

CONTROLS AND CONTROLS COORDINATION

THE BUILDING AUTOMATIC CONTROL SYSTEM (BAS) WILL BE PROVIDED UNDER A SEPARATE CONTRACT. THE BAS CONTRACTOR WILL BE TEXAS BUILDING CONTROLS, 201 METRO DRIVE, TERRELL, TX 75160, 972-524-2801. CONTACT IS SCOTT CANNON, 214-850-4545, CANNON@TEXASBUILDINGCONTROLS.COM.

THE MECHANICAL CONTRACTOR IS TO COORDINATE WITH THE BAS CONTRACTOR FOR THE INSTALLATION REQUIREMENTS OF THE CONTROLS SYSTEM. THE MECHANICAL CONTRACTOR IS TO FURNISH AND INSTALL ALL PIPE TAPS, THERMOMETER WELLS, ETC. AS REQUIRED BY THE BAS CONTRACTOR.

THE FOLLOWING SEQUENCE IS GENERAL IN NATURE AND DOES NOT DESCRIBE ALL CONTROL REQUIREMENTS OR DEVICES. SEE BAS CONTRACTORS FINAL CONTROL DIAGRAMS AND SEQUENCES FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

HVAC CONTROL SEQUENCE FOR CHILLER & BOILER SYSTEM WITH 5 AIR HANDLERS

CHILLER & CHILLED WATER SYSTEM ENABLE/DISABLE SEQUENCE

1. CHILLER/CHILLED WATER SYSTEM ENABLE:
 - a. THE CHILLER AND CHILLED WATER PUMP SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 45°F, CHILLED WATER PUMP AND THERE IS A CALL FOR COOLING FROM ANY AIR HANDLER TEMPERATURE SENSOR.
 - b. UPON PROOF OF PUMP STATUS (FLOW), THE CHILLER WILL START. CHILLER RUN STATUS SHALL BE MONITORED THROUGH THE BAS SYSTEM. INTERNAL CHILLER CONTROLS SHALL STAGE COMPRESSORS TO MAINTAIN CHILLED WATER SUPPLY TEMPERATURE OF 44°F (ADJ.).
 - c. THE BAS WILL ALTERNATE THE CHILLED WATER PUMPS IN A DUTY/STANDBY SEQUENCE EACH WEEK (ADJUSTABLE) TO EQUALIZE THE RUN TIME OF EACH CHILLED WATER PUMP. THE LEAD CHILLED WATER PUMP SHALL RUN ANYTIME THE CHILLER IS CALLED TO RUN. FAILURE OF EITHER PUMP TO START WHEN COMMANDED IS TO SIGNAL A PUMP FAILURE TO THE BAS SYSTEM. THE OTHER CHILLED WATER PUMP IS TO RUN WHENEVER THERE IS A PUMP FAILURE.
 - d. CHILLER INTERNAL CONTROLS AND SAFETY PARAMETERS WILL OPERATE TO ASSURE CHILLER FLOW IS VERIFIED, AND THAT FACTORY SETPOINTS AND EQUIPMENT PROTECTION CRITERIA ARE MET.
 - e. CHILLER OPERATION SHALL BE INTERLOCKED WITH THE DIFFERENTIAL PRESSURE SENSOR TO ENSURE CHILLED WATER FLOW IS MAINTAINED (VIA BYPASS CONTROL VALVE IF NEEDED).
 - f. A MINIMUM RUN-TIME (E.G., 30 MINUTES) SHALL BE ENFORCED TO PREVENT SHORT CYCLING.
2. CHILLER/CHILLED WATER SYSTEM DISABLE:
 - a. THE CHILLER AND CHILLED WATER PUMP SHALL BE DISABLED WHEN THE OUTSIDE AIR TEMPERATURE IS 45°F OR BELOW, AND NO COOLING DEMAND EXISTS FROM THE AIR HANDLERS.
 - b. THE CHILLER SHALL ALSO BE DISABLED IF THE DIFFERENTIAL PRESSURE FALLS OUTSIDE THE ACCEPTABLE RANGE DUE TO INSUFFICIENT CHILLED WATER FLOW. SEE FREEZE PROTECTION SEQUENCE FOR CHILLED WATER CIRCULATION REQUIREMENTS DURING COLD AMBIENT CONDITIONS.
 - c. SEE FREEZE PROTECTION SEQUENCE FOR CHILLED WATER CIRCULATION REQUIREMENTS DURING COLD AMBIENT CONDITIONS.

BOILER & HEATING WATER SYSTEM ENABLE/DISABLE SEQUENCE

1. BOILER/HEATING WATER SYSTEM ENABLE
 - a. THE BOILER AND HEATING HOT WATER PUMP SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 55°F AND THERE IS A CALL FOR HEATING FROM ANY AHU.
 - b. BOILER INTERNAL CONTROLS AND SAFETY PARAMETERS WILL OPERATE TO ASSURE THE BOILER'S INTERNAL PUMP IS VERIFIED, AND THAT FACTORY SETPOINTS AND EQUIPMENT PROTECTION CRITERIA ARE MET.
 - c. A MINIMUM RUN-TIME (E.G., 15 MINUTES) SHALL BE ENFORCED TO PREVENT SHORT CYCLING.
2. BOILER/HEATING WATER SYSTEM DISABLE:
 - a. THE BOILER AND HEATING HOT WATER PUMP SHALL BE DISABLED WHEN THE OUTSIDE AIR TEMPERATURE IS 55°F OR ABOVE, AND NO HEATING DEMAND EXISTS FROM THE AIR HANDLERS.

AIR HANDLER CONTROL SEQUENCE

1. OCCUPIED MODE:
 - a. AIR HANDLERS SHALL BE FULLY OPERATIONAL DURING OCCUPIED MODE.
 - b. THE SUPPLY FAN SHALL MODULATE BASED ON VARIABLE AIR VOLUME (VAV) REQUIREMENTS TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.
 - c. ON A CALL FOR COOLING, THE TWO-WAY CHILLED WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE AIR TEMPERATURE OF 55°F ON A CALL FOR HEATING, THE TWO WAY HOT WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
 - d. IF DISCHARGE AIR TEMPERATURE IS WITHIN SETPOINT, THE VALVE SHALL CLOSE TO REDUCE CHILLED WATER FLOW.
2. UNOCCUPIED MODE:
 - a. AIR HANDLERS SHALL CYCLE ON/OFF AS REQUIRED TO MAINTAIN A NIGHT-SETBACK SPACE TEMPERATURE (E.G., HEATING: 60°F, COOLING: 80°F).
 - b. THE CHILLED WATER CONTROL VALVES SHALL REMAIN CLOSED WHEN COOLING IS NOT REQUIRED.
 - c. THE HEATING HOT WATER CONTROL VALVES SHALL REMAIN CLOSED WHEN HEATING IS NOT REQUIRED.
 - d. THE SUPPLY FAN SHALL OPERATE INTERMITTENTLY TO CHECK SPACE TEMPERATURE AND CYCLE AS NEEDED.

CHILLED WATER BYPASS CONTROL VALVE

1. A BYPASS CONTROL VALVE SHALL BE LOCATED AT THE END OF THE CHILLED WATER LOOP.
2. THE BYPASS VALVE SHALL MONITOR THE DIFFERENTIAL PRESSURE BETWEEN THE CHILLED WATER SUPPLY AND RETURN.
 - a. THE VALVE SHALL OPEN AS NEEDED TO MAINTAIN THE MINIMUM REQUIRED CHILLED WATER FLOW FOR PROPER CHILLER OPERATION.
 - b. AS TWO-WAY VALVES ON THE AIR HANDLERS MODULATE TO REDUCE WATER FLOW, THE BYPASS VALVE SHALL OPEN TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINT (E.G., 3-5 PSI, ADJUSTABLE).
3. THE BYPASS VALVE SHALL CLOSE INCREMENTALLY AS CHILLED WATER FLOW DEMAND INCREASES FROM THE AIR HANDLERS.

AIR HANDLER VARIABLE AIR VOLUME (VAV) CONTROL

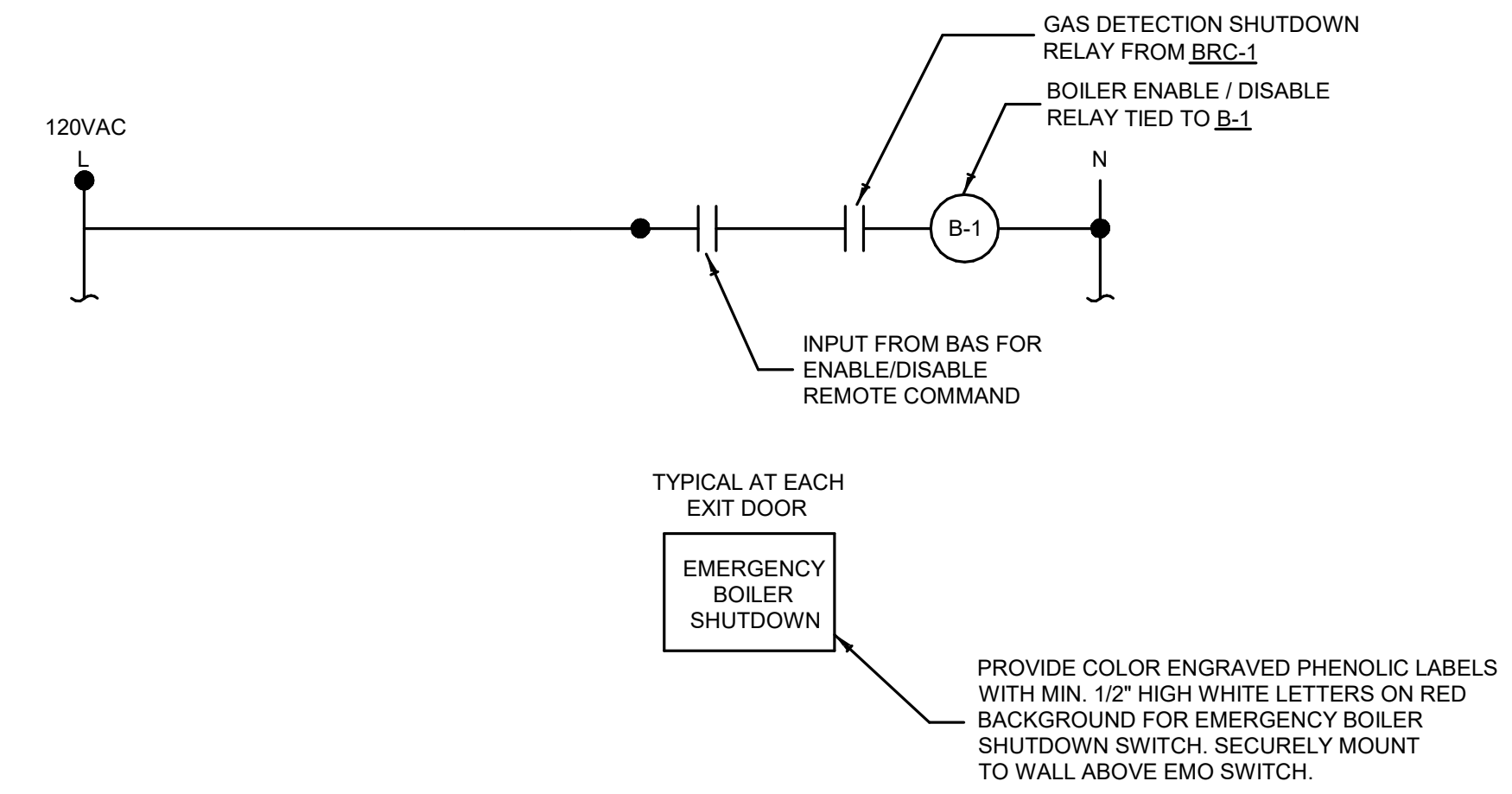
1. EACH AIR HANDLER SHALL INCLUDE A VAV SYSTEM TO MAINTAIN SPACE TEMPERATURE SETPOINT.
 - a. SPACE TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE VIA THE BUILDING MANAGEMENT SYSTEM (BMS).

FREEZE PROTECTION:

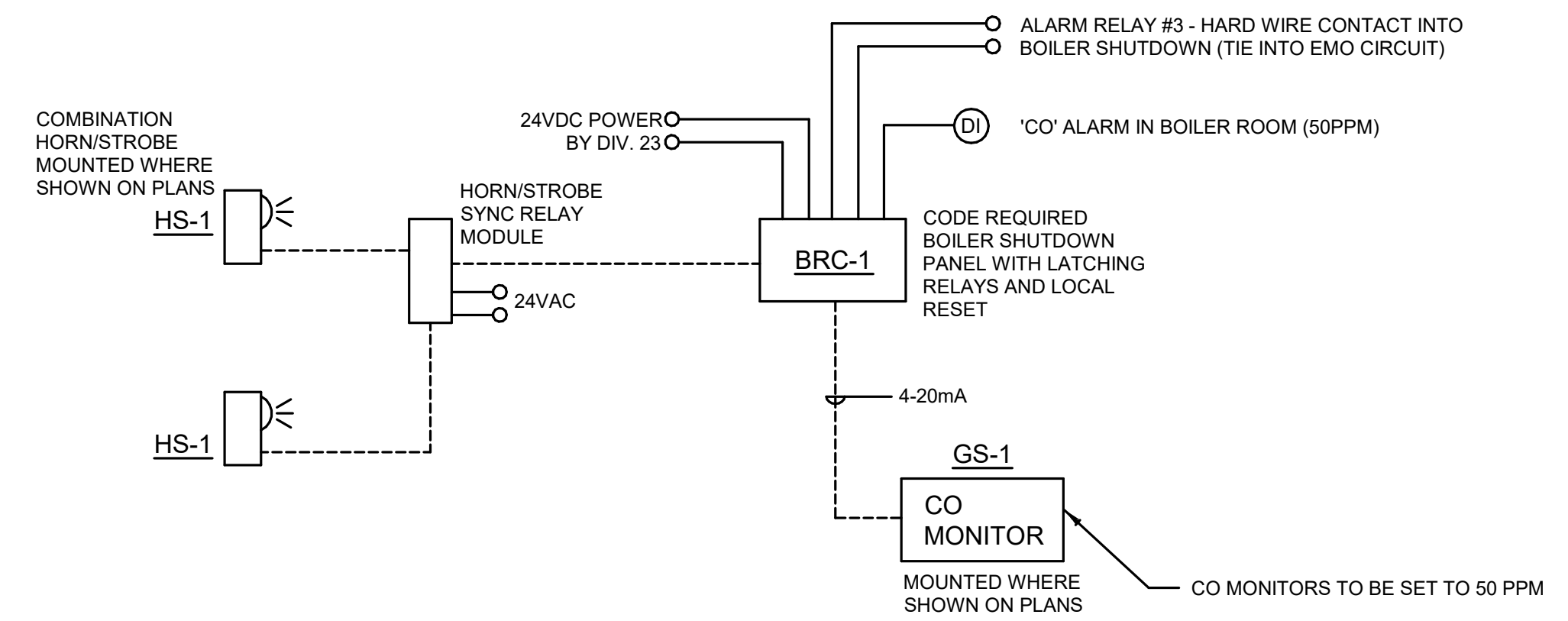
1. ENABLE FREEZE PROTECTION FOR CHILLED WATER COILS DURING UNOCCUPIED MODE OR LOW-TEMPERATURE CONDITIONS.
2. BAS SYSTEM IS TO CIRCULATE CHILLED WATER PERIODICALLY IF OUTDOOR AIR TEMPERATURE FALLS BELOW A SET THRESHOLD (E.G., 35°F).

ALARMS AND FAULT DETECTION:

1. INCLUDE ALARMS FOR:
 - a. LOW CHILLED WATER FLOW/DIFFERENTIAL PRESSURE
 - b. HIGH/LOW DISCHARGE AIR TEMPERATURE
 - c. CHILLER FAILURE OR SHORT CYCLING
2. INTEGRATE FAULT DETECTION INTO THE BMS FOR DIAGNOSTICS AND MAINTENANCE ALERTS.



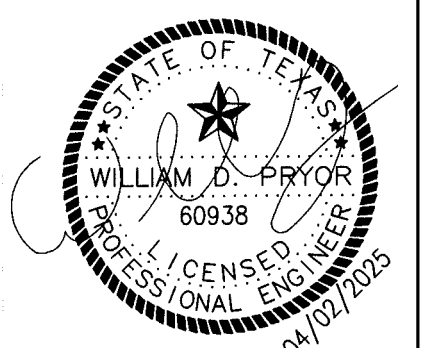
WIRING SCHEMATIC - BOILER SHUTDOWN



CARBON MONOXIDE - GAS MONITORING SYSTEM



Revision No.	Date	Description



AVO:	55881.001
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