

A

B

C

D

E

F

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS					
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM
432RCHS01-1 (NOTE 1)										
Chiller Start/Stop Command				1				1	1	
Chiller Status			1						1	1
Chilled Water Supply Temp Setpoint Reset					1				1	
Chiller General Alarm			1							1
Chiller CHWS-T > SP + 5deg.F Alarm						1				1
Chiller Run Fault			1							1
Chiller Compressor Status						2			2	2
Chiller Current					1				1	
Chiller Instantaneous Power (kW)					1				1	
Chiller Misc. Monitoring 1					1				1	1
Chiller Misc. Monitoring 2					1				1	1
Condenser Water Head Pressure Control Valve (NOTE 2)										
Condenser Water Head Pressure Control Valve Position					1				1	1
Chilled Water Flow Switch Status (NOTE 2)										
Condenser Water Flow Switch Status (NOTE 2)										
Condenser Water Bypass Control Valve				1				1	1	
Chilled Water Return Temp (NOTE 3)	1								1	1
Condenser Water Supply Temp (NOTE 3)	1								1	1
Chilled Water Flow Meter (NOTE 3)	1								1	1
432PCHW01-1 & 432PCHW02-1 (NOTE 1)										
VFD Pump Start/Stop Command				2				2	2	
VFD Pump Speed Control Command		2						2	2	
VFD Status			2						2	2
VFD Speed/Current	2								2	
VFD Instantaneous Power (kW)					2				2	
VFD General Alarm			2						2	2
Pump Differential Pressure (NOTE 3)	2								2	2
432ACU08-2H / 432RCUA01-2H & 432ACU09-3H / 432RCUA02-3H										
Unit Enable Command						2		2	2	
Room Temp Setpoint					2				2	
Unit General Alarm						2				2
Unit Run Fault						2				2
Unit Current					2				2	
Unit Instantaneous Power (kW)					2				2	
Unit Misc. Monitoring 1					2					2
Unit Misc. Monitoring 2					2					2
Room Temp (NOTE 3)	2								2	2
432HEA01-A1 & 432HEA02-4 & 432HEA03-5										
Heater Enable Command		3							3	
Room Temp Setpoint					3				3	
Room Temp (NOTE 3)	3								3	3
Supply Airflow (NOTE 3)	3								3	3
TOTALS	15	5	7	4	21	9	0	8	50	34

Total Hardware (31)
Total Software (122)
NOTES:
1. NEW ALC DDC UNIT CONTROLLERS SERVING 432RCHS01-1, 432PCHW01-1, & 432PCHW02-1 SHALL BE SIZED AND SELECTED TO SERVE AS CENTRAL CONTROL PANEL (432DDCP01) FOR ALL NEW HVAC EQUIPMENT REQUIRED BY PROJECT AND INCLUDE 10% SPARE CAPACITY FOR EACH CATEGORY OF HARD-WIRED POINT.
2. WIRE CONTROL DEVICE DIRECTLY TO FACTORY CHILLER CONTROL PANEL. IF POINT CAN BE MONITORED OVER ALC, MONITOR POINT. FLOW SWITCHES ARE FACTORY-INSTALLED AND FACTORY-WIRED.
3. EQUIPMENT VENDOR WILL NOT PROVIDE CONTROL DEVICE, SUBCONTRACTOR TO PROVIDE FIELD-INSTALLED, HARD-WIRED CONTROL DEVICE.
4. REFER TO SEQUENCES OF OPERATION FOR ALL DEFAULT SYSTEM SETPOINTS. COORDINATE FINAL SYSTEM SETPOINTS WITH LLNL.
5. CONTROLS SUBCONTRACTOR TO PROVIDE ALL PROGRAMMING REQUIRED TO DELIVER NEW ALARM NOTIFICATIONS OVER NEW ALC SYSTEM TO LLNL EMAILS AND PAGERS. COORDINATE WITH LLNL.
6. CELLS WITH "<__>" SHALL BE DETERMINED BY THE CONTROLS SUBCONTRACTOR. SPACES WHERE NO ENTRY IS REQUIRED CONTAIN "--".

HEAT PUMP SPLIT SYSTEMS
432ACU08-2H / 432RCUA01-2H & 432ACU09-3H / 432RCUA02-3H

- RUN CONDITIONS - CONTINUOUS:
EACH EVAPORATOR AND INTERLOCKED CONDENSING UNIT (SEE EQUIPMENT SCHEDULES FOR INTERLOCKED CONDENSING UNIT) MUST RUN 24/7 TO SATISFY THE FOLLOWING SETPOINTS:
- 432ACU08: A 72°F (ADJ.) OCCUPIED COOLING SETPOINT
A 70°F (ADJ.) OCCUPIED HEATING SETPOINT
A 85°F (ADJ.) UNOCCUPIED COOLING SETPOINT
A 55°F (ADJ.) UNOCCUPIED HEATING SETPOINT
 - 432ACU09: A 72°F (ADJ.) OCCUPIED COOLING SETPOINT
A 70°F (ADJ.) OCCUPIED HEATING SETPOINT
A 85°F (ADJ.) UNOCCUPIED COOLING SETPOINT
A 55°F (ADJ.) UNOCCUPIED HEATING SETPOINT
 - 432ACU10: A 72°F (ADJ.) OCCUPIED COOLING SETPOINT
A 70°F (ADJ.) OCCUPIED HEATING SETPOINT
A 85°F (ADJ.) UNOCCUPIED COOLING SETPOINT
A 55°F (ADJ.) UNOCCUPIED HEATING SETPOINT

SPLIT SYSTEMS WILL COMMUNICATE STATUS AND ALARMS TO THE BAS FROM NATIVE UNIT CONTROLLER (REFER TO POINTS LIST). SPLIT SYSTEMS WILL OPERATE ACCORDING TO EXISTING, STAND-ALONE OEM PROGRAMMING.

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

ALARM CONDITION	GRAPHIC	POINT SETTING (WITH UNITS)	POINT RANGE (WITH UNITS)	ALARM TYPE
~	Y	~	ON/OFF	~
CHILLER COMMAND IS ON, BUT CHILLER STATUS IS OFF	Y	~	ON/OFF	CRIT
~	Y	43 DEG. F.	<__>	~
STATUS IS "ALARM"	Y	~	NORMAL/ALARM	INFO
STATUS IS "ALARM"	Y	~	NORMAL/ALARM	CRIT
STATUS IS "ALARM"	Y	~	NORMAL/ALARM	INFO
CHILLER COMMAND IS ON, BUT COMPRESSOR STATUS IS OFF	Y	~	ON/OFF	CRIT
~	Y	~	<__>	~
~	Y	~	<__>	~
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	~	INFO
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	~	INFO
~	Y	~	0-100%	~
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	<__>	INFO
~	Y	~	OPEN/CLOSED	~
~	Y	~	OPEN/CLOSED	~
~	Y	~	OPEN/CLOSED	~
CHWR TEMP GREATER THAN 57 DEG F OR LESS THAN 42 DEG F	Y	~	<__>	CRIT
LCWS TEMP GREATER THAN 86 DEG F OR LESS THAN 60 DEG F	Y	~	<__>	INFO
FLOW IS NOT EQUAL TO 220 GPM	Y	~	OPEN/CLOSED	INFO
~	Y	~	ON/OFF	~
~	Y	~	0-100%	~
VFD COMMAND IS ON, BUT VFD STATUS IS OFF	Y	~	ON/OFF	CRIT
~	Y	~	0-100%	~
~	Y	~	<__>	~
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	~	INFO
VFD COMMAND IS ON, BUT DP IS LESS THAN 5 PSIG	Y	56 PSIG	<__>	CRIT
~	Y	~	ON/OFF	~
~	Y	72 DEG. F.	<__>	~
STATUS IS "ALARM"	Y	~	NORMAL/ALARM	INFO
STATUS IS "ALARM"	Y	~	NORMAL/ALARM	INFO
~	Y	~	<__>	~
~	Y	~	<__>	~
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	~	INFO
FOR FUTURE USE AT OWNER'S DISCRETION	Y	~	~	INFO
HIGH LIMIT ALARM, LOW LIMIT ALARM - REFER TO SEQUENCE	Y	~	<__>	INFO
~	Y	~	ON/OFF	~
~	Y	72 DEG. F.	<__>	~
~	Y	~	<__>	~
HIGH LIMIT ALARM, LOW LIMIT ALARM - REFER TO SEQUENCE	Y	~	<__>	INFO

WATER FLOW METER (CHILLED WATER)

THE ALC CONTROLLER MUST MONITOR THE CHILLED WATER METER FOR CHILLED WATER FLOW (GPM) VIA ANALOG INPUT. PROVIDE CONNECTION FROM WATER FLOW METER TO ALC PANEL.

- ALARM MUST BE GENERATED AS FOLLOWS:
- FLOW IS DIFFERENT THAN DESIGN FLOWRATE (220 GPM) BY MORE THAN 5 GPM (ADJ.)

USAGE HISTORY:
THE ALC CONTROLLER MUST CALCULATE AND RECORD BTU/HR USING FLOW METER GPM VALUE AND TEMPERATURE SENSORS SO AS TO PROVIDE A CHILLED WATER CONSUMPTION HISTORY. USAGE READINGS MUST BE RECORDED ON A DAILY, MONTH-TO-DATE, AND YEAR-TO-DATE BASIS.

432HEA01-A1

WHEN ROOM 1204 TEMPERATURE IS LESS THAN 65 DEG. F. (ADJ.), SCR PROPORTIONAL ELECTRIC DUCT-MOUNTED HEATING COIL SHALL BE ENABLED TO MAINTAIN MINIMUM 65 DEG. F. (ADJ.) ROOM TEMPERATURE.

HEATING COIL SHALL BE DISABLED WHEN ROOM TEMPERATURE IS AT LEAST 65 DEG. F. (ADJ.) FOR 10 MINUTES (ADJ.)

CONTROLLER SHALL MODULATE HEATER LOAD ACCORDING TO THE TEMPERATURE CONTROL SIGNAL. HEATER SHALL PROVIDE MAXIMUM HEATING WHEN WHEN NEEDED WITH NORMAL MINIMUM AIRFLOW (TBD DURING CX), REDUCE HEATING WHEN AIRFLOW IS LOWER THAN NORMAL MINIMUM AIRFLOW (TBD DURING CX), AND STOP HEATING WHEN AIRFLOW IS ZERO.

432HEA02-4 & 432HEA03-5

WHEN ACHPS SUPPLY AIR TEMPERATURE IS LESS THAN 40 DEG. F. (ADJ.), AN ALARM SHALL BE PROVIDED OVER ALC, AND SCR PROPORTIONAL ELECTRIC DUCT MOUNTED HEATING COIL SHALL BE ENABLED TO MAINTAIN MINIMUM 65 DEG. F. (ADJ.) SUPPLY AIR TEMPERATURE.

HEATING COIL SHALL BE DISABLED AFTER 30 MINUTES (ADJ.)

CONTROLLER SHALL MODULATE HEATER LOAD ACCORDING TO THE TEMPERATURE CONTROL SIGNAL. HEATER SHALL PROVIDE MAXIMUM HEATING WHEN WHEN NEEDED WITH NORMAL MINIMUM AIRFLOW (TBD DURING CX), REDUCE HEATING WHEN AIRFLOW IS LOWER THAN NORMAL MINIMUM AIRFLOW (TBD DURING CX), AND STOP HEATING WHEN AIRFLOW IS ZERO.

Sheet Title
MECHANICAL CONTROL
POINTS AND SEQUENCES

Dwg. No.
PLM2021-0432-0035D

Sht. No.
M-704