



	SMOKE DETECTOR	TS	TEMPERATURE SENSOR
	SMOKE DAMPER ACTUATOR	CV	CONTROL VALVE
	CONTROL DAMPER ACTUATOR	DI	DIGITAL INPUT
	AIR FLOW MEASURING STATION	DO	DIGITAL OUTPUT
	DUCT TEMPERATURE SENSOR (AVERAGING)	AI	ANALOG INPUT
	SPACE TEMPERATURE SENSOR	EP	ELECTRIC PNEUMATIC
	IMMERSION TEMPERATURE SENSOR	AO	ANALOG OUTPUT
	CONTROL VALVE	VP	VELOCITY PRESSURE SENSOR
	CURRENT RELAY (ADJ. TRIP FOR BELT DRIVEN APPLICATIONS)	HM	HUMIDITY SENSOR
		EW	ELECTRIC/ELECTRONIC WIRE
		HS-XX	HUMIDITY SENSOR
		TS-XX	FREEZE/STAT
		SP-XX	STATIC PRESSURE SENSOR
		DPS-XX	DIFFERENTIAL PRESSURE SWITCH
		DPT-XX	DIFFERENTIAL PRESSURE SENSOR
		FT-XX	WATER FLOW TRANSMITTER
		IO	INPUT/OUTPUT POINT TO DDC CONTROL PANEL
		CO <sub>2</sub>	CARBON DIOXIDE SENSOR

CONTROLS LEGEND A

POINTS LIST			
TAG	POINT TYPE	DESCRIPTION	SETPPOINT (ALL SETPOINTS ADJ.)
DM-1	AO	ERV OA DAMPER	
HS-1	AI	PRE-TREATED OA HUM	
TS-1	AI	PRE-TREATED OA TEMP	
FM-1	AI	OUTSIDE AIR CFM	AS SCHEDULED
DM-2	AO	ERV EA DAMPER	
HS-2	AI	ERV LEAVING EA HUM	
TS-2	AI	ERV LEAVING EA TEMP	
FM-2	AI	EXHAUST AIR CFM	AS SCHEDULED
-	DI	*EXHAUST FAN STATUS	
-	AO	*EXHAUST FAN VFD CONTROL	
-	AI	*EXHAUST FAN VFD FEEDBACK	
V-1	AI	OA CHILLED WATER CONTROL VALVE	
TS-4	AI	OA CHW COOLING COIL LEAVING AIR TEMP	51°F
HS-3	AI	RA HUM	
TS-3	AI	RA TEMP	
DM-3	AO	RA DAMPER	
V-2	AI	RA CHILLED WATER CONTROL VALVE	
TS-5	AI	RA CHW COOLING COIL LEAVING AIR TEMP	54°F
DPT-1	AI	CHILLED WATER DIFFERENTIAL PRESSURE	SET BY TAB
TS-6	AI	MIXED AIR TEMP	
-	DI	**AHU FAN STATUS	
-	AO	**AHU FAN VFD CONTROL	
-	AI	**AHU FAN VFD FEEDBACK	
-	DI	**AHU FAN FAIL	
TS-7	AI	SUPPLY AIR TEMPERATURE	
-	AI	SUPPLY AIR STATIC PRESSURE	SET BY TAB / STATIC PRESS SEQUENCE.
-	AI	OUTSIDE AIR TEMP	
-	AI	OUTSIDE AIR HUM	
-	AI	OUTSIDE AIR CO <sub>2</sub>	
EDH-1	AO	ELECTRIC DUCT HEATER	84°F

\*REFER TO FAN SCHEDULE. PROVIDE IF VFD IS SCHEDULED. OTHERWISE PROVIDE STATUS, START/STOP AND ECM ANALOG CONTROL.  
 \*\*ONE PER FAN. REFER TO AHU SCHEDULES FOR FAN QUANTITY.

**DUAL PATH VAV AHU WITH DEDICATED ERV CONTROL:**  
 AHU SYSTEM CONSISTS OF A SUPPLY FAN ARRAY WITH VARIABLE FREQUENCY DRIVES, OUTSIDE, AND RETURN AIR CONTROL DAMPERS, OUTDOOR AIR AND RETURN AIR COOLING COILS WITH MODULATING CONTROL VALVES.  
 ERV SYSTEM CONSISTS OF EXHAUST FAN, SUPPLY AND EXHAUST DAMPERS, AND ENERGY CORE.

**OCCUPIED MODE:**  
 AHU WILL ENTER THE OCCUPIED MODE WHEN SCHEDULED BY THE BUILDING AUTOMATION SYSTEM (BAS).  
 IN THE OCCUPIED MODE, THE OUTDOOR AIR CHILLED WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN THE OUTDOOR AIR CHILLED WATER COIL LEAVING AIR TEMPERATURE SETPOINT OF 51° F (ADJ.).  
 THE RETURN AIR CHILLED WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN THE RETURN AIR CHILLED WATER COIL LEAVING AIR TEMPERATURE SETPOINT OF 54° F (ADJ.).  
 RETURN AIR HUMIDITY SHALL BE MONITORED. IF RETURN AIR HUMIDITY IS WITHIN SETPOINT AND ZONE TEMPERATURE IS SATISFIED, THEN THE RETURN AIR CHILLED WATER COIL LEAVING AIR TEMPERATURE SETPOINT SHALL INCREASE BY 2° F (ADJ.) EVERY 15 MINUTES (ADJ.). IF RETURN AIR HUMIDITY EXCEEDS 60% SETPOINT (ADJ.), OR ZONE TEMPERATURE IS NO LONGER SATISFIED, THEN THE SETPOINT SHALL RESET DOWN IN A SIMILAR FASHION.

OUTSIDE AIR TEMPERATURE SHALL BE MONITORED. IF OUTDOOR AIR TEMPERATURE DROPS BELOW 38 DEG F (ADJ.), THE OUTDOOR AIR CHILLED WATER CONTROL VALVE SHALL OPEN TO THE OUTDOOR AIR CHILLED WATER COIL.

IN THIS OCCUPIED MODE, THE ERV SHALL BE ENABLED. OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL MODULATE OPEN AND SUPPLY AND EXHAUST FAN SHALL ENTER THE OCCUPIED MODE. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE OUTSIDE AIR CFM SETPOINT (ADJ.) AS SENSED BY THE OUTSIDE AIRFLOW MONITORING STATION. IF THE OUTSIDE AIR CFM IS NOT ACHIEVED AFTER THE OUTDOOR DAMPER IS FULLY OPEN, THEN THE RETURN AIR DAMPER SHALL MODULATE CLOSED IN ORDER TO MAINTAIN THE OUTSIDE AIR CFM. THE EXHAUST FAN SHALL MODULATE TO MAINTAIN THE ERV EXHAUST AIR CFM SETPOINT (ADJ.) AS SENSED BY THE ERV EXHAUST AIRFLOW MONITORING STATION.

CONSTANT VOLUME EXHAUST FAN SHALL BE MAINTAINED BY MODULATING THE EXHAUST AIR DAMPER TO MEET THE CONSTANT VOLUME EXHAUST CFM SETPOINT AS SENSED BY THE EXHAUST AIRFLOW MONITORING STATION.

**FOR AHU-2:**  
 THE SUPPLY FAN VFDs SHALL MODULATE SPEED OF THE SUPPLY FANS TO MAINTAIN THE DUCT STATIC PRESSURE SET BY TAB. THE BAS SHALL MONITOR ALL SUPPLY TERMINAL BOXES ASSOCIATED WITH THE AHU. IF ALL THE TERMINALS ARE LESS THAN 92% OPEN, THE STATIC PRESSURE SETPOINT WILL DECREASE BY 5%. IF ANY TERMINAL EXCEEDS 98% OPEN, THE STATIC PRESSURE SETPOINT WILL INCREASE BY 5% UNTIL THE MAXIMUM VALUE FOR ANY TERMINAL IS 95% OPEN.

IF A SUPPLY FAN FAILS, THE BAS SHALL ALARM AND MODULATE REMAINING FAN SPEED TO MAINTAIN DUCT STATIC PRESSURE SETPOINT.

**FOR AHU-3:**  
 THE SUPPLY FAN VFDs SHALL MODULATE SPEED OF THE SUPPLY FANS TO MAINTAIN THE SPACE TEMPERATURE SET BY TAB.

THE SCR REHEAT CONTROL SHALL MODULATE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT IF THE SETPOINT IS NOT MET BY THE SUPPLY FAN'S MINIMUM SCHEDULED CFM VALUE. SUPPLY AIR TEMPERATURE SHALL BE LIMITED TO LESS THAN 15 DEG. F ABOVE SPACE TEMPERATURE IN THE REHEATING MODE.

IF A SUPPLY FAN FAILS, THE BAS SHALL ALARM AND MODULATE REMAINING FAN SPEED TO MAINTAIN SPACE TEMPERATURE SETPOINT.

**UNOCCUPIED MODE:**  
 AHU WILL ENTER THE UNOCCUPIED MODE WHEN SCHEDULED BY THE BUILDING AUTOMATION SYSTEM (BAS).  
 IN THE UNOCCUPIED MODE, THE OUTSIDE AIR AND THE RELIEF AIR DAMPER SHALL CLOSE AND EXHAUST/RELIEF FANS SHALL DE-ENERGIZE. SPACE TEMPERATURE SETPOINTS SHALL BE RESET TO AN ADJUSTABLE NIGHT SETBACK SETPOINT.  
 THE ERV SHALL BE DE-ENERGIZED AND OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL CLOSE.

**GENERAL NOTES:**  
 THE BAS SHALL UTILIZE OPTIMIZATION STRATEGIES TO IMPLEMENT THE DIFFERENT SEQUENCES FOR OPTIMAL ENERGY SAVINGS.  
 HIGH AND LOW TEMPERATURE, CFM (IF OA DEVIATES BY 10% OF DESIGN OR CALCULATED VALUE), AND FILTERS PRESSURE DROP ALARMS SHALL BE INDICATED AT THE BAS FRONT END.

DUAL PATH VARIABLE AIR VOLUME AIR HANDLING UNIT WITH ERV - TYPICAL OF AHU-2 AND 3. B

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CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THESE DRAWINGS COMPLY WITH ALL RELEVANT BUILDING CODES

**PERMIT SET**  
 05/06/2020

FGA PROJECT NUMBER  
 19048

ISSUE DATE  
 04-15-2020

REVISIONS	
NO.	DATE / NOTES

SHEET NAME  
 CONTROLS - HVAC

SHEET NUMBER  
 M7.2