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| 1 | Revision 1 - Owner Changes | 09/09/2024 |
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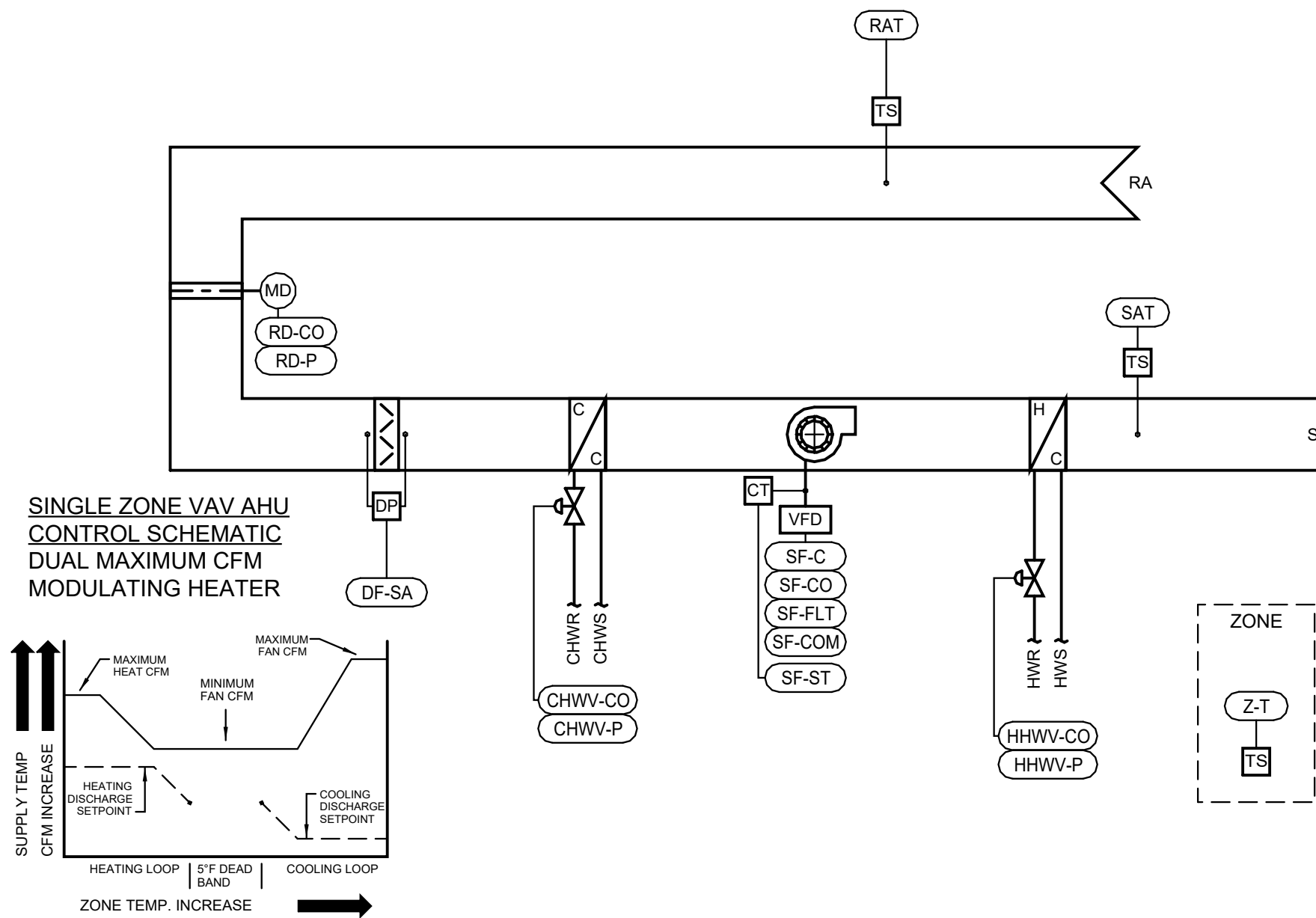
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M7.10

MECHANICAL CONTROLS

LSL PROJECT NUMBER: 2024-107.000

BENTON, ARKANSAS



| POINTS LIST - AIR HANDLING UNIT | | | | | | | | | | |
|---|---|------------|------------------|---------------------|---------------|------------------|-----------------|--------------|---------------------------|-------|
| POINT ID | DESCRIPTION | POINT TYPE | DEFAULT SETPOINT | SETPOINT RANGE | FAIL POSITION | TRENDING STORAGE | GRAPHIC DISPLAY | STATUS ALARM | ALARM RANGE | NOTES |
| ZONE LEVEL SENSORS | | | | | | | | | | |
| Z-T | ZONE TEMPERATURE | AI | SCHED. | | | X | X | | | D,E |
| Z-T-DB | ZONE TEMPERATURE DEADBAND | BV | 5 F | -2.5 F < Z-T < +2.5 | | X | X | | | D,E |
| AIR SENSING | | | | | | | | | | |
| SAT | SUPPLY AIR TEMPERATURE | AI | 54 F CLG; 85 HTG | 52 - 65 CLG | | X | X | X | SAT < 48 F OR SAT > 100 F | D |
| RAT | RETURN AIR TEMPERATURE | AI | | | | X | X | | | |
| FIRE ALARM CONTROL PANEL RELAY INTERLOCK | | | | | | | | | | |
| FA-SD | FIRE ALARM SHUTDOWN AND STATUS | BI | | | | | X | X | ON ACTIVATION | H |
| SUPPLY FAN | | | | | | | | | | |
| SF-COM | SUPPLY FAN VFD COMMUNICATION | COM | | | | | X | | | |
| SF-C | SUPPLY FAN COMMAND (ENABLE/DISABLE) | BO | | | | X | X | | | |
| SF-CO | SUPPLY FAN CONTROL OUTPUT - SPEED (PERCENT) | AV | | SCHED. | | X | X | | | |
| SF-ST | SUPPLY FAN STATUS | BI | | | | X | X | X | SF-ST <=> SF-C | |
| SF-FLT | SUPPLY FAN VFD FAULT | BV | | | | X | X | X | COMMON ALARM | |
| RETURN AIR DAMPERS - DAMPER POSITION TRACKING CONTROL | | | | | | | | | | |
| RD-CO | RETURN AIR DAMPER CONTROL OUTPUT | AO | | | NO | X | X | | | |
| RD-P | RETURN AIR DAMPER POSITION | AI | | | | X | X | X | RD-P <=> RD-CO | |
| SUPPLY AIR DIRTY FILTER INDICATION | | | | | | | | | | |
| DF-SA | SUPPLY AIR FILTER PRESSURE DIFFERENTIAL | AI | SCHED. | | | X | X | | | |
| COOLING COIL - CHILLED WATER MODULATING | | | | | | | | | | |
| CHWV-CO | CHILLED WATER VALVE CONTROL OUTPUT | AO | | | NO | X | X | | | |
| CHWV-P | CHILLED WATER VALVE POSITION (PERCENT) | AI | | | | X | X | X | CHWV-P <=> CHWV-CO | |
| HEATING COIL - HOT WATER MODULATING | | | | | | | | | | |
| HHWV-CO | HEATING HOT WATER VALVE CONTROL OUTPUT | AO | | | NO | X | X | | | |
| HHWV-P | HEATING HOT WATER VALVE POSITION (PERCENT) | AI | | | | X | X | X | HHWV-P <=> HHWV-CO | |
| ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE. PROVIDE UNIQUE POINT NAME FOR EACH CONTROL POINT CONSISTENT WITH THE MARK IDENTIFIER ON THE EQUIPMENT SCHEDULE (E.G. RH01-D-C) REFER TO SPECIFICATION FOR ADDITIONAL REQUIREMENTS. | | | | | | | | | | |
| NOTES: D. POINT SHALL BE ADJUSTABLE. E. DETERMINE SETPOINT DURING TESTING AND BALANCING. COORDINATE WITH THE TEST AND BALANCE CONTRACTOR. H. DEVICE AND RELAY FROM FIRE ALARM SYSTEM PROVIDED BY DIVISION 28. | | | | | | | | | | |

v1.03

1 SINGLE ZONE AIR HANDLING UNIT CONTROL DIAGRAM (AHU 10, AHU 11, AHU 12)
NTS

SEQUENCE OF OPERATIONS
SINGLE ZONE VARIABLE AIR
VOLUME AIR HANDLING UNITS
(AHU 10, AHU 11, AHU 12)

This sequence of operations is organized into the following main categories:
operating modes; control setpoint resets; safeties, overrides and interlocks; and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that are required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections. Setpoints shall be adjustable (adj.) as noted.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

GENERAL DESCRIPTION

The air handling unit(s) described by this sequence of operations consist(s) of a variable speed supply fan, a chilled water cooling coil, and a hot water heating coil to provide heating, ventilation, and air conditioning for the conditioned spaces as shown on the drawings.

OPERATING MODES

OCCUPIED MODE:

The unit shall be in occupied mode per the Project Design Conditions Schedule shown on the control drawings.

COOLING MODE:

The unit shall be in cooling mode when the zone temperature (Z-T) rises above the dead band (Z-T-DB).

HEATING MODE:

The unit shall be in heating mode when the zone temperature (Z-T) falls below the dead band (Z-T-DB).

UNOCCUPIED MODE:

The unit shall be in unoccupied mode for all periods not included in the occupied hours of operation. Overrides of unoccupied schedule are defined at the zone level control.

FREEZE PROTECTION MODE:

The unit shall be in freeze protection mode when the supply air temperature sensor (SAT) senses a temperature less than the alarm setpoint.

CONTROL SETPOINT RESETS

Not Used.

SAFETIES, OVERRIDES AND INTERLOCKS

FIRE ALARM CONTROL PANEL INTERLOCK:

The unit shall be disabled via relay circuit signal from the fire alarm control panel. Division 28 shall provide the relay and leads from relay to unit. BAS contractor shall connect leads to unit. Display relay status (normal or alarm) at BAS front end.

FREEZE PROTECTION MODE INTERLOCK:

The supply fan shall be disabled via hard wired interlock at the supply fan start circuit from the low limit temperature controller.

COMPONENT CONTROL LOOPS

SUPPLY FAN CONTROL-VFD:

When the HOA switch is in hand position, the variable speed supply fan shall operate at a speed set manually by the operator at the user interface of the drive.

When the HOA switch is in off position, the fan shall be off.

When the HOA switch is in auto position, the variable speed supply fan shall operate subject to the unit enable signal, and unit operating modes.

When in Occupied Mode:

The fan shall energize and slowly ramp to the initial minimum fan speed determined during system startup. Minimum fan speed shall be established during balancing.

When in Cooling Mode:

The fan VFD shall modulate to control zone temperature (Z-T) at setpoint. An increase in zone temperature causes an increase in airflow.

When in Heating Mode:

The fan VFD shall modulate to control zone temperature at setpoint. A decrease in zone temperature causes an increase in airflow.

When in Unoccupied Mode:

The fan shall be OFF. On a call for cooling/heating or override signal from the zone level, the fan shall operate as in occupied mode until the call is cleared or the override is removed.

When in Freeze Protection Mode:

The fan shall be OFF.

FILTER MONITORING:

When in All Modes:

The controller shall monitor the differential pressure across each filter bank and shall provide a signal when the setpoint is exceeded.

HEATING COIL - HOT WATER VALVE - MODULATING:

When in Occupied Mode:

When in Cooling Mode:

The coil shall be OFF.

When in Heating Mode:

The controller shall modulate the heating to maintain the supply air temperature setpoint (SAT).

When in Unoccupied Mode:

The valve shall be closed.

On a call for heating or override signal from the zone level the valve shall operate as in occupied mode until the call is cleared or the override is removed.

When in Freeze Protection Mode:

The valve shall be fully open.

When in Cooling Mode:

The valve shall modulate to maintain the supply air temperature setpoint (SAT).

When in Heating Mode:

The coil shall be OFF.

When in Unoccupied Mode:

The valve shall be closed.

On a call for cooling or override signal from the zone level the valve shall operate as in occupied mode until the call is cleared or the override is removed.

When in Freeze Protection Mode:

The valve shall be fully open.

And- The chilled water plant AHU freeze protection mode shall be activated.

OAT INTERLOCK:

When OAT is above 45 degrees Fahrenheit, heating mode shall be disabled.