

SEQUENCE OF OPERATION FOR 7-AHU107

1. GENERAL

1.1. UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS "OFF" D-1, D-3, SHALL BE FULLY CLOSED. WHEN THE UNIT IS "ON" D-1, SD-1 AND SD-2 SHALL BE FULLY OPEN. D-2 AND D-3 SHALL MODULATE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE:

2. TEMPERATURE CONTROL

- 2.1. SUPPLY AIR TEMPERATURE (SAT) SETPOINT SHALL BE RESET LINEARLY BETWEEN AN ADJUSTABLE LOW AND HIGH LIMIT AS THE OUTSIDE AIR DRY BULB TEMPERATURE (OAT) AS SENSED BY TT-2 VARIES. WHEN THE OAT IS ABOVE 55°F, THE SAT SETPOINT SHALL NOT EXCEED 57°F.
- 2.2. THE SAT AS SENSED BY TT-1, SHALL BE MAINTAINED AT SETPOINT VIA DCP BY MODULATING V-1 OR D-2 AND D-3 OR V-2 IN SEQUENCE.
- 2.3. WHEN THE OAT IS ABOVE 75°F (ADJUSTABLE), THE DCP SHALL PREVENT THE MODULATION OF D-2 AND D-3 AND SHALL ASSUME THE MINIMUM OUTSIDE AIR POSITION (D-2 FULLY OPEN AND D-3 FULLY CLOSED). THE DCP SHALL MODULATE V-1 TO MAINTAIN THE SAT AS SENSED BY TT-1.
- 2.4. WHEN THE OAT IS BELOW THE SAT, DAMPERS D-1, D-2 AND D-3 SHALL MODULATE TO MAINTAIN THE SCHEDULED SAT. IF D-2 IS OPEN AND D-3 IS CLOSED TO MINIMUM OUTSIDE AIR, V-2 SHALL MODULATE OPEN TO MAINTAIN THE SAT SETPOINT.
- 2.5. THE PREHEAT VALVE, V-2 SHALL MODULATE TO MAINTAIN A SAT AT 50°F (ADJUSTABLE). THE PREHEAT VALVE, V-2 SHALL BE CLOSED WHEN THE OAT OR THE MIXED AIR TEMPERATURE (MAT) IS GREATER THAN 50°F (ADJUSTABLE).

3. AIR FLOW CONTROL

- 3.1. THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DCP MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER (VSMC) TO MAINTAIN 1.0" OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL ATUs.
- 3.2. THE DCP, USING TOTAL SUPPLY AIR AND RETURN AIR FLOW SIGNALS, SHALL RESET THE RETURN AIR FAN VSMC TO MAINTAIN A CONSTANT AIR FLOW DIFFERENCE BETWEEN THE SUPPLY AIR AND THE RETURN AIR EQUAL TO MINIMUM OUTSIDE AIR.
- 3.3. USING HIGH PRESSURE SENSOR SPS-2 LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT SPS-2 DOES EXCEED 3" THE SUPPLY AIR FAN SHALL STOP. SPS-2 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC AND UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. SPS-2 SHALL REQUIRE MANUAL RESET AT THE DEVICE. AN ALARM SHALL BE SENT TO THE BAS.
- 3.4. THE RETURN FAN SPEED SHALL BE MODULATED TO MAINTAIN AN AIRFLOW DIFFERENTIAL WITH A FAN SPEED DIFFERENTIAL OVERRIDE.

4. ECONOMIZER CONTROL

- 4.1. DURING ECONOMIZER MODE, THE DIGITAL CONTROL PANEL SHALL MODULATE THE OUTSIDE AIR (D-1), RETURN AIR (D-2) AND EXHAUST AIR (D-3) DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE 2° BELOW SETPOINT.

5. STATIC PRESSURE CONTROL

- 5.1. THE STATIC PRESSURE SETPOINT SHALL BE RESET LINEARLY BETWEEN AN ADJUSTABLE LOW AND HIGH LIMIT BASED ON OUTSIDE AIR DRY BULB TEMPERATURE.
- 5.2. A SEPARATE SCHEDULE WITH A DIFFERENT STATIC PRESSURE LOW AND HIGH LIMIT SETPOINTS SHALL BE UTILIZED DURING UNOCCUPIED PERIODS FOR AHUs THAT ARE REQUIRED TO REMAIN ON DURING THESE PERIODS.

6. HUMIDITY CONTROL

- 6.1. WHEN THE DCP IS NOT CALLING FOR HUMIDITY, SENSED BY RETURN AIR HUMIDITY H-1, 2-WAY "ON-OFF" CONTROL VALVE V-3 SHALL REMAIN CLOSED. WHEN THE DIGITAL CONTROL PANEL IS CALLING FOR HUMIDITY, V-3 SHALL REMAIN OPEN.
- 6.2. RETURN AIR HUMIDITY SHALL BE MAINTAINED AT SETPOINT OF 35% RH (ADJ) VIA DCP BY MODULATING CONTROL VALVE V-4 TO MAINTAIN THE DESIRED HUMIDITY. THE DCP SHALL OVERRIDE THIS CONTROL TO MAINTAIN HUMIDITY OF 80% AS SENSED BY H-2. DCP SHALL CLOSE VALVE V-3 WHENEVER THE SUPPLY FAN IS OFF. VALVE V-4 SHALL BE INTERLOCKED WITH A TEMPERATURE SWITCH TO KEEP THE HUMIDIFIER OFF UNTIL CONDENSATE TEMPERATURE APPROACHES STEAM TEMPERATURE.

7. FREEZE PROTECTION

- 7.1. IF THE AIR TEMPERATURE AS SENSED BY TT-3 FALLS BELOW 45°F, AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F, AS SENSED BY THE TSL THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DCP AND ECC. TSL-1 SHALL BE HARDWIRED TO THE SUPPLY FAN UFD AND UNIT SHALL BE SHUTDOWN IN HAND, AUTO OR BYPASS MODE. TSL-1 WILL REQUIRE MANUAL RESET AT THE DEVICE. AN ALARM SHALL BE SENT TO THE BAS.

8. AUTOMATIC SHUTDOWN/RESTART

- 8.1. WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD, THE SUPPLY AND RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE.
- 8.2. EXHAUST FANS SERVING AREA OF THE SUPPLY FAN SHALL CONTINUE TO RUN. SUPPLY AND RETURN FANS SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

9. EMERGENCY CONSTANT SPEED OPERATION

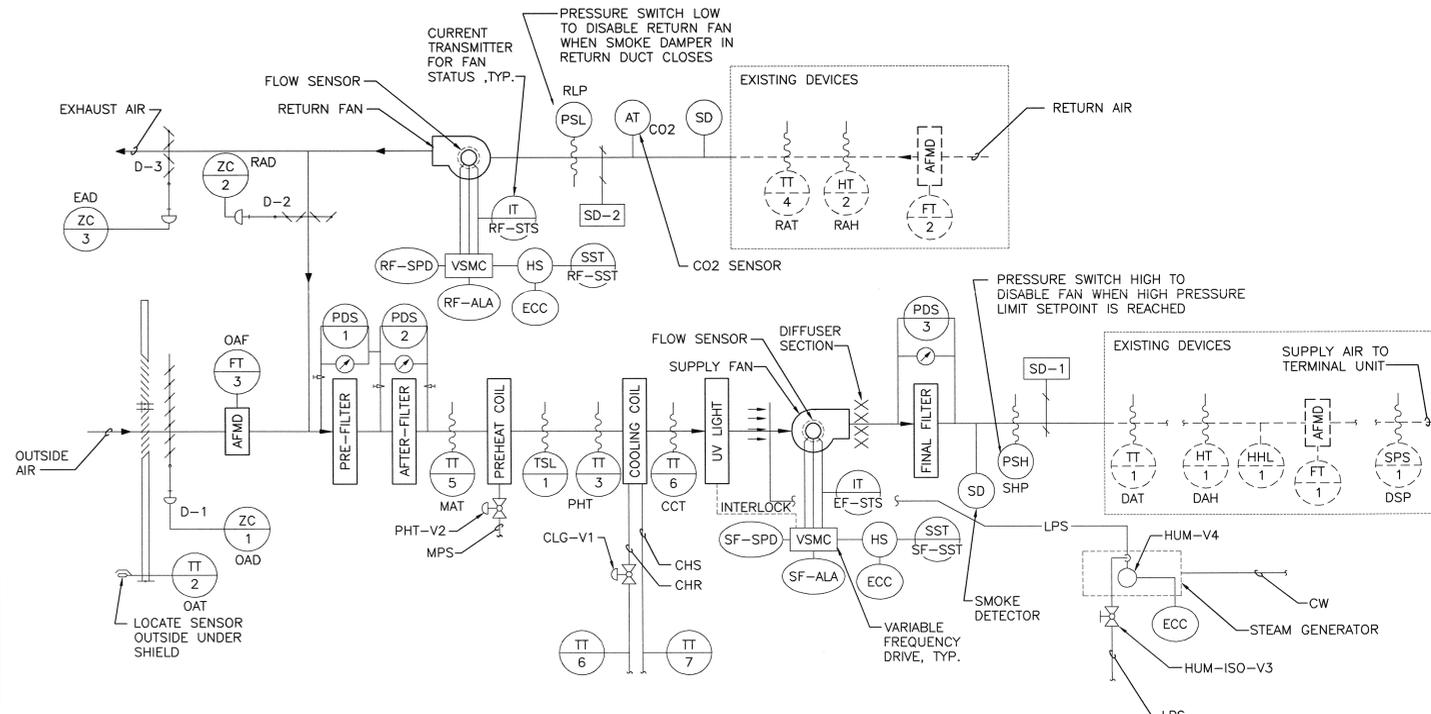
- 9.1. UPON FAILURE OF THE VSMC, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DIGITAL CONTROL PANEL OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

PDS-1, PDS-2, PDS-3:
PROVIDE A SINGLE DIAL-TYPE DIFFERENTIAL PRESSURE GAUGE WITH AIR SAMPLING TUBING AND THREE ISOLATION BALL VALVES TO MEASURE STATIC PRESSURE ACROSS PREFILTER AND AFTER FILTER AND THE TOTAL STATIC PRESSURE DROP ACROSS BOTH FILTER SECTIONS.

PROVIDE A SINGLE DIAL-TYPE DIFFERENTIAL PRESSURE GAUGE AT FINAL FILTER.

PROVIDE DEDICATED DDC PRESSURE DIFFERENTIAL SWITCH FOR EACH FILTER SECTION. THE DDC SWITCH SHALL INTERFACE WITH THE ECC SYSTEM TO PROVIDE A REMOTE MAINTENANCE ALARM, WHEN THE PRESSURE DROP EXCEEDS THE SWITCH ALARM SETTING.

JOB: 502-90C BUILDING: VA ALEXANDRIA BID PKG A POINTS LIST	POINT LEGEND	SYSTEM OUTPUTS		SYSTEM INPUTS		SYSTEM SOFTWARE/CONTROL		PAGE:
		BINARY	ANALOG	BINARY	ANALOG	ALARM PROCESSING	APPLICATION/FUNCTION	
SYSTEM: 7-AHU107								
SYSTEM COMPONENT:	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE, NO.	SELECTING DEVICE	STATUS	STATUS	STATUS	REMARKS
RETURN AIR TEMPERATURE	AI-1	RAT (TT-4)						
RETURN AIR HUMIDITY	AI-2	RAH (HT-2)						
RETURN AIR FLOW (CFM)	AI-3	RAF (FT-2)						
MIXED AIR TEMPERATURE	AI-4	MAT (TT-5)						
PRE-HEAT TEMPERATURE	AI-5	PHT (TT-3)						
COOLING COIL SUPPLY TEMP	AI-6	CCT (TT-6)						
COOLING COIL RETURN TEMP	AI-7	CCT (TT-7)						
DISCHARGE AIR TEMPERATURE	AI-8	DAT (TT-1)						
DISCHARGE STATIC PRESSURE	AI-9	DSP (SPS-1)						
DISCHARGE AIR HUMIDITY	AI-10	DAH (HT-1)						
SUPPLY AIR FLOW (CFM)	AI-11	SAF (FT-1)						
OUTSIDE AIR TEMPERATURE	AI-12	OAT (TT-2)						
RETURN LOW PRESSURE	BI-1	RLP (PSL)						
RETURN FAN STATUS	BI-2	RF-STG						
SUPPLY FAN STATUS	BI-3	SF-STG						
MIXED AIR LOW LIMIT	BI-4	TSL-1						
STATIC PRESSURE HIGH LIMIT	BI-5	SPS-2						
HUMIDITY HIGH LIMIT	BI-6	HHL-1						
SUPPLY FAN VSMC ALARM	BI-7	SF-ALA						
RETURN FAN VSMC ALARM	BI-8	RF-ALA						
RETURN FAN VSMC	AO-1	RF-SPD						FULL COMMUNICATION
SUPPLY FAN VSMC	AO-2	SF-SPD						FULL COMMUNICATION
OUTSIDE AIR DAMPER	AO-3	OAD (D-1)						
RETURN AIR DAMPER	AO-4	RAD (D-2)						
EXHAUST AIR DAMPER	AO-5	EAD (D-3)						
PRE-HEAT VALVE V-2	AO-7	PHT-V2						
COILING VALVE V-1	AO-8	CLG-V1						
STEAM HUMIDIFIER VALVE V-4	AO-9	HUM-V4						
RETURN FAN START/STOP	BO-1	RF-SST						
SUPPLY FAN START/STOP	BO-2	SF-SST						
STEAM ISOLATION VALVE V-3	BO-3	HUM-ISO-V3						



F5 7-AHU107 CONTROL DIAGRAM
SCALE: NONE

BUILDING AUTOMATION SYSTEM SHALL BE AN EXTENSION OF EXISTING SYSTEM.

REVISION NO.	REVISION DESCRIPTION	By	Date

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Recommended Approvals:	
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2. ASSOCIATE DIRECTOR	7. INFECTION CONTROL MANAGER
3. CHIEF OF STAFF	8. SAFETY MANAGER
4. ASSOC. DIRECTOR	9. GENERAL ENGINEER
5. SERVICE LINE MGRS.	10. COR

Drawing Title MECHANICAL CONTROL DIAGRAM	Project Title DESIGN BUILDING 7 AIR HANDLER UPGRADE - PROJECT A: 7-AHU107 & 7-AHU108	Date SEPT. 27, 2013
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