

**AHU REPORT GENERATION:**  
 DDC BAS SHALL MONITOR THE FOLLOWING POINTS ON 10 MINUTE (ADJ.) INTERVALS WITHIN A SINGLE TREND. THE TREND SHALL RUN FOR A 100-DAY (ADJ.) DURATION AT WHICH POINT THE NEWEST VALUES SHALL AUTOMATICALLY OVERWRITE THE OLDEST VALUES.

- DATE
- TIME
- GLOBAL OUTSIDE AIR TEMP [°F]
- GLOBAL OUTSIDE AIR DEWPOINT [°F]
- GLOBAL OUTSIDE AIR HUMIDITY [%RH]
- SUPPLY AIRFLOW [CFM]
- SUPPLY AIR TEMP (SAT) [°F]
- SUPPLY AIR TEMP SETPOINT [°F]
- SUPPLY AIR RELATIVE HUMIDITY [%]
- SUPPLY AIR DEWPOINT [°F]
- SUPPLY AIR DEWPOINT SETPOINT [°F]
- RETURN AIRFLOW [CFM]
- RETURN AIR TEMP (RAT) [°F]
- RETURN AIR RELATIVE HUMIDITY [%]
- OUTSIDE AIRFLOW [CFM]
- MIXED AIR TEMP [°F]
- PREHEAT COIL DISCHARGE AIR TEMP [°F]
- FILTER ALARM PRE-FILTER LOADING
- HEATING WATER VALVE POSITION [% OPEN]
- CHILLED WATER VALVE POSITION [% OPEN]
- SUPPLY DUCT STATIC PRESSURE SETPOINT [INCHES W.G.]
- SUPPLY DUCT STATIC PRESSURE [INCHES W.G.]
- SUPPLY FAN VFD OUTPUT [% FULL SPEED]
- RELIEF FAN VFD OUTPUT [% FULL SPEED]
- OUTSIDE AIR DAMPER POSITION [% OPEN]
- RETURN AIR DAMPER POSITION [% OPEN]
- RELIEF AIR DAMPER POSITION [% OPEN]

THIS INFORMATION SHALL BE ACCESSIBLE TO VIEW IN GRAPHICAL FORM ON THE FMCS OPERATOR WORKSTATION.

ONCE PER MONTH, THE DDC FMCS SHALL RECORD THE LARGEST AHU AIRFLOW WHICH OCCURRED DURING THAT MONTH, THE DATE, TIME, OUTSIDE AIR TEMP (AND ALL OTHER VALUES LISTED ABOVE) THAT EVENT WITH THAT EVENT SHALL ALSO BE RECORDED. THIS INFORMATION SHALL BE STORED TO A MEMORY LOCATION ON THE FMCS OPERATOR WORKSTATION THAT IS MAINTAINED (NOT AUTOMATICALLY OVERWRITTEN).

AHU OUTSIDE AIR FLOW RATE SCHEDULE		
SYSTEM	HIGH MINIMUM OUTSIDE AIR FLOW RATE (CFM)	LOW MINIMUM OUTSIDE AIR FLOW RATE (CFM)
AHU-1M	2,500	1,250
AHU-2M	1,280	550

**SEQUENCE OF OPERATION:**

**WHEN AHU IS INDEXED TO RUN, THE FOLLOWING SHALL OCCUR:**

- SUPPLY FANS SHALL BE ENABLED TO RUN.
- WHEN THE SUPPLY FANS HAVE STARTED THE RELIEF FAN SHALL BE ENABLED TO RUN.

**SUPPLY FAN OPERATION:**  
 BAS SHALL MODULATE SIGNAL TO SUPPLY FAN VFD'S TO MAINTAIN DUCT STATIC PRESSURE AS MEASURED BY STATIC PRESSURE TRANSMITTER NEAR THE END OF THE CRITICAL DUCT BRANCH.

**RELIEF FAN OPERATION:**  
 RETURN FAN SHALL BE ENABLED TO RUN WHENEVER THE SUPPLY FAN IS INDEXED TO RUN. BAS SHALL MODULATE SIGNAL TO RELIEF FAN VFD AS REQUIRED TO MAINTAIN THE BUILDING STATIC PRESSURE AT +0.02" WC (ADJ.). WHEN THE RELIEF FAN IS INDEXED TO RUN THE FAN SHALL NOT START UNTIL THE DAMPER END SWITCH IS PROVEN. WHEN FAN IS INDEXED OFF THE RELIEF DAMPER SHALL CLOSE AND THERE SHALL BE A 30 SECOND DELAY BEFORE THE FAN IS SHUT DOWN.

**STATIC PRESSURE RESET:**  
 BAS SHALL RESET SUPPLY DUCT STATIC PRESSURE SETPOINT BELOW THE MAXIMUM SETPOINT AS REQUIRED TO MAINTAIN AT LEAST ONE SUPPLY TAB DAMPER 90% (ADJ.) OPEN. BAS SHALL MONITOR ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

**DISCHARGE AIR TEMPERATURE SET POINT:**  
 DISCHARGE AIR SET POINT SHALL BE 55°F (ADJ.).

**DISCHARGE AIR TEMPERATURE RESET:**  
 RESET DISCHARGE AIR TEMPERATURE BASED ON THE ZONE WITH THE GREATEST CALL FOR COOLING. RESET THE TEMPERATURE AS FOLLOWS:  
 • WHEN WORST CASE TAB IS LESS THAN 90% (ADJ.) OPEN FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL INCREASE BY 1°F (ADJ.). THIS SHALL CONTINUE UNTIL AHU MAXIMUM DISCHARGE AIR TEMPERATURE OF 60°F (ADJ.) IS ACHIEVED.  
 • WHEN WORST CASE TAB IS MORE THAN 90% OPEN FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL DROP BY 1°F (ADJ.). THIS SHALL CONTINUE UNTIL AHU MINIMUM DISCHARGE AIR TEMPERATURE OF 52°F (ADJ.) IS ACHIEVED.  
 • IF ANY DCV ZONE HAS A CO2 CONCENTRATION ABOVE ITS SCHEDULED SETPOINT AND THAT ZONE'S TAB MINIMUM FLOW IS RESET TO ITS MAXIMUM FLOW RATE, THE MINIMUM OA SETPOINT SHALL INCREASE UNTIL THAT ZONE CO2 SETPOINT IS SATISFIED OR UNTIL THE DESIGN OCCUPIED HIGH MINIMUM OUTSIDE AIR FLOW ON THE AHU SCHEDULE IS REACHED.  
 • IF THE CRITICAL ZONE'S CO2 CONCENTRATION DROPS BELOW THE SCHEDULED CO2 SETPOINT, THE MINIMUM OUTSIDE AIR RATE SHALL BE RESET LOWER UNTIL THE CO2 CONCENTRATION REACHES ITS SETPOINT OR UNTIL THE AHU OUTSIDE AIR FLOW RATE REACHES THE MINIMUM OA RATE IN AHU SCHEDULE.

**STATIC PRESSURE AND DISCHARGE AIR TEMPERATURE RESET PRIORITY:**  
 RESET THE DISCHARGE AIR TEMPERATURE PRIOR TO RESETTING THE DUCTWORK STATIC PRESSURE SETPOINT. ONCE THE MAXIMUM SUPPLY TEMPERATURE IS REACHED THEN THE SYSTEM SHALL ENABLE THE STATIC PRESSURE RESET

**DEMAND CONTROL VENTILATION:**  
 WHENEVER THE AIR HANDLING UNIT IS IN OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN. THE RETURN AIR AND OUTSIDE AIR DAMPER SHALL MODULATE IN OPPOSITION TO MAINTAIN THE MINIMUM OUTSIDE AIR FLOW RATE AS MEASURED AT THE OUTSIDE AIRFLOW MEASURING STATION. THE MINIMUM OUTSIDE AIR FLOW RATE SHALL BE RESET AS FOLLOWS:  
 • DURING OCCUPIED MODE, THE MINIMUM OA FLOW RATE SHALL NOT FALL BELOW THE AMOUNT LISTED IN THE AHU SCHEDULE.  
 • IF ANY DCV ZONE HAS A CO2 CONCENTRATION ABOVE ITS SCHEDULED SETPOINT AND THAT ZONE'S TAB MINIMUM FLOW IS RESET TO ITS MAXIMUM FLOW RATE, THE MINIMUM OA SETPOINT SHALL INCREASE UNTIL THAT ZONE CO2 SETPOINT IS SATISFIED OR UNTIL THE DESIGN OCCUPIED HIGH MINIMUM OUTSIDE AIR FLOW ON THE AHU SCHEDULE IS REACHED.  
 • IF THE CRITICAL ZONE'S CO2 CONCENTRATION DROPS BELOW THE SCHEDULED CO2 SETPOINT, THE MINIMUM OUTSIDE AIR RATE SHALL BE RESET LOWER UNTIL THE CO2 CONCENTRATION REACHES ITS SETPOINT OR UNTIL THE AHU OUTSIDE AIR FLOW RATE REACHES THE MINIMUM OA RATE IN AHU SCHEDULE.

**COOLING COIL OPERATION:**  
 BAS SHALL MODULATE CHILLED WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

**PREHEAT COIL OPERATION:**  
 PREHEAT COIL CONTROLS SHALL BE ENABLED WHEN OUTSIDE AIR TEMP DROPS BELOW 50°F (ADJ.). PREHEAT COIL CONTROLS SHALL BE DISABLED WHEN OUTSIDE AIR TEMP RISES ABOVE 54°F (ADJ.).

BAS SHALL MODULATE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

**BYPASS VALVE CONTROL (WHERE SHOWN):**  
 THE MINIMUM FLOW BYPASS CONTROL VALVE SHALL MODULATE OPEN PROPORTIONATELY AS THE ASSOCIATED COIL CONTROL VALVE CLOSES.

**DEHUMIDIFICATION:**  
 THE BAS SHALL MEASURE THE RETURN AIR HUMIDITY AND OVERRIDE THE COOLING SYSTEM TO MAINTAIN RETURN AIR HUMIDITY AT OR BELOW 55%. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON. DURING THE DEHUMIDIFICATION CYCLE THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN 50°F (ADJ.) SETPOINT AS SENSED BY THE COOLING COIL DISCHARGE AIR TEMP SENSOR. THE CHILLED WATER VALVE SHALL RETURN TO NORMAL OPERATION WHEN THE RA % RH IS BELOW 55% RH (ADJ.).

**ULTRAVIOLET LIGHT MONITOR:**  
 THE BAS WILL MONITOR THE OUTPUT POWER OF THE UV LIGHTS, THROUGH A RADIOMETER, AND WILL ALARM THE SYSTEM OPERATOR WHEN THE LEVEL DROPS BELOW ITS REPLACEMENT SETPOINT. UV LIGHTS WILL BE INTERLOCKED WITH DOOR SWITCHES IN ADJACENT ACCESS DOORS TO SHUT OFF LIGHTS WHENEVER THOSE DOORS ARE OPENED.

**ALARMS, INTERLOCKS, AND SAFETIES:**

WHEN FIRE ALARM CONTROL PANEL INDICATES AN ALARM CONDITION, AHU SHALL BE SHUTDOWN.

THE FOLLOWING CONDITIONS SHALL SHUTDOWN THE AHU AND SHALL INDICATE AN ALARM CONDITION AT THE BAS WORKSTATION:  
 • HIGH STATIC PRESSURE SWITCH INDICATES RELIEF DUCT DISCHARGE PRESSURE GREATER THAN THE SPECIFIED DUCT PRESSURE CLASS.  
 • LOW STATIC PRESSURE SWITCH INDICATES MIXED AIR PRESSURE LESS THAN THE SPECIFIED DUCT PRESSURE CLASS OF THE OUTSIDE AIR DUCTWORK.  
 • HIGH STATIC PRESSURE SWITCH INDICATES SUPPLY DUCT STATIC PRESSURE GREATER THAN THE SPECIFIED DUCT PRESSURE CLASS.  
 • SHOULD ANY ONE FOOT SECTION OF THE MANUAL RESET LOW LIMIT TEMPERATURE SWITCH #1 SENSE AIR TEMP <34°F (ADJ.). IF MULTIPLE FREEZE STATS ARE REQUIRED, WIRE ALL TO A COMMON RESET SWITCH.

THE FOLLOWING CONDITIONS SHALL INDICATE AN ALARM AT THE FMCS, HOWEVER AHU SHALL CONTINUE TO OPERATE:  
 • AN ALARM IS INDICATED AT ANY SUPPLY FAN VFD OR RELIEF FAN VFD.  
 • DIFFERENTIAL PRESSURE TRANSDUCER ACROSS FILTER BANK EXCEEDS 1.5 INCHES W.G. (ADJ.)  
 • SHOULD ANY ONE FOOT SECTION OF THE AUTO RESET LOW LIMIT TEMPERATURE SWITCH #2 SENSE AIR TEMPERATURE <38°F (ADJ.) THE FOLLOWING SHALL OCCUR:  
 • THE RETURN AIR DAMPER SHALL FULLY OPEN.  
 • THE OUTSIDE AIR AND RELIEF DAMPERS SHALL FULLY CLOSE.  
 • THIS ACTION SHALL OCCUR INDEPENDENT OF THE BAS AHU CONTROLLER. ONCE THE LOW LIMIT TEMPERATURE SWITCH #2 AIR TEMPERATURE RISES ABOVE SET POINT, OPERATION OF THE OUTSIDE AIR, RELIEF AIR, AND RETURN AIR DAMPERS SHALL BE RESTORED. HOWEVER, THE ALARM SHALL CONTINUE UNTIL ACKNOWLEDGED AND MANUALLY RESET BY THE BAS OPERATOR.  
 • SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 5°F (ADJ.) ABOVE OR BELOW SETPOINT.

IN THE EVENT SUPPLY FAN IS NOT RUNNING (AS INDICATED BY THE CURRENT SENSING RELAYS) RELIEF AIR FAN SHALL BE DE-ENERGIZED.

**WHENEVER AHU IS SHUTDOWN THE FOLLOWING SHALL OCCUR:**  
 • THE OUTSIDE AIR DAMPER AND RELIEF AIR DAMPER SHALL FULLY CLOSE.  
 • RETURN AIR DAMPER SHALL FULLY OPEN.  
 • HEATING WATER CONTROL VALVE SHALL REMAIN UNDER CONTROL OF ITS INPUT SENSOR.  
 • CHILLED WATER CONTROL VALVE SHALL FULLY CLOSE.  
 • SUPPLY FAN AND RELIEF FAN VFD'S SHALL BE DE-ENERGIZED.

**UNOCCUPIED MODE:**  
 PROVIDE TIME OF DAY SCHEDULE TO ALLOW AHU TO ENTER UNOCCUPIED MODE PER SCHEDULE. COORDINATE SCHEDULE WITH OWNER.  
 • THE SUPPLY FANS SHALL CONTINUE RUNNING.  
 • THE RELIEF FAN WILL BE DISABLED. THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN.  
 • ALL SPACE TEMPERATURES SHALL BE ALLOWED TO VARY +/- 10°F (ADJ.) FROM OCCUPIED SETPOINT.

**HEATING OPTIMUM START-UP:**  
 • THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL DETERMINE THE MINIMUM RUNTIME TO WARM THE SPACES TO THEIR SETPOINT WHEN THE COMPUTED START TIME IS REACHED. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 85°F (ADJ.). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES EXCEED A SETPOINT OF 68°F (ADJ.). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL.

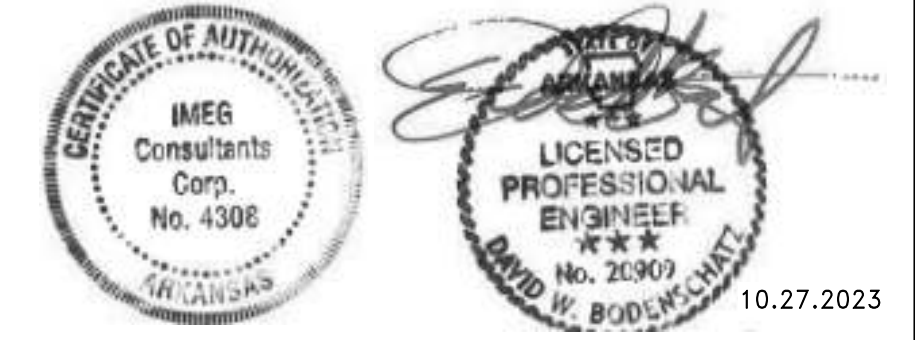
**COOLING OPTIMUM START-UP:**  
 • THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL DETERMINE THE MINIMUM RUNTIME TO COOL THE SPACES TO THEIR SETPOINT WHEN THE COMPUTED START TIME IS REACHED. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 55°F (ADJ.). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES ARE LESS THAN A SETPOINT OF 75°F (ADJ.). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL.

**GRAPHICAL DISPLAY:**  
 DISPLAY THE GLOBAL OUTSIDE AIR TEMPERATURE AND HUMIDITY ON AHU GRAPHIC PAGE.

# AIR HANDLING UNIT - VAV CHILLED AND HEATING WATER WITH DEMAND CONTROL VENTILATION AND AIRFLOW MEASURING

1 NO SCALE

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MEP/ENG: IMEG CORP. 1400 BALTIMORE STREET, SUITE 300 KANSAS CITY, MO T: 816.842.8437			REHABILITATE BATHHOUSES HOT SPRINGS NATIONAL PARK	PMIS/PKG NO. 318674 SHEET 161 OF 286



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