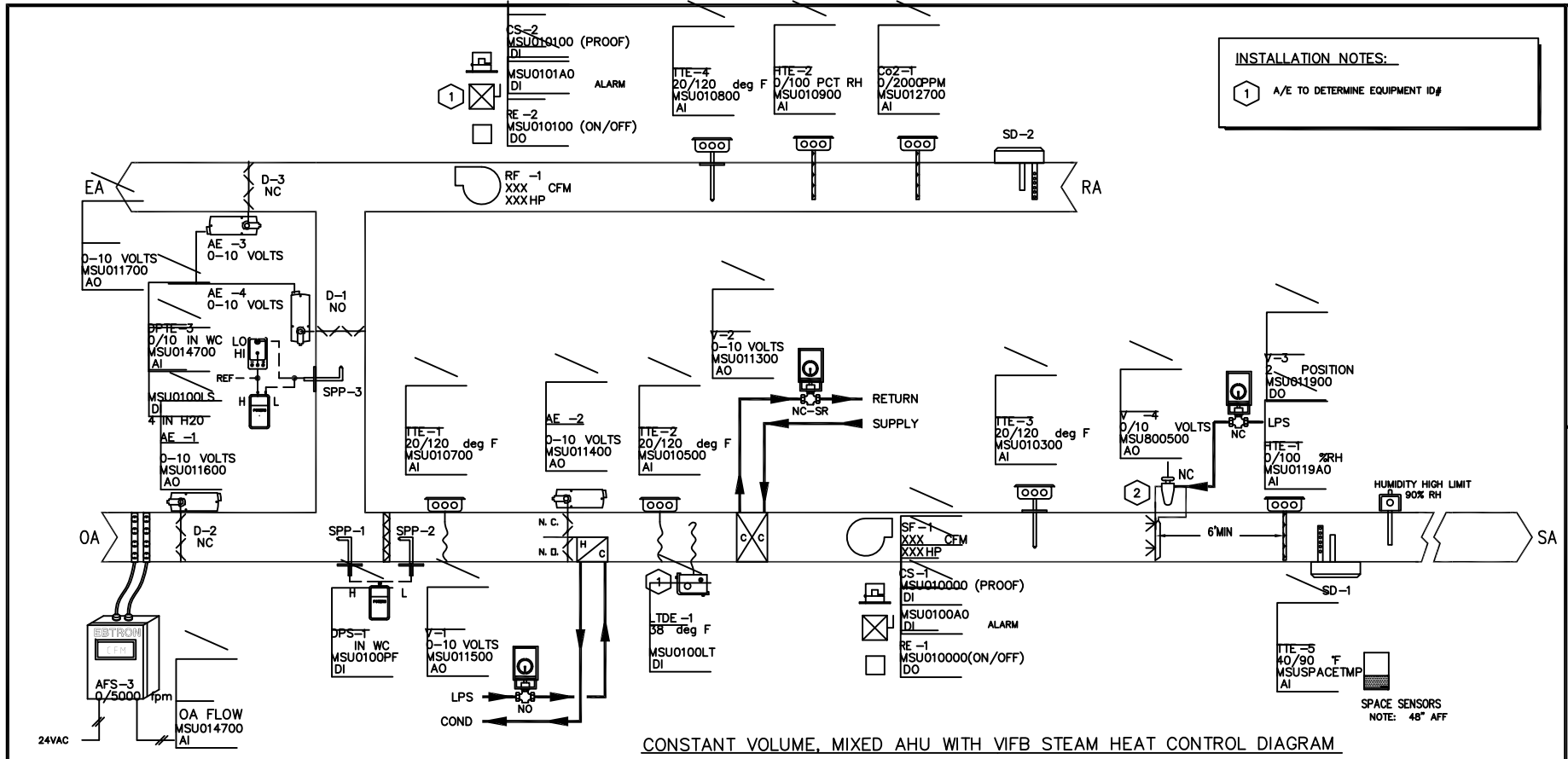


CONSTANT VOLUME, MIXED AHU WITH VFB STEAM HEAT CONTROL DIAGRAM



INSTALLATION NOTES:
1 A/E TO DETERMINE EQUIPMENT ID#

CONSTANT VOLUME, MIXED AHU WITH VFB STEAM HEAT CONTROL DIAGRAM

SEQUENCE OF OPERATION

CONSTANT VOLUME AIR HANDLING UNIT WITH MIXED AIR SYSTEM, RETURN FAN AND VFB STEAM HEAT

NOTE: ALL SETPOINTS DESCRIBED IN THE SEQUENCE WILL BE ADJUSTABLE BY SYSTEM OPERATORS. (CREATE REQUIRED VIRTUAL POINTS), APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL FAN MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

SYSTEM OFF:

1. THE SUPPLY AND RETURN FAN SHALL BE OFF. THE OUTSIDE AIR DAMPERS SHALL BE CLOSED. THE EXHAUST DAMPER SHALL BE CLOSED. THE RETURN AIR DAMPER SHALL BE OPEN. COOLING COIL CONTROL VALVE SHALL BE CLOSED. THE HUMIDITY ISOLATION AND CONTROL VALVE SHALL BE CLOSED. HEATING CONTROL VALVE SHALL BE UNDER THE CONTROL OF THE HEATING COIL DISCHARGE AIR TEMPERATURE AT ALL TIMES MAINTAINING A SETPOINT OF 50 DEG. F.

SYSTEM ON:

2. SUPPLY FAN AND RETURN FAN SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. SUPPLY FAN SHALL BE MONITORED BY DDC THRU A CURRENT RELAY AN ABNORMAL STATUS CONDITION SHALL ACTIVATE ALARM. THE RETURN FAN SHALL BE SOFTWARE INTERLOCKED TO RUN WHENEVER THE SUPPLY FAN IS PROVEN TO RUN.
3. HVAC UNIT SHALL OPERATE BASED ON TIME SCHEDULED OCCUPIED MODE COMPENSATED BY OPTIMUM START PROGRAM AND UNOCCUPIED CYCLE MODE. WHEN THE UNIT IS INDEXED TO START THE OUTSIDE AIR DAMPER SHALL SLOWLY OPEN TO MINIMUM OVER A FIXED PERIOD OF TIME TO PREVENT THE LOW TEMPERATURE DETECTOR FROM TRIPPING DURING COLD WEATHER. THE SUPPLY AND RETURN FANS SHALL BE ENERGIZED.

ENTHALPY ECONOMIZER CYCLE:

4. THE OUTSIDE AIR ENTHALPY (TOTAL HEAT CONTENT OF AIR) SHALL BE CALCULATED IN THE SOFTWARE BASED ON PSYCHOMETRIC PROPERTIES OF THE OUTSIDE AIR TEMPERATURE AND HUMIDITY. THE RETURN AIR ENTHALPY SHALL BE CALCULATED THE SAME WAY BASED ON THE RETURN AIR TEMPERATURE AND A FIXED CONSTANT SOFTWARE VALUE FOR THE RETURN AIR HUMIDITY.
5. IF THE OUTSIDE AIR ENTHALPY IS GREATER THAN THE RETURN AIR ENTHALPY AND CHILLED WATER IS AVAILABLE AS DETERMINED BY CHILLED WATER SUPPLY TEMPERATURE BEING BELOW 59 DEG. F., THE OUTSIDE, RETURN AIR AND EXHAUST AIR DAMPERS SHALL MODULATE TO MAINTAIN MINIMUM AIR OUTDOOR AIR SETPOINT (TO BE DETERMINED BY A/E FIRM) AS MEASURED BY THE UNIT'S OUTDOOR AIR FLOW STATION IF THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY, THE OUTSIDE, RETURN AIR AND EXHAUST AIR DAMPERS SHALL MODULATE TO MAINTAIN MIXED AIR SETPOINT OF 55 DEG. F. AN ADJUSTABLE DEADBAND OFFSET SHALL BE REQUIRED BETWEEN SWITCH OVER TO PREVENT SHORT CYCLING.
6. WITH THE RETURN AIR/EXHAUST AIR DAMPER SIGNAL BEING SEPARATE FROM THE OUTDOOR AIR DAMPER SIGNAL A DPS SWITCH SHALL BE INTERLOCKED TO THE AHU TO PREVENT OPERATION IN IT'S SETTING IS EXCEEDED. A PANEL MOUNT PILOT LIGHT SHALL BE USED FOR LOCAL INDICATION THAT THE DPS HAS TRIPPED.

OUTSIDE AIR VENTILATION-CARBON DIOXIDE (CO2) CONTROL:

7. WHEN IN OCCUPIED MODE, THE CONTROLLER SHALL MEASURE THE RETURN AIR CO2 LEVELS AND MODULATE THE OUTSIDE AIR DAMPER OPEN ON RISING CO2 CONCENTRATIONS, OVERRIDING NORMAL DAMPER TEMPERATURE AND MINIMUM OUTDOOR AIR FLOW OPERATIONS. CO2 SETPOINT OF 750 PPM (ADJ.)

ALARM SHALL BE PROVIDED AS FOLLOWS:

8. HIGH RETURN AIR CARBON DIOXIDE CONCENTRATION: IF THE RETURN AIR CO2 CONCENTRATION IS GREATER THAN 1000 PPM (ADJ.)
9. DISCHARGE AIR CONTROL: FOR HEATING AND COOLING OCCUPIED MODE, HVAC UNIT SHALL BE CONTROLLED TO MAINTAIN DISCHARGE AIR TEMP SETPOINT. THE DISCHARGE AIR TEMP SETPOINT WILL BE RESET BY THE SPACE TEMPERATURE SENSOR TO MAINTAIN SPACE TEMPERATURE SETPOINT
10. THE DISCHARGE AIR TEMPERATURE SENSOR SHALL MODULATE THE HEATING VALVE, COOLING VALVE AND THE FACE AND BYPASS DAMPER TO MAINTAIN A DISCHARGE AIR SETPOINT OF 55 DEG. F.
11. WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 55 DEG. F, THE HEATING VALVE SHALL BE CLOSED, THE FACE AND BYPASS DAMPER SHALL BE OPEN TO THE COIL AND THE COOLING VALVE SHALL MODULATE OPEN TO MAINTAIN DISCHARGE AIR SETPOINT.
12. WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55 DEG. F, THE COOLING VALVE SHALL BE CLOSED AND THE STEAM HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT ABOVE 42' F. BELOW 40' F THE HEATING COIL CONTROL VALVE SHALL BE FULL OPEN AND THE FACE AND BYPASS DAMPER SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE HEATING COIL AIR TEMPERATURE SENSOR SHALL ACT AS A LOW LIMIT AND NOT ALLOW THE HEATING COIL DISCHARGE TEMPERATURE TO FALL BELOW 45 DEG. F.(ADJ.)
13. HUMIDIFIER CONTROL: WHEN THE SYSTEM IS CALLING FOR HEATING THE HUMIDIFIER SHALL BE ENABLED AND THE ISOLATION VALVE SHALL BE OPENED THOUGHT THE DDC. ON A CALL FOR HUMIDIFICATION THE DDC SHALL MODULATE DUCT HUMIDIFIER CONTROL VALVE TO MAINTAIN SPACE

HUMIDITY SETPOINT. THE SETPOINT SHALL BE RESET, 30% RH WHEN OAT IS 55 DEGREES AND 25% WHEN OAT IS 35 DEGREES. A DDC DISCHARGE HUMIDITY SENSOR SHALL BE USED TO PREVENT HUMIDITY LEVELS FROM EXCEEDING 90% RH

14. HUMIDIFIER OPERATION SHALL BE HARDWIRED INTERLOCKED TO PREVENT OPERATION WHEN AHU IS NOT IN OPERATION AND A HARDWIRED HIGH LIMIT SHALL PROVIDE OVERRIDE CONTROL WHEN 95% RH SETPOINT IS REACHED
15. MINIMUM HIGH TEMPERATURE CONTROL: THE DDC SYSTEM SHALL MONITOR SPACE TEMPERATURE TO PREVENT THE SPACE FROM FALLING BELOW 62 DEG. F. WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 55 DEG. F.
16. WHEN THE MONITORED SPACES FALLS BELOW 62 DEG. F, THE AHU SHALL START UP AND RUN AT 100% RETURN AIR MODE. THE AHU SHALL CONTINUE TO RUN UNTIL THE SPACE TEMPERATURE RISES TO 65 DEG. F.
17. SAFETIES: THE SMOKE DETECTOR SHALL STOP THE SUPPLY AND RETURN FANS THROUGH THE FIRE ALARM SYSTEM WHEN SMOKE IS DETECTED.
18. FREEZE STAT ALARM SHALL ANNUNCIATE AT THE BAS. MANUAL RESET OF THE FREEZE STAT SHALL BE REQUIRED BEFORE AIR HANDLING UNIT RESTARTS. A PANEL MOUNT PILOT LIGHT SHALL BE USED FOR LOCAL INDICATION THAT THE FREEZE STAT HAS TRIPPED.
19. WHEN ANY SAFETY DEVICE TRIPS/ACTIVATION ALL CONTROL DEVICES SHALL FALL TO THE NORMAL FAIL SAFE POSITIONS

ALARMING

- NORMAL**
- SUPPLY FAN FAILURE
 - RETURN FAN FAILURE
 - FREEZE STAT
 - DISCHARGE AIR TEMPERATURE (+/- 5 DEGREES OF SETPOINT)
 - MIXED AIR TEMPERATURE (+/- 5 DEGREES OF SETPOINT)
 - SPACE TEMPERATURE (WHERE APPLICABLE)
 - DISCHARGE HUMIDITY HIGH LIMIT (90%)
 - FILTER STATUS
 - CO2 CONCENTRATION

"ENHANCED" 24/7

- IF SYSTEM SERVES CRITICAL AREA
- SUPPLY FAN FAILURE
- DISCHARGE AIR TEMPERATURE
- SPACE TEMPERATURE (WHERE APPLICABLE)

CS-STD_MEC_230923_AHU_CAV_MIXED_VFB_STM_DWG

DATE	9/10/10
DRAWN	
REVISION	7/11/16 RLANDRUM
DETAIL NO.	XXXXXX-XX
SHEET	OF ONE

