

**LEGEND AND ABBREVIATION**

SMOKE DETECTOR	TS	TEMPERATURE SENSOR
SMOKE DAMPER ACTUATOR	CV	CONTROL VALVE
CONTROL DAMPER ACTUATOR	DI	DIGITAL INPUT
	DO	DIGITAL OUTPUT
	AI	ANALOG INPUT
	AO	ANALOG OUTPUT
	EP	ELECTRIC PNEUMATIC
	AO	ELECTRIC PNEUMATIC
	VP	VELOCITY PRESSURE SENSOR
	HS	HUMIDITY SENSOR
	---	ELECTRIC/ELECTRONIC WIRE
FM-XX		AIR FLOW MEASURING STATION
TS-XX		DUCT TEMPERATURE SENSOR (AVERAGING)
TS-XX		SPACE TEMPERATURE SENSOR
TS-XX		IMMERSION TEMPERATURE SENSOR
CV-1		CONTROL VALVE
HS-XX		HUMIDITY SENSOR
FZ-XX		FREEZE STAT
SP-XX		STATIC PRESSURE SENSOR
DPS-XX		DIFFERENTIAL PRESSURE SWITCH
DPS-XX		DIFFERENTIAL PRESSURE SENSOR
WT-XX		WATER FLOW TRANSMITTER
		INPUT/OUTPUT POINT TO DDC CONTROL PANEL

**POINTS LIST**

TAG	POINT TYPE	DESCRIPTION	SETPPOINT (ALL SETPOINTS ADJ.)
DM-1	AO	OUTSIDE AIR DAMPER	-
TS-1	AI	OUTSIDE AIR TEMP	-
FM-1	AI	OUTSIDE AIR CFM	BASED ON DCV SEQUENCE
-	AI	OUTSIDE AIR TEMP	-
-	AI	OUTSIDE AIR HUM	-
-	AI	OUTSIDE AIR CO <sub>2</sub>	-
DPS-1	AI	FILTER STATUS	PER FILTER MANUF.'S RECOMMENDATIONS
V-1	AO	OA CHILLED WATER CONTROL VALVE	-
TS-2	AI	OA LEAVING COIL TEMP.	51°F
DM-2	AO	RETURN AIR DAMPER	-
DPS-2	AI	RETURN FILTER STATUS	PER FILTER MANUF.'S RECOMMENDATIONS
HS-1	AI	RETURN AIR HUMIDITY	50% RH
TS-3	AI	RETURN AIR TEMPERATURE	75°F
V-2	AO	RA CHILLED WATER CONTROL VALVE	-
TS-4	AI	RA LEAVING COIL TEMP.	54°F
TS-5	AI	MIXED AIR TEMP.	53°F
-	DI	AHU FAN STATUS	-
-	DI	AHU FAN STATUS	-
-	AO	AHU FAN VFD CONTROL	-
-	AI	AHU FAN VFD FEEDBACK	-
-	DI	AHU VFD FAULT	-
TS-6	AI	SUPPLY AIR TEMPERATURE	-
-	DI	RELIEF FAN STATUS	-
-	AI	SUPPLY AIR STATIC PRESSURE	SET BY TAB / STATIC PRESS SEQUENCE.

**DUAL PATH VAV AHU AND TRACKING RELIEF FAN CONTROL**

AHU SYSTEM CONSISTS OF A SUPPLY FAN WITH VARIABLE FREQUENCY DRIVES, OUTSIDE AND RETURN AIR CONTROL DAMPERS, AND OUTDOOR AIR AND RETURN AIR COOLING COILS WITH MODULATING CONTROL VALVES.

**OCCUPIED MODE**

AHU WILL ENTER THE OCCUPIED MODE WHEN SCHEDULED BY THE BUILDING AUTOMATION SYSTEM (BAS).  
IN THE OCCUPIED MODE, THE 2-WAY 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 2-WAY 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 AND CHILLED WATER PUMP SHALL BE ACTIVATED.

OUTSIDE AIR DAMPERS SHALL MODULATE TO MAINTAIN THE OUTSIDE AIR CFM SETPOINT AS SENSED BY THE OUTSIDE AIR FLOW MEASURING STATION. IF THE OUTSIDE AIR CFM IS NOT ACHIEVED AFTER THE OUTDOOR DAMPER IS FULLY OPEN, THEN THE RETURN AIR DAMPER SHALL MODULATE CLOSE IN ORDER TO MAINTAIN THE OUTSIDE AIR CFM.

AHU 1: THE OUTSIDE AIR CFM SET POINT SHALL BE RESET BY CO<sub>2</sub> BASED DCV (DEMAND CONTROL VENTILATION). THE BAS SHALL FOLLOW THE CO<sub>2</sub> SENSORS AND USE ASHRAE 62.1 EQUATIONS TO ACCOUNT FOR ACTUAL POPULATION IN A ZONE AND SET THE OUTSIDE AIR CFM SET POINT. RESET AIR TEMPERATURE SET POINT SHALL BE IN BETWEEN THE MINIMUM AND MAXIMUM CFM SETPOINT IN THE DCV SCHEDULE AND CORRESPOND TO A RANGE OF CO<sub>2</sub> PPM.

**DEMAND CONTROL VENTILATION SCHEDULE**

AHU	DESIGN AIRFLOWS			MAX AIRFLOW DURING OCCUPIED MODE			MIN AIRFLOW DURING DCV MODE		
	SA CFM	RA CFM	OA CFM	CFM	EXFILTRATION CFM	OA CFM	EA CFM	EXFILTRATION CFM	
1	11325	7770	3555	2555	995	2555	1660	995	
TOTALS			3555	2555	995	2555	1660	995	

THE SUPPLY FAN VFD SHALL MODULATE SPEED OF THE SUPPLY FANS TO MAINTAIN THE STATIC PRESSURE SETPOINT BY TAB. THE BAS SHALL MONITOR ALL SUPPLY TERMINAL BOXES ASSOCIATED WITH THE AHU. ALL THE TERMINALS LESS THAN 92% OPEN, THE STATIC PRESSURE SETPOINT WILL DECREASE 0.1% IF ANY TERMINAL EXCEEDS 92% 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.

**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.

**GENERAL NOTES**

THE BAS SHALL UTILIZE OPTIMIZATION STRATEGIES TO IMPLEMENT THE DIFFERENT SEQUENCES FOR OPTIMAL ENERGY SAVINGS.  
HIGH AND LOW TEMPERATURE, CFM AND FILTERS PRESSURE DROP ALARMS SHALL BE INDICATED AT THE BAS FRONT END.

**LEGEND AND ABBREVIATION**

**POINTS LIST**

TAG	POINT TYPE	DESCRIPTION
-	DO	FAN START
-	DI	FAN STATUS
-	-	-
-	-	-

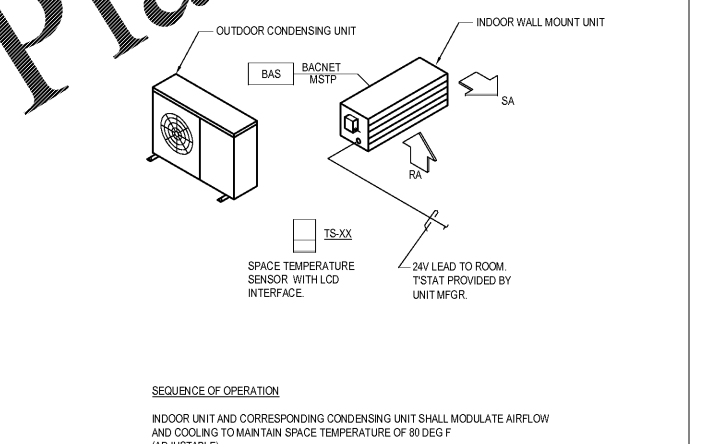
**EXHAUST FAN CONTROL**

EXHAUST FANS SHALL BE INTERLOCKED WITH THEIR RESPECTIVE AHU'S OUTSIDE AIR DAMPER AND AHU FAN STATUS.

**DUAL PATH - VARIABLE AIR VOLUME AHU CONTROL - TYPICAL OF AHU-1**

**EXHAUST FAN CONTROL**

**Order Plans**



**DUCTLESS MINI-SPLIT CONTROL**

**POINTS LIST**

TAG	POINT TYPE	DESCRIPTION	SETPPOINT (ALL SETPOINTS ADJ.)
-	AI	AIR TERMINAL AIRFLOW	-
-	AI	AIR TERMINAL DAMPER POSITION	-
-	AO	AIR TERMINAL DAMPER CONTROL	-
TS-1	AI	REHEAT COIL SUPPLY TEMP	AS SCHEDULED
TS-2	AI	SPACE TEMPERATURE	75°F / 70°F
-	AI	SPACE TEMPERATURE SETPOINT	-
CO <sub>2</sub> -X	AI	CARBON DIOXIDE SENSOR	-
EDH-1	AO	SCR REHEAT COIL CONTROL	-
OCC-1	DI	OCCUPANCY SENSOR	-

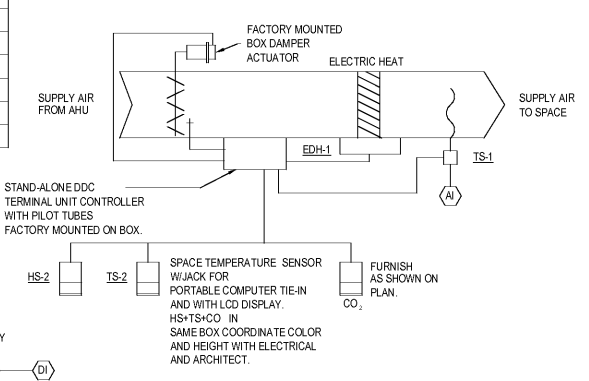
**AIR TERMINAL UNIT CONTROL**

THE BAS SHALL MODULATE THE AIR TERMINAL UNIT CFM FROM ITS MINIMUM TO MAXIMUM SCHEDULED VALUE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

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

SPACE TEMPERATURE SETPOINTS SHALL BE RESET TO AN ADJUSTABLE NIGHT SETBACK SETPOINT WHEN INDEXED BY BAS OR BY OCCUPANCY SENSOR.

HIGH AND LOW TEMPERATURE AND CFM ALARMS SHALL BE INDICATED AT THE BAS FRONT END.



**VARIABLE AIR VOLUME TERMINAL UNIT CONTROL**

**VOLT AIR**  
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6003 Benjamin Road, Suite A  
Tampa, Florida 33634  
Tel: 888.881.9713  
www.voltaire.com  
Project # 11-18040  
COA # 27138  
Engineer of Record:  
DANNY CELIS, P.E. #7042

**FLEISCHMAN**  
ARCHITECTS  
3500 HUNTERS VILLAGE RD.  
TAMPA, FL 33647  
PHONE (772) 775-4000  
FAX (772) 775-3000  
www.fleischmanarchitects.com

**HILLSBOROUGH COUNTY  
NEW TAMPA PERFORMING ARTS  
CENTER**  
8550 HUNTERS VILLAGE RD.  
TAMPA FL, 33647

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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**  
M7.1