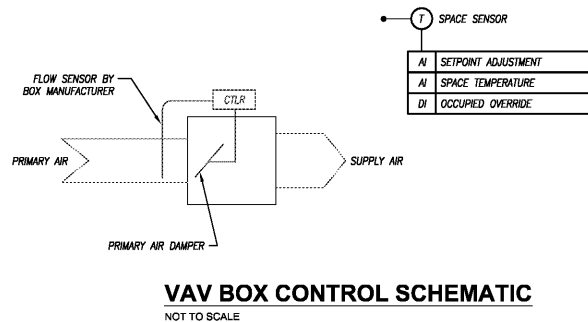


GENERAL NOTES:

- FURNISH AND INSTALL A COMPLETE DIRECT DIGITAL CONTROL BUILDING AUTOMATION SYSTEM (BAS) TO CONTROL AND MONITOR THE BUILDING MECHANICAL SYSTEMS. THE BUILDING AUTOMATION SYSTEM SHALL BE A WEB BASED OPEN PROTOCOL SYSTEM. NO PROPRIETARY SYSTEMS ALLOWED.
- FURNISH AND INSTALL ALL ACCESSORIES INCLUDING BUT NOT LIMITED TO CONTROLLERS, SENSORS, ACTUATORS, RELAYS, CONTROL WIRING, ETC. AS REQUIRED TO PROVIDE THE LEVEL OF MONITORING AND CONTROL NOTED FOR EACH SYSTEM.
- THE USER INTERFACE SHALL INCLUDE BUILDING LEVEL, FLOOR LEVEL, AND EQUIPMENT LEVEL GRAPHIC CONTROL. ALL LEVELS SHALL HAVE DYNAMICALLY UPDATING REAL TIME VALUES WITH LINKS TO ASSOCIATED CONTROL LEVELS. PROVIDE A FLOOR PLAN INDICATING SPACES SERVED BY EACH PIECE OF EQUIPMENT. THE FLOOR PLAN GRAPHIC SHALL INCLUDE ROOM NUMBERS/NAMES, A IDENTIFYING NAME OF EACH PIECE OF EQUIPMENT, AND A READOUT OF THE ZONE TEMPERATURE.
- THE FOLLOWING SYSTEMS SHALL CONNECT TO THE BUILDING AUTOMATION SYSTEM. REFER TO THE ASSOCIATED CONTROL SCHEMATIC AND SEQUENCE OF OPERATION FOR DETAIL.
 - ROOFTOP UNITS
 - FAN POWERED VAV TERMINALS WITH ELECTRIC HEATING
 - COOLING ONLY VAV TERMINALS
 - EXHAUST FANS
- ZONE THERMOSTATS / TEMPERATURE SENSORS SHALL INCLUDE THE FOLLOWING:
 - ZONE TEMPERATURE READOUT
 - SETPOINT ADJUSTMENT OF +/- 2 DEGREES (ADJUSTABLE) ABOVE AND +/- 2 DEGREES (ADJUSTABLE) BELOW SETPOINT.
 - PROVIDE DARK COVERPLATES FOR SENSORS INSTALLED ON COLUMNS.



SEQUENCE OF OPERATION

VAV TERMINALS

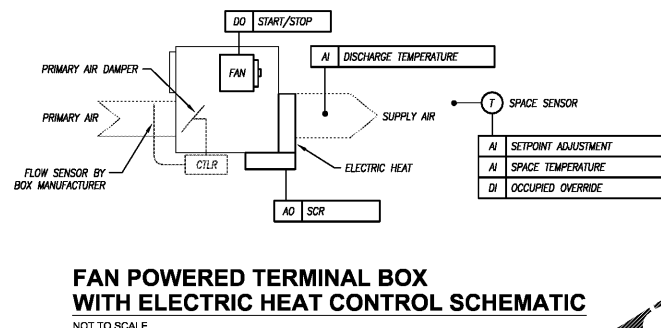
THE OCCUPIED/UNOCCUPIED MODE OF OPERATION OF EACH VAV TERMINAL BOX SHALL BE DETERMINED BY THE TIMELOCK FUNCTION OF THE BUILDING MANAGEMENT SYSTEM. EACH BOX SHALL HAVE ITS OWN UNIQUE OCCUPIED/UNOCCUPIED SCHEDULE.

IN OCCUPIED MODE, WHEN THE SPACE TEMPERATURE IS BELOW THE COOLING SET POINT THE PRIMARY AIR DAMPER SHALL BE AT MINIMUM POSITION. WHEN THE SPACE TEMPERATURE RISES ABOVE THE COOLING SETPOINT THE PRIMARY DAMPER SHALL MODULATE BETWEEN THE MINIMUM AND MAXIMUM POSITION AS REQUIRED TO MAINTAIN THE COOLING SETPOINT.

DURING THE UNOCCUPIED MODE THE PRIMARY DAMPER SHALL BE CLOSED. THE UNIT SHALL CYCLE ON AND OFF AS REQUIRED TO MEET NIGHT SETBACK TEMPERATURES.

THE LOCAL SPACE SENSOR SHALL HAVE AN OVERRIDE BUTTON TO ENERGIZE THE ASSOCIATED SYSTEM INTO THE OCCUPIED MODE FOR A PERIOD OF 1 HOUR (ADJUSTABLE).

THE SPACE SENSOR SHALL ALLOW ADJUSTMENT OF THE SPACE SETPOINT +/-2 DEGREES (ADJUSTABLE) ABOVE OR BELOW THE SETPOINT ESTABLISHED IN THE BUILDING MANAGEMENT SYSTEM.



SEQUENCE OF OPERATION

FAN POWERED VAV TERMINALS

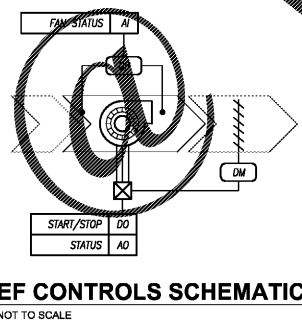
THE OCCUPIED/UNOCCUPIED MODE OF OPERATION OF EACH FAN POWERED TERMINAL SHALL BE DETERMINED BY THE TIMELOCK FUNCTION OF THE BUILDING MANAGEMENT SYSTEM. EACH TERMINAL BOX SHALL HAVE ITS OWN UNIQUE OCCUPIED/UNOCCUPIED SCHEDULE.

IN OCCUPIED MODE, WHEN THE SPACE TEMPERATURE IS BETWEEN THE COOLING SET POINT AND THE HEATING SET POINT THE PRIMARY AIR DAMPER SHALL BE AT MINIMUM AIRFLOW. THE FAN SHALL BE OFF. THE ELECTRIC HEAT SHALL BE OFF. WHEN THE SPACE TEMPERATURE RISES ABOVE THE COOLING SETPOINT THE PRIMARY DAMPER SHALL MODULATE BETWEEN ITS MINIMUM AND MAXIMUM POSITION AS REQUIRED TO MAINTAIN THE COOLING SETPOINT. THE FAN AND ELECTRIC HEAT SHALL BE ON. WHEN THE SPACE TEMPERATURE FALLS BELOW THE HEATING SETPOINT THE PRIMARY DAMPER SHALL BE AT MINIMUM POSITION. THE FAN SHALL ENERGETIC AND THE ELECTRIC HEAT SHALL MODULATE AS REQUIRED TO MAINTAIN THE HEATING SETPOINT.

DURING THE UNOCCUPIED MODE THE UNIT SHALL BE AT THE PRIMARY DAMPER SHALL BE CLOSED. THE FAN SHALL BE OFF AND THE ELECTRIC HEAT SHALL BE OFF. THE UNIT SHALL CYCLE ON AND OFF AS REQUIRED TO MEET NIGHT SETBACK TEMPERATURES.

THE LOCAL SPACE SENSOR SHALL HAVE AN OVERRIDE BUTTON TO ENERGIZE THE ASSOCIATED SYSTEM INTO THE OCCUPIED MODE FOR A PERIOD OF 1 HOUR (ADJUSTABLE).

THE SPACE SENSOR SHALL ALLOW ADJUSTMENT OF THE SPACE SETPOINT +/-2 DEGREES (ADJUSTABLE) ABOVE OR BELOW THE SETPOINT ESTABLISHED IN THE BUILDING MANAGEMENT SYSTEM.



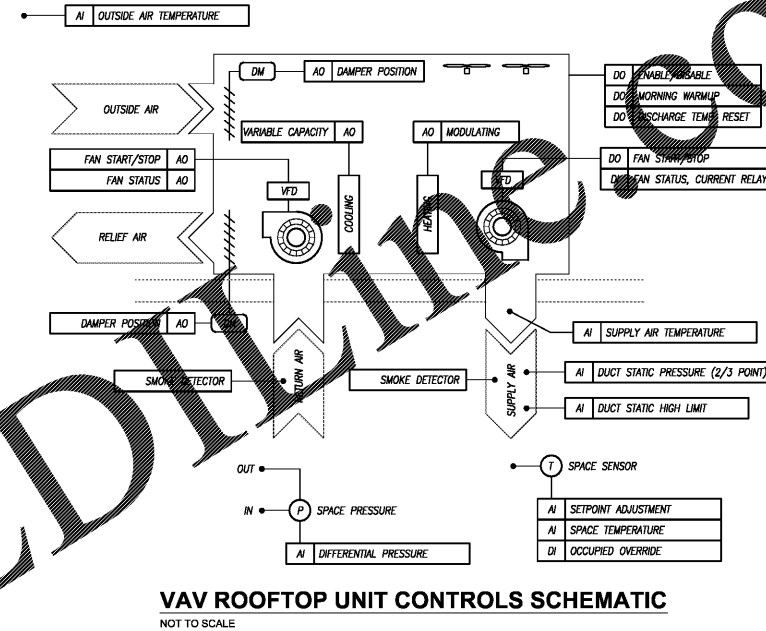
SEQUENCE OF OPERATION

EXHAUST FAN

THE OCCUPIED/UNOCCUPIED MODE OF OPERATION SHALL BE DETERMINED BY THE TIMELOCK FUNCTION OF THE BUILDING AUTOMATION SYSTEM. EACH EXHAUST FAN SHALL HAVE ITS OWN UNIQUE OCCUPIED / UNOCCUPIED MODE OF OPERATION.

UPON ACTIVATION OF OCCUPIED MODE THE DAMPER SHALL OPEN AND THE FAN SHALL START. DURING UNOCCUPIED MODE THE FAN SHALL BE OFF AND THE DAMPER SHALL BE CLOSED.

THE FAN SHALL ALARM THE BUILDING AUTOMATION SYSTEM IF THE FAN STATUS OR DAMPER STATUS DOES NOT MATCH THE COMMAND.



SEQUENCE OF OPERATION

VARIABLE VOLUME PACKAGED ROOFTOP UNIT

OCCUPIED MODE OF OPERATION

THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY. THE FAN VFD'S SHALL MODULATE TO MAINTAIN A SUPPLY AIR DUCT STATIC PRESSURE OF 0.5" (ADJ.) LOCATED IN THE SUPPLY DUCTWORK 2/3 POINT DOWN STREAM OF UNIT.

WHEN OUTDOOR AIR ENTHALPY IS ABOVE THE RETURN AIR ENTHALPY THE UNIT SHALL BE IN COOLING MODE. THE OUTSIDE AIR DAMPER SHALL MODULATE TO THE MINIMUM POSITION. THE COMPRESSOR CONTROLS SHALL STAGE THE STEPS OF REFRIGERATION AS REQUIRED TO PROVIDE THE NECESSARY SUPPLY AIR TEMPERATURE SETPOINT OF 55F (ADJ.).

WHEN THE OUTDOOR AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY AND THE OUTSIDE AIR TEMPERATURE IS ABOVE 55F (ADJ.), THE UNIT SHALL BE IN AIR SIDE ECONOMIZER MODE WITH MECHANICAL COOLING. THE OUTSIDE AIR DAMPER SHALL MODULATE TO ITS MAXIMUM POSITION AND THE COMPRESSOR CONTROLS SHALL STAGE THE STEPS OF REFRIGERATION AS REQUIRED TO PROVIDE THE NECESSARY SUPPLY AIR TEMPERATURE SETPOINT OF 55F (ADJ.). RELIEF FAN SHALL MODULATE TO MAINTAIN BUILDING PRESSURE.

WHEN THE OUTDOOR AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY AND THE OUTSIDE AIR TEMPERATURE IS BELOW 55F (ADJ.), THE UNIT SHALL BE IN AIR SIDE ECONOMIZER MODE. COMPRESSORS SHALL BE LOCKED OUT. THE OUTSIDE AIR DAMPER RETURN AIR DAMPER AND GAS HEAT SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE SET POINT OF 55F (ADJ.). RELIEF FAN SHALL MODULATE TO MAINTAIN BUILDING PRESSURE.

UNOCCUPIED MODE OF OPERATION

ALL DAMPERS GO TO THEIR NORMAL POSITION. THE SUPPLY FAN AND COMPRESSORS ARE CYCLED OFF-ON TO MAINTAIN A MAXIMUM SPACE TEMPERATURE OF 82F (ADJ.).

THE UNIT SHALL BE COMMANDED INTO THE OCCUPIED MODE FOR A PERIOD OF 1 HOUR (ADJUSTABLE) WHEN ANY SPACE THERMOSTAT OVERRIDE BUTTON IS PRESSED.

MORNING WARM-UP MODE

SUPPLY FAN WILL OPERATE AND THE FAN VFD'S SHALL MODULATE TO MAINTAIN A SUPPLY AIR DUCT STATIC PRESSURE. THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPEN. THE COMPRESSOR WILL BE LOCKED OUT. THE GAS FURNACE SHALL MODULATE TO MAINTAIN A UNIT DISCHARGE TEMPERATURE OF 80F (ADJ.). WHEN THE RETURN AIR TEMPERATURE RISES ABOVE 80F (ADJ.) THE NORMAL CYCLE IS RESUMED.

MORNING COOL-DOWN MODE

THE SUPPLY FAN, COMPRESSORS, AND ECONOMIZER SHALL OPERATE IN NORMAL OCCUPIED MODE. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 55 F THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPEN. WHEN THE RETURN AIR TEMPERATURE FALL BELOW 78F (ADJ.) THE NORMAL CYCLE IS RESUMED.

SMOKE CONTROL

SMOKE DETECTOR, LOCATED IN RETURN AIR, SIGNALS ALARM AND STOPS ALL RTU FANS WHEN PRODUCTS OF COMBUSTION ARE DETECTED IN THE AIRSTREAM, BY FIRE ALARM CONTRACTOR. PROVIDE SMOKE DETECTOR ALARM STATUS TO BUILDING AUTOMATION SYSTEM. UPON FIRE ALARM RELEASE THE NORMAL CYCLE IS RESUMED.

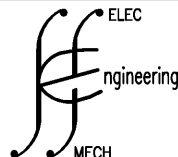
SAFETIES

- THE UNIT SHALL SHUT DOWN THE SUPPLY AND RELIEF FAN IF THE DISCHARGE AIR TEMPERATURE FALLS BELOW 45F (ADJ.).
- THE UNIT WILL NOTIFY THE BUILDING AUTOMATION SYSTEM OF DIRTY FILTERS UPON A PRESSURE DROP ABOVE LIMIT ACROSS THE FILTER BANK.
- THE UNIT SHALL ALARM THE BUILDING AUTOMATION SYSTEM WHEN THE SUPPLY FAN STATUS DOES NOT MATCH THE SUPPLY FAN COMMAND.
- THE UNIT SHALL ALARM THE BUILDING AUTOMATION SYSTEM WHEN THE RELIEF FAN STATUS DOES NOT MATCH THE RELIEF FAN COMMAND.
- THE UNIT SHALL ALARM THE BUILDING AUTOMATION SYSTEM WHEN THE COMPRESSOR STATUS DOES NOT MATCH THE COMPRESSOR COMMAND.

TEMPERATURE CONTROL SYMBOLS			
LS	LIMIT SWITCH	DP	DIFFERENTIAL PRESSURE SENSOR
FS	FLOW SWITCH	SP	STATIC PRESSURE SENSOR
DO	DIGITAL OUTPUT	DATS	DISCHARGE AIR TEMPERATURE SENSOR
DI	DIGITAL INPUT	VFD	VARIABLE FREQUENCY DRIVE
AI	ANALOG INPUT	MAT	MIXED AIR TEMPERATURE SENSOR
NC	NORMALLY CLOSED	DX	DIRECT EXPANSION
RA	RETURN AIR	CT	CURRENT TRANSDUCER
SA	SUPPLY AIR	FAC	FIRE ALARM CONTROL PANEL
OA	OUTSIDE AIR	STG	STAGE OF HEATING/COOLING
S/S	START / STOP	CTRL	CONTROL
DM	DAMPER MOTOR	AO	ANALOG OUTPUT
VOC	VOLATILE ORGANIC COMPOUNDS	CO2	CARBON DIOXIDE
		AFMS	AIR FLOW MEASURING STATION

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MECHANICAL CONTROLS

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