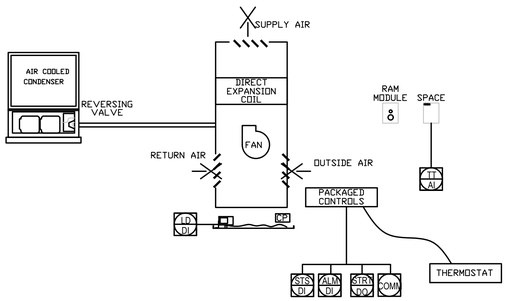

PM01 AIR COOLED SPLIT DX VRF HEAT PUMP UNIT TYPICAL

AIR COOLED VRF AND AC UNITS SEQUENCE OF OPERATIONS:

SIMPLIFIED SEQUENCE OF OPERATIONS INDICATED BELOW. REFER TO SPECIFICATIONS FOR COMPLETE SEQUENCE OF OPERATION AND OTHER BMS REQUIREMENTS.

A. OCCUPIED MODE

1. THE CONDENSER UNIT SHALL STOP ONLY WHEN ALL OF THE CONNECTED INDOOR UNITS ARE EXPERIENCING PROBLEMS. THE OPERATION OF EVEN A SINGLE INDOOR UNIT WILL KEEP THE CONDENSER UNIT RUNNING. THE CONDENSER UNIT OPERATES ACCORDING TO THE OPERATION MODE COMMANDED BY THE INDOOR UNIT. HOWEVER, WHEN THE CONDENSER UNIT IS RUNNING IN COOLING OPERATION, SOME OF THE OPERATING INDOOR UNITS WILL STOP, OR THE OPERATION OF THE INDOOR UNITS WILL BE PROHIBITED EVEN WHEN THE INDOOR UNIT MODE IS SWITCHED FROM FAN MODE TO HEATING MODE. INDOOR UNIT IS ABLE TO OPERATE IN COOLING, HEATING, DRY, AUTOMATIC HEATING/COOLING MODE, FAN MODE AND STOP MODE. CONDENSER UNIT IS ABLE TO OPERATE IN COOLING ONLY MODE, HEATING ONLY MODE, COOLING MAIN MODE (COEXISTING UNITS IN HEATING), HEATING MAIN MODE (COEXISTING UNITS IN COOLING), OR STOP MODES. WHEN UNITS IN COOLING AND HEATING COEXIST, THE OPERATION MODE (COOLING MAIN OR HEATING MAIN) WILL BE DETERMINED BY THE CONDENSER UNIT BASED ON THE REFRIGERANT PRESSURE AND SPEED VARIATION DATA.
2. A WALL MOUNTED THERMOSTAT SHALL BE PROVIDED WITH EACH INDOOR UNIT.
3. UPON A COMMAND TO START, THE CONDENSER REFRIGERANT EXPANSION VALVE SHALL OPEN. IN OCCUPIED MODE, THE VALVE IS FULLY OPEN.
4. THE COMPRESSOR(S) SHALL CYCLE AS NECESSARY TO MAINTAIN THE SPACE TEMPERATURE SETPOINT (ADJ.).

B. COOLING MODE

1. THE INDOOR UNIT SHALL BE STARTED BASED UPON A START TIME OPTIMIZATION PROGRAM, TIME OF DAY SCHEDULE, OR MANUAL COMMAND.
2. AFTER THE INDOOR UNIT FAN STATUS IS PROVEN ON VIA A CURRENT SENSING RELAY, THE TEMPERATURE CONTROL ALGORITHM SHALL BE ENABLED.
3. USING COOLING MODE SIGNAL FROM INDOOR UNIT CONTROLLER VIA SPACE THERMOSTAT COMMAND, THE CONDENSER UNIT SHALL TURN ON IN COOLING MODE.
4. INDOOR UNIT COOLING CAPACITY IS ADJUSTED BY MODULATING ITS LINEAR EXPANSION VALVE (LEV) TO MAINTAIN SPACE COOLING TEMPERATURE SETPOINT (ADJ.). A DEADBAND OF 1°F (ADJ.) SHALL BE MAINTAINED BETWEEN THE SPACE AIR TEMPERATURE AND COOLING TEMPERATURE SETPOINT BY MODULATING THE LINEAR EXPANSION VALVE (LEV).
5. AN INITIAL CALL FOR COOLING, WHICH WILL BE BASED ON A FIXED DEADBAND FROM SET TEMPERATURE OF +1.0°F, WILL COMMAND THE INDOOR UNIT'S LEV TO OPEN AND MODULATE BASED ON THE ZONE'S EFFECTIVE SPACE TEMPERATURE AND DEVIATION FROM SET TEMPERATURE. AS THE ZONE TEMPERATURE DROPS, THE LEV WILL MODULATE TO A THERMO OFF CONDITION BASED ON A FIXED DEADBAND FROM SET TEMPERATURE OF -1.0°F. THE INDOOR UNIT WILL MAINTAIN A THERMO OFF CONDITION UNTIL THE ZONE TEMPERATURE REACHES THE INITIAL CALL FOR COOLING LIMIT. THERMO OFF IS THE CONDITION OF THE LEV (LINEAR EXPANSION VALVE) AT STATIC MINIMUM POSITION WHILE NO LOAD DEMAND.

C. HEATING MODE

1. THE INDOOR UNIT SHALL BE STARTED BASED UPON A START TIME OPTIMIZATION PROGRAM, TIME OF DAY SCHEDULE, OR MANUAL COMMAND.
2. AFTER THE INDOOR UNIT FAN STATUS IS PROVEN ON VIA A CURRENT SENSING RELAY, THE TEMPERATURE CONTROL ALGORITHM SHALL BE ENABLED.
3. USING HEATING MODE SIGNAL FROM INDOOR UNIT CONTROLLER VIA SPACE THERMOSTAT COMMAND, THE CONDENSER UNIT SHALL TURN ON IN HEATING MODE.
4. INDOOR HEATING CAPACITY IS ADJUSTED TO MAINTAIN SPACE HEATING TEMPERATURE SETPOINT (ADJ.). A DEADBAND OF 2°F (ADJ.), WILL COMMAND THE INDOOR UNIT'S LEV TO OPEN AND MODULATE BASED ON THE ZONE'S EFFECTIVE SPACE TEMPERATURE AND DEVIATION FROM SET TEMPERATURE. AS THE ZONE TEMPERATURE RISES, THE LEV WILL MODULATE TO A THERMO OFF CONDITION BASED ON THE SET TEMPERATURE OF THE ZONE. THE INDOOR UNIT WILL MAINTAIN A THERMO OFF CONDITION UNTIL THE ZONE TEMPERATURE REACHES THE INITIAL CALL FOR HEATING LIMIT. IN THE EVENT THAT THE INDOOR UNIT CAN NOT MAINTAIN SET TEMPERATURE AND THE ZONE TEMPERATURE CONTINUES TO FALL, CN24 OUTPUT WILL ENERGIZE WHEN THE ZONE TEMPERATURE DROPS 4.0°F (ADJ. 1.8°F - 9.0°F) BELOW SET TEMPERATURE TO ENABLE A SUPPLEMENTAL SOURCE OF HEATING. SUPPLEMENTAL SOURCE OF HEATING WILL REMAIN ENERGIZED UNTIL ZONE TEMPERATURE REACHES SET TEMPERATURE. THERMO OFF IS THE CONDITION OF THE LEV (LINEAR EXPANSION VALVE) AT MINIMUM POSITION WHILE NO LOAD DEMAND.

D. DRY MODE

1. DRY MODE IS USED TO REDUCE THE MOISTURE OR LATENT CONTENT OF THE AIR IN THE CONDITIONED SPACE WITHOUT SIGNIFICANTLY IMPACTING ROOM TEMPERATURE. REDUCTION IS ACCOMPLISHED BY REDUCING THE AIRFLOW ACROSS THE INDOOR UNIT'S HEAT EXCHANGER WHILE CONTROLLING THE TEMPERATURE OF THE COIL'S SURFACE TO JUST BELOW THE DEW POINT OF THE RETURN AIR. DRY MODE IS INITIATED BY THE REMOTE CONTROLLER MODE SELECTION OR THE COMMAND FROM THE BMS.
2. UPON INITIATING A CALL FOR DRY MODE, THE ZONE TEMPERATURE AND SET TEMPERATURE WILL BE MONITORED FOR OPERATING CONDITIONS. THE ZONE TEMPERATURE MUST BE ABOVE 64°F FOR DRY MODE TO BE EFFECTIVE AND THE INDOOR UNIT'S SET TEMPERATURE WILL AFFECT THE DRY MODE CYCLE. IF THE INDOOR UNIT IS IN A DEMAND CONDITION (ZONE TEMPERATURE IS ABOVE SET TEMPERATURE) AND THE ZONE TEMPERATURE IS WITHIN PARAMETER RANGES, THE LINEAR EXPANSION VALVE AND THE FAN WORK SIMULTANEOUSLY TO "WRING OUT" MOISTURE OR REDUCE LATENT CONTENT OF THE AIRSTREAM.
3. WHEN THE INDOOR UNIT INLET TEMPERATURE EXCEEDS 64°F, THE CONDENSER COMPRESOR AND THE INDOOR UNIT FAN START THE INTERMITTENT OPERATION SIMULTANEOUSLY. WHEN THE INDOOR UNIT INLET TEMPERATURE BECOMES 64°F OR LESS, THE FAN ALWAYS RUNS AT LOW SPEED. THE CONDENSER UNIT, INDOOR UNIT AND THE SOLENOID VALVE OPERATE IN THE SAME WAY AS THEY DO IN THE COOLING OPERATION WHEN THE COMPRESSOR IS TURNED ON.

E. INDOOR AUTOMATIC COOLING/HEATING MODE

1. ACCORDING TO SET TEMPERATURE, COOLING OPERATION STARTS IF THE ROOM TEMPERATURE IS TOO HOT AND HEATING OPERATION STARTS IF THE ROOM TEMPERATURE IS TOO COLD. DURING AUTOMATIC OPERATION, IF THE ROOM TEMPERATURE CHANGES AND REMAINS 3.0°F (ADJ. 1.8°F - 9.0°F) OR MORE ABOVE SET TEMPERATURE FOR 3 MINUTES, THE INDOOR UNIT MODE CHANGES TO AUTOCOOL. IF THE ROOM TEMPERATURE CHANGES AND REMAINS 3.0°F (ADJ. 1.8°F - 9.0°F) OR MORE BELOW SET TEMPERATURE FOR 3 MINUTES, THE INDOOR UNIT MODE CHANGES TO AUTOHEAT. DURING COOL/HEAT-THERMO ON, OPERATION OF SPACE CONDITIONING IS ACCOMPLISHED BY COOL MODE SEQUENCE/HEAT MODE SEQUENCE. AUTO MODE IS THE DECISION BY THE INDOOR UNIT'S LOGICS TO SELECT COOL MODE CONTROL OR HEAT MODE CONTROL BASED ON ZONE CONDITIONS. BECAUSE THE ROOM TEMPERATURE IS AUTOMATICALLY ADJUSTED IN ORDER TO MAINTAIN A FIXED EFFECTIVE SET TEMPERATURE, COOLING OPERATION AND HEATING OPERATION IS PERFORMED USING MODE SPECIFIC DEADBANDS ONCE SET TEMPERATURE IS REACHED.

F. INDOOR FAN MODE

1. THE INDOOR UNIT SHALL CONTROL FAN SPEED TO MAINTAIN SPACE TEMPERATURE SETPOINT (ADJ.) WITHIN A DEADBAND OF 2°F (ADJ.) OR LESS.

G. UNOCCUPIED MODE

1. DURING THE UNOCCUPIED MODE, THE SPACE COOLING AND HEATING SETPOINT TEMPERATURE IS SET TO THE PROGRAMMED SETBACK TEMPERATURE SETPOINT (ADJ.). DURING UNOCCUPIED MODE WHEN THE SPACE SETPOINT INCREASES ABOVE THE UNOCCUPIED COOLING SETBACK TEMPERATURE SETPOINT (ADJ.) OR DECREASES BELOW THE UNOCCUPIED HEATING SETBACK TEMPERATURE (ADJ.), THE UNIT SUPPLY FAN AND CONDENSER UNIT WILL ENERGIZE AS DESCRIBED PER THE OCCUPIED SEQUENCE. ON A CALL FOR HEATING OR COOLING THE INDOOR UNIT SHALL MODULATE OUTPUT CAPACITY TO MAINTAIN THE UNOCCUPIED SETPOINT TEMPERATURES.

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No.	Description	Date
1	ISSUED FOR BID	11/03/23

SPRING VALLEY VILLAGE

SPRING VALLEY POLICE LOCKER UPGRADES

DRAWING TITLE
MECHANICAL DIAGRAMS

DRAWING NO.
M-400.00

SEAL & SIGNATURE

ISSUE DATE: 9-27-23
SCALE: NTS
DWG BY: DWN
CHK BY: CHECK

JOB NUMBER
23025-00