

SINGLE ZONE AIR HANDLING UNIT (AHU-1)

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SYSTEM APPARATUS		INPUTS														OUTPUTS						SYSTEM FEATURES												GENERAL		AL	SUPPLEMENTARY							
OR AREA POINT	ANALOG										BINARY					DIGITAL				/	ANALOG		ALARMS					PROGRAMS								1			NOTES					
DESCRIPTION	MEASURED						CALCULATED																																					
	TEMPERATURE	RH	KW AIR FLOW	DEW POINT VACUUM			X	ENTHALPY	EFFICIENCY	FLOW	IONS WETBULB		STATUS	FILTER	FREEZE	AIR FLOW METER	RUN TIME	DP SWITCH CURR SWITCH	END SWITCH	OFF-ON OFF-AUTO-ON	OFF-HI-LOW	OF EN-OLOSE		DAMPER POS	SET POINT ADJ	A0-E A0-P	HI ANALOG	HI BINARY	LOW BINARY PROOF	SMOKE DBIVE EAL	HIGH STATIC	FAILURE	TIME SCHEDULING	DEMAND LIMITING DUTY CYCLE	START/START OPT.	SMOKE CONTROL	AI ARM INSTRINCTION	MAIN. WORK ORDER	LEAD/LAG TOTALIZER	DDC	COLOR GRAPHIC MANUAL OVERRIDE			
NON CRITICAL	ZC	NE	All	<u></u>	 IAN	1DL	_IN(	G	UNI	T	!					•		•	•	•							<u> </u>			!		•	•	·		, ,	•						•	1
SUPPLY AIR	x x	т т								П	T	П		×					П										x	x	x				×						x			
F-1			×										×					X	$\prod$	x						x		T		<b> </b>	<b>₹</b>									x				DPS-1, AMD-1
COOLING COIL	X														×									,	x x	Х	Х													Х	X			TT-2 & V-2
										Ш					Ш		Ш																Ш			Ш								
REHEAT COIL	x																									X	X																	TT-1 & V-1
COIL CIRCULATOR													×		Ш		Ш	×		×								$\perp \downarrow$					Ш			Ш								
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0A D—1			x							Ш							Ш			$\perp$				x		X		$\coprod$							<u> </u>					X				AMD-3, HTT-2
)-2, D-3										Ш					$\coprod$									x		X									×					X				
<b>-,</b>												L		T	,															[x]	x									$\mathbf{x}^{T}$				HTT-1
ETURN AIR	х	X				Ш								<u> </u>	<u>\</u>				Ш		oxdot												$oldsymbol{\perp}$			┷								

#### MEETING ROOM AIR HANDLING UNIT (AHU-1):

THE AIR HANDLING UNITS SHALL BE CONTROLLED BY THE FACILITY MANAGEMENT CONTROL SYSTEM (FMCS). OCCUPIED/UNOCCUPIED MODES OF OPERATION SHALL BE DETERMINED BY THE FMCS. ALL SAFETY INTERLOCKS SHALL BE HARD WIRED THROUGH THE FAN CONTROLLERS TO BE OPERABLE WHENEVER THE FAN IS IN EITHER "AUTO", "HAND", OF "BYPASS" POSITIONS.

WITH VFD APPLICATIONS THE SAME SHALL APPLY. THE SAFETY DEVICES SHALL BE HARD WIRED.

SMOKE DETECTORS SHALL BE HARD WIRED. WHEN PRODUCTS OF COMBUSTION ARE DETECTED, BOTH THE SUPPLY AND RETURN FANS SHALL BE DE-ENERGIZED. AN ALARM CONDITION SHALL BE SENT TO THE CCMS AND THE FIRE ALARM SYSTEM.

WHEN THE UNIT IS IN THE "STOP" POSITION, THE PREHEAT COIL CONTROL SHALL BE

#### "START-STOP" FUNCTION:

"START-STOP" FUNCTION SHALL BE THROUGH THE DDC LOGIC CONTROLLER. WHEN IN THE "STOP" CONDITION, THE SYSTEM IS OFF AND THE CONTROLS ARE IN THEIR NORMAL POSITION. WHEN IN THE "START" CONDITION, RETURN FAN RF-1 SHALL BE ENERGIZED 15 SECONDS (ADJUSTABLE) PRIOR TO ENERGIZING THE SUPPLY FAN.

OUTSIDE AIR DAMPER  $\underline{D-1}$  SHALL OPEN TO THE MINIMUM POSITION WHENEVER THE SYSTEM IS IN THE "START" POSITION. MINIMUM OUTSIDE AIR SHALL BE MONITORED BY AMD-3.

#### **MORNING WARMP-UP**:

WHEN INDEXED TO THE OCCUPIED MODE BY THE TIME SCHEDULE OF THE FMCS, THE SUPPLY AIR FAN SHALL BE ENERGIZED AND RUN CONTINUOUSLY. AN AIR MEASURING DEVICE LOCATED IN THE SUPPLY AIR SHALL MODULATE THE SUPPLY FAN THROUGH THE VARIABLE FREQUENCY DRIVE (VFD) TO MAINTAIN THE SUPPLY AIRFLOW SETPOINT. A DISCHARGE AIR TEMPERATURE SENSOR SHALL MODULATE THE HEATING COIL CONTROL VALVE TO MAINTAIN THE MORNING WARM—UP DISCHARGE AIR TEMPERATURE SETPOINT OF 70 DEGREES F. MORNING WARM—UP MODE SHALL CONTINUE AS LONG AS THE RETURN AIR TEMPERATURE AS SENSED BY HTT—1 IS BELOW 68 DEGREES F. THE OUTDOOR AIR DAMPER SHALL REMAIN CLOSED, AND THE RETURN AIR DAMPER SHALL BE OPEN. THE COOLING COIL CONTROL VALVE SHALL BE CLOSED. WHEN THE RETURN AIR TEMPERATURE REACHES 68 DEGREES F THE MORNING WARM—UP SEQUENCE SHALL BE COMPLETED AND THE AIR HANDLING UNIT SHALL FUNCTION IN THE OCCUPIED MODE.

#### OCCUPIED MODE:

WHEN THE MORNING WARM-UP SEQUENCE IS COMPLETE THE OUTDOOR AIR DAMPER SHALL OPEN TO THE MINIMUM POSITION AND THE RETURN AIR DAMPER SHALL CLOSE PROPORTIONALLY. THE AIR MEASURING DEVICE SHALL MODULATE THE SUPPLY FAN THROUGH THE VARIABLE FREQUENCY DRIVE (VFD) TO MAINTAIN SPAACE TEMPERATURE SETPOINT.

UPON A FALL IN SPACE TEMPERATURE, AS SENSED BY <u>HTT-1</u>, BELOW SETPOINT (ADJUSTABLE), THE SUPPLY AIRFLOW SETPOINT SHALL BE REDUCED PROPORTIONATELY TOWARDS THE ADJUSTABLE MINIMUM AIRFLOW SETPOINT. UPON A FURTHER FALL IN SPACE TEMPERATURE THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE INCREASED BY 1 DEGREE F. THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL NOT EXCEED 65 DEGREES F.

UPON A RISE IN SPACE TEMPERATURE, AS SENSED BY <a href="https://doi.org/10.1001/j.com/html">https://doi.org/10.1001/j.com/html</a>, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE REDUCED BY 1 DEGREE F. THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL NOT FALL BELOW 55 DEGREES F. UPON A FURTHER RISE IN SPACE TEMPERATURE THE SUPPLY AIRFLOW SETPOINT SHALL BE PROPORTIONATELY INCREASED TO THE MAXIMUM AIRFLOW SETPOINT.

#### **DEHUMIDIFICATION OVERRIDE:**

UPON A RISE IN SPACE HUMIDITY, AS SENSED BY <u>HTT-1</u>, ABOVE SETPOINT (ADJUSTABLE), THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE REDUCED BY 1 DEGREE F. THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL NOT FALL BELOW 55 DEGREES F.

# ENTHALPY COOLING COIL CONTROL:

DISCHARGE TEMPERATURE TRANSMITTER  $\underline{\text{TT}}-2$  SHALL, THROUGH THE DDC LOGIC CONTROLLER, CONTROL THE CHILLED WATER VALVE  $\underline{\text{V}}-2$  TO MAINTAIN ITS ADJUSTABLE SETPOINT. THE CHILLED WATER VALVE SHALL HAVE A SEPARATE CONTROL LOOP.

TEMPERATURE TRANSMITTER  $\overline{11}-1$  SHALL, THROUGH THE DDC LOGIC CONTROLLER AND ENTHALPY LOGIC, CONTROL THE OUTSIDE AIR DAMPER  $\underline{D}-1$ , RETURN AIR DAMPER  $\underline{D}-2$ , AND RELIEF AIR DAMPER  $\underline{D}-3$  TO MAINTAIN ITS ADJUSTABLE SETPOINT. THE SETPOINT OF  $\overline{11}-1$  SHALL BY INPUT FROM DISCHARGE TEMPERATURE TRANSMITTER  $\overline{11}-2$ . THE DAMPERS SHALL HAVE A SEPARATE CONTROL LOOP.

THE ENTHALPY CONTROL INPUT SHALL BE FROM THE CENTRAL OUTSIDE AIR HUMIDITY/TEMPERATURE TRANSMITTER <u>HTT-2</u> (NEW) AND RETURN AIR <u>HTT-1</u> LOCATED WITHIN THE RETURN AIR DUCTWORK.

THE CONTROL OF OUTSIDE AND RETURN AIR DAMPERS SHALL BE THROUGH THE ELECTRONIC LOW LIMIT  $\underline{\mathsf{LL}}=1$ . IF THE SETPOINT OF  $\underline{\mathsf{LL}}=1$  (40°F ADJUSTABLE) IS EXCEEDED THE OUTSIDE AIR DAMPER SHALL MODULATE TO THE MINIMUM POSITION.

### PREHEAT COIL CONTROL:

TEMPERATURE TRANSMITTER  $\underline{\text{IT}}-1$  SHALL, THROUGH THE DDC LOGIC CONTROLLER, CONTROL PREHEAT COIL VALVE  $\underline{V}-1$  TO MAINTAIN ITS ADJUSTABLE SETPOINT. THE PREHEAT COIL CIRCULATOR PUMP SHALL OPERATE CONTINUOUSLY WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 35°F (ADJUSTABLE).

### FAN CONTROL:

THE DDC LOGIC CONTROLLER SHALL CONTROL BOTH THE SUPPLY AND RETURN FANS. THE SUPPLY FAN SPEED, THROUGH THE VARIABLE FREQUENCY CONTROLLER, SHALL BE CONTROLLED FROM INPUT FROM THE AIR MONITORING DEVICE  $\underline{\mathsf{AMD}} = 1$  AND SPACE HUMIDITY TEMPERATURE TRANSMITTER  $\underline{\mathsf{HTT}} = 3$ .

THE RETURN FAN SPEED SHALL BE CONTROLLED THROUGH THE DDC LOGIC CONTROLLER TO MAINTAIN THE ADJUSTABLE DIFFERENTIAL BETWEEN THE SUPPLY AND RETURN. THE DIFFERENTIAL SHALL BE ADJUSTABLE THROUGH THE NETWORK.

INPUT SHALL BE FROM AIR MEASUREMENT DEVICES, LOCATED WITHIN THE SUPPLY AND RETURN FAN INLETS, AND VELOCITY TRANSMITTERS.

DIFFERENTIAL PRESSURE SWITCH,  $\underline{DPS-1}$ , SHALL DE-ENERGIZED SUPPLY FAN,  $\underline{SF-1}$ , AND AN ALARM SHALL SOUND. THIS DEVICE SHALL BE MANUALLY RESET.

# UNOCCUPIED MODDE:

WHEN INDEXED TO THE UNOCCUPIED MODE BY THE TIME SCHEDULE OF THE FMCS, THE SUPPLY AIR FAN SHALL BE PLACED UNDER CONTROL OF THE UNOCCUPIED ZONE SENSOR. THIS SENSOR SHALL CYCLE THE SUPPLY AIR FAN TO MAINTAIN THE UNOCCUPIED SETPOINT. THE OUTDOOR AIR DAMPER SHALL REMAIN CLOSED AND THE RETURN AIR DAMPER SHALL REMAIN OPEN. COOLING COIL CONTROL VALVE SHALL REMAIN CLOSED. SAFETY AND EMERGENCY CONTROLS SHALL FUNCTION DURING THE UNOCCUPIED SEQUENCE.

### MINIMUM OUTDOOR AIR SETPOINT:

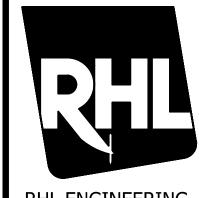
MINIMUM OUTDOOR AIR SETPOINT = SUPPLY AIR FLOW SETPOINT X 12%

### RETURN AIR SETPOINT:

RETURN AIR FLOW SETPOINT = SUPPLY AIR FLOW X 88%

# CO2 OVERRIDE:

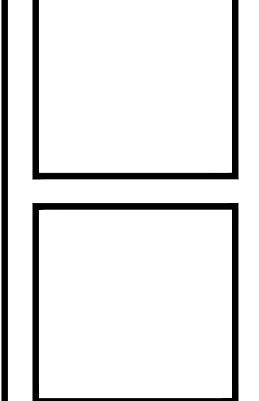
UPON A RISE IN CO2 LEVELS AS SENSED BY CO2 SENSOR MOUNTED IN RETURN AIR DUCTWORK, ABOVE SETPOINT (ADJUSTABLE) THE MINIMUM OUTDOOR AIR SETPOINT SHALL BE INCREASED BY 25%.



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BID DOCUMENTS

AUTOMATIC TEMP. CONTROL

11 OF 12 SHEETS DATE: 08.15.14