RTU-1&2 SEQUENCE OF OPERATION

VARIABLE VOLUME RTU WITH PREHEAT COIL DESIGNATED TO SKIP STATE 2 (ALL SET POINTS SHALL BE ADJUSTABLE)

1. SUPPLY AIR AND RETURN AIR FAN

A. SUPPLY AIR AND RETURN AIR FANS SHALL BE ENERGIZED/DE-ENERGIZED FROM THE VFD IN HAND POSITION OR THE DDC SYSTEM WHEN IN AUTO MODE. THE DDC CONTROL SYSTEM SHALL SENSE WHEN THE FAN IS IN HAND POSITION BY THE FAN STATUS VERIFICATION AND INITIATE THE AHU CONTROL SEQUENCE.

B. IN AUTO MODE THE TWO-POSITION MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL OPEN. ONCE THE DAMPER IS OPEN, THE SUPPLY FAN SHALL START, AND THE DDC SYSTEM SHALL SIGNAL THE ASSOCIATED RETURN AND EXHAUST FANS TO START. DDC SHALL UTILIZE A 15 SECOND TIME DELAY TO ALLOW SMOKE DAMPER OPENING PRIOR TO START OF FAN. IF THE FAN IS STARTED IN HAND THE TWO POSITION MINIMUM OUTSIDE AIR DAMPER SHALL OPEN IMMEDIATELY UPON SENSING FAN STATUS AS ON.

C. FANS SHALL SHUT DOWN FROM A SIGNAL FROM:
1) THE FIRE ALARM PANEL THRU THE F/A RELAY.
2) THE SUPPLY AIR SMOKE DETECTOR(S) (SD-SA).
3) FREEZE STAT, (TS-FRZ).
4) THE HIGH/LOW LIMIT STATIC PRESSURE SWITCHES (SPS-SHI & RLO).

D. WHEN THE SUPPLY FAN SHUTS DOWN THE FOLLOWING SHALL OCCUR:
1) THE MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL CLOSE.
2) THE ECONOMIZER OUTSIDE AIR DAMPER (D-EOA) SHALL CLOSE.
3) THE RELIEF DAMPER (D-REL) SHALL CLOSE, UNLESS RTU IS IN SMOKE PURGE MODE.
4) THE RETURN DAMPER (D-RET) SHALL OPEN.
5) THE CHILLED WATER VALVE (V-CHW) SHALL CLOSE.
6) THE PREHEAT COIL (V-HTG) SHALL REMAIN UNDER CONTROL OF THE PREHEAT DISCHARGE TEMP. SENSOR (TT-PHT).
7) THE RETURN FAN AND THE ASSOCIATED EXHAUST FANS SHALL SHUTDOWN, UNLESS RTU IS IN SMOKE PURGE MODE.
8) ASSOCIATED FIRE/SMOKE DAMPERS SHALL CLOSE IN SUPPLY DUCT, OTHERWISE ALL DAMPERS WILL ONLY CLOSE WHEN FIRE ALARM SHUTS DOWN UNIT.

2. SUPPLY FAN SPEED CONTROL

A. THE SUPPLY FANS VARIABLE FREQUENCY DRIVE (VFD) SHALL BE CONTROLLED BY A DUCT MOUNTED DIFFERENTIAL STATIC PRESSURE TRANSMITTER (SPT-SA) MODULATING THE VFD TO MAINTAIN A SUPPLY DUCT STATIC PRESSURE AT THE LOWEST SET POINT POSSIBLE AS DETERMINED BY THE TAB CONTRACTOR. FOR MULTIPLE STATIC PRESSURE TRANSMITTERS, THE DDC SYSTEM SHALL PROVIDE A SEPARATE SET POINT FOR EACH STATIC PRESSURE TRANSMITTER, AND SELECT THE STATIC PRESSURE TRANSMITTER THAT IS FARTHEST BELOW ITS SET POINT TO CONTROL THE SPEED OF THE VFD. THE VFD SHALL OUTPUT THE % FULL SPEED TO THE DDC SYSTEM THROUGH THE NETWORK INTERFACE.

B. ON A FALL IN DIFFERENTIAL PRESSURE SENSED BY SPT-SA, THE DDC SYSTEM SHALL SPEED UP THE SUPPLY FAN VFD TO MAINTAIN SPT-SA AT SET POINT. ON A RISE IN DIFFERENTIAL PRESSURE SENSED BY SPT-SA, THE DDC SYSTEM SHALL SLOW DOWN THE SUPPLY FAN VFD TO MAINTAIN SPT-SA AT SET POINT. SPT-SA SHALL ALARM THE DDC SYSTEM IF ITS MEASURED PRESSURE IS EITHER 50% HIGHER OR 50% LOWER THAN SET POINT.

C. SPS-SHI SHALL SHUTDOWN THE FANS WHENEVER IT SENSES A HIGH STATIC PRESSURE, ALARM THE DDC SYSTEM, AND REQUIRE A LOCAL MANUAL RESET TO RESTART THE FAN. SPS-RLO SHALL SHUTDOWN THE FANS WHENEVER IT SENSES A LOW STATIC PRESSURE AND ALARM THE DDC SYSTEM AND REQUIRE A LOCAL MANUAL RESET TO RESTART THE FAN

3. VOLUMETRIC TRACKING

A. THE RETURN FAN VFD SHALL BE CONTROLLED FROM AN OUTSIDE AIR QUANTITY SOFTWARE SET POINT (SCHEDULED OUTSIDE AIR QUANTITY, ADJ) USING AIRFLOW MEASURING DEVICES AND TRANSMITTERS AM-SA AND AM-RA INSTALLED AT THE INLET OF THE SUPPLY AND RETURN FANS. AM-SA SHALL MEASURE THE TOTAL AIRFLOW OF THE SUPPLY FAN AND AM-RA SHALL MEASURE THE TOTAL AIRFLOW OF THE RETURN FAN. THE AIRFLOW MEASURING TRANSMITTERS SHALL OUTPUT THE TOTAL CFM READING TO THE DDC SYSTEM. THE DDC SYSTEM SHALL CALCULATE THE DIFFERENCE OF THE TOTAL SUPPLY AIR AND THE TOTAL RETURN AIR TO MAKE AN OUTSIDE AIR QUANTITY SOFTWARE POINT. THE DDC SYSTEM SHALL MODULATE THE SPEED OF THE RETURN AIR FAN VFD TO MAINTAIN THE CALCULATED OUTSIDE AIR QUANTITY WITHIN 2% OF THE OUTSIDE AIR QUANTITY SET POINT.

4. AIR HANDLER OPERATING STATES

A. THE AIR HANDLING UNIT SHALL OPERATE IN FOUR DISTINCT STATES. CRITERIA TO TRANSITION BETWEEN STATES ARE INDICATED BELOW. TO TRANSITION BETWEEN STATES THE SPECIFIED CRITERIA SHALL BE MET FOR AN ADJ. MINIMUM PERIOD OF TIME REFERRED TO AS "TRANSITION TIME".

5. STATE 1 - FULL COOLING COIL

A. DURING THE NORMAL COOLING MODE, ECONOMIZER OUTSIDE AIR DAMPERS SHALL BE CLOSED. THE COOLING COIL CONTROL VALVE, V-CHW, SHALL BE CONTROLLED BY A CONTROL LOOP WITH THE DISCHARGE TEMP. TRANSMITTER, TT-DAT, AS THE INPUT, AND A SETPOINT EQUAL TO THE DISCHARGE AIR SETPOINT OF (55 DEGREES F, ADJ).

B. WHEN THE HIGHEST O.R. SPACE HUMIDITY REACHES 50% RH (ADJUSTABLE) FOR A TIME PERIOD OF 10 MINUTES (ADJUSTABLE) THE UNIT SHALL BE INDEXED INTO A LOW-TEMP COOLING MODE.

C. WHEN IN THE LOW-TEMP COOLING MODE THE DISCHARGE AIR TEMP SETPOINT WILL BE RESET TO 45 DEGREES F (ADJUSTABLE). THE ASSOCIATED LOW TEMP CHILLER, ACC-20, AND ASSOCIATED PUMPS WILL BE ENABLED. THE LOW-TEMP COOLING VALVE, V-GLY, SHALL BE FULLY OPEN AND CHILLED WATER VALVE, V-CHW, WILL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMP SETPOINT.

D. WHEN THE HIGHEST O.R. SPACE HUMIDITY IS SENSED BELOW 30% RH (ADJUSTABLE) FOR A TIME PERIOD OF 30 MINUTES (ADJUSTABLE) THE UNIT SHALL BE INDEXED INTO A NORMAL COOLING MODE.

E. THE COOLING COIL CONTROL LOOP SHALL CONTROL THE LEAVING AIR TEMP WITHIN +/- 0.5°F.

6. TRANSITION FROM STATE 1 TO STATE 2 (FREE COOLING):

A. THERE SHALL BE AN ADJUSTABLE OUTSIDE AIR ECONOMIZER ENABLE TEMP. (55 DEGREES F) AND AN ADJUSTABLE DEAD BAND (+/-2 DEGREES F). THE UNIT SHALL TRANSITION FROM STATE 1 TO STATE 2 WHENEVER THE OUTSIDE AIR TEMP. IS BELOW THE ECONOMIZER ENABLE TEMP. LESS THE DEAD BAND, (55 DEGREES F- 2 DEGREES F = 53 DEGREES F) FOR AN ADJUSTABLE TRANSITION TIME PREIOD OF 5 MINUTES.

7. TRANSITION FROM STATE 2 TO STATE 1:

A. THE UNIT SHALL TRANSITION FROM STATE 2 TO STATE 1 WHENEVER THE OUTSIDE AIR TEMP. IS ABOVE THE ECONOMIZER ENABLE TEMP. PLUS THE DEAD BAND (55 DEGREES F + 2 DEGREES F = 57 DEGREES F) FOR AN ADJ. TRANSITION TIME PERIOD OF 5 MINUTES.

8. STATE 2 - FREE COOLING:

A. THE COOLING COIL VALVE SHALL REMAIN CLOSED AND THE ECONOMIZER AIR DAMPER (D-EOA), RELIEF AIR DAMPER (D-REL), AND THE RETURN AIR DAMPER (D-RET) SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMP. AT THE DISCHARGE AIR TEMP. SET POINT.

B. THE DISCHARGE AIR TEMP. CONTROL LOOP SHALL HAVE THE UNIT DISCHARGE AIR TEMP. TRANSMITTER (TT-DAT) AS THE INPUT AND A SET POINT EQUAL TO THE COOLING COIL SET POINT (55°F). ON A RISE IN DISCHARGE AIR TEMP. THE ECONOMIZER OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL MODULATE OPEN AND THE RETURN AIR DAMPER SHALL MODULATE CLOSED. ON A FALL IN DISCHARGE AIR TEMP. THE ECONOMIZER OUTSIDE AIR DAMPER AND RELIEF AIR DAMPER SHALL MODULATE CLOSED AND THE RETURN AIR DAMPER SHALL MODULATE OPEN. DAMPERS SHALL MAINTAIN DAT TO WITHIN +/- 0.5°F OF SET POINT.

9. TRANSITION FROM STATE 2 TO STATE 3 (FULL ECONOMIZER WITH COOLING COIL):
A. THE UNIT SHALL TRANSITION FROM STATE 2 TO STATE 3 WHENEVER THE HIGHEST O.R. SPACE HUMIDITY IS SENSED ABOVE 50% RH (ADJUSTABLE) FOR A TIME PERIOD OF 10 MINUTES (ADJUSTABLE).

10.TRANSITION FROM STATE 3 TO STATE 2:

A. THE UNIT SHALL TRANSITION FROM STATE 3 TO STATE 2 WHENEVER THE HIGHEST O.R. SPACE HUMIDITY IS SENSED BELOW 30% RH (ADJUSTABLE) FOR

A TIME PERIOD OF 30 MINUTES (ADJUSTABLE).

11. STATE 2 - FULL ECONOMIZER WITH COOLING COIL:

A. ECONOMIZER OUTSIDE AIR DAMPERS SHALL BE FULLY OPEN. THE COOLING COIL CONTROL VALVE, V-CHW, SHALL BE CONTROLLED BY A CONTROL LOOP WITH THE DISCHARGE TEMP. TRANSMITTER, TT-DAT , AS THE INPUT, AND A SET POINT EQUAL TO THE DISCHARGE AIR SET POINT OF (45 DEGREES F, ADJ).

12. TRANSITION FROM STATE 2 TO STATE 4 (PREHEAT):

A. THE UNIT SHALL TRANSITION FROM STATE 2 TO STATE 4 WHENEVER THE ECONOMIZER DAMPER CONTROL LOOP HAS AN OUTPUT OF 0% OPEN FOR AN ADJUSTABLE TRANSITION TIME (5 MINUTES).

13. TRANSITION FROM STATE 4 (PREHEAT) TO STATE 2 (FREE COOLING):

A. THE UNIT SHALL TRANSITION FROM STATE 4 TO STATE 2 WHENEVER THE PREHEAT VALVE CONTROL LOOP HAS AN OUTPUT OF 0% OPEN FOR AN ADJ. TRANSITION TIME (5 MINUTES).

14. STATE 4 - PREHEAT NORMAL CONTROL:

A. WHEN THE UNIT IS IN STATE 4 THE PREHEAT HOT WATER VALVE, V-PH, SHALL BE CONTROLLED BY A SELECTING THE MINIMUM OUTPUT OF THE DISCHARGE AIR TEMP. CONTROL LOOP AND THE PREHEAT COIL LOW LIMIT TEMP. CONTROL LOOP (AS DESCRIBED IN THE NEXT PARAGRAPH). THE DISCHARGE AIR TEMP. CONTROL LOOP SHALL HAVE THE DISCHARGE AIR TEMP. TRANSMITTER (TT-DAT) AS INPUT AND A SET POINT OF 55°F (ADJ.).

15. PREHEAT COIL LOW LIMIT CONTROL

A. THE PREHEAT COIL LOW LIMIT CONTROL LOOP SHALL BE OPERATIVE AT ALL TIMES WHEN THE UNIT IS IN ANY STATE, INCLUDING WHEN THE UNIT IS DE-ENERGIZED, TO MAINTAIN A MINIMUM PREHEAT COIL DISCHARGE TEMP. THE PREHEAT LOW LIMIT CONTROL LOOP SHALL HAVE THE PREHEAT COIL LEAVING AIR TEMP. TRANSMITTER (TT-PHT) AS INPUT AND THE SET POINT SHALL BE 42°F (ADJ.). THE BAS SHALL ISSUE A "PREHEAT LOW LIMIT ALARM" IF THE PHT FALLS BELOW SET POINT -1°F. THE ALARM SHALL RESET WHEN THE PHT RISES +1°F ABOVE SET POINT.

B. IF THE PREHEAT COIL LEAVING AIR TEMP. FALL TO 38°F (ADJ.), THE BAS SHALL SHUT DOWN THE SUPPLY FAN. A "PREHEAT TEMP. SHUTDOWN ALARM" SHALL BE GENERATED AT THE BAS FRONT-END. A SOFTWARE RESET SHALL BE REQUIRED TO RESTART THE UNIT.

16. PREHEAT COIL CIRCULATING PUMP

A. THE PREHEAT COIL CIRCULATING PUMP SHALL BE ENERGIZED WHENEVER THE OUTSIDE AIR TEMP. FALLS BELOW 40 DEGREES F (ADJ.) WITHOUT REGARD TO WHETHER THE AHU SUPPLY FAN IS RUNNING. THIS PUMP SHALL DE-ENERGIZE WHENEVER THE OUTSIDE TEMP. RISES ABOVE 42 DEGREES F. (ADJ.) A DIFFERENTIAL PRESSURE SWITCH ACROSS THE CIRCULATING PUMP, PHP-STS, SHALL BE EMPLOYED TO SENSE THE PRESENCE OF FLOW THROUGH THE PREHEAT COIL. IF THE LOSS OF FLOW IS SENSED AND THE OUTSIDE AIR TEMP. IS BELOW 40 DEGREES F (ADJ.), THE PREHEAT VALVE SHALL OPEN AND THE BAS SHALL GENERATE A "PREHEAT COIL CIRCULATING PUMP ALARM" AT THE FRONT-END.

17. FREEZESTAT

A. WHENEVER FREEZE STAT, TS-FZ, SENSES A TEMP. BELOW 36 °F (ADJ.), IT SHALL PERFORM THE FOLLOWING:
1) THE SUPPLY FAN SHALL SHUTDOWN.
2) THE RETURN FAN AND THE ASSOCIATED EXHAUST FANS SHALL SHUTDOWN.
3) START PRE-HEAT RE-CIRCULATING PUMP.
4) THE MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL CLOSE.
5) THE ECONOMIZER OUTSIDE AIR DAMPER (D-EOA) SHALL CLOSE.
6) THE RELIEF DAMPER (D-REL) SHALL CLOSE.
7) THE RETURN DAMPER (D-RET) SHALL OPEN.
8) FULLY OPEN THE CHILLED WATER VALVE (V-CHW).
9) OPEN THE LEAD CHILLER CHILLED WATER ISOLATION VALVE, IF APPLICABLE.
10) ISSUE A UNIQUE ALARM.
11) THE PREHEAT COIL (V-HTG) SHALL REMAIN UNDER CONTROL OF THE PREHEAT DISCHARGE TEMP. SENSOR (TT-PHT).
12) COMMAND "ON" THE VARIABLE PRIMARY OR SECONDARY CHILLED WATER PUMP AND CONTROL SPEED TO MAINTAIN THE DIFFERENTIAL PRESSURE SET POINT.

B. A MANUAL RESET AT THE AHU SHALL BE REQUIRED TO RESTART AN AHU THAT HAS AUTOMATICALLY SHUT DOWN FROM A FREEZE STAT TRIP.

18. FILTERS

A. ALL FILTERS SHALL HAVE A DIFFERENTIAL PRESSURE SWITCH (DPS-FF & DPS-PF) MEASURING THE PRESSURE DROP ACROSS THE FILTER BANKS. EACH SHALL ALARM THE DDC SYSTEM WHENEVER THE PRESSURE DROP ACROSS THE FILTER IS EXCESSIVE (DIRTY FILTER) (ADJ.).

19. HUMIDIFIER

A. THE HUMIDIFIER CONTROLS SHALL BE ACTIVE ANY TIME THE SUPPLY FAN IS RUNNING.

B. AS THE SPACE HUMIDITY RISES TO ITS ADJUSTABLE SET POINT, THE HUMIDIFIER VALVE, V-HUM, SHALL MODULATE CLOSED. AS THE SPACE HUMIDITY DECREASES BELOW ITS SET POINT THE HUMIDIFIER VALVE, V-HUM, SHALL MODULATE OPEN.

C. WHENEVER THE DISCHARGE AIR HUMIDITY IS ABOVE THE CONTROLLING LIMIT SET POINT (80% ADJ.) AS SENSED BY THE HIGH LIMIT HUMIDISTAT, HT-SAH, THE HUMIDIFIER VALVE SHALL BE MODULATED CLOSED TO MAINTAIN THE CONTROLLING LIMIT SET POINT.

D. WHENEVER THE DISCHARGE AIR HUMIDITY IS ABOVE THE HIGH LIMIT SET POINT, 95% ADJ, AS SENSED BY THE HT-SAH, THE DDC SYSTEM SHALL DISABLE THE HUMIDIFIER, CLOSE THE STEAM VALVE, AND AN ALARM SHALL BE SENT TO THE OPERATOR WHICH MUST BE ACKNOWLEDGED AND RESET IN ORDER TO RE-ENABLE THE HUMIDIFIER.

20. FIRE ALARM SMOKE PURGE SEQUENCE

A. WHENEVER THE FIRE ALARM SYSTEM SENSES SMOKE/FIRE IN THE AREA SERVED BY THE AHU, THE FIRE ALARM SHALL SEND A SIGNAL TO THE BAS ALARM AND THE BAS SHALL CLOSE THE RETURN DAMPER (D-RET) AND OPEN OUTSIDE AIR DAMPER (D-EOA AND D-MIN) AND OPEN THE RELIEF DAMPER. DURING A PURGE SEQUENCE THE RELIEF DAMPER (D-REL) SHALL OPEN, RETURN DAMPER SHALL CLOSE, AND THE SYSTEM SHALL SIGNAL THE DDC SYSTEM TO INDEX THE UNIT INTO A SMOKE PURGE.

B. IF SMOKE IS DETECTED IN THE OUTSIDE AIR INTAKE, OUTSIDE AIR DAMPERS (D-EOA, D-MIN) SHALL CLOSE AND SUPPLY FAN SHALL STOP.

21. PROGRAM DESIGN

A. WHEN THE SUPPLY FAN IS STARTED, THE AHU SHALL ALWAYS GO TO STATE 1 WITHOUT ENABLING THE CHILLED WATER PLANT. THE UNIT SHALL OPERATE IN STATE 1 FOR A 4 MINUTE TIME PERIOD (ADJ). AFTER THE 4 MINUTE TIMER HAS EXPIRED ONE OF THE FOLLOWING SHALL OCCUR:

1) IF THE OAT IS EQUAL TO OR GREATER THAN 52 °F (ADJUSTABLE) THE UNIT SHALL REMAIN IN STATE 1 UNTIL IT TRANSITIONS TO ANOTHER OPERATING STATE PER THE DETAILED SEQUENCES ABOVE

OR,

2) IF THE OAT IS LESS THAN 52 °F (ADJUSTABLE) THE UNIT SHALL TRANSITION TO STATE 3 AND REMAIN IN STATE 3 UNTIL IT TRANSITIONS TO ANOTHER OPERATING STATE PER THE DETAILED SEQUENCES ABOVE.

B. IF THE FACILITY'S CHILLED WATER PLANT IS NOT REQUIRED TO OPERATE CONTINUOUSLY THROUGHOUT THE YEAR, AN OUTDOOR AIR TEMP. SHALL BE ESTABLISHED, T-DISABLE, TO PREVENT THE PLANT FROM BEING INADVERTENTLY STARTED. THE CHILLED WATER PLANT SHALL NOT BE ACTIVATED BELOW OUTDOOR TEMP.S EQUAL TO OR LESS THAN T-DISABLE, FOR EXAMPLE 44°F (ADJ).

C. THIS AHU SEQUENCE OF OPERATION SHALL INITIATE THE OPERATION OF THE CHILLED WATER PLANT, IF IT IS NOT ALREADY IN OPERATION, IF BOTH OF THE FOLLOWING OCCUR:

1) THE OAT EXCEEDS THE T-DISABLE SET POINT FOR THE CHILLED WATER PLANT

AND,

2) THE AHU TRANSITIONS FROM STATE 3 TO STATE 1.

D. ALL TIMERS ARE TO BE INDEPENDENTLY ADJUSTABLE.

E. SOFTWARE STATUS POINTS SHALL BE CREATED FOR THE FOLLOWING LOCKOUTS AND FINITE STATES. THE CURRENT STATUS OF THE SOFTWARE LOCKOUT POINTS, ENABLED OR DISABLED, SHALL BE DISPLAYED AT THE BAS/FMS FRONT END:

1) CHILLED WATER CONTROL VALVE FULLY CLOSED LOCKOUT
2) ECONOMIZER DAMPERS FULLY OPEN LOCKOUT
3) ECONOMIZER DAMPERS FULLY CLOSED LOCKOUT
4) PREHEAT VALVE NORMAL CONTROL LOCKOUT
5) STATE #1
6) STATE #3
7) STATE #4

F. THE AHU SHALL RESTART AUTOMATICALLY AFTER A MOMENTARY POWER FAILURE OR AFTER TRANSFER TO AN ALTERNATE POWER SOURCE AND OPERATE IN THE SAME STATE IT WAS IN PRIOR TO THE POWER FAILURE OR TRANSFER OF POWER.18. PROGRAM DESIGN

INPUT/OUTPUT SUMMARY

ROOFTOP UNITS

TYPICAL FOR: RTU-1&2

		INPUTS: ANALOG: MEASURED						INPUTS: ANALOG: CALC.						INPUTS: DIGITAL								OUTPUTS: DIGITAL				OUTPUTS: ANALOG			SYSTEM FEATURES: ALARMS						SYSTEM FEATURES: PROGRAMS							GENERAL
		TEMP.	PRESSURE	HUMIDITY (RH)	AIR FLOW	AIR QUALITY	KW	DDC GATEWAY	VALVE POSITION	KWH	ENTHALPY	RUN TIME	EFFICIENCY	AIR FLOW (CFM)	STATUS (DIFF. PRESS.)	STATUS (CURRENT SWITCH)	SMOKE	LOW TEMP.	AIR FLOW	END SWITCH	FIRE ALARM	PRESSURE	ON-OFF	OFF-AUTO-ON	OFF-HIGH-LOW	OPEN-CLOSE	DAMPER POSI.	VALVE POSI.	SET POINT ADJ.	4-20 mA	HI ANALOG	LOW ANALOG	HI BINARY	LOW BINARY	PROOF	MANUAL RESET	AUTO RESET	TIME SCHEDULING	DEMAND LIMITING	START/STOP OPTIM.	ENTHALPY OPTIM.	SMOKE CONTROL	TREND	ALARM INSTRUCTION	
O.A. TEMP.	TT-OAT	●																																							●	
LOW STATIC	SPS-RLO																															●	●		●							●	●
RETURN HUMIDITY	HT-RAH		●																																							●	
RETURN AIR TEMP.	TT-RAT	●																																							●	
RETURN FAN VFD	VFD-RAF						●																	●						●												●	●
RETURN FAN STATUS	STS-RAF														●																					●							●	●
RETURN AIR FLOW	AM-RA			●		●																																				●	
RELIEF DAMPER	D-REL																				●							●							●	●						●	●
RETURN DAMPER	D-RET																				●							●							●	●						●	●
MIN. O.A. DAMPER	D-MIN																				●					●									●	●						●	●
ECONOMIZER DAMPER	D-EOA																				●							●							●	●						●	●
PRE-FILTER STATUS	DPS-PF														●																			●		●						●	●
MIXED AIR TEMP.	TT-MAT	●																																		●						●	●
PRE-HEAT VALVE	V-PH							●																				●														●	●
PRE-HEAT FLOW	DPS-PHF														●						●															●		●					●	●
PRE-HEAT PUMP START/STOP	SS-PHP																							●																		●	●
PRE-HEAT PUMP STATUS	STS-PHP														●						●															●		●					●	●
HUMIDIFIER VALVE	V-HU							●																				●														●	●
SUPPLY HUMIDITY/HI-LIMIT	HT-SAH			●																																●						●	●
CHW VALVE	V-CHW							●																				●														●	●
FREEZESTAT	TS-FZ																																			●		●					●	●
SUPPLY FAN VFD	VFD-SAF						●																	●						●												●	●
SUPPLY FAN STATUS	STS-SAF														●																					●		●					●	●
SUPPLY AIR FLOW	AM-SA			●		●																																				●	
O.A. FLOW	---													●																													●	
FINAL FILTER STATUS	DPS-FF														●																					●		●					●	●
HI STATIC	SPS-SHI																					●														●		●					●	●
DISCHARGE TEMP.	TT-DAT	●																																		●	●						●	●
SUPPLY STATIC	SPT-SA		●																																							●	●
OA SMOKE DETECTOR	SD-OA																					●																●					●	●
RETURN SMOKE DETECTOR	SD-RA																					●																●					●	●
SUPPLY SMOKE DETECTOR	SD-SA																					●																●					●	●
FIRE ALARM	---																					●																●					●	●
ROOM MOUNTED EXHAUST DAMPER	---																											●															
SMOKE DAMPER (TYP.)	---																									●		●														●	
VAV BOX (TYP.)	---	●		●		●																																				●	
EXHAUST FAN START/STOP (TYP.)	SS-EF																							●																			●	
EXHAUST FAN STATUS (TYP.)	STS-EF														●																												●	●
ISOLATION DPA	DPA		●				●																													●		●					●	●
SUBCOOLING VALVE	V-GLY							●																				●														●	●
PREHEAT COIL	TT-PHT	●																																		●		●					●	●
CHW COIL	TT-CHW	●																																		●		●					●	●

SYMBOL LEGEND

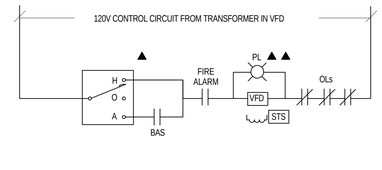
▲ LOCATE AT VFD COVER

▲▲ LOCATE IN LOCAL CONTROL PANEL

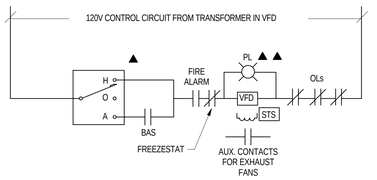
AI --- ANALOG INPUT
AO --- ANALOG OUTPUT
DI --- DIGITAL INPUT
DO --- DIGITAL OUTPUT
N.C. --- NORMALLY CLOSED
N.O. --- NORMALLY OPEN
MOD. --- MODULATING DEVICE
2-POS --- TWO POSITION DEVICE

DEVICE/SENSOR LEGEND

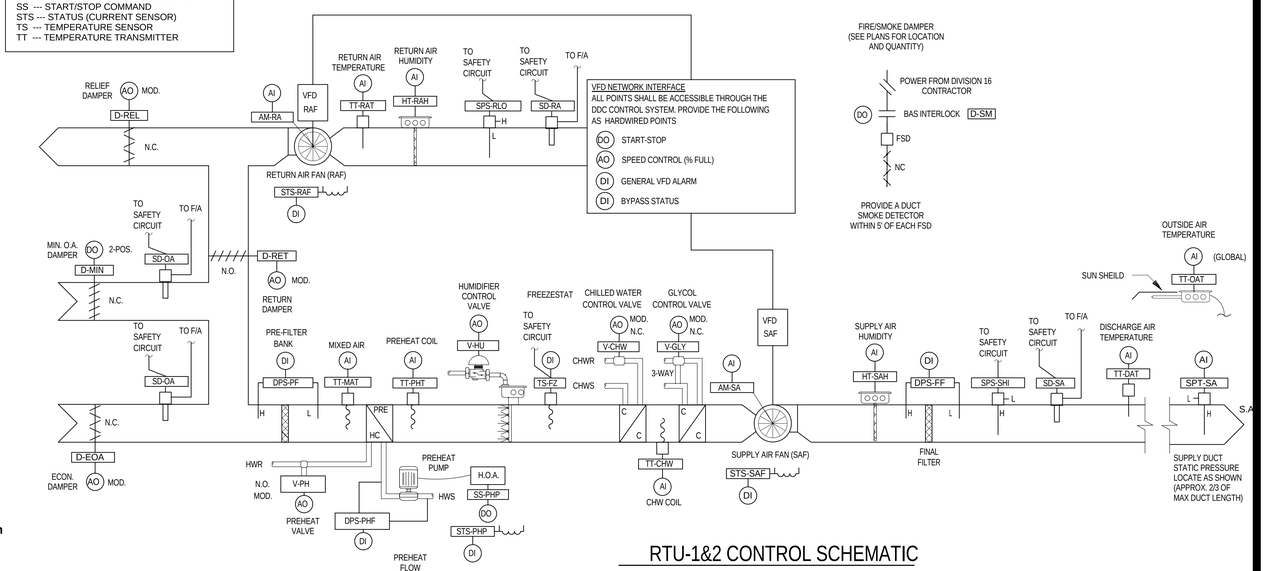
AM --- AIRFLOW MEASURMENT STATION
D --- DAMPER CONTROL
DPS --- DIFFERENTIAL PRESSURE SWITCH
HT --- HUMIDITY TRANSMITTER
SD --- SMOKE DETECTOR
SPS --- STATIC PRESSURE SWITCH
SPT --- STATIC PRESSURE TRANSMITTER
SS --- START/STOP COMMAND
STS --- STATUS (CURRENT SENSOR)
TS --- TEMPERATURE SENSOR
TT --- TEMPERATURE TRANSMITTER



TYPICAL RETURN FAN CONTROL



TYPICAL SUPPLY FAN CONTROL



RTU-1&2 CONTROL SCHEMATIC

REVISION TO PERMIT 15-916743, PREVIOUS RSN 966198

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *Y. Munoz*
Date: *Mar 09, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1089436*
Permit #: *16-1066963*

Only highlighted or clouded revisions are approved on this review. All previous comments apply.

City of Aurora Building Division
Project: *MEDICAL CENTER OF AURORA*
Address: *REV-1501 S POTOMAC ST*
Occupancy Group: *IBC I-2*
Construction Type: *IBC TYPE IA-SPK*
RSN: *1089436*
Permit: *16-1066963*

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