HEAT PUMP VRF INDOOR UNITS

APPLICABLE UNITS:
AHU-2-1 THROUGH AHU-2-17

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:
- OCCUPIED MODE: THE UNIT SHALL MAINTAIN
  - A 75°F (ADJ.) COOLING SETPOINT
  - A 70°F (ADJ.) HEATING SETPOINT
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN
  - A 85°F (ADJ.) COOLING SETPOINT
  - A 55°F (ADJ.) HEATING SETPOINT.
- EXCEPTIONS: AHU-2-2, AHU-2-3, AHU-2-11, AND AHU-2-12 SHALL ALWAYS MAINTAIN
  - A 75°F (ADJ.) COOLING SETPOINT
  - A 68°F (ADJ.) HEATING SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).
- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

SMOKE DETECTION (AHU-2-10 ONLY):
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR WITHIN A +/- 3 DEGREE TEMPERATURE RANGE (ADJ.).

ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

EMERGENCY SHUTDOWN:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL.

FAN:
THE FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.

THE FAN SPEEDS SHALL BE INDEXED AS FOLLOWS:
- LOW SPEED SHALL RUN ANYTIME THE ZONE TEMPERATURE IS WITHIN SETPOINTS.
- MEDIUM SPEED SHALL RUN ANYTIME THE ZONE TEMPERATURE IS OUTSIDE OF SETPOINTS.
- HIGH SPEED SHALL RUN ANYTIME THE ZONE TEMPERATURE IS OUTSIDE OF SETPOINTS BY A USER DEFINABLE AMOUNT (ADJ.).

HEATING AND COOLING - 2 COMPRESSOR STAGES:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND STAGE THE COMPRESSORS TO MAINTAIN ITS SETPOINT. TO PREVENT SHORT CYCLING, THERE SHALL BE A USER DEFINABLE (ADJ.) DELAY BETWEEN STAGES, AND EACH STAGE SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME. THE COMPRESSOR SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

THE HEATING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS LESS THAN 70°F (ADJ.).
- AND THE FAN STATUS IS ON.
- AND THE REVERSING VALVE IS IN HEAT MODE.

THE COOLING SHALL BE ENABLED WHENEVER:
- OUTSIDE AIR TEMPERATURE IS GREATER THAN 50°F (ADJ.).
- AND THE FAN STATUS IS ON.
- AND THE REVERSING VALVE IS IN COOL MODE.

ON MODE CHANGE, THE COMPRESSOR SHALL BE DISABLED AND REMAIN OFF UNTIL AFTER THE REVERSING VALVE HAS CHANGED POSITION.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- COMPRESSOR 1 RUNTIME EXCEEDED: COMPRESSOR 1 RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).
- COMPRESSOR 2 RUNTIME EXCEEDED: COMPRESSOR 2 RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

OUTSIDE AIR AND RETURN AIR DAMPERS:
THE OUTSIDE AIR DAMPER SHALL OPEN TO PROVIDE A FIXED PERCENTAGE OUTSIDE AIR VENTILATION ANYTIME THE UNIT IS OCCUPIED AND SHALL CLOSE ANYTIME THE UNIT STOPS. THE DAMPER OPEN POSITION SHALL BE SET DURING TESTING AND BALANCING. THE OUTSIDE AIR DAMPER SHALL CLOSE 1SEC (ADJ.) AFTER THE FAN STOPS.

DURING OPTIMAL START UP THE OUTSIDE AIR DAMPER SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN.

FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FILTER CHANGE REQUIRED: FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

RETURN AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE RETURN AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS GREATER THAN 90°F (ADJ.).
- LOW RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS LESS THAN 45°F (ADJ.).

DISCHARGE AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).
- LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40°F (ADJ.).

FAN STATUS:
THE CONTROLLER SHALL MONITOR THE FAN STATUS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- FAN RUNTIME EXCEEDED: FAN STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

ZONE HUMIDITY:
THE CONTROLLER SHALL MONITOR THE ZONE HUMIDITY.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH ZONE HUMIDITY: IF THE ZONE HUMIDITY IS GREATER THAN 70% (ADJ.).
- LOW ZONE HUMIDITY: IF THE ZONE HUMIDITY IS LESS THAN 35% (ADJ.).

HEAT PUMP VRF INDOOR UNITS

POINT NAME	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM	SHOW ON GRAPHIC
	HARDWARE POINTS				SOFTWARE POINTS					
ZONE TEMP	X							X		X
ZONE SETPOINT ADJUST	X									X
FILTER DIFFERENTIAL PRESSURE	X							X		X
DISCHARGE TEMP	X							X		X
RETURN AIR TEMP	X							X		X
ZONE HUMIDITY	X							X		X
SUPPLY AIR SMOKE DETECTOR (AHU-2-10 ONLY)			X					X	X	X
RETURN AIR SMOKE DETECTOR (AHU-2-10 ONLY)			X					X	X	X
ZONE OVERRIDE			X					X		X
FAN STATUS			X					X		X
FAN LOW SPEED				X				X		X
FAN MEDIUM SPEED				X				X		X
FAN HIGH SPEED				X				X		X
REVERSING VALVE				X				X		X
COMPRESSOR STAGE 1				X				X		X
COMPRESSOR STAGE 2				X				X		X
OUTSIDE AIR DAMPERS				X				X		X
RETURN AIR DAMPERS				X				X		X
EMERGENCY SHUTDOWN						X		X	X	X
SCHEDULE							X			
HEATING SETPOINT								X		X
COOLING SETPOINT								X		X
HIGH ZONE TEMP									X	
LOW ZONE TEMP									X	
COMPRESSOR 1 RUNTIME EXCEEDED									X	
COMPRESSOR 2 RUNTIME EXCEEDED									X	
FILTER CHANGE REQUIRED									X	
HIGH DISCHARGE AIR TEMP									X	
LOW DISCHARGE AIR TEMP									X	
FAN FAILURE									X	
FAN IN HAND									X	
FAN RUNTIME EXCEEDED									X	
HIGH RETURN AIR TEMP									X	
LOW RETURN AIR TEMP									X	
HIGH ZONE HUMIDITY									X	
LOW ZONE HUMIDITY									X	
TOTALS	6	0	4	8	0	1	1	20	17	21
	TOTAL HARDWARE (18)				TOTAL SOFTWARE (39)					

1 HEAT PUMP VRF INDOOR UNITS
M-9906   N.T.S.

RA

BI - RETURN AIR SMOKE DETECTOR (AHU-2-10 ONLY)

AI - RETURN AIR TEMP

BO - RETURN AIR DAMPER   N.O.
BO - OUTSIDE AIR DAMPER

AI - FILTER DIFFERENTIAL PRESSURE   AI - DISCHARGE AIR TEMP

BI - SUPPLY AIR SMOKE DETECTOR (AHU-2-10 ONLY)

OA   DA

N.C.

BI - ZONE OVERRIDE
AI - ZONE TEMP
AI - ZONE SETPOINT ADJUST

AI - ZONE HUMIDITY

BO - REVERSING VALVE   HP

BO - COMPRESSOR STAGE 1
BO - COMPRESSOR STAGE 2
BI - FAN STATUS   CT
BO - FAN LOW SPEED
BO - FAN MEDIUM SPEED
BO - FAN HIGH SPEED

BID SET

HUNTSVILLE UTILITIES
SOUTHEAST WATER TREATMENT PLANT
MECHANICAL HVAC CONTROLS

Project No.: 200-11740-10003
Designed By: SBR
Drawn By: BJZ
Checked By: DSB

M-9906

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Bar Measures 1 inch