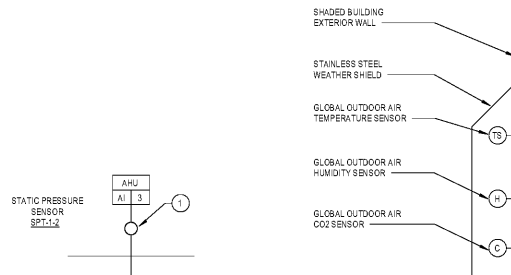


INPUT/OUTPUT SUMMARY

Table with columns: POINT NO., SYSTEM APPARATUS OR AREA POINT DESCRIPTION, ANALOG (MEASURED, CALC), BINARY, OUTPUTS (BINARY, ANALOG), SYSTEM FEATURES (ALARMS, PROGRAMS), GEN.

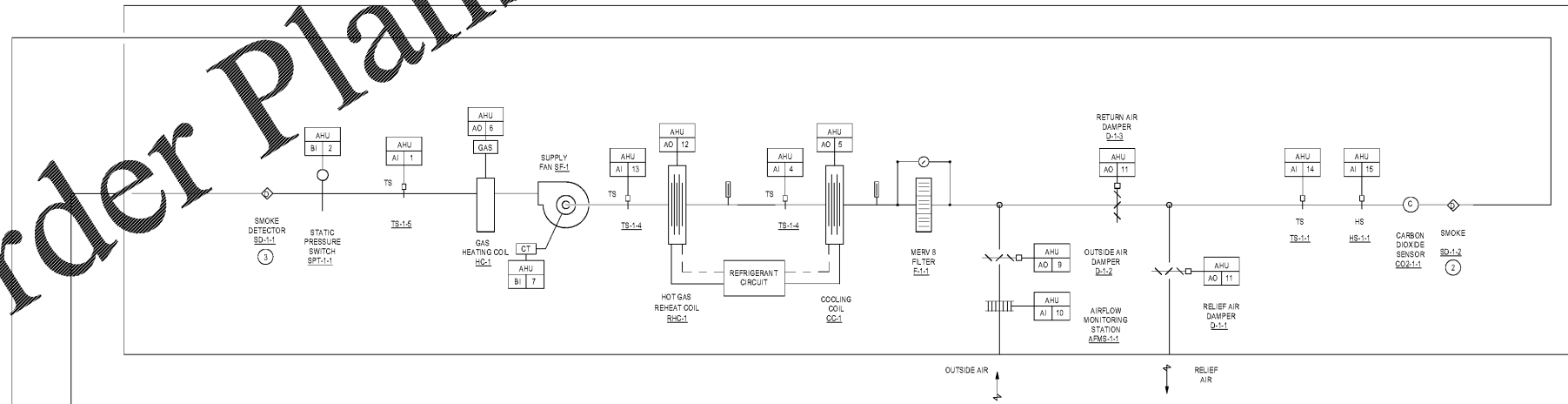
DRAWING NOTES:

- 1. STATIC PRESSURE SENSOR SHALL BE LOCATED IN THE SUPPLY DUCTWORK AT THE POINT(S) OF MINIMUM STATIC PRESSURE (TYPICALLY 20' DOWNSTREAM) AND THE INITIAL BALANCED SET POINT DETERMINED THROUGH TEST AND BALANCE.
2. SMOKE DETECTOR SHALL BE FURNISHED AND WIRED UNDER DIVISION 26 AND INSTALLED BY DIVISION 23.



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AHU CONTROLS DIAGRAM
SCALE: N.T.S.



SEQUENCE OF CONTROLS
PART 1 - TEMPERATURE CONTROL SEQUENCES
A. SEE SCHEMATICS FOR LOCATIONS OF ALL TEMPERATURE TRANSMITTERS, PANELS, DAMPERS, VALVES, AND EQUIPMENT...
B. THE BAS PROVIDER AND THE EQUIPMENT MANUFACTURER SHALL PROVIDE A COMPLETE LIST OF ALL BMS POINTS AVAILABLE TO BE ACCESSED FROM WITHIN THE MANUFACTURER'S FACTORY CONTROLLERS AND, SPECIFICALLY, IDENTIFY WHAT POINTS CAN BE READ FROM THE BAS...
C. THE BAS SUBMITTAL SEQUENCES AND POINTS LISTS SHALL INDICATE ALL ROUTINES THAT ARE CONTROLLED COMPLETELY BY THE MANUFACTURER'S CONTROLLERS...
D. THE BAS PROVIDER AND EQUIPMENT MANUFACTURER, IN COLLABORATION, SHALL PROVIDE COORDINATED SUBMITTALS THAT INDICATE ANYTHING THAT HAS TO BE SET, RESET OR ACCESSED IN A MANUFACTURER'S CONTROLLER AT THE POINTS OF EQUIPMENT AS OPPOSED TO BEING ACCESSED AT OR FROM THE BAS USER INTERFACE/CONTROL CONSOLE...
E. THE BAS PROVIDER SHALL BE FULLY ADJUSTABLE FROM THE BAS.
PART 2 - MASTER HEATING AND COOLING CONTROL
A. THE BAS SHALL COMMAND THE AIR HANDLING UNIT ON BASED ON THE OCCUPIED/UNOCCUPIED SCHEDULE (INITIAL SCHEDULE SHALL BE PROVIDED BY THE OWNER AND ENABLE THE AHU'S AUTOMATIC CONTROLS TO OPERATE AS INDICATED BELOW)
B. THE BAS SHALL NORMALLY CONTROL THE SYSTEM HEATING AND COOLING MODES AS SELECTED IN ACCORDANCE WITH OUTDOOR AIR TEMPERATURE THROUGH THE BUILDING GLOBAL OUTDOOR AIR SENSOR...
C. CONTROL POINT ADJUSTMENT FOR "HEATING" AND "COOLING" CHANGE OVER TEMPERATURE SHALL BE BY THE BAS.
D. WHERE USED TO CONTROL BOTH COMFORT HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEAD BAND OF AT LEAST 5°F WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS SHUT OFF OR REDUCED TO A MINIMUM.
PART 3 - AIR HANDLING UNIT CONTROL
A. SYSTEM CONTROL
a. SUPPLY FAN SHALL BE MANUALLY INDEXED TO THE AUTOMATIC MODE AT THE BYPASS.
b. THE AIR HANDLING UNIT SHALL BE ENERGIZED VIA REMOTE SIGNAL FROM THE BAS. THE BAS SHALL DETERMINE AND OPERATE THE UNIT ON AN OPTIMAL OCCUPIED AND UNOCCUPIED SCHEDULE WITH A 365 DAY/24 HOUR GRAPHIC INTERFACE SCHEDULE PROGRAM.
c. WHEN THE UNIT IS DEENERGIZED THROUGH THE BAS, ALL CONTROLS SHALL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING. THE SUPPLY FAN SHALL DEENERGIZE AND, AFTER AN ADJUSTABLE INTERVAL, OUTSIDE AIR DAMPER D-1-2 SHALL CLOSE. END SWITCH ON DAMPER SHALL PROVIDE PROOF OF CLOSURE. THE REFRIGERATION CIRCUIT SHALL DEENERGIZE.
d. WHEN THE AIR HANDLING UNIT IS ENERGIZED THROUGH THE BAS, THE RELIEF DAMPER D-1-1 AND OUTDOOR AIR D-1-2 DAMPERS SHALL OPEN TO THEIR MINIMUM BALANCED POSITIONS. THE SUPPLY FAN SHALL BE SOFT STARTED TO MINIMUM SPEED.
e. THE SUPPLY FAN SE-1 SHALL BE SOFT STARTED THROUGH THE BAS. UPON FAILURE OF DAMPER D-1-2 TO OPEN, THE AIR HANDLING UNIT SHALL BE DEENERGIZED AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS.
f. THE SUPPLY FAN SE-1 SPEED SHALL BE CONSTANT SPEED.
g. A FAILURE OF THE SUPPLY FAN AS SENSED BY THE CURRENT TRANSDUCER SHALL BE ALARMED TO THE BAS. UPON SENSING FAILURE, THE BAS SHALL INITIATE AN ALARM, DISABLE THE FAN AND RETURN ALL CONTROLS TO THEIR NORMAL POSITION.
h. WHEN THE UNIT IS DEENERGIZED THROUGH THE BAS, CONTROLS SHALL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING. OUTSIDE AIR DAMPER D-1-2 AND DAMPERS SHALL CLOSE. COOLING COIL SHALL BE DEENERGIZED. HEATING COIL SHALL BE DEENERGIZED. RETURN AIR DAMPER SHALL BE OPEN.

B. HEATING MODE CONTROL
a. OCCUPIED MODE: SUPPLY FAN SHALL BE RUNNING, OUTDOOR DAMPER D-1-2 SHALL BE SET TO THE MINIMUM POSITION. THE DIRECT EXPANSION REFRIGERANT COIL SHALL BE DEENERGIZED. THE GAS HEATING COIL SHALL BE ENERGIZED ON A DROP IN SPACE TEMPERATURE BELOW THE SPACE AIR TEMPERATURE SETPOINT OF SEVENTY (70) DEGREES FAHRENHEIT. THE BAS SHALL DEENERGIZE THE GAS HEATING COIL WHEN THE TEMPERATURE REACHES A MINIMUM OF SEVENTY (70) DEGREES FAHRENHEIT.
b. UNOCCUPIED MODE: THE BAS SHALL DETERMINE THE UNOCCUPIED MODE BASED ON A 365 DAY/24 HR GRAPHIC INTERFACE SCHEDULE PROGRAM. THE AIR HANDLING UNIT SHALL BE DEENERGIZED WHEN THE UNOCCUPIED MODE IS INITIATED. THE SUPPLY FAN SHALL BE ENERGIZED WHEN OUTDOOR AIR TEMPERATURE SENSOR FALLS BELOW 40 DEGREES FAHRENHEIT AND THE ROOM TEMPERATURE IS BELOW THE UNOCCUPIED TEMPERATURE SET POINT OF SIXTY-FIVE (65) DEGREES FAHRENHEIT (A.U.). THE ROOF TOP UNIT SHALL BE DEENERGIZED WHEN THE TEMPERATURE IN ALL ZONES REACHES A MINIMUM OF SEVENTY (70) DEGREES FAHRENHEIT (A.U.).
c. COOLING MODE CONTROL
a. OCCUPIED MODE: SUPPLY FAN SE-1 SHALL BE RUNNING, OUTDOOR DAMPER D-1-2 SHALL BE OPEN TO ITS MINIMUM POSITION.
b. THE BAS SHALL MODULATE THE REFRIGERANT CIRCUIT TO MAINTAIN THE SPACE AIR TEMPERATURE SET POINT OF SEVENTY-FIVE (75) DEGREES FAHRENHEIT. ON A FALL IN TEMPERATURE BELOW ITS SPACE AIR SET POINT OF SEVENTY-FIVE (75) DEGREES FAHRENHEIT, THE BAS SHALL DEENERGIZE THE REFRIGERANT CIRCUIT.
c. UNOCCUPIED MODE: THE BAS SHALL DETERMINE THE UNOCCUPIED MODE BASED ON A 365 DAY/24 HR GRAPHIC INTERFACE SCHEDULE PROGRAM. THE AHU SHALL BE DEENERGIZED WHEN THE UNOCCUPIED MODE IS INITIATED. THE SUPPLY FAN SHALL BE ENERGIZED WHEN OUTDOOR AIR TEMPERATURE, AS SENSED BY GLOBAL OUTDOOR AIR TEMPERATURE SENSOR, RISES ABOVE 70°F AND THE ROOM TEMPERATURE RISES ABOVE THE UNOCCUPIED TEMPERATURE SET POINT OF SEVENTY-FIVE (75) DEGREES FAHRENHEIT (A.U.). THE AHU SHALL BE DEENERGIZED WHEN THE TEMPERATURE REACHES A MINIMUM OF SEVENTY-FIVE (75) DEGREES FAHRENHEIT (A.U.).
d. OUTDOOR AIR DAMPER AND CO2 LEVEL CONTROL
a. THE OUTDOOR AIR DAMPER SHALL BE CLOSED DURING WARM-UP AND UNOCCUPIED MODES.
b. DURING OCCUPIED MODE, OUTDOOR AIR DAMPER SHALL INITIALLY OPERATE AT MINIMUM POSITION TO MAINTAIN THE MINIMUM OUTDOOR AIR QUANTITY AS SENSED BY OUTDOOR AIR FLOW MONITORING STATION LEMS-1-1. MINIMUM OUTDOOR AIR POSITION QUANTITY SHALL BE SET TO THE SCHEDULED VALUE.
c. THE OUTDOOR AIR DAMPER SHALL MODULATE TO MAINTAIN THE MAXIMUM OUTDOOR AIR QUANTITY UPON A RISE IN CO2 LEVEL. THE MAXIMUM OUTDOOR AIR POSITION QUANTITY SHALL BE SET TO THE SCHEDULED VALUE. ON A DROP IN CO2 DIFFERENTIAL FROM THE SET POINT, THE DAMPER SHALL MODULATE TO ITS MINIMUM POSITION.
e. ECONOMIZER CONTROL
a. WHEN THE OUTDOOR AIR DRY BULB TEMPERATURE IS LESS THAN 70°F AND THE ENTHALPY IS LESS THAN 28 BTULBS OF DRY AIR, THE BAS SHALL MODULATE THE OUTDOOR AIR RELIEF AND RETURN AIR DAMPERS TO MAINTAIN THE AHU LEAVING AIR TEMPERATURE SETPOINT OF 55°F.
b. ECONOMIZER CONTROL SHALL BE SALES IF OUTDOOR AIR DRY BULB TEMPERATURE RISES ABOVE 70°F OR ENTHALPY RISES ABOVE 30 BTULBS OF DRY AIR.
f. DEHUMIDIFICATION CONTROL
a. WHEN THE RETURN AIR RELATIVE HUMIDITY RISES ABOVE SIXTY (60) PERCENT, THE INTERMEDIATE CONTROL SYSTEM SHALL OPERATE THE REFRIGERANT CIRCUIT TO SUBCOOL THE SUPPLY AIR VIA THE EVAPORATOR COIL AND REHEAT THE AIR VIA THE HOT GAS REHEAT COIL. WHEN THE RETURN AIR RELATIVE HUMIDITY, SENSED BY SDC-1-1, DROPS BELOW FIFTY-FIVE (55) PERCENT, CONTROL OF REFRIGERANT CIRCUIT SHALL BE RETURNED TO THE SPACE AIR TEMPERATURE SENSOR.
b. ON A RISE IN RETURN AIR HUMIDITY ABOVE 60% RH ALL TEMPERATURE CONTROL, ECONOMIZER AND CO2 SEQUENCES SHALL BE OVERRIDDEN. OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS SHALL RETURN TO THEIR MINIMUM BALANCED POSITIONS.
c. WHEN THE RETURN AIR RELATIVE HUMIDITY DROPS BELOW 65% FOR 15 MINUTES, THE DEHUMIDIFICATION MODE SHALL BE CANCELED. THE DISCHARGE AIR SETPOINT SHALL BE RETURNED TO NORMAL (55°F) AND THE COOLING COIL SHALL BE CONTROLLED TO MAINTAIN THE DISCHARGE AIR SETPOINT.

G. SMOKE CONTROL
a. THE AHU AND ASSOCIATED AIR DISTRIBUTION SYSTEM SHALL BE EQUIPPED WITH SMOKE DETECTORS AND CONNECTED TO THE BUILDING FIRE ALARM SYSTEM IN ACCORDANCE WITH THE INTERNATIONAL FIRE AND MECHANICAL CODES.
b. ANY AHU OR ASSOCIATED AIR DISTRIBUTION (HVAC) SMOKE DETECTOR SHALL, UPON ACTIVATION, SHUT DOWN ALL OPERATIONAL CAPABILITIES OF THE AIR DISTRIBUTION SYSTEM. THE AIR HANDLING UNIT AND ALL ASSOCIATED SYSTEM SUPPLY FAN SHALL DEENERGIZE AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS.
c. ALL HVAC SMOKE DETECTORS SHALL BE CONNECTED TO THE FIRE ALARM SYSTEM AND ACTIVATE THE BUILDING'S ALARM NOTIFICATION AND AUDIOVISUAL ALARM INDICATING DEVICES IN ACCORDANCE WITH THE REQUIREMENTS OF THE INTERNATIONAL FIRE AND MECHANICAL CODES.
H. ALARMS
a. FAN FAILURE: A FAILURE OF THE SUPPLY FAN, AS SENSED BY THE CURRENT TRANSDUCER, SHALL BE ALARMED TO THE BAS. UPON SENSING FAILURE, THE BAS SHALL INDICATE ALARM, DISABLE THE FAN, AND RETURN ALL CONTROLS TO THEIR NORMAL POSITION.
b. DAMPER FAILURE: A FAILURE OF ANY OF THE DAMPERS THAT ARE REQUIRED TO BE PROVEN OPEN FOR NORMAL OPERATION SHALL BE ALARMED TO THE BAS. UPON SENSING FAILURE, THE BAS SHALL INDICATE ALARM, DISABLE THE AHU, AND RETURN ALL CONTROLS TO THEIR NORMAL POSITION.
I. FAILURE MODES
a. OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL BE CLOSED DURING WARM-UP AND UNOCCUPIED MODES.

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