

	<div><div>SEQUENCES OF OPERATION</div><div><div><div><div>A</div><div><div><div><div><div>432ACU01-A1</div><div>UNIT MUST BE FURNISHED WITHOUT DDC CONTROLS PACKAGE AND HAVE ALL FUNCTIONS AND COMMANDS CONTROLLED BY LOCAL FIELD-INSTALLED ALC CONTROLLER AS DESCRIBED BELOW.</div></div></div><div><div>RUN CONDITIONS - SCHEDULED:</div><div>THE UNIT MUST RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE CONFIGURABLE OVER ALC IN THE FOLLOWING MODES:<ul style="list-style-type: none"><li>• OCCUPIED MODE, MONDAY THROUGH FRIDAY 6AM TO 6PM (ADJ.): THE UNIT MUST MAINTAIN A ZONE TEMPERATURE CORRESPONDING TO<ul style="list-style-type: none"><li>• A 70°F (ADJ.) COOLING SETPOINT</li><li>• A 68°F (ADJ.) HEATING SETPOINT</li></ul></li><li>• UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT MUST MAINTAIN A ZONE TEMPERATURE CORRESPONDING TO<ul style="list-style-type: none"><li>• A 80°F (ADJ.) COOLING SETPOINT.</li><li>• A 55°F (ADJ.) HEATING SETPOINT.</li></ul></li></ul></div></div></div><div><div>ALARMS MUST BE PROVIDE OVER ALC AS FOLLOWS:</div><div><ul style="list-style-type: none"><li>• HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY 5°F (ADJ.)</li><li>• LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY 5°F (ADJ.)</li></ul></div></div><div><div>PURGE MODE:</div><div>WHEN PUSHBUTTON FOR PURGE ACTIVATION IS PRESSED IN ROOM, THE UNIT SHALL BE COMMANDED ON AND ENTER 100% ECONOMIZER MODE. OUTSIDE AIR DAMPER SHALL BE COMMANDED FULLY OPEN, EXHAUST AIR DAMPER SHALL BE COMMANDED FULLY CLOSED. HEATING MODE SHALL BE ALLOWED DURING 100% ECONOMIZER ONLY DURING ACTIVE PURGE MODE - HEATING CONTROL VALVE SHALL MODULATE TO MAINTAIN MINIMUM 50 DEG. F.</div><div>THE UNIT SHALL REMAIN IN PURGE MODE FOR 30 MINUTES (ADJ.) AFTER WHICH THE UNIT SHALL RETURN TO PREVIOUS OPERATING MODE.</div></div><div><div>FREEZE PROTECTION:</div><div>THE UNIT MUST REMAIN RUNNING, BUT GENERATE AN ALARM IF THE AIR TEMPERATURE AT FREEZESTAT IS SENSED TO BE LESS THAN 35°F (ADJ.). THE COOLING COIL VALVE MUST OPEN TO 50% (ADJ.) WHENEVER THE FREEZESTAT IS ON. THE HEATING COIL VALVE MUST OPEN TO 100% (ADJ.) WHENEVER THE FREEZESTAT IS ON. LEAD CHILLED WATER PUMP SHALL BE ENABLED UNTIL FREEZESTAT ALARM IS CLEARED IF PUMP STATUS IS OFF. PUMP SHALL DISABLE IF ONLY COMMANDED ON BY FREEZESTAT ALARM. FREEZESTAT SHALL AUTOMATICALLY RESET WHEN AIR TEMPERATURE AT FREEZESTAT IS GREATER THAN 40°F (ADJ.) FOR 5 MINUTES (ADJ.).</div><div>SMOKE DETECTION:</div><div>THE UNIT MUST SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SHUTDOWN COMMAND FROM BUILDING FIRE ALARM CONTROL SYSTEM. SUPPLY AIR SMOKE DETECTOR STATUS MUST BE MONITORED BY FIRE ALARM CONTROL SYSTEM AND BAS.</div><div>OPTIMAL START:</div><div>THE UNIT MUST USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM MUST MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.</div></div><div><div>SUPPLY FANS:</div><div>FOUR SUPPLY FANS WITH INDIVIDUAL VARIABLE-SPEED MOTORS ARE PROVIDED FOR N+1 REDUNDANCY. ALL SUPPLY FANS MUST RUN AT IDENTICAL CONSTANT SPEED (ADJ.) ANYTIME THE UNIT IS COMMANDED TO RUN. SUPPLY FANS MUST RUN AT SPEED CORRESPONDING TO DESIGN AIRFLOW SETPOINT (16,400 CFM) (SPEED VALUES ACTIVELY COMMUNICATED IN RESPONSE TO MEASURED SUPPLY AIRFLOW) ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.</div></div><div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:</div><div><ul style="list-style-type: none"><li>• HIGH SUPPLY AIR FLOWRATE: IF THE SUPPLY AIR FLOWRATE IS 5% (ADJ.) GREATER THAN DESIGN AIRFLOW SETPOINT (16,400 CFM).</li><li>• LOW SUPPLY AIR FLOWRATE: IF THE SUPPLY AIR FLOWRATE IS 5% (ADJ.) LESS THAN DESIGN AIRFLOW SETPOINT (16,400 CFM).</li></ul></div></div><div><div>ZONE TEMPERATURE SETPOINT ADJUST:</div><div>THE OCCUPANT MUST BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.</div></div><div><div>OCCUPANT ZONE SETPOINT CONTROL RANGE:</div><div><ul style="list-style-type: none"><li>• +/-2°F (ADJ.) AROUND SETPOINT</li></ul></div></div><div><div>ZONE UNOCCUPIED OVERRIDE:</div><div>A TIMED LOCAL OVERRIDE CONTROL MUST ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME, INITIALLY 1 HOUR (ADJ.) AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT MUST AUTOMATICALLY RETURN TO THE SCHEDULE.</div></div><div><div>COOLING MODE:</div><div>THE ALC CONTROLLER MUST MEASURE THE ZONE TEMPERATURE AND MUST MODULATE ACU-01 SUPPLY AIR TEMPERATURE SETPOINT TO MAINTAIN ACTIVE ZONE TEMPERATURE SETPOINT. ACU-01 SUPPLY AIR TEMPERATURE SETPOINT MUST INCREASE AS THE ZONE TEMPERATURE DROPS BELOW THE ACTIVE ZONE TEMPERATURE SETPOINT OR DECREASE AS THE ZONE TEMPERATURE RISES ABOVE THE ACTIVE ZONE TEMPERATURE SETPOINT.</div></div><div><div>THE ALC CONTROLLER MUST MEASURE ACU-01 SUPPLY AIR TEMPERATURE AND MODULATE ACU-01 COOLING COIL VALVE TO MAINTAIN ACU-01 SUPPLY AIR TEMPERATURE SETPOINT.</div></div></div></div><div><div>HEATING MODE:</div><div>THE ALC CONTROLLER MUST MEASURE THE ZONE TEMPERATURE AND MUST MODULATE ACU-01 SUPPLY AIR TEMPERATURE SETPOINT TO MAINTAIN ACTIVE ZONE TEMPERATURE SETPOINT. ACU-01 SUPPLY AIR TEMPERATURE SETPOINT MUST DECREASE AS THE ZONE TEMPERATURE RISES ABOVE THE ACTIVE ZONE TEMPERATURE SETPOINT OR INCREASE AS THE ZONE TEMPERATURE DROPS BELOW THE ACTIVE ZONE TEMPERATURE SETPOINT.</div><div>THE ALC CONTROLLER MUST MEASURE ACU-01 SUPPLY AIR TEMPERATURE AND MODULATE ACU-01 HEATING COIL VALVE TO MAINTAIN ACU-01 SUPPLY AIR TEMPERATURE SETPOINT.</div><div>ACU-01 HEATING SHALL BE ENABLED WHENEVER:<ul style="list-style-type: none"><li>• OUTSIDE AIR TEMPERATURE IS LESS THAN 58°F (ADJ.),AND THE SUPPLY AIR TEMPERATURE IS ABOVE ACTIVE SUPPLY AIR TEMPERATURE SETPOINT.</li><li>• AND THE SUPPLY AIR TEMPERATURE IS BELOW ACTIVE SUPPLY AIR TEMPERATURE SETPOINT.</li><li>• AND ACU-01 FAN STATUS IS ON.</li><li>• AND ACU-01 COOLING IS NOT ACTIVE.</li></ul></div><div>ECONOMIZER:</div><div>THE ALC CONTROLLER MUST MEASURE THE MIXED AIR TEMPERATURE AND MODULATE THE ECONOMIZER DAMPERS IN SEQUENCE TO MAINTAIN A MIXED AIR TEMPERATURE SETPOINT 2°F (ADJ.) LESS THAN THE SUPPLY AIR TEMPERATURE SETPOINT. THE OUTSIDE AIR DAMPER MUST MAINTAIN A MINIMUM ADJUSTABLE POSITION CORRESPONDING TO DESIGN MINIMUM OUTSIDE AIRFLOW (980 CFM) (ADJ.) WHENEVER OCCUPIED. AIRFLOW MONITORING STATION SHALL BE USED TO VERIFY OUTSIDE AIR FLOWRATE.</div><div>THE ECONOMIZER SHALL BE ENABLED WHENEVER:<ul style="list-style-type: none"><li>• OUTSIDE AIR TEMPERATURE IS AT LEAST 3°F (ADJ.) LESS THAN THE RETURN AIR TEMPERATURE FOR 5 MINUTES (ADJ.)</li><li>• AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN 75°F (ADJ.)</li></ul></div><div>THE ECONOMIZER SHALL BE DISABLED WHENEVER:<ul style="list-style-type: none"><li>• FREEZESTAT IS ON</li><li>• OR LOSS OF SUPPLY FAN STATUS</li><li>• OR OUTSIDE AIR TEMPERATURE IS AT LEAST 3°F (ADJ.) MORE THAN THE RETURN AIR TEMPERATURE FOR 5 MINUTES (ADJ.)</li><li>• OR MIXED AIR TEMPERATURE IS LESS THAN 35°F (ADJ.)</li><li>• AND OUTSIDE AIR TEMPERATURE IS MORE THAN 78°F (ADJ.)</li></ul></div><div>HEATING MUST BE DISABLED WHEN ECONOMIZER MODE IS ACTIVE - UNLESS PURGE MODE IS ACTIVATED, SEE PURGE MODE.</div><div>THE ECONOMIZER MUST CLOSE WHENEVER THE FREEZESTAT IS ON - UNLESS PURGE MODE IS ACTIVATED, SEE PURGE MODE.</div><div>THE OUTSIDE AIR DAMPER MUST CLOSE, THE EXHAUST AIR DAMPER MUST CLOSE, AND THE RETURN AIR DAMPER MUST OPEN WHEN THE UNIT IS OFF.</div><div>WHEN OPTIMAL START UP MODE IS ACTIVE, THE OUTSIDE AIR DAMPER MUST MODULATE TO FULLY CLOSED AND THE RETURN AIR DAMPER MUST MODULATE TO FULLY OPEN.</div><div>BUILDING PRESSURIZATION CONTROL:</div><div>THE ALC CONTROLLER MUST MEASURE THE OUTSIDE AIR FLOWRATE AND RELIEF AIR FLOWRATE AND MODULATE THE RELIEF AIR FANS SO THAT RELIEF AIR FLOWRATE ALWAYS EQUALS OUTSIDE AIR FLOWRATE.</div><div>RELIEF FANS MUST BE ENABLED WHEN THE SUPPLY FAN STATUS IS PROVEN ON AND RELIEF FANS MUST TURN OFF WHEN THE UNIT IS OFF.</div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:<ul style="list-style-type: none"><li>• HIGH RELIEF AIR FLOWRATE: IF THE RELIEF AIR FLOWRATE IS 5% (ADJ.) GREATER THAN OUTSIDE AIR FLOWRATE.</li><li>• LOW RELIEF AIR FLOWRATE: IF THE RELIEF AIR FLOWRATE IS 5% (ADJ.) LESS THAN OUTSIDE AIR FLOWRATE.</li></ul></div><div>FILTER DIFFERENTIAL PRESSURE MONITOR:</div><div>THE ALC CONTROLLER MUST MONITOR THE DIFFERENTIAL PRESSURE ACROSS INDIVIDUAL FILTER SECTIONS.</div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:<ul style="list-style-type: none"><li>• PRE-FILTER CHANGE REQUIRED: FILTER DIFFERENTIAL PRESSURE EXCEEDS 1.0 IN. W.C. (ADJ.)</li><li>• FINAL FILTER CHANGE REQUIRED: FILTER DIFFERENTIAL PRESSURE EXCEEDS 1.0 IN. W.C. (ADJ.)</li></ul></div><div>SUPPLY AIR TEMPERATURE MONITORING:</div><div>THE ALC CONTROLLER MUST MONITOR THE SUPPLY AIR TEMPERATURE.</div><div>FAN STATUS MONITORING:</div><div>THE ALC CONTROLLER MUST MONITOR THE FAN STATUS, ALL SUPPLY AND ALL RELIEF.</div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:<ul style="list-style-type: none"><li>• FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.</li><li>• FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.</li></ul></div><div>SHELTER IN PLACE (ALC COMMAND):</div><div>THE OUTSIDE AIR DAMPER MUST CLOSE, RELIEF FANS MUST DISABLE, AND UNIT MUST ENTER 100% RECIRCULATION MODE WHEN SYSTEM STATUS IS SHELTER IN PLACE, COMMANDED BY ALC BAS.</div><div>COMPRESSOR DEFROST MODE:</div><div>UNIT CONTROLLER SHALL ENABLE DEFROST MODE ACCORDING TO MANUFACTURER'S STANDARD DEFROST MODE CONTROL SEQUENCE.</div><div>WHEN UNIT IS IN DEFROST MODE, FAN SPEED SHALL BE REDUCED TO SPEED CORRESPONDING TO 1,260 CFM FOR DURATION OF DEFROST MODE.</div></div></div><div><div>432ACHPS01-4 / 432ACHPS02-5 / 432ACHPS04, PACKAGED HEAT PUMP UNITS</div><div><div>432ACHPS04 IS EXISTING TO REMAIN AND MAY NOT BE CAPABLE OF EVERY CONTROL FUNCTION IDENTIFIED HERE DUE TO LIMITATIONS OF EXISTING 432ACHPS04 CONTROLS CONFIGURATION. CONTROLS INTENT WITH 432ACHPS04 IS TO INCORPORATE AS MUCH OF THIS PROGRAMMING AS POSSIBLE WITHOUT SIGNIFICANT EQUIPMENT MODIFICATIONS TO ALLOW 432ACHPS02 AND 432ACHPS04 TO COOPERATE AND OPERATE IN UNISON WHERE POSSIBLE.</div><div>NEW ACHPS UNITS MUST BE PROVIDED WITH DDC CONTROLS PACKAGE AND HAVE SOME FUNCTIONS AND COMMANDS CONTROLLED BY ALC AND SOME FUNCTIONS CONTROLLED BY FACTORY-INSTALLED, INTEGRAL UNIT CONTROLLER AS DESCRIBED BELOW.</div><div>RUN CONDITIONS - SCHEDULED:</div><div>THE UNIT MUST RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE CONFIGURABLE OVER ALC IN THE FOLLOWING MODES:<ul style="list-style-type: none"><li>• OCCUPIED MODE, MONDAY THROUGH FRIDAY 6AM TO 6PM (ADJ.): THE UNIT MUST MAINTAIN<ul style="list-style-type: none"><li>• A 72°F (ADJ.) COOLING SETPOINT</li><li>• A 70°F (ADJ.) HEATING SETPOINT</li></ul></li><li>• UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT MUST MAINTAIN<ul style="list-style-type: none"><li>• A 85°F (ADJ.) COOLING SETPOINT.</li><li>• A 55°F (ADJ.) HEATING SETPOINT.</li></ul></li></ul></div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:<ul style="list-style-type: none"><li>• HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).</li><li>• LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).</li></ul></div><div>SMOKE DETECTION:</div><div>THE UNIT MUST SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SHUTDOWN COMMAND FROM BUILDING FIRE ALARM CONTROL SYSTEM. SUPPLY AIR AND RETURN AIR SMOKE DETECTOR STATUS MUST BE MONITORED BY FIRE ALARM CONTROL SYSTEM AND BAS.</div><div>ZONE TEMPERATURE SETPOINT ADJUST:</div><div>THE OCCUPANT MUST BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.</div><div>OCCUPANT ZONE SETPOINT CONTROL RANGE:</div><div><ul style="list-style-type: none"><li>• +/-2°F (ADJ.) AROUND SETPOINT</li></ul></div><div>ZONE OPTIMAL START:</div><div>THE UNIT MUST USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM MUST MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.</div><div>ZONE UNOCCUPIED OVERRIDE:</div><div>A TIMED LOCAL OVERRIDE CONTROL MUST ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME, INITIALLY 1 HOUR (ADJ.) AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT MUST AUTOMATICALLY RETURN TO THE SCHEDULE.</div><div>SMOKE DETECTION:</div><div>THE UNIT MUST SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SUPPLY AIR SMOKE DETECTOR STATUS.</div><div>SUPPLY FAN:</div><div>THE SUPPLY FAN MUST RUN AT CONSTANT SPEED CORRESPONDING TO DESIGN AIRFLOW SETPOINT (SEE EQUIPMENT SCHEDULES) (SPEED VALUE ACTIVELY COMMUNICATED IN RESPONSE TO MEASURED SUPPLY AIRFLOW) ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES. DESIGN AIRFLOW SETPOINT IS DIFFERENT FOR COOLING MODE AND HEATING MODE.</div><div>ALARMS MUST BE PROVIDED OVER ALC AS FOLLOWS:<ul style="list-style-type: none"><li>• HIGH SUPPLY AIR FLOWRATE: IF THE SUPPLY AIR FLOWRATE IS 5% (ADJ.) GREATER THAN DESIGN AIRFLOW SETPOINT (SEE ACHPS SCHEDULE).</li><li>• LOW SUPPLY AIR FLOWRATE: IF THE SUPPLY AIR FLOWRATE IS 5% (ADJ.) LESS THAN DESIGN AIRFLOW SETPOINT (SEE ACHPS SCHEDULE).</li></ul></div><div>HEATING AND COOLING - 1 COMPRESSOR STAGE:</div><div>THE UNIT CONTROLLER MUST MEASURE THE ZONE TEMPERATURE AND CYCLE THE COMPRESSOR TO MAINTAIN ITS SETPOINT. TO PREVENT SHORT CYCLING, THE STAGE MUST HAVE A USER DEFINABLE MINIMUM RUNTIME, INITIALLY 10 MINUTES (ADJ). THE COMPRESSOR MUST RUN SUBJECT</div></div></div></div></div>
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