAXIMUM HEATING AIR TEMPERATURE SETPOINT OF 85 DEGREES F (ADJ.). ON FURTHER DEMAND FOR HEATING, THE VALVE SHALL CONTINUE TO MODULATE TO MAINTAIN HEATING AIR SETPOINT AS FAN AIRFLOW INCREASES FROM MINIMUM TO THE HEATING AIRFLOW MAXIMUM. b. WARM-UP MODE: THE VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE AT THE HEATING SETPOINT. 4. UNOCCUPIED MODE: THE SYSTEM SHALL BE OFF.
- D. SYSTEM STOP: 1. OPERATOR COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES. 2. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE. E. SAFETIES: FAN SHALL STOP IF ASSOCIATED PRIMARY AIR SYSTEM IS SHUT OFF BY THE FIRE ALARM SYSTEM.

### **SEQUENCE OF OPERATIONS – TYPICAL AIR CONDITIONING UNIT**

- 1.SERVER ROOM UNITS: A. TWO FULL SIZE UNITS ARE PROVIDED (ONE AS BACK UP)
- B. THE LEAD ACU CONTROLS THE ROOM TEMPERATURE AT ALL TIMES VIA ITS PACKAGED CONTROLS AND THERMOSTAT. C. DDC MONITORS THE ACU SUMMARY ALARM AND ENABLES THE LAG ACU IF THE LEAD ACU FAILS.
- D. ROTATE THE LEAD ACU ON A WEEKLY BASIS (ADJ). E. DDC MONITORS THE ROOM TEMPERATURE WITH ITS OWN INDEPENDENT ROOM
- SENSOR. 2.OTHER MISCELLANEOUS UNITS:
- A. THE ACU CONTROLS THE ROOM TEMPERATURE AT ALL TIMES VIA ITS PACKAGED CONTROLS AND THERMOSTAT. B. DDC MONITORS THE ROOM TEMPERATURE WITH ITS OWN INDEPENDENT ROOM SENSOR. 3.SAFETIES:
- A. UPON A LOSS OF POWER, PERFORM AN ORDERLY SHUTDOWN OF THE SYSTEM. ONCE POWER IS RESTORED, RESTORE THE SYSTEM TO ITS SCHEDULED MODE OF OPERATION. 4. MONITORING AND ALARMS: PROVIDE MONITORING AND ALARMS AS SHOWN ON THE

POINTS LIST.









#### SEQUENCE OF OPERATIONS

- A. SYSTEM OFF:
- FAN OFF. 2. DAMPERS CLOSED
- SYSTEM START:
- THE EXHAUST FAN OPERATES ACCORDING TO THE OWNER'S OCCUPANCY SCHEDULE. AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE. OPERATOR ENTERED COMMAND AT THE BMS. A. SYSTEM OPERATION:
- DAMPERS OPEN.
- FANS START AFTER PROOF OF DAMPER OPENING.
- SYSTEM STOP: Α.
  - OPERATOR-COMMAND AT THE BMS OR AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULES. WHEN THE SYSTEM IS CALLED TO STOP, THE SYSTEM SHALL REVERT TO THAT "OFF" STATE AS DESCRIBED ABOVE.





## SEQUENCE OF OPERATIONS

- A. SYSTEM OFF:
- FAN OFF. DAMPERS CLOSED
- SYSTEM START:
- AUTOMATICALLY BY THE BMS BASED ON PREPROGRAMMED SCHEDULE. OPERATOR ENTERED COMMAND AT THE BMS. SPACE THERMOSTAT.
- C. SYSTEM OPERATION:
- DAMPERS OPEN. FANS START AFTER PROOF OF DAMPER OPENING. SPACE THERMOSTAT SHALL ENERGIZE THE EXHAUST FAN ON A RISE IN TEMPERATURE ABOVE 80°F.
- D. SYSTEM STOP:
  - OPERATOR ENTERED COMMAND AT THE BMS. IF ROOM TEMPERATURE IS BELOW SETPOINT REVERT TO SYSTEM OFF STATUS.

TEMPERATURE CONTROLLED EXHAUST FAN DIAGRAM SCALE: NTS

A. EACH RADIANT HEATER IS PROVIDED WITH ITS OWN WALL THERMOSTAT AND PROVIDED FOR EACH UNIT MOUNTED ADJACENT TO THE UNIT THERMOSTAT FOR

PACKAGED CONTROLS TO MAINTAIN THE SPACE TEMPERATE HEATING SETPOINT C. ABOVE OA TEMPERATURE OF 60 DEG F (ADJ) HEATERS ARE DISABLED.

3.WARMUP MODE: PLACE THE SYSTEM IN WARM-UP MODE BASED ON AN OPTIMIZED TEMPERATURE TO DETERMINE THE AMOUNT OF TIME PRIOR TO OCCUPIED MODE

6. TEMPORARY OCCUPANCY MODE: PLACE THE SYSTEM IN TEMPORARY OCCUPANCY

ENGAGED. OPERATE THE SYSTEM THE SAME AS OCCUPIED MODE. AFTER TWO 7. UNOCCUPIED HEATING MODE: PLACE THE SYSTEM IN UNOCCUPIED HEATING MODE IF SCHEDULED TO BE UNOCCUPIED AND THE ZONE TEMPERATURE FALLS BELOW 55 DEG F. OPERATE THE SYSTEM THE SAME AS IN WARM-UP MODE UNTIL THE ZONE TEMPERATURE REACHES 60 DEG F. ONCE THE ZONE TEMPERATURE REACHES 60 DEG F, PLACE THE SYSTEM BACK IN UNOCCUPIED MODE. PREVENT THE SYSTEM

8.MONITORING AND ALARMS: PROVIDE MONITORING AND ALARMS AS SHOWN ON THE

