



INPUT/ OUTPUT SUMMARY	WATER SOURCE HEAT PUMP POINTS LIST														NOTES	
	OUTPUTS				INPUTS				SOFTWARE							
	DIGITAL	ANALOG	DIGITAL	ANALOG	ALARM	ENERGY MANAGEMENT										
WATER SOURCE HEAT PUMPS	X															(1)
SUPPLY FAN	X															
SOLENOID VALVE		X														
SUPPLY AIR TEMPERATURE									X							
SPACE TEMPERATURE SENSOR				X					X		X		X	X		
SPACE HUMIDITY				X					X							
OCCUPANCY OVERRIDE								X								
SMOKE DETECTOR								X								(2)
CONDENSATE OVERFLOW SWITCH								X								
REVERSING VALVE	X															
IONIZATION FILTER ALARM										X						

(1) SEE MECHANICAL FLOOR PLAN SHEETS FOR TOTAL NUMBER OF WATER SOURCE HEAT PUMPS
(2) 5-TON UNITS AND LARGER ONLY

INPUT/ OUTPUT SUMMARY	MISCELLANEOUS HVAC EQUIPMENT AND BUILDING POINTS LIST														NOTES		
	OUTPUTS				INPUTS				SOFTWARE								
	DIGITAL	ANALOG	DIGITAL	ANALOG	ALARM	ENERGY MANAGEMENT											
DX SPLIT SYSTEM	X																ADD EXISTING WDF & IDF UNITS
UNIT ALARM									X								
SPACE TEMPERATURE									X								
SUPPLY AIR TEMPERATURE									X								
EXHAUST FANS (EF)	X																ADD ALL NEW EXHAUST FANS
RANGE HOOD (H-1)																	EXISTING
RANGE HOOD EXHAUST FAN (KEF-1)									X								EXISTING
RANGE HOOD MAKEUP AIR FAN (MAU-1)	X								X								EXISTING
WATER HEATER	X								X				X				EXISTING
DOMESTIC HOT WATER CIRC PUMP	X												X				EXISTING
HOT WATER SUPPLY TEMPERATURE									X								EXISTING
FIRE ALARM STATUS										X							PER GCPS STANDARDS
FIRE ALARM TROUBLE										X							PER GCPS STANDARDS
SECURITY ALARM										X							PER GCPS STANDARDS
SECURITY ALARM POWER LOSS										X							PER GCPS STANDARDS
FREEZER/COOLER ZONE TEMPERATURE									X	X			X				PER GCPS STANDARDS
FREEZER/COOLER POWER LOSS									X								PER GCPS STANDARDS
GENERATOR										X							PER GCPS STANDARDS
GENERATOR OVERCRANK										X							PER GCPS STANDARDS
HVAC EMERGENCY FAN STOP SWITCH										X							
OUTSIDE TEMPERATURE									X								
OUTSIDE HUMIDITY									X								EXISTING AT ADMIN OFFICES
OUTSIDE CO2									X								
PLUMBING TRAP PRIMER SOLENOID	X																PER GCPS STANDARDS

CONTROL SEQUENCES - WATER SOURCE HEAT PUMPS

- WATER SOURCE HEAT PUMP UNITS
- The water source heat pumps are packaged constant volume units. Each unit is controlled by the DDC system using electric actuation and is scheduled for automatic operation on a time of day basis with local occupancy sensor override by lighting controls. Occupied, Unoccupied and Safety modes are as follows:
 - FAN OPERATION: The supply fan operates continuously without cycling.
 - TEMPERATURE CONTROLS: Zone space sensors provide feedback for maintaining the space temperature set point of 74°F (adjustable) for cooling and 70°F (adjustable) for heating. Space temperature is controlled by the heat pump unitary controller based on requests for either cooling or heating from the DDC system. Temperature setpoint defaults to unoccupied mode whenever lighting occupancy sensor de-energizes overhead light fixtures.
 - COOLING MODE: On a rise in temperature above the cooling setpoint, the building water solenoid valve shall open and the compressor starts after the water valve is fully opened.
 - HEATING MODE: On a drop in temperature below the heating setpoint, the reversing water solenoid valve shall open, the reversing valve shifts to heating, and the compressor starts after the water valve is fully opened.
 - DEHUMIDIFICATION MODE: Not Available.
 - MORNING COOL-DOWN/WARM-UP: The water-source heat pumps shall be energized by the DDC system to achieve Occupied cooling setpoint at the start of business hours. Software shall calculate unit start time based on indoor and outdoor air conditions.
 - BUILDING LOOP FLOW: Normally closed BUILDING loop solenoid valve shall fully open before the compressor starts (both cooling and heating modes).
 - See Input/Output Summary for the status inputs to be monitored.
 - Unoccupied:
 - If space temperature increases to 85°F (adjustable) or drops to 55°F (adjustable), the unit supply fan will cycle with operation of the respective cooling or heating sections until the space temperature is stabilized.
 - Upon activation of the override switch, the DDC system shall change the system status to the occupied mode for 1-hour (adjustable).
 - Smoke Detector:
 - The supply fan shall be de-energized upon activation of the fire alarm shutdown (hardwired, no DDC processing).
 - Activation of the Emergency Fan Stop switch shall stop all heat pump supply fans.
 - Activation of the overflow switch in the auxiliary drain pan shall stop the unit (where shown).

CONTROL SEQUENCES - SCHEDULES & MISCELLANEOUS

- BUILDING OCCUPANCY SCHEDULES: Provide occupancy schedules for each zone and the associated equipment.
 - *Each dedicated outdoor air system (ERU) unit shall be independently scheduled for occupancy such that the operator can change each ERU operating schedule independent of the associated water source heat pump (WSHP) zone it serves.
- BUILDING WATER LOOP:
 - BUILDING water loop shall be operational when any zone of heat pumps are in the occupied mode.
 - BAS shall transition from scheduled unoccupied to occupied mode (morning warm-up) with optimized unit start-up to reach occupied setpoint at the start of occupied time, based on historical trended data, in a minimal amount of time, and stagger start-up to prevent low loop supply temperature.
 - For equipment operation see ZONE SEQUENCES below and see each equipment type sequences.
- DX SPLIT SYSTEM UNIT CONTROLS: Units shall operate under independent controls. BAS temperature sensors shall monitor space temperature and initiate a BAS alarm if the space temperature exceed 80°F (adjustable). ODSA/C shall be set to maintain a room temperature of 72°F.
- EXHAUST FAN CONTROLS:
 - Exhaust and/or transfer fans serving electrical rooms for temperature control shall be controlled by a wall-mounted DDC temperature sensor, with space temperature alarm at 95°F (adjustable). Provide current sensor in fan motor; if sensor indicates failure when room is calling for fan operation, DDC shall disable fan and activate fan failure alarm. Exhaust fan operation shall be interlocked with associated motorized damper on intake hood or wall louver.
 - All exhaust fans serving multiple user restrooms shall operate during occupied hours. Provide control relay and NEMA 1 enclosure in power wiring to fan. Provide current sensor in fan motor; if sensor indicates failure when room is calling for fan operation, DDC shall disable fan and activate fan failure alarm.
 - Exhaust fan serving kitchen shall be activated by two means: either local ON/OFF digital timer switch with a temperature override activating the exhaust fan when room temperature exceed 85°F.
- KITCHEN HOODS (EXISTING)
- ELECTRIC UNIT HEATERS shall be controlled by wall or unit-mounted thermostats. When temperature drops below setpoint of 60°F (adjustable), the heater element shall energize, and unit heater fan shall operate.
- INTERIOR LIGHTING CONTROLS: Occupancy sensors shall be provided in each major space as shown on BAS drawings for control of lighting. Coordinate with Division 26.
- EMERGENCY FAN SHUT-DOWN: Activation of the Emergency Fan Stop switch shall stop all heat pump supply fans, Rooftop Units, Make-up Air Unit, ERU unit fans, split-systems, wall-hung units and exhaust fans.
- PLUMBING TRAP PRIMER SOLENOID: BAS shall activate solenoid for 5 seconds every 24 hour period. BAS vendor shall provide electronic trap primers at all locations, field verify.

Order Plans

BAS CONTROLS NOTES

- Automatic controls manufacturer is HI Solutions. All BAS work shall be installed by Frazier Service Company.
- I/O points and control sequences shall comply with the latest Gwinnett County Public School design guidelines.
- Any deviations to the sequences or points listed on these drawings shall be specifically approved by Owner and Engineer with a credit issued during shop drawing submittal phase as applicable.



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Revisions:

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