

SEQUENCE OF OPERATION:

CHILLER CONTROL: THE CHILLED WATER PLANT HAS AN EXISTING WATER COOLED CENTRIFUGAL CHILLER (9-CCU1), AN ABSORPTION CHILLED WATER COOLED CHILLER (9-ACU1) AND A NEW FLAT PLATE HEAT EXCHANGER (9-HX1). THE EXISTING CHILLERS ARE CONTROLLED BY THEIR PACKAGED MICROPROCESSOR BASED UNIT CONTROL PANELS. THE EXISTING UNIT CONTROL PANELS ARE CONNECTED TO THE BUILDING AUTOMATION SYSTEM. THE ABSORPTION CHILLER (9-ACU1) UNIT CONTROL PANEL HAS BEEN INTEGRATED WITH THE BUILDING AUTOMATION SYSTEM (BAS). THE CENTRIFUGAL CHILLER (9-CCU1) UNIT CONTROL PANEL IS HARDWIRED TO THE BAS TO ENABLE/DISABLE THE CHILLER. PROGRAM BAS AS FOLLOWS:

- TO ENABLE/DISABLE EACH CHILLER AND HEAT EXCHANGER IN ACCORDANCE WITH THE "CHILLER SEQUENCING SCHEDULE"
- TO SEND CHILLED WATER SUPPLY RESET SIGNAL TO THE BUILDING AUTOMATION SYSTEM. CHILLED WATER RESET SIGNAL SHALL BE BASED ON THE FURTHEST OPEN CHILLED WATER CONTROL VALVE.
- TO MONITOR ALL AVAILABLE ANALOG SIGNALS AND DIGITAL ALARMS FROM THE UNIT CONTROL PANELS.
- TO LOG AND TREND CENTRIFUGAL CHILLER ELECTRICAL LOAD VERSUS COOLING CAPACITY, CONDENSER WATER TEMPERATURES, AND CHILLED WATER TEMPERATURES.
- TO LOG AND TREND THE ABSORPTION CHILLER STEAM LOAD VERSUS COOLING CAPACITY, CONDENSER WATER TEMPERATURES, AND CHILLED WATER TEMPERATURES.

CHILLER SEQUENCING SCHEDULE: THE BAS SHALL DETERMINE THE MODE OF OPERATION BY COMPARING CURRENT COOLING LOAD TO THE PLATE HEAT EXCHANGER CAPACITY. THE CURRENT COOLING LOAD SHALL BE BASED ON CAMPUS CHILLED WATER FLOW AND TEMPERATURE DIFFERENTIAL. THE PLATE HEAT EXCHANGER CAPACITY SHALL INITIALLY BE APPROXIMATED BASED ON OUTDOOR AIR WET-BULB TEMPERATURE, TOWER CAPACITY, AND HEAT EXCHANGER CAPACITY. ACTUAL HEAT EXCHANGER CAPACITY SHALL BE DEVELOPED BY HISTORICAL DATA AFTER START-UP.

IN ADDITION TO HEAT EXCHANGER CAPACITY, THE ACTUAL OPERATING ENERGY COST SHALL BE CALCULATED BASED ON TOTAL EQUIPMENT ELECTRICAL POWER DRAW TO ESTABLISH THE EFFICIENCY CROSSOVER POINT. IT IS ANTICIPATED THAT THIS CROSSOVER POINT WILL OCCUR WHEN THE FLAT PLATE CAPACITY FALLS BELOW APPROXIMATELY 75 TONS OF COOLING. PROOF OF OPERATION SHALL BE VERIFIED AT EACH STAGE OF THE SWITCHOVER TO PREVENT REMOVING CAPACITY BEFORE PROVING OPERATION OF ENABLED EQUIPMENT. THE FOLLOWING IS THE EQUIPMENT SEQUENCING BASED ON MODE OF OPERATION:

- FLAT PLATE HEAT EXCHANGER MODE: SWITCHOVER FROM WATER COOLED CHILLER MODE TO FLAT PLATE HEAT EXCHANGER MODE SHALL BE ACCOMPLISHED IN THE FOLLOWING SEQUENCE:
 - RESET THE CONDENSER WATER SUMP SETPOINT TEMPERATURE DOWN TO 42 DEGREES F (ADJUSTABLE). RAMP TOWER SPEED UP TO 100 PERCENT TO DRIVE DOWN THE CONDENSER WATER TEMPERATURE TO 55 DEGREES F (ADJUSTABLE) BEFORE INITIATING SWITCHOVER.
 - DISABLE CHILLER (9-CCU1) (200 TON WATER COOLED CENTRIFUGAL CHILLER).
 - DISABLE CHILLER (9-ACU1) (200 TON WATER COOLED ABSORPTION CHILLER).
 - ENABLE FLAT PLATE HEAT EXCHANGER (9-HX1).
- WATER COOLED CHILLER MODE: THE SWITCHOVER FROM FLAT PLATE HEAT EXCHANGER MODE TO WATER COOLED CHILLER MODE SHALL BE ACCOMPLISHED IN THE FOLLOWING SEQUENCE:
 - RESET THE CONDENSER WATER SUMP SETPOINT TEMPERATURE UP TO 72 DEGREES F (ADJUSTABLE).
 - DISABLE FLAT PLATE HEAT EXCHANGER (9-HX1) AFTER THE SUMP TEMPERATURE RISES ABOVE 55 DEGREES F (ADJUSTABLE).
 - ENABLE CHILLER (9-ACU1) (200 TON WATER COOLED ABSORPTION CHILLER).
 - ENABLE CHILLER (9-CCU-1) (200 TON WATER COOLED CENTRIFUGAL CHILLER).

CHILLER CONDENSER WATER FLOW SWITCH: SOME OF THE CHILLERS HAVE A FLOW SWITCH ON THE CHILLED AND CONDENSER WATER PIPING INTERLOCKED TO PREVENT OPERATION UNTIL FLOW IS PROVEN. THE FOLLOWING IS A LIST OF CHILLERS AND FLOW SWITCHES:

CHILLER	FLOW SWITCH	FLOW SWITCH
9-CCU1	YES	YES
9-ACU1	YES	YES

PROVIDE A BAS RELAY IN THE UNIT CONTROL PANEL SERVING CHILLER (9-CCU1). WIRE BAS RELAY CONTACTS IN PARALLEL TO THE CHILLERS EXISTING CONDENSER WATER FLOW SWITCH. IN THE EVENT THAT THE CONDENSER WATER TEMPERATURE IS BELOW 70 DEGREES F (ADJUSTABLE), THE BAS SHALL CLOSE THE RELAY CONTACTS TO SIMULATE FLOW AND ALLOW THE CHILLER TO OPERATE UNDER HEAD PRESSURE CONTROL. IN THE EVENT THAT THE CONDENSER WATER TEMPERATURE IS ABOVE 70 DEGREES F (ADJUSTABLE) THE BAS RELAY CONTACTS SHALL BE OPEN TO ALLOW THE FLOW SWITCH TO SHUT DOWN CHILLER IN THE EVENT OF LOSS OF FLOW.

CHILLER CHILLED WATER VALVE CONTROL (9-CCU1 & 9-ACU1): NEW NORMALLY OPEN 2-POSITION CONTROL VALVE ON THE CHILLED WATER RETURN TO EACH CHILLER SHALL BE INTERLOCK THROUGH SOFTWARE TO OPEN WHEN ITS RESPECTIVE CHILLER IS ENABLED.

HEAD PRESSURE CONTROL (9-CCU1): PROVIDE AND INSTALL AN ELECTRONIC ANALOG PRESURE SENSOR ON THE CONDENSER OF THE WATER COOLED CHILLER. PRESSURE SENSOR SHALL SEND AN ANALOG SIGNAL TO THE UNIT CONTROL PANEL WHICH SHALL IN TURN MODULATE THE NORMALLY OPEN HEAD PRESSURE CONTROL VALVES IN SEQUENCE TO MAINTAIN THE HEAD PRESSURE SETPOINT AS RECOMMENDED BY THE CHILLER MANUFACTURER. AS THE HEAD PRESSURE INCREASES ABOVE SETPOINT, THE UNIT CONTROL PANEL SHALL MODULATE THE HEAD PRESSURE CONTROL VALVES OPEN. AS THE HEAD PRESSURE DECREASES BELOW SETPOINT, THE UNIT CONTROL PANEL SHALL MODULATE THE HEAD PRESSURE CONTROL VALVES CLOSED. HEAD PRESSURE CONTROL VALVES SHALL BE CLOSED WHEN THE RESPECTIVE CHILLER IS DISABLED.

PLATE & FRAME HEAT EXCHANGER CONTROL (HX-1): THE PLATE AND FRAME HEAT EXCHANGER SHALL BE ENABLED BY THE BAS BY OPENING THE CHILLED AND CONDENSER WATER CONTROL VALVES.

PRIMARY CHILLED WATER PUMP START/STOP CONTROL (9-P1, 9-P2, & P-P3): THE PUMPS HAVE A HAND-OFF-AUTO SWITCH IN THE MOTOR STARTER. WHEN IN THE "HAND" POSITION THE PUMP SHALL OPERATE, WHEN IN THE "OFF" POSITION THE PUMP SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE PUMP SHALL BE CONTROLLED BY THE BAS. HARDWIRED INTERLOCKS SHALL SHUTDOWN PUMP IF THE MOTOR OVERLOAD CONTACTS OPEN. PROGRAM THE BAS TO OPERATE THE PRIMARY CHILLED WATER PUMPS CONTINUOUSLY WHEN ITS RESPECTIVE CHILLER OR HEAT EXCHANGER IS ENABLED. PROGRAM THE BAS TO OPERATE THE PRIMARY CHILLED WATER PUMP FOR 90 SECONDS AFTER ITS RESPECTIVE CHILLER IS DISABLED.

PRIMARY CHILLED WATER PUMP STATUS (9-P1, 9-P2, & 9-P3): A FAILURE OF THE PUMP AS DETERMINED BY A DIGITAL CURRENT SWITCH SHALL, THROUGH THE DDC CONTROLLER, ISSUE A STOP COMMAND AND SIGNAL THE BAS OF A PUMP FAILURE. THE BAS SHALL IN TURN START A STANDBY PUMP.

SECONDARY CHILLED WATER PUMP START/STOP CONTROL (9-P7 & 9-P8): THE PUMPS HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION THE PUMP SHALL OPERATE. WHEN IN THE "OFF" POSITION THE PUMP SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE PUMP SHALL BE CONTROLLED BY THE BAS. HARDWIRED INTERLOCKS SHALL SHUTDOWN PUMP IF THE MOTOR OVERLOAD CONTACTS OPEN.

SECONDARY CHILLED WATER PUMP STATUS (9-P7 & 9-P8): A FAILURE OF THE PUMP AS DETERMINED BY A DIGITAL CURRENT SWITCH SHALL, THROUGH THE DDC CONTROLLER, ISSUE A STOP COMMAND AND SIGNAL THE BAS OF A PUMP FAILURE. THE BAS SHALL IN TURN START A STANDBY PUMP.

SECONDARY CHILLED WATER PUMP SPEED CONTROL (9-P7 & 9-P8): ANALOG DIFFERENTIAL PRESSURE TRANSMITTERS LOCATED ACROSS THE CHILLED WATER SUPPLY AND RETURN MAINS SHALL PROVIDE DIFFERENTIAL PRESSURE SIGNALS TO THE BAS. THE BAS SHALL IN TURN SELECT THE LOWEST DIFFERENTIAL PRESSURE SIGNAL AND MODULATE A 4-20ma SIGNAL WHICH IS PROPORTIONAL TO THE SPEED OF THE VARIABLE FREQUENCY DRIVE TO MAINTAIN A DIFFERENTIAL PRESSURE OF 20 FT W.C. (ADJUSTABLE).

CONDENSER WATER PUMP START/STOP CONTROL (9-P4 & P-P5): THE PUMPS SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION THE PUMP SHALL OPERATE. WHEN IN THE "OFF" POSITION THE PUMP SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE PUMP SHALL BE CONTROLLED BY THE BAS. HARDWIRED INTERLOCKS SHALL SHUTDOWN PUMP IF THE MOTOR OVERLOAD CONTACTS OPEN. EACH CHILLER SHALL SEND A CONDENSER WATER PUMP START/STOP SIGNAL TO THE BAS UPON A CALL FOR COOLING. PROGRAM THE BAS TO OPERATE ONE CONDENSER WATER PUMP WHEN ONE CHILLER OR HEAT EXCHANGER HAS A CALL FOR COOLING AND TWO PUMPS WHEN TWO CHILLERS HAVE A CALL FOR COOLING.

CONDENSER WATER PUMP SPEED CONTROL (9-P4 & 9-P5): ANALOG CONDENSER WATER FLOW METER SHALL PROVIDE A FLOW SIGNAL TO THE BAS. THE BAS SHALL IN TURN MODULATE A 4-20ma SIGNAL WHICH IS PROPORTIONAL TO THE SPEED OF THE VARIABLE FREQUENCY DRIVE TO MAINTAIN THE RESPECTIVE CHILLER OR HEAT EXCHANGER CONDENSER WATER DESIGN FLOW RATE.

CONDENSER WATER PUMP STATUS (9-P4 & 9-P5): A FAILURE OF THE PUMP AS DETERMINED BY A DIGITAL CURRENT SWITCH OR VFD FAULT SIGNAL SHALL, THROUGH THE DDC CONTROLLER, ISSUE A STOP COMMAND AND SIGNAL THE BAS OF A PUMP FAILURE. A FAILURE OF THE PUMP AS DETERMINED BY THE CURRENT SWITCH OR VFD FAULT ALARM SIGNAL SHALL, THROUGH THE DDC CONTROLLER, ISSUE A STOP COMMAND AND SIGNAL THE BAS OF A PUMP FAILURE. THE BAS SHALL IN TURN START A STANDBY PUMP.

COOLING TOWER FAN START/STOP CONTROL (9-CT1, CT-2 & CT-3): THE COOLING TOWER FANS SHALL HAVE A HAND-OFF-AUTO SWITCH IN THE VARIABLE FREQUENCY DRIVE. WHEN IN THE "HAND" POSITION THE FAN SHALL OPERATE. WHEN IN THE "OFF" POSITION THE FAN SHALL NOT OPERATE. WHEN IN THE "AUTO" POSITION, THE FAN SHALL BE CONTROLLED BY THE BAS. HARDWIRED INTERLOCKS SHALL SHUTDOWN FAN IF THE MOTOR OVERLOAD CONTACTS OPEN. PROGRAM THE BAS TO OPERATE THE COOLING TOWER FANS ON BASED ON COOLING TOWER FAN SPEED IN SEQUENCE WITH THE CONDENSER WATER BYPASS VALVE CLOSING. WHEN THE OPERATING COOLING TOWER FAN(S) FAN SPEED INCREASES ABOVE 75 PERCENT (ADJUSTABLE), THE BAS SHALL START ANOTHER FAN. WHEN THE OPERATING COOLING TOWER FAN(S) SPEED FALLS BELOW 35 PERCENT (ADJUSTABLE) THE BAS SHALL STOP A COOLING TOWER FAN. PROGRAM BAS TO ALTERNATE COOLING TOWER FAN LEAD/LAG SEQUENCE ON A FIRST-ON/FIRST-OFF AND MONTHLY BASIS.

COOLING TOWER FAN STATUS (CT-1, CT-2 & CT-3): A FAILURE OF THE FAN AS DETERMINED BY A DIGITAL CURRENT SWITCH OR VFD FAULT ALARM SIGNAL SHALL, THROUGH THE DDC CONTROLLER, ISSUE A STOP COMMAND AND SIGNAL THE BAS OF A COOLING TOWER FAN FAILURE. PROGRAM BAS TO START STANDBY COOLING TOWER IF AVAILABLE.

COOLING TOWER FAN SPEED CONTROL (CT-1, CT-2 & CT-3): ELECTRONIC ANALOG TEMPERATURE SENSORS LOCATED IN THE CONDENSER WATER SUMP SHALL PROVIDE AN ELECTRONIC ANALOG SIGNAL TO THE BAS WHICH IS LINEAR WITH RESPECT TO THE TEMPERATURE SENSED. THE DDC CONTROLLER, SHALL IN TURN MODULATE AN ELECTRONIC ANALOG SIGNAL TO THE COOLING TOWER VFD'S WHICH IS PROPORTIONAL TO THE FAN SPEED TO MAINTAIN THE CONDENSER WATER SUMP SETPOINT TEMPERATURE.

CONDENSER WATER SUMP SETPOINT TEMPERATURE: PROGRAM BAS TO SET THE CONDENSER WATER SUMP SETPOINT TEMPERATURE AT 72 DEGREES F (ADJUSTABLE) WHEN OPERATING IN THE WATER COOLED CHILLER MODE. PROGRAM THE BAS TO RESET THE CONDENSER WATER SUMP TEMPERATURE TO MAINTAIN THE CHILLED WATER SETPOINT TEMPERATURE IN ACCORDANCE WITH THE CHILLED WATER RESET SCHEDULE WHEN OPERATING IN THE HEAT EXCHANGER MODE.

COOLING TOWER CONDENSER WATER VALVE CONTROL (CT-1, CT-2 & CT-3): NORMALLY CLOSED CONDENSER WATER RETURN VALVES SHALL BE INTERLOCKED WITH THEIR RESPECTIVE COOLING TOWER FANS TO ALLOW CONDENSER WATER FLOW TO THE COOLING TOWER WHEN IT IS ENABLED.

COOLING TOWER BYPASS VALVE CONTROL: AN ELECTRONIC ANALOG TEMPERATURE SENSOR IN THE CONDENSER WATER SUMP SHALL SEND AN ANALOG SIGNAL TO THE BAS WHICH IS LINEAR WITH RESPECT TO THE SUMP TEMPERATURE. THE BAS SHALL IN TURN MODULATE AN ELECTRONIC ANALOG SIGNAL TO THE COOLING TOWER BYPASS CONTROL VALVE ON THE CONDENSER WATER RETURN LINE FROM THE CHILLERS AND COOLING TOWER CONTROL VALVES. PROGRAM THE BAS TO MODULATE THE CONDENSER WATER BYPASS VALVE CLOSED AND THE COOLING TOWER CONTROL VALVES OPEN WHEN THE CONDENSER WATER SUMP TEMPERATURE IS BELOW SETPOINT TEMPERATURE AND MODULATE THE CONDENSER WATER BYPASS VALVE OPEN AND THE COOLING TOWER CONTROL VALVES OPEN WHEN THE CONDENSER WATER SUMP TEMPERATURE IS ABOVE SETPOINT TEMPERATURE.

MAKE-UP WATER CONTROL: AN ELECTRONIC ANALOG LEVEL SENSOR LOCATED IN THE INDOOR CONDENSER WATER SUMP SHALL PROVIDE AN ANALOG INPUT SIGNAL TO THE BAS. THE BAS SHALL IN TURN CONTROL THE OPEN/CLOSED STATUS OF THE NORMALLY CLOSED CONDENSER WATER MAKE-UP VALVE TO MAINTAIN THE INDOOR CONDENSER WATER SUMP WATER LEVEL. PROGRAM BAS AS FOLLOWS:

- TO SIGNAL A LOW LEVEL ALARM AND SHUT DOWN THE CONDENSER WATER PUMPS IF THE SUMP WATER LEVEL FALLS BELOW 36"
- TO OPEN THE MAKE-UP WATER VALVE IF THE SUMP WATER LEVEL FALLS BELOW 58" WITH ONE PUMP OPERATING OR BELOW 42" WITH TWO PUMPS OPERATING.
- TO CLOSE THE MAKE-UP WATER VALVE IF THE SUMP WATER LEVEL RISES ABOVE 60" WITH ONE PUMP OPERATING OR ABOVE 46" WITH TWO PUMPS OPERATING.
- TO SIGNAL A HIGH LEVEL ALARM IF THE SUMP WATER LEVEL RISES ABOVE 75".

CONDENSER WATER MAKE-UP MONITORING AND ALARM: WATER METER SHALL SEND A PULSE SIGNAL TO THE BAS TO INDICATE MAKE-UP WATER QUANTITY. THE BAS SHALL IN TURN LOG THE MAKE-UP WATER FOR HISTORICAL DATA AND SIGNAL AN ALARM CONDITION IF THE MAKE-UP WATER FLOW BECOMES CONTINUOUS OR EXCESSIVE AS DETERMINED BY HISTORICAL DATA.

CONDUCTIVITY MONITORING & ALARM: AN ELECTRONIC ANALOG CONDUCTIVITY SENSORS LOCATED IN THE CONDENSER WATER CHEMICAL TREATMENT PIPING SHALL SEND A CONDUCTIVITY SIGNAL TO THE BAS. THE BAS SHALL LOG THE CONDENSER WATER CONDUCTIVITY FOR HISTORICAL DATA AND SIGNAL AN ALARM IF THE CONDUCTIVITY EXCEEDS 1,000 MOHS.

BLOWDOWN VALVE CONTROL: THE CONDUCTIVITY CONTROLLER SHALL SEND A DIGITAL SIGNAL TO THE BAS WHEN THE CONDENSER WATER CONDUCTIVITY RISES ABOVE SETPOINT. THE BAS SHALL IN TURN OPEN THE BLOWDOWN VALVE ON THE DIRT SEPARATOR IF A CONDENSER WATER PUMP IS OPERATING TO BLOWDOWN THE CONDENSER WATER SYSTEM FOR A PREDETERMINED TIME PERIOD AS DETERMINED BY THE CHEMICAL TREATMENT SUPPLIER.

EQUIPMENT OVERRIDES: EQUIPMENT SHALL BE MANUALLY CONTROLLED THROUGH THEIR RESPECTIVE HAND-OFF-AUTO SWITCHES AT THEIR RESPECTIVE MOTOR STARTERS OR VARIABLE FREQUENCY DRIVES.

RUNTIME: INITIATE A RUNTIME CALCULATION UPON A START COMMAND FOR EACH PUMP, CHILLER, AND COOLING TOWER. RUNTIME IN HOURS AND TOTALIZE THE HOURS FOR EACH DAY, WEEK, MONTH, AND YEAR. INTERRUPT THE RUNTIME CALCULATION UPON A STOP COMMAND.

STOP COMMAND: A DDC CONTROLLER ISSUED STOP COMMAND SHALL: DE-ENERGIZE THE MOTOR OR EQUIPMENT. SIGNAL THE BAS OF AN OFF CONDITION.

ABBREVIATIONS

GENERAL ABBREVIATION	DESIGNATION
A	AMBER
BAS	BUILDING AUTOMATION SYSTEM
C	COMMON
CB	CIRCUIT BREAKER
CS	CONDUCTIVITY SENSOR
DDC	DIRECT DIGITAL CONTROLLER
DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DS	DISCONNECT SWITCH
EP	ELECTRIC TO PNEUMATIC VALVE
EPT	ELECTRIC TO PNEUMATIC TRANSDUCER
ES	END SWITCH
EXH	EXHAUST PORT
FM	FLOW METER
FS	FLOW SWITCH
G	GREEN
HOA	HAND-OFF-AUTO SWITCH
HPS	HIGH PRESSURE SWITCH
IS	CURRENT SWITCH
LS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH OR LEVEL SWITCH
MD	MOTORIZED CONTROL DAMPER
MS	MOTOR STARTER
MV	MOTORIZED CONTROL VALVE
NC	NORMALLY CLOSED
NCTC	NORMALLY CLOSED TIMED CLOSED
NCTO	NORMALLY CLOSED TIMED OPEN
NO	NORMALLY OPEN
NOTO	NORMALLY OPEN TIMED CLOSED
NOTC	NORMALLY OPEN TIMED OPEN
OA	OUTSIDE AIR
OL	OVERLOAD
PB	PUSHBUTTON SWITCH
PS	PRESSURE SWITCH
P/T	PRESSURE/TEMPERATURE PORT
R	RED OR RELAY
RA	RETURN AIR
S	SWITCH
SA	SUPPLY AIR
SD	SMOKE DETECTOR
SP	SETPOINT
STR	MOTOR STARTER
SV	SOLENOID VALVE
TC	TEMPERATURE CONTROLLER
TD	TIME DELAY
VFD	VARIABLE FREQUENCY DRIVE
BAS ABBREVIATION	INPUT/OUTPUT DESIGNATION
2P	TWO POSITION CONTROL
A	ALARM CONTACT SIGNAL
C	CONDUCTIVITY INDICATION
CO2	CARBON DIOXIDE INDICATION
F	FLOW INDICATION
FA	FAULT ALARM
FR	FORWARD/REVERSE RELAY
H	HUMIDITY INDICATION
I	CURRENT INDICATION
IS	CURRENT SWITCH
KW	POWER
L	LEVEL INDICATION
O	ON-OFF STATUS
P	PRESSURE INDICATION
PC	POSITION CONTROL (MODULATING)
R	RESET SIGNAL
S	START/STOP
SC	SPEED CONTROL
T	TEMPERATURE INDICATION
TM	TURBINE METER

I/O SUMMARY TABLE

PROJECT: GRAND JUNCTION VAMC REPLACE COOLING TOWERS	QUANTITY REQUIRED	SYSTEM/POINT DESCRIPTION	HARDWARE										SOFTWARE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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			CONTROL RELAY (INSTANTANEOUS)	CONTROL RELAY (LATCHING)	4-20 MILLAMP	CONTROL POINT ADJUSTMENT	ELECTRIC-PNEUMATIC TRANSDUCER	PRESSURE SWITCH	DIFFERENTIAL PRESSURE SWITCH	THERMOSTAT	CURRENT SWITCH	AUXILIARY CONTACT	STATUS CONTACT	FLOW SWITCH	PULSE	TEMPERATURE	HUMIDITY	LEVEL	PRESSURE	FLOW	CONDUCTIVITY	CURRENT	CONTACT CLOSURE	SAFETY SHUTDOWN	HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULED START/STOP	OPTIMUM START/STOP	EVENT	TEMPERATURE CONTROL	DAY/NIGHT SETBACK	ECONOMIZER	LEVEL CONTROL	VENTILATION/REGULATION	SETPOINT TEMPERATURE RESET	CHILLER DEMAND LIMIT	CONDUCTIVITY CONTROL	PRESSURE CONTROL	FLOW CONTROL	ALARM INSTRUCTION	ALL POINTS LOG	ALARM SUMMARY LOG	STATUS SUMMARY LOG	TIME EVENT LOG	TREND LOG	POWER FAILURE MODE	COMMUNICATIONS FAILURE MODE	NEW (N)/EXISTING (E) POINT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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