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Date: 11/9/2023
Return Request: 11/19/2023
Project: UCA Snow – Fine Arts Center
Supplier: NW Controls
Manufacturer:
Submittal: Controls
Submittal Number: 23 09 23-01
Drawing # and Installation: Mechanical Drawings

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Notes:

CSUSA PROJECT NO.
23-2020
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UCA Snow Fine Arts

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!! SEE MECHANICAL SHEETS FOR HVAC THERMOSTAT WIRING NOTES FOR WIRE-MOLD INSTALLATION INSTRUCTION. !!

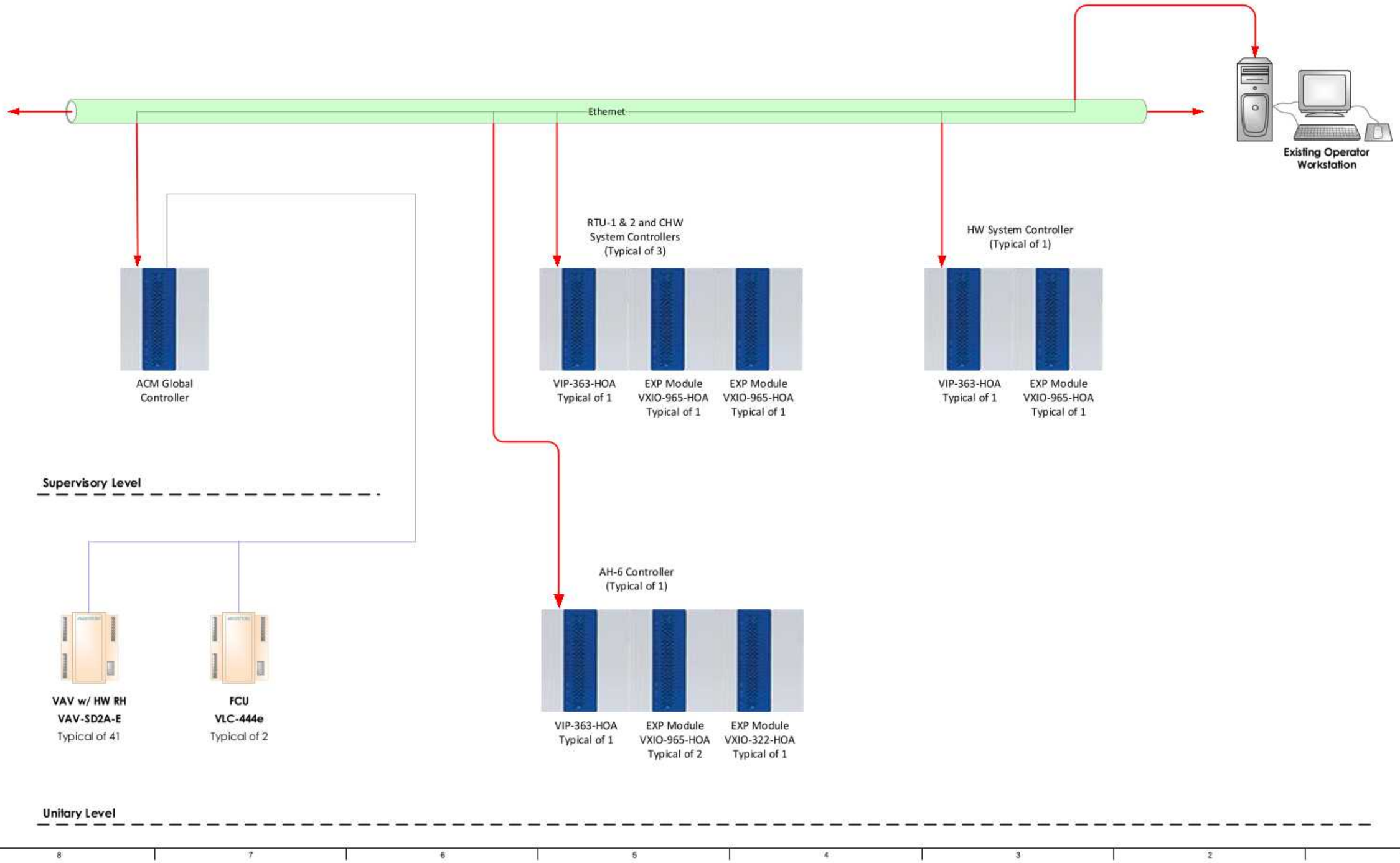
Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

Northwest Controls
7631 Northshore Place
North Little Rock, AR 72118
Ph: (501) 280-0404 Fax: (501) 280-9200

System Architecture

Typical of 1



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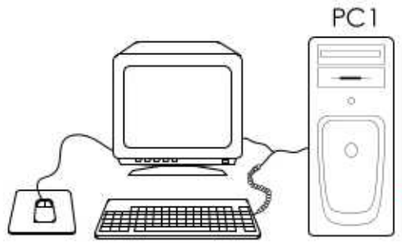
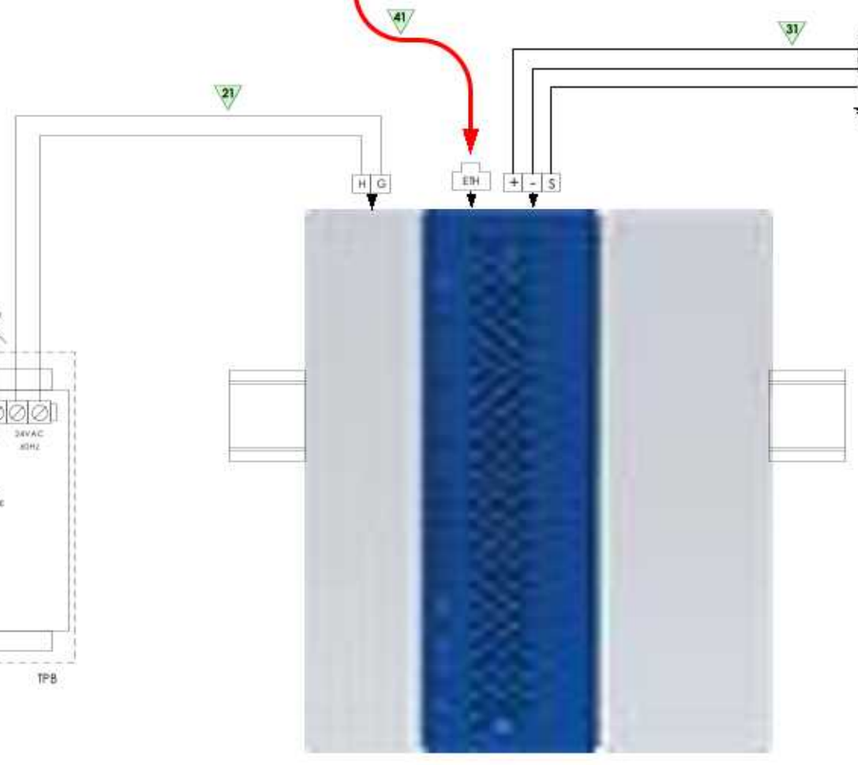
Global Controller

Typical of 1

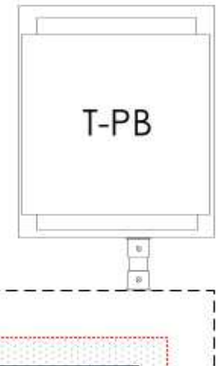
TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
MC1	1	RET2018ULP-DB	Kele	NEMA 1 Enclosure 20"h x 18"w x 7"d Dk Blue
TPB	1	T-PB202-0	Kele	24VAC power source, 4A (Class 1) panel mount
ACM	1	ACM	Alerton	Ascent control module global controller
	1	ACM064	Alerton	ACM license for up to 64 devices

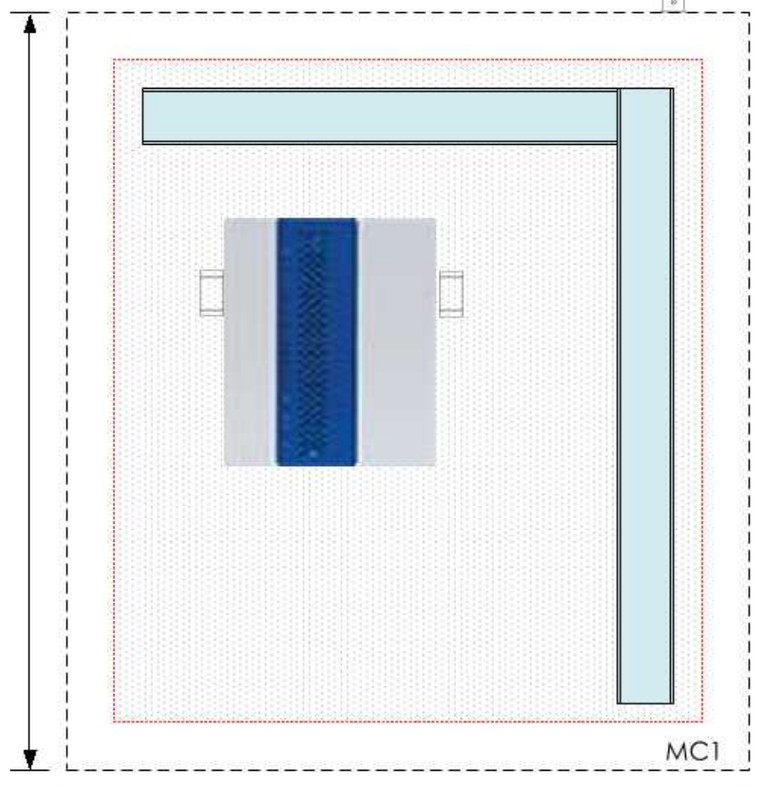


Existing Alerton
Operator Workstation



TPB





UNIT TYPE	DEVICE INST	MAC ADDR	REP-JOB-APP
ACM	110	0	rep\job\app

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RTU-1 and 2 Control Diagram and SOO

Typical of 2

Sequence of Operation

GENERAL DESCRIPTION: ROOFTOP VAV AIR HANDLING UNIT SHALL BE ROOF-MOUNTED AND SHALL SERVE INDIVIDUAL VAV SUPPLY AIR TERMINAL BOXES WITHIN THE INTERIOR SPACES. UNIT TO BE FACTORY PROVIDED WITH VARIABLE FREQUENCY DRIVE (VFD).

UNIT CONTROLS: UNIT SHALL BE PROVIDED WITH A STANDALONE UNIT CONTROLLER THAT SHALL INTERFACE WITH THE BACNET BUILDING AUTOMATION SYSTEM (BAS) SYSTEMS. UNIT CONTROLLER SHALL BE CAPABLE OF OPERATING UNIT WITHOUT REQUIRING CONSTANT BACNET COMMUNICATION TO MAINTAIN NORMAL UNIT OPERATION. IF COMMUNICATION WITH THE BAS IS LOST, THE ROOFTOP AIR HANDLING UNIT SHALL USE ITS DEFAULT SETPOINTS AND OPERATE IN THE OCCUPIED COOLING MODE.

THE BAS SHALL SEND THE ROOFTOP AIR HANDLING UNIT A DISCHARGE AIR TEMPERATURE (DAT) COOLING SETPOINT AND A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL ALSO SEND START-UP, MORNING WARM-UP, OCCUPIED, UNOCCUPIED, HEATING / COOLING, TIMED OVERRIDE, COAST DOWN, NIGHT SETBACK, PURGE, AND PRIORITY SHUT-DOWN COMMANDS.

OCCUPIED MODE: THE OCCUPIED MODE SHALL BE DETERMINED BY THE OWNER'S BUILDING SCHEDULE. WHEN THE AIR HANDLING UNIT IS IN OCCUPIED MODE, THE SUPPLY FAN(S) SHALL OPERATE CONTINUOUSLY, THE VARIABLE FREQUENCY DRIVE(S) (VFD) SHALL MODULATE THE SUPPLY FAN(S) AS REQUIRED BETWEEN THE MINIMUM AND MAXIMUM FAN SPEED SETPOINTS (ADJUSTABLE) TO MAINTAIN THE DUCT STATIC PRESSURE, AND THE COOLING VALVE AND HEATING VALVE SHALL MODULATE IN SEQUENCE TO MAINTAIN THE COOLING DISCHARGE AIR TEMPERATURE. THE SUPPLY FAN(S) SHALL BE OFF WHENEVER THE ROOFTOP AIR HANDLING UNIT MIXED AIR LOW LIMIT IS TRIPPED, THE STOP / AUTO INTERLOCK IS OPEN, OR THE SUPPLY FAN STATUS INDICATES A FAILURE (AFTER A TWO MINUTE DELAY). THE LOW LIMIT AND THE FAN FAILURE REQUIRE A MANUAL RESET. THE OUTDOOR AIRFLOW, AS MEASURED AT THE AIRFLOW MEASURING STATION, SHALL BE MAINTAINED AT A VALUE EQUAL TO OR HIGHER THAN THE MINIMUM REQUIRED OUTDOOR AIRFLOW SETPOINT SECTION OF THE AHU SYSTEM LEVEL OPERATION SECTION OF THIS SPECIFICATION.

UNOCCUPIED MODE: THE UNOCCUPIED MODE SHALL BE DETERMINED BY THE OWNER'S BUILDING SCHEDULE. WHEN THE AIR HANDLING UNIT IS IN THE UNOCCUPIED MODE, THE SUPPLY FAN(S) SHALL MODULATE DOWN TO MAINTAIN ASSOCIATED VAV TERMINAL BOX MINIMUM AIR FLOW RATES. THE OUTDOOR AIR DAMPER SHALL BE CLOSED. THE ZONE TERMINAL RE-HEAT SHALL MODULATE TO MAINTAIN THE BUILDING UNOCCUPIED TEMPERATURE SETPOINT.

OVERRIDE MODE: IF DURING THE COURSE OF AN UNOCCUPIED MODE PERIOD THE LOCAL USER UTILIZES THE OVERRIDE FUNCTION AT THE LOCAL USER THERMOSTAT, THE AIR HANDLING UNIT SHALL RETURN TO OCCUPIED MODE STATUS FOR A PERIOD OF TWO (2) HOURS (ADJ.).

VFD CONTROL: WHEN THE SUPPLY FAN(S) ARE ON, THE VFD(S) SHALL SLOWLY RAMP (ADJ.) UP AND MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT.

SUPPLY FANS: THE ROOFTOP AIR HANDLING UNIT WILL BE FACTORY SUPPLIED WITH DIRECT DRIVE SUPPLY FAN(S).

COOLING VALVE CONTROL: THE COOLING VALVE SHALL MODULATE TO MAINTAIN THE UNIT SUPPLY AIR DISCHARGE TEMPERATURE OF 55°F (ADJ.). THE COOLING VALVE SHALL BE CLOSED IF THE SUPPLY FAN(S) ARE OFF, THE SUPPLY AIR SENSOR HAS FAILED, OR IF THE AIR HANDLING UNIT IS IN THE HEATING MODE (THE COOLING COIL CONTROL VALVE SHALL BE CLOSED IF OUTSIDE AIR TEMPERATURE IS ABOVE 40°F (ADJ.), IF OUTSIDE AIR TEMPERATURE IS BELOW 40°F (ADJ.) THEN THE COOLING COIL CONTROL VALVE SHALL BE FULLY OPENED TO HELP PREVENT FREEZING).

HEATING VALVE INTEGRAL FACE & BYPASS DAMPER CONTROL: WHEN THE PRE-HEAT COIL LEAVING AIR TEMPERATURE DROPS TO BELOW 50°F (ADJ.), THE HEATING VALVE SHALL MODULATE OPEN AS NEEDED AND THE FACE AND BYPASS DAMPER SHALL MODULATE IN CONCERT TO MAINTAIN THE PRE-HEAT COIL LEAVING AIR TEMPERATURE SETPOINT OF 55°F (ADJ.). WHEN THE OUTDOOR AIR TEMPERATURES ARE BELOW 40°F (ADJ.), THEN THE BYPASS DAMPER ONLY SHALL BE MODULATED AND THE HEATING WATER VALVE SHALL OPERATE AT 100% OPEN.

MINIMUM REQUIRED OUTDOOR AIRFLOW SETPOINT :DURING OCCUPIED TIMES, THE AIR HANDLER OUTDOOR AIR DAMPER SHALL MAINTAIN A MINIMUM OPEN POSITION TO DELIVER REQUIRED OUTDOOR AIRFLOW TO EACH INDIVIDUAL VAV ZONE. SEE THE OSA CFM LISTED ON THE AIR HANDLER UNIT SCHEDULE. COORDINATE WITH ENGINEER.

DISCHARGE DUCT STATIC PRESSURE SETPOINT: THE DISCHARGE DUCT STATIC PRESSURE SHALL BE SENSED DIRECTLY AT A POINT APPROXIMATELY TWO-THIRDS (2/3) THE TRUNK DUCT OVERALL LENGTH. THE SENSOR SHALL BE MOUNTED IN A NON-TURBULENT LOCATION. THE BUILDING AUTOMATION SYSTEM SHALL CONTINUOUSLY MONITOR THE DAMPER POSITION OF ALL VAV TERMINAL UNITS. WHEN ANY VAV TERMINAL UNIT DAMPER IS MORE THAN 95% (ADJ.) OPEN, THE SUPPLY FAN DISCHARGE DUCT STATIC PRESSURE SETPOINT SHALL BE RESET UPWARDS BY 0.1" W.C. (ADJ.) OF THE MAXIMUM SYSTEM STATIC PRESSURE SETPOINT AT A FREQUENCY OF 10 MINUTES (ADJ.) UNTIL NO VAV TERMINAL UNIT DAMPER IS MORE THAN 95% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET UPWARD TO THE SYSTEM MAXIMUM SETTING OR THE SUPPLY FAN VFD(S) ARE AT THEIR MAXIMUM SETTING.

WHEN ALL VAV TERMINAL UNIT DAMPERS ARE LESS THAN 85% (ADJ.) OPEN, THE SUPPLY FAN DISCHARGE DUCT STATIC PRESSURE SETPOINT SHALL BE RESET DOWNWARD BY 0.1" W.C. (ADJ.) OF THE MAXIMUM SYSTEM STATIC PRESSURE SETPOINT AT A FREQUENCY OF 10 MINUTES (ADJ.) UNTIL ALL DAMPERS ARE MORE THAN 85% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET DOWNWARD TO THE SYSTEM MINIMUM SETTING OR THE VFD(S) ARE AT THEIR MINIMUM SETTING.

Sequence of Operation (Continued)

THE CONTROL BANDS, SETPOINT INCREMENT VALUES, SETPOINT DECREMENT VALUES, AND ADJUSTMENT FREQUENCIES SHALL BE ADJUSTED TO MAINTAIN STATIC PRESSURE OPTIMIZATION WITH STABLE SYSTEM CONTROL AND MAXIMUM COMFORT CONTROL.

COOLING: THE UNIT IS PROVIDED WITH A CHILLED WATER COIL FOR COOLING.COOLING DAT RESET: THE COOLING DAT SETPOINT MAY BE RESET BY THE SPACE TEMPERATURE, RETURN AIR TEMPERATURE, OUTSIDE AIR TEMPERATURE, SPACE RELATIVE HUMIDITY, OR EXTERNAL VOLTAGE/mA SIGNALS. A LINEAR RELATIONSHIP BETWEEN THE DAT AND THE RESET VARIABLE WILL BE CREATED FOR THE MINIMUM AND MAXIMUM DAT SETPOINTS. AS THE RESET VARIABLE CHANGES THE DAT WILL ADJUST ACCORDING TO THE RELATIONSHIP. MINIMUM RESET SETPOINT IS 53°F (ADJ.) AND MAXIMUM RESET SETPOINT IS 65°F (ADJ.).

HEATING: THE UNIT IS PROVIDED WITH A HEATING HOT WATER COIL FOR HEATING.HEATING DAT RESET: THE HEATING DAT SETPOINT MAY BE RESET BY SPACE TEMPERATURE, RETURN AIR TEMPERATURE, OUTSIDE AIR TEMPERATURE, NETWORK, OR EXTERNAL VOLTAGE/mA SIGNALS. A LINEAR RELATIONSHIP BETWEEN THE DAT AND THE RESET VARIABLE WILL BE CREATED FOR THE MINIMUM AND MAXIMUM DAT SETPOINTS. AS THE RESET VARIABLE CHANGES THE DAT WILL ADJUST ACCORDINGLY TO THE RELATIONSHIP. WHEN THE AIR HANDLING UNIT IS IN THE HEATING MODE OR THE NIGHT SETBACK MODE, THE HEATING VALVE SHALL MODULATE OPEN TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT THE DISCHARGE HEATING SETPOINT (ADJUSTABLE).

LOW LIMIT TEMPERATURE DETECTOR: IN THE EVENT THE LOW LIMIT TEMPERATURE DETECTOR DETECTS MIXED AIR TEMPERATURE BELOW 35 DEG. F, THE SUPPLY AIR FAN(S) SHALL STOP, THE DAMPERS SHALL CLOSE, AND AN ALARM SHALL SOUND AT THE BAS WORKSTATION. THE LOW LIMIT TEMPERATURE DETECTOR SHALL REQUIRE A MANUAL RESET.

NIGHT SETBACK / MORNING WARM-UP HEATING MODE: THE AIR HANDING UNIT SHALL INDEX FROM UNOCCUPIED MODE TO OCCUPIED MODE AT A TIME DETERMINED BY THE BAS SYSTEM SO THAT THE SETPOINT IS MET DURING THE ENTIRE PORTION OF THE BUILDING OCCUPIED HOURS (ADJUSTABLE).

ECONOMIZER MODE: ECONOMIZER MODE SHALL OPERATE BASED UPON ENTHALPY SETPOINT. DURING ECONOMIZER MODE, THE OUTSIDE AIR DAMPER SHALL MODULATE FULLY OPEN, THE RETURN AIR DAMPER SHALL MODULATE CLOSED, AND THE BAROMETRIC RELIEF DAMPERS SHALL OPEN AS REQUIRED TO MAINTAIN SPACE SETPOINT. WHEN THE OUTSIDE AIR CONDITIONS ARE ABOVE THE ENTHALPY SETPOINT, THE OUTSIDE AIR DAMPER SHALL CLOSE TO THE MINIMUM POSITION REQUIRED, THE RETURN AIR DAMPER SHALL FULLY OPEN, AND THE UNIT SHALL RESUME NORMAL COOLING/HEATING OPERATION.

SUPPLY AIR DISCHARGE TEMPERATURE RESET: THE SUPPLY AIR DISCHARGE TEMPERATURE SHALL BE SENSED DIRECTLY AT THE DISCHARGE OF THE AIR HANDLING UNIT. THE BUILDING AUTOMATION SYSTEM SHALL CONTINUOUSLY MONITOR THE SPACE RELATIVE HUMIDITY AS INDICATED ON PLANS AND THE DAMPER POSITION OF ALL VAV TERMINAL UNITS. WHEN IN COOLING MODE AND ALL OF THE VAV TERMINAL UNITS HAVE BEEN REDUCED DOWN TO THE MINIMUM SETTING OF THE VAV TERMINAL UNIT, THE UNIT SUPPLY AIR TEMPERATURE SHALL BE RESET UPWARDS BY 0.5°F (ADJ.) AT A FREQUENCY OF 10 MINUTES (ADJ.) UNTIL ALL OF THE VAV TERMINAL UNIT DAMPERS ARE AT LEAST 85% OPEN (ADJ.) BUT NO VAV TERMINAL UNIT DAMPER IS MORE THAN 97% OPEN (ADJ.). UPON ANY VAV TERMINAL UNIT DAMPER OPENING TO 98% OPEN (ADJ.) OR MORE, THEN THE UNIT SUPPLY AIR TEMPERATURE SHALL BE RESET DOWNWARDS BY 0.5°F (ADJ.) AT A FREQUENCY OF 10 MINUTES (ADJ.) UNTIL ALL OF THE VAV TERMINAL UNIT DAMPERS ARE AT LEAST 85% OPEN (ADJ.) BUT NO VAV TERMINAL UNIT DAMPER IS MORE THAN 97% OPEN (ADJ.). THE BUILDING AUTOMATION SYSTEM SHALL OVERRIDE AND RESET THE UNIT SUPPLY AIR TEMPERATURE DOWNWARDS BY 0.5°F (ADJ.) AT A FREQUENCY OF 10 MINUTES (ADJ.) IF THE SPACE RELATIVE HUMIDITY INCREASES TO MORE THAN 60%RH. THE MAXIMUM ALLOWABLE SUPPLY AIR DISCHARGE TEMPERATURE RESET SHALL BE 60°F (ADJ.) FOR THE UNIT SUPPLY AIR DISCHARGE TEMPERATURE. THE SUPPLY AIR DISCHARGE TEMPERATURE RESET SEQUENCE SHALL BE ALLOWED TO BE ENABLED OR DISABLED AT ANY TIME BY THE OWNER THRU A RADIO BUTTON IN THE UNIT CONTROL GRAPHICS AT THE BAS WORKSTATION.AIR HANDLING UNIT SYSTEM LEVEL CONTROL:

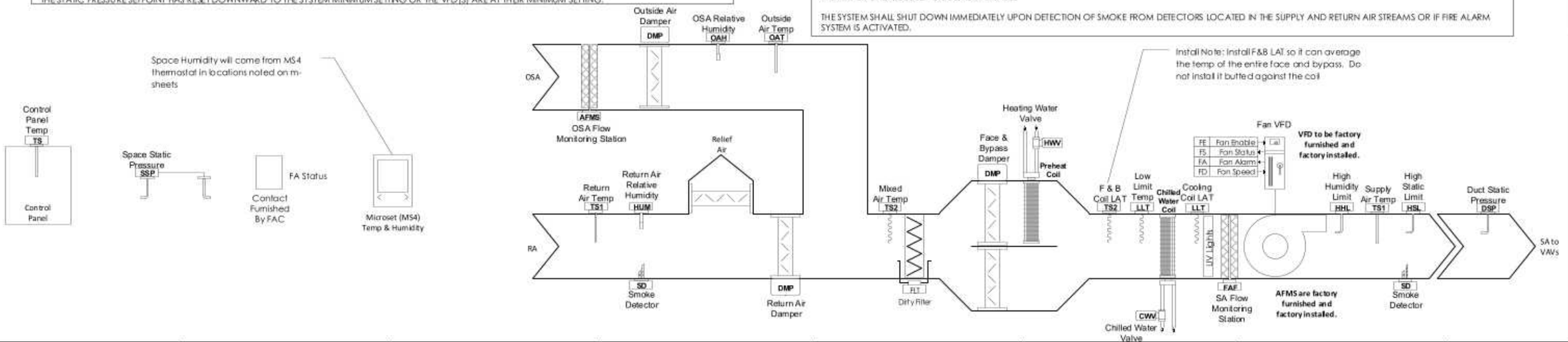
1. VAV TERMINAL BOX RE-HEAT INTERLOCK CONTROL:
A. VAV TERMINAL BOX RE-HEAT SHALL BE DISABLED FROM, OR ENABLED FOR LOCAL CONTROL BY THE VAV TERMINALBOX STANDALONE CONTROLLER.
B. AT A MINIMUM, ALL VAV TERMINAL BOXES BEING SERVED BY AN AIR HANDLING UNIT SHALL BE CONTROLLED AS A GROUP. PROVIDE MORE GROUPS AS DESIGNATED IN THE POINTS LIST, DRAWINGS, OR ELSEWHERE IN THIS SPECIFICATION.
C. THE INTERLOCK SHALL BE CONTROLLED BY COMPARING THE OUTSIDE AIR AMBIENT TEMPERATURE TO THE INTERLOCK SETPOINT (ADJUSTABLE). IF EACH AIR HANDLING UNIT CONTROLLER IS INDIVIDUALLY SENSING THE OUTSIDE AIR AMBIENT TEMPERATURE SERVING THE UNIT, THEN THE TEMPERATURE SENSOR FOR THAT AIR HANDLING UNIT SHALL BE USED FOR THE COMMAND AND OTHER PROCESSES.
D. THE INTERLOCK SHALL BE CONTROLLED BY A SYSTEM OPERATOR INTERLOCK FOR EACH GROUP OF BOXES.

THE FOLLOWING POINTS SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS:

1. SUPPLY AIR TEMP.
2. MIXED AIR TEMP.
3. OUTSIDE AIR TEMP.
4. OUTSIDE AIR RELATIVE HUMIDITY
5. SPACE RELATIVE HUMIDITY
6. SPACE PRESSURE
7. VFD OUTPUT %
8. SUPPLY FAN MODULATION
9. FAN STATUS
10. COOLING AIR TEMP.
11. HEATING AIR TEMP.
12. RETURN AIR TEMP.
13. RETURN AIR RELATIVE HUMIDITY
14. SENSORS NORMAL / FAIL STATUS
15. LOW LIMIT STATUS
16. COOLING VALVE OPEN %
17. HEATING VALVE OPEN %
18. HEAT / COOL MODE
19. DAMPER MINIMUM POSITION %
20. FILTER NORMAL / DIRTY
21. SUPPLY AIR STATIC PRESSURE
22. DDC LOOP PARAMETERS

THE FOLLOWING POINTS SHALL BE OPERATOR ADJUSTABLE AND / OR AUTOMATICALLY RESET BY THE BAS PROGRAM:
1. HEATING SETPOINT - HEAT RESET SETPOINT
2. COOLING SETPOINT - COOL RESET SETPOINT
3. MIN. POSITION SETPOINT - STATIC PRESS. SETPOINT
4. DAMPER OPEN/CLOSE - COOL/HEAT DISABLE

THE SYSTEM SHALL SHUT DOWN IMMEDIATELY UPON DETECTION OF SMOKE FROM DETECTORS LOCATED IN THE SUPPLY AND RETURN AIR STREAMS OR IF FIRE ALARM SYSTEM IS ACTIVATED.



Project name: UCA Snow Fine Arts
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Application Engineer: VWI
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Architect:
Engineers: Pettit & Pettit
Mechanical: CSUSA
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7631 Northshore Place
North Little Rock, AR 72118
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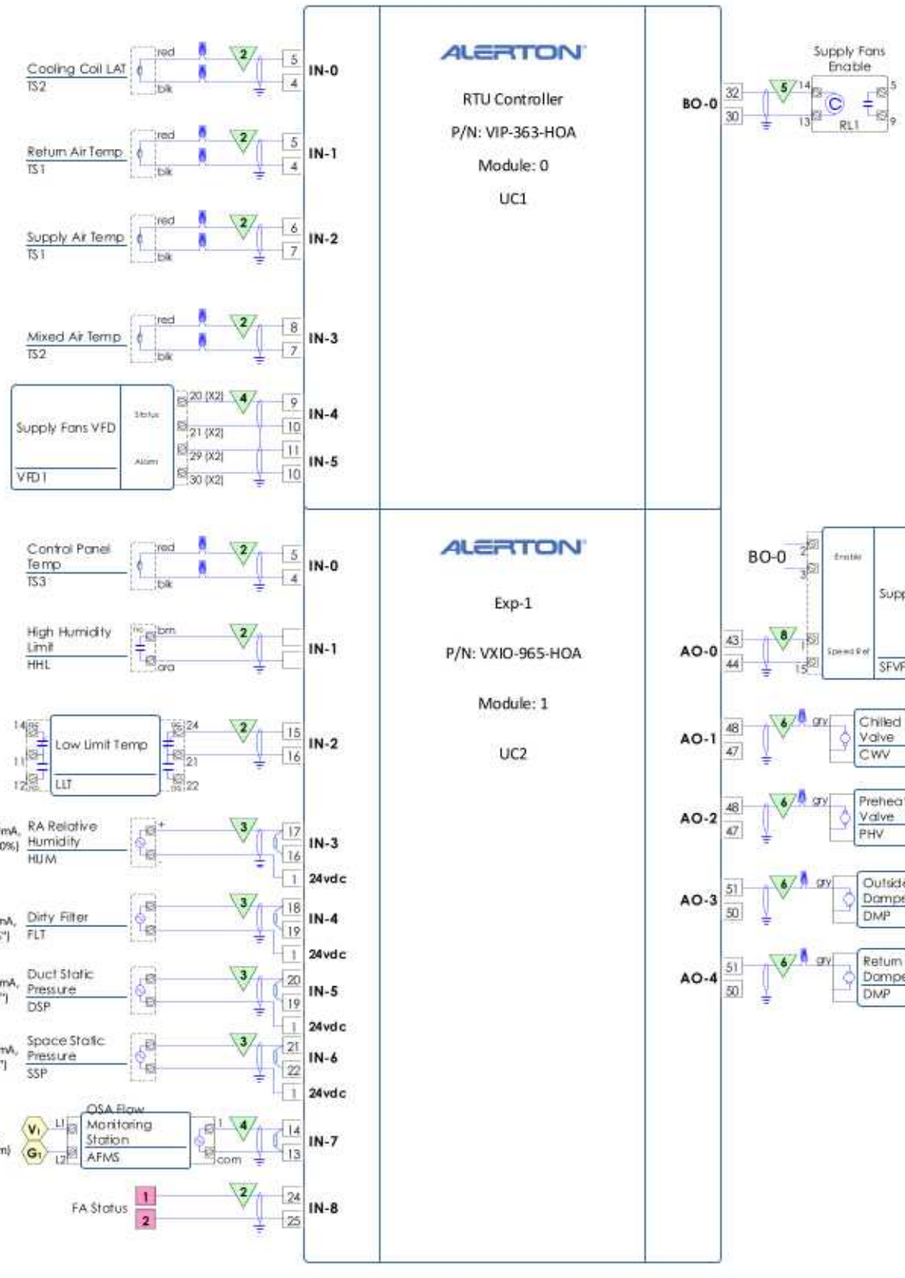
RTU-1 and 2 Control Wiring Diagram

Typical of 2



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DSP, FLT, SSP	6	V-PX3ULX05	Alerton	Dry media pressure transducer with LCD display, universal mount, 0-10"wc range, 2-wire 4-20ma or 3-wire 0-5V/0-10VDC
RL1	2	V-VMD2B-F24A	Alerton	Veris VMD2B-F24A; 15A DPDT socket/DIN relay; Full,24VAC
RL1	2	V-VBD2B-C	Alerton	Relay Base DPDT
TS1	4	TS-2006-FB-10-AA	Alerton	10K duct sensor, 6" probe w/ flange and 6' plenum cable
TS2	6	TS-5024-XD-10-AA	Alerton	10K duct average sensor, w/ 24' flexible wire
TS3	2	TS-1101-WA-10-AA	Alerton	10K SS wallplate
AFMS	2	GTA116	Ebtron	Gold Series High Density Airflow Measurement System
HHL	2	HC-201	Kele	Invensys Humidistat, Duct mount with SPDT contact
HSL	2	AFS-460-137	Kele	AFS-460-137 Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), 24 VAC, SPDT
HUM	2	HD20K	Kele	Duct humidity transmitter 2%
LLT	2	TF142-SODP20	Kele	Low temp limit, Manual reset, DPDT, 34 to 70 deg F
DMP	6	AFB24-MFT	Belimo	180lb.-in spring return actuator, 2-10VDC w/ plenum cable
UC1	1	VIP-363	Alerton	Field controller, 3 universal inputs, 6 binary outputs, 3 analog inputs/outputs
UC2, UC3	2	VXIO-965-HOA	Alerton	Exp module, 9 universal inputs, 6 binary outputs, 5 analog inputs/outputs

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L23-13452 submittal.vwd

AH-6 Control Diagram

Typical of 1

Sequence of Operation

GENERAL DESCRIPTION: INTERIOR VAV AIR HANDLING UNIT SHALL BE MOUNTED ON A STRUCTURAL PLATFORM AND SHALL SERVE INDIVIDUAL AREAS WITHIN THE INTERIOR SPACES AS A SINGLE ZONE VAV SYSTEM. UNIT TO BE FACTORY PROVIDED WITH VARIABLE FREQUENCY DRIVE (VFD).

UNIT CONTROLS: UNIT SHALL BE PROVIDED WITH A STANDALONE UNIT CONTROLLER THAT SHALL INTERFACE WITH THE BACNET BUILDING AUTOMATION SYSTEM (BAS) SYSTEMS. UNIT CONTROLLER SHALL BE CAPABLE OF OPERATING UNIT WITHOUT REQUIRING CONSTANT BACNET COMMUNICATION TO MAINTAIN NORMAL UNIT OPERATION. IF COMMUNICATION WITH THE BAS IS LOST, THE VAV AIR HANDLING UNIT SHALL USE ITS DEFAULT SETPOINTS AND OPERATE IN THE OCCUPIED COOLING MODE.

THE BAS SHALL SEND THE VAV AIR HANDLING UNIT A DISCHARGE AIR TEMPERATURE (DAT) COOLING SETPOINT AND A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL ALSO SEND START-UP, MORNING WARM-UP, OCCUPIED, UNOCCUPIED, HEATING / COOLING, TIMED OVERRIDE, COAST DOWN, NIGHT SETBACK, PURGE, AND PRIORITY SHUT-DOWN COMMANDS.

OCCUPIED MODE: THE OCCUPIED MODE SHALL BE DETERMINED BY THE OWNER'S BUILDING SCHEDULE. WHEN THE AIR HANDLING UNIT IS IN OCCUPIED MODE, THE SUPPLY FAN(S) SHALL OPERATE CONTINUOUSLY, THE VARIABLE FREQUENCY DRIVE(S) (VFD) SHALL MODULATE THE SUPPLY FAN(S) AS REQUIRED BETWEEN THE MINIMUM AND MAXIMUM FAN SPEED SETPOINTS (ADJUSTABLE) TO MAINTAIN THE DUCT STATIC PRESSURE, AND THE COOLING VALVE AND PRE-HEAT / HEATING VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN THE UNIT DISCHARGE AIR TEMPERATURE. THE SUPPLY FAN(S) SHALL BE OFF WHENEVER THE AIR HANDLING UNIT MIXED AIR LOW LIMIT IS TRIPPED, THE STOP / AUTO INTERLOCK IS OPEN, OR THE SUPPLY FAN STATUS INDICATES A FAILURE (AFTER A TWO MINUTE DELAY). THE LOW LIMIT AND THE FAN FAILURE REQUIRE A MANUAL RESET. THE OUTDOOR AIRFLOW, AS MEASURED AT THE AIRFLOW MEASURING STATION, SHALL BE MAINTAINED AT A VALUE EQUAL TO OR HIGHER THAN THE MINIMUM REQUIRED OUTDOOR AIRFLOW SETPOINT SECTION OF THE AHU SYSTEM LEVEL OPERATION SECTION OF THIS SPECIFICATION.

UNOCCUPIED MODE: THE UNOCCUPIED MODE SHALL BE DETERMINED BY THE OWNER'S BUILDING SCHEDULE. WHEN THE AIR HANDLING UNIT IS IN THE UNOCCUPIED MODE, THE SUPPLY FAN(S) SHALL MODULATE DOWN TO MINIMUM AIR FLOW RATE REQUIRED TO MAINTAIN THE BUILDING UNOCCUPIED TEMPERATURE SETPOINT (ADJUSTABLE). THE OUTDOOR AIR DAMPER SHALL BE CLOSED.

OVERRIDE MODE: IF DURING THE COURSE OF AN UNOCCUPIED MODE PERIOD THE LOCAL USER UTILIZES THE OVERRIDE FUNCTION AT THE LOCAL USER THERMOSTAT, THE AIR HANDLING UNIT SHALL RETURN TO OCCUPIED MODE STATUS FOR A PERIOD OF TWO (2) HOURS (ADJ.).

VFD CONTROL: WHEN THE SUPPLY FAN(S) ARE ON, THE VFD(S) SHALL SLOWLY RAMP (ADJ.) UP AND MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT.

SUPPLY FANS: THE AIR HANDLING UNIT WILL BE FACTORY SUPPLIED WITH DIRECT DRIVE SUPPLY FAN(S).

COOLING VALVE CONTROL: THE COOLING VALVE SHALL MODULATE TO MAINTAIN THE UNIT SUPPLY AIR DISCHARGE TEMPERATURE OF 55°F (ADJ.). THE COOLING VALVE SHALL BE CLOSED IF THE SUPPLY FAN(S) ARE OFF, THE SUPPLY AIR SENSOR HAS FAILED, OR IF THE AIR HANDLING UNIT IS IN THE HEATING MODE (THE COOLING COIL CONTROL VALVE SHALL BE CLOSED IF OUTSIDE AIR TEMPERATURE IS ABOVE 40°F (ADJ.), IF OUTSIDE AIR TEMPERATURE IS BELOW 40°F (ADJ.) THEN THE COOLING COIL CONTROL VALVE SHALL BE FULLY OPENED TO HELP PREVENT FREEZING).

HEATING VALVE INTEGRAL FACE & BYPASS DAMPER CONTROL: WHEN THE PRE-HEAT COIL LEAVING AIR TEMPERATURE DROPS TO BELOW 50°F (ADJ.), THE HEATING VALVE SHALL MODULATE OPEN AS NEEDED AND THE FACE AND BYPASS DAMPER SHALL MODULATE IN CONCERT TO MAINTAIN THE PRE-HEAT COIL LEAVING AIR TEMPERATURE SETPOINT OF 55°F (ADJ.). WHEN THE OUTDOOR AIR TEMPERATURES ARE BELOW 40°F (ADJ.), THEN THE BYPASS DAMPER ONLY SHALL BE MODULATED AND THE HEATING WATER VALVE SHALL OPERATE AT 100% OPEN.

MINIMUM REQUIRED OUTDOOR AIRFLOW SETPOINT: DURING OCCUPIED TIMES, THE AIR HANDLER OUTDOOR AIR DAMPER SHALL MAINTAIN A MINIMUM OPEN POSITION TO DELIVER REQUIRED OUTDOOR AIRFLOW TO THE ZONES SERVED. SEE THE OSA CFM LISTED ON THE AIR HANDLER UNIT SCHEDULE. COORDINATE WITH ENGINEER.

DISCHARGE DUCT STATIC PRESSURE SETPOINT: THE DISCHARGE DUCT STATIC PRESSURE SHALL BE SENSED DIRECTLY AT A POINT APPROXIMATELY TWO-THIRDS (2/3) THE TRUNK DUCT OVERALL LENGTH. THE SENSOR SHALL BE MOUNTED IN A NON-TURBULENT LOCATION. THE CONTROL BANDS, SETPOINT INCREMENT VALUES, SETPOINT DECREMENT VALUES, AND ADJUSTMENT FREQUENCIES SHALL BE ADJUSTED TO MAINTAIN STATIC PRESSURE OPTIMIZATION WITH STABLE SYSTEM CONTROL AND MAXIMUM COMFORT CONTROL.

COOLING: THE UNIT IS PROVIDED WITH A CHILLED WATER COIL FOR COOLING.

COOLING DAT RESET: THE COOLING DAT SETPOINT MAY BE RESET BY THE SPACE TEMPERATURE, RETURN AIR TEMPERATURE, OUTSIDE AIR TEMPERATURE, SPACE RELATIVE HUMIDITY, OR EXTERNAL VOLTAGE/mA SIGNALS. A LINEAR RELATIONSHIP BETWEEN THE DAT AND THE RESET VARIABLE WILL BE CREATED FOR THE MINIMUM AND

Sequence of Operation (Continued)

MAXIMUM DAT SETPOINTS. AS THE RESET VARIABLE CHANGES THE DAT WILL ADJUST ACCORDING TO THE RELATIONSHIP. MINIMUM RESET SETPOINT IS 53°F (ADJ.) AND MAXIMUM RESET SETPOINT IS 65°F (ADJ.).

HEATING: THE UNIT IS PROVIDED WITH A HEATING HOT WATER COIL FOR HEATING.

HEATING DAT RESET: THE HEATING DAT SETPOINT MAY BE RESET BY SPACE TEMPERATURE, RETURN AIR TEMPERATURE, OUTSIDE AIR TEMPERATURE, NETWORK, OR EXTERNAL VOLTAGE/mA SIGNALS. A LINEAR RELATIONSHIP BETWEEN THE DAT AND THE RESET VARIABLE WILL BE CREATED FOR THE MINIMUM AND MAXIMUM DAT SETPOINTS. AS THE RESET VARIABLE CHANGES THE DAT WILL ADJUST ACCORDINGLY TO THE RELATIONSHIP. WHEN THE AIR HANDLING UNIT IS IN THE HEATING MODE OR THE NIGHT SETBACK MODE, THE HEATING VALVE SHALL MODULATE OPEN TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT THE DISCHARGE HEATING SETPOINT (ADJUSTABLE).

LOW LIMIT TEMPERATURE DETECTOR: IN THE EVENT THE LOW LIMIT TEMPERATURE DETECTOR DETECTS MIXED AIR TEMPERATURE BELOW 35 DEG. F, THE SUPPLY AIR FAN(S) SHALL STOP, THE DAMPERS SHALL CLOSE, AND AN ALARM SHALL SOUND AT THE BAS WORKSTATION. THE LOW LIMIT TEMPERATURE DETECTOR SHALL REQUIRE A MANUAL RESET.

NIGHT SETBACK / MORNING WARM-UP HEATING MODE: THE AIR HANDING UNIT SHALL INDEX FROM UNOCCUPIED MODE TO OCCUPIED MODE AT A TIME DETERMINED BY THE BAS SYSTEM SO THAT THE SETPOINT IS MET DURING THE ENTIRE PORTION OF THE BUILDING OCCUPIED HOURS (ADJUSTABLE).

ECONOMIZER MODE: ECONOMIZER MODE SHALL OPERATE BASED UPON ENTHALPY SETPOINT. THE EXISTING DUCTWORK CONNECTIONS TO THE RETURN AIR AT THE ROOF LEVEL PENTHOUSE HAVE BEEN PROVIDED WITH A RELIEF DAMPER ASSEMBLY (S) (QUANTITY OF TWO) FOR ECONOMIZER OPERATION. CONTROLS CONTRACTOR SHALL FIELD REPLACE EXISTING RELIEF DAMPER ACTUATORS AT EXISTING RELIEF DAMPER ASSEMBLY (S) AND THE UNIT CONTROLLER SHALL ACTIVATE ECONOMIZER MODE ONCE THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY. DURING ECONOMIZER MODE, THE OUTSIDE AIR DAMPER SHALL MODULATE FULLY OPEN, THE RETURN AIR DAMPER SHALL MODULATE CLOSED, AND THE RELIEF AIR DAMPERS SHALL OPEN AND MODULATE TO MAINTAIN A BUILDING PRESSURE DIFFERENTIAL OF 0.04"W.G. (ADJUSTABLE). WHEN THE OUTSIDE AIR CONDITIONS ARE ABOVE THE ENTHALPY SETPOINT, THE OUTSIDE AIR DAMPER SHALL CLOSE TO THE MINIMUM POSITION REQUIRED, THE RETURN AIR DAMPER SHALL FULLY OPEN, THE RELIEF AIR DAMPERS SHALL CLOSE, AND THE UNIT SHALL RESUME NORMAL COOLING/HEATING OPERATION.

AIR HANDLING UNIT SYSTEM LEVEL CONTROL: 1. THE INTERLOCK SHALL BE CONTROLLED BY COMPARING THE OUTSIDE AIR AMBIENT TEMPERATURE TO THE INTERLOCK SETPOINT (ADJUSTABLE). IF EACH AIR HANDLING UNIT CONTROLLER IS INDIVIDUALLY SENSING THE OUTSIDE AIR AMBIENT TEMPERATURE SERVING THE UNIT, THEN THE TEMPERATURE SENSOR FOR THAT AIR HANDLING UNIT SHALL BE USED FOR THE COMMAND AND OTHER PROCESSES:

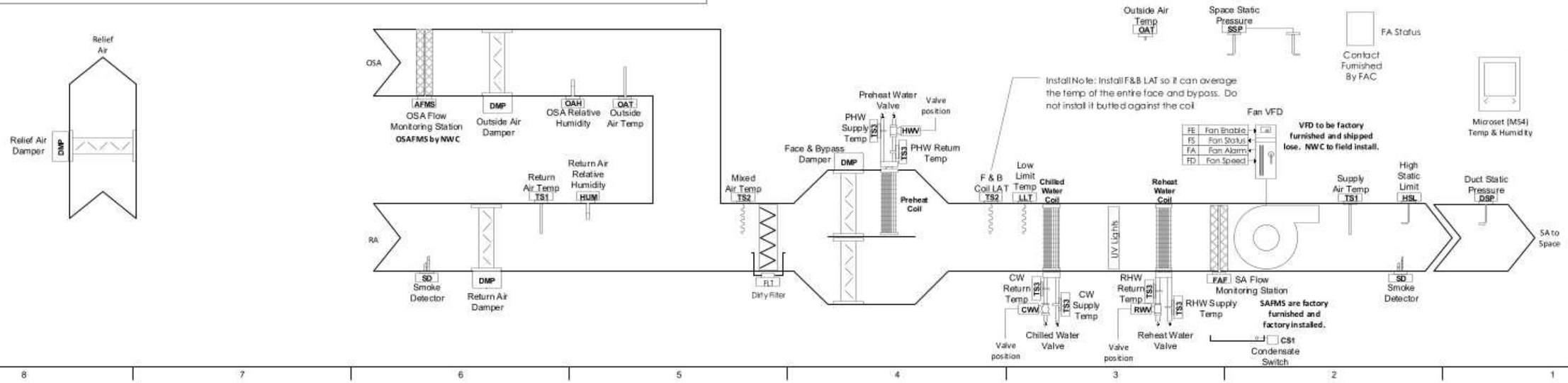
THE FOLLOWING POINTS SHALL BE MONITORED AND ALARMED AT THE AIR HANDLING UNIT CONTROLLER AND THE BAS:

1. SUPPLY AIR TEMP.
2. MIXED AIR TEMP.
3. OUTSIDE AIR TEMP.
4. OUTSIDE AIR RELATIVE HUMIDITY
5. SPACE RELATIVE HUMIDITY
6. SPACE PRESSURE
7. VFD OUTPUT %
8. SUPPLY FAN MODULATION
9. FAN STATUS
10. COOLING AIR TEMP.
11. HEATING AIR TEMP.
12. RETURN AIR TEMP.
13. RETURN AIR RELATIVE HUMIDITY
14. SENSORS NORMAL / FAIL STATUS
15. LOW LIMIT STATUS
16. COOLING VALVE OPEN %
17. HEATING VALVE OPEN %
18. HEAT / COOL MODE
19. DAMPER MINIMUM POSITION %
20. FILTER NORMAL / DIRTY
21. SUPPLY AIR STATIC PRESSURE
22. DDC LOOP PARAMETERS

THE FOLLOWING POINTS SHALL BE OPERATOR ADJUSTABLE AND / OR AUTOMATICALLY RESET BY THE BAS PROGRAM:

1. HEATING SETPOINT - HEAT RESET SETPOINT
2. COOLING SETPOINT - COOL RESET SETPOINT
3. MIN. POSITION SETPOINT - STATIC PRESS. SETPOINT
4. DAMPER OPEN/CLOSE - COOL/HEAT DISABLE

THE SYSTEM SHALL SHUT DOWN IMMEDIATELY UPON DETECTION OF SMOKE FROM DETECTORS LOCATED IN THE SUPPLY AND RETURN AIR STREAMS OR IF FIRE ALARM SYSTEM IS ACTIVATED.



Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Pettit & Pettit
Mechanical: CSUSA

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7631 Northshore Place
North Little Rock, AR 72118
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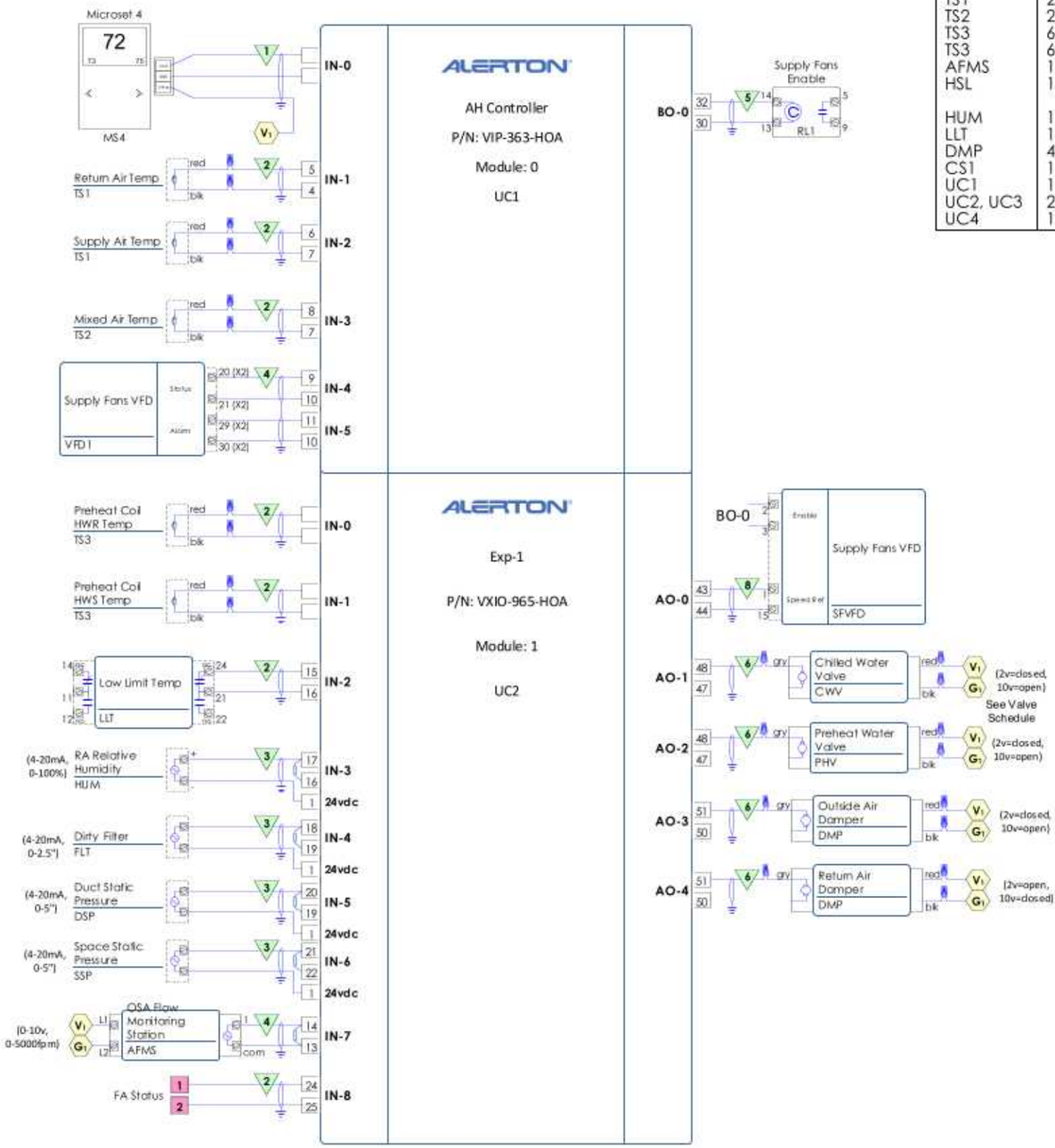
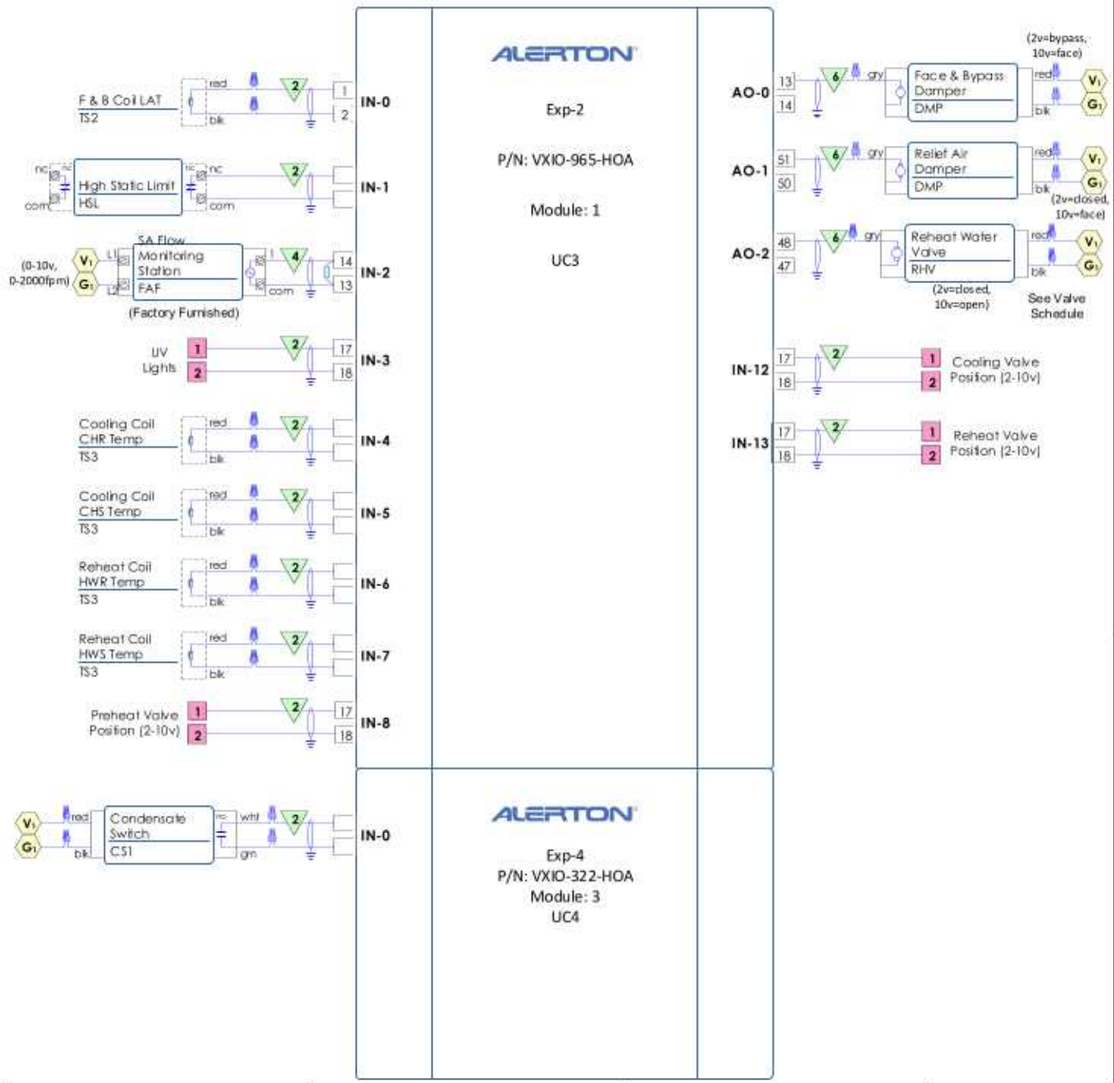
L23-13452 submittal.vwd

AH-6 Control Wiring Diagram

Typical of 1

TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DSP, FLT, SSP	3	V-PX3ULX05	Alerton	Dry media pressure transducer with LCD display, universal mount, 0-10"wc range, 2-wire 4-20ma or 3-wire 0-5V/0-10VDC
MS4	1	MS4-TH	Alerton	Microset 4 with temperature and humidity sensors
RL1	1	V-VMD2B-F24A	Alerton	Veris VMD2B-F24A; 15A DPDT socket/DIN relay; Full,24VAC
RL1	1	V-VBD2B-C	Alerton	Relay Base DPDT
TS1	2	TS-2006-FB-10-AA	Alerton	10K duct sensor, 6" probe w/ flange and 6' plenum cable
TS2	2	TS-5024-XD-10-AA	Alerton	10K duct average sensor, w/ 24' flexible wire
TS3	6	TS-2104-MH-10-AA	Alerton	10K immersion sensor, 4" probe w/ painted enclosure 1/2 NPT
TS3	6	TS-3104-CI-00-AA	Alerton	SS well for 4" immersion sensor w/ 1/2 NPT threads
AFMS	1	GTA116	Ebtron	Gold Series High Density Airflow Measurement System
HSL	1	AFS-460-137	Kele	AFS-460-137 Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), 24 VAC, SPDT
HUM	1	HD20K	Kele	Duct humidity transmitter 2%
LLT	1	TF142-SODP20	Kele	Low temp limit, Manual reset, DPDT, 34 to 70 deg F
DMP	4	AFB24-MFT	Belimo	180lb.-in spring return actuator, 2-10VDC w/ plenum cable
CS1	1	WS-1	Wagner	Wet switch
UC1	1	VIP-363	Alerton	Field controller, 3 universal inputs, 6 binary outputs, 3 analog inputs/outputs
UC2, UC3	2	VXIO-965-HOA	Alerton	Exp module, 9 universal inputs, 6 binary outputs, 5 analog inputs/outputs
UC4	1	VXIO-322-HOA	Alerton	Exp module, 3 universal inputs, 2 binary outputs, 2 analog inputs/outputs





Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

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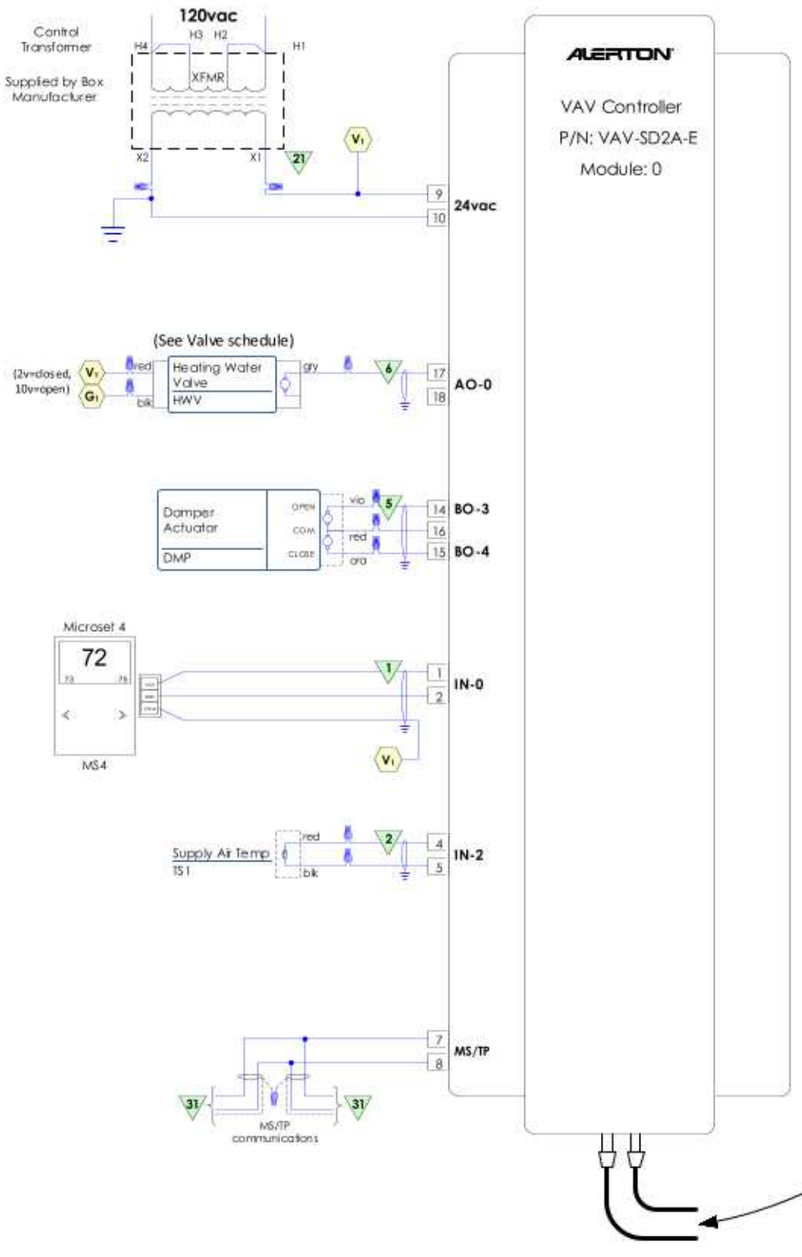
VAV w/HW Reheat

Typical of 39



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
MS4	39	MS4-TH	Alerton	Microset 4 with temperature and humidity sensors
TS1	39	TS-2004-FB-10-AA	Alerton	10K duct sensor, 4" probe w/ flange and 6' plenum cable
UC1	39	VAV-SD2A-E	Alerton	Single duct variable air volume controller with 2 analog outputs
DMP	39	LMX24-SR-T	Belimo	45lb.-in 2-10v modulating, NSR actuator, 24VAC w/ plenum cable

Sequence of Operation

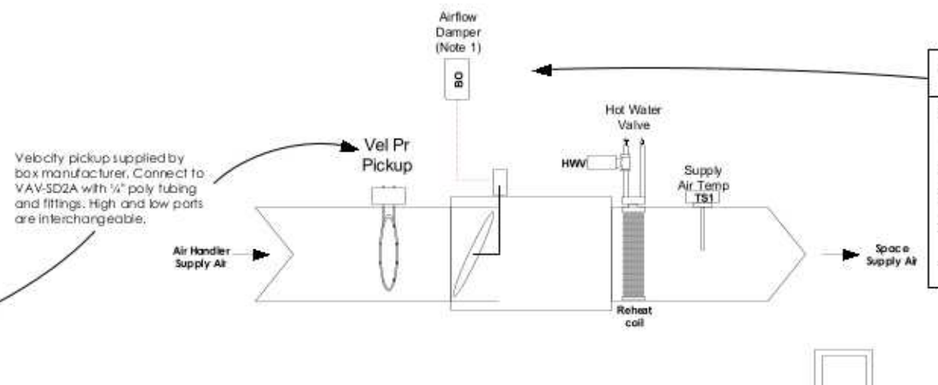
AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED" OR "UNOCCUPIED" BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND.

OCCUPIED CYCLE: DURING THE OCCUPIED MODE OF OPERATION, THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE OCCUPANT AT THE THERMOSTAT BETWEEN A MINIMUM OF 68°F (ADJ.) AND A MAXIMUM OF 75° F. (ADJ.). ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO PROVIDE MAXIMUM CFM. AS SPACE TEMPERATURE DECREASES BELOW THE HEATING SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO ITS MINIMUM POSITION. AS THE SPACE TEMPERATURE CONTINUES TO FALL BELOW THE HEATING SETPOINT WITH THE AIR VALVE AT MINIMUM POSITION, THE CONTROLLER SHALL MODULATE THE AIR VALVE TO ITS HEATING MINIMUM AIRFLOW. AT THIS POINT, THE HEATING VALVE SHALL BE MODULATED OPEN AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT THE HEATING SETPOINT.

UNOCCUPIED CYCLE: DURING THE UNOCCUPIED CYCLE, THE AIR VALVE ON THE TERMINAL UNIT SHALL DRIVE TO THE UNOCCUPIED MINIMUM CFM. THE SYSTEM FAN AND HEAT SHALL CYCLE TO MAINTAIN A REDUCED SPACE TEMPERATURE (NSB).

UNOCCUPIED CYCLE OVERRIDE: DURING THE UNOCCUPIED CYCLE, THE LOCAL USER SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION ON EACH LOCAL THERMOSTAT. THE OVERRIDE FUNCTION SHALL FUNCTION FOR A TWO (2) HOUR PERIOD.

FREEZE PROTECTION SEQUENCE OF OPERATION:
UPON ACTIVATION OF A FREEZE STAT IN ANY AIR HANDLING UNIT SERVING THIS BUILDING, ALL VAV TERMINAL BOX HEATING WATER CONTROL VALVES SHALL BE FULLY OPENED. UPON RESET OF THE ACTIVATED FREEZE STAT, THE VALVES SHALL RETURN TO NORMAL OPERATION.



NOTE 1: VAVi ACTUATOR INSTALLATION NOTES

For actuators that open to airflow in counter-clockwise motion.

1. Depress clutch on actuator and rotate clamp "U" bolt fully counter-clockwise.
2. Rotate damper shaft to open position.
3. Clamp "U" bolt to damper shaft.
4. Depress clutch and rotate damper to closed position.
5. If needed, loosen travel stop and move into place to limit travel and tighten.

Adjust the above procedure for dampers that open clockwise.

UNIT TYPE	DEVICE INST	MAC ADDR	REP-JOB-APP
VAV-SD2A-E	108001	1	

Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023
Drawn by: VWI
Checked by: VWI

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North Little Rock, AR 72118
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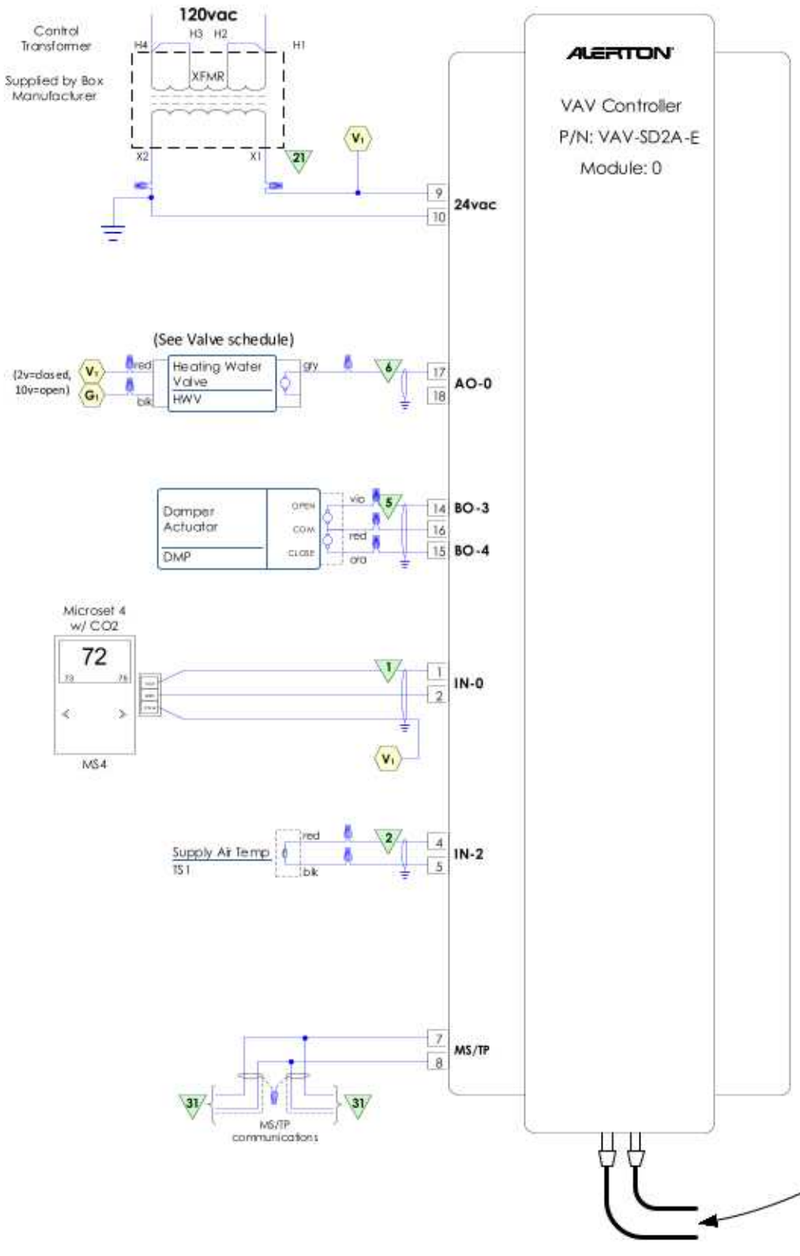
123-13452 submittal.vwi

VAV w/HW Reheat w/ CO2 (ST1-05 and ST2-16)

Addendum #2

Typical of 2



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
MS4	2	MS4-THC	Alerton	Microset 4 with temperature, humidity, and CO2 sensors
TS1	2	TS-2004-FB-10-AA	Alerton	10K duct sensor, 4" probe w/ flange and 6' plenum cable
UC1	2	VAV-SD2A-E	Alerton	Single duct variable air volume controller with 2 analog outputs
DMP	2	LMX24-SR-T	Belimo	45lb.-in 2-10v modulating, NSR actuator, 24VAC w/ plenum cable

Sequence of Operation

AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED" OR "UNOCCUPIED" BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND.

OCCUPIED CYCLE: DURING THE OCCUPIED MODE OF OPERATION, THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE OCCUPANT AT THE THERMOSTAT BETWEEN A MINIMUM OF 68°F (ADJ.) AND A MAXIMUM OF 75° F. (ADJ.). ON A RISE IN SPACE TEMPERATURE ABOVE THE SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO PROVIDE MAXIMUM CFM. AS SPACE TEMPERATURE DECREASES BELOW THE HEATING SETPOINT, THE VAV CONTROLLER WILL MODULATE THE AIR VALVE TO ITS MINIMUM POSITION. AS THE SPACE TEMPERATURE CONTINUES TO FALL BELOW THE HEATING SETPOINT WITH THE AIR VALVE AT MINIMUM POSITION, THE CONTROLLER SHALL MODULATE THE AIR VALVE TO ITS HEATING MINIMUM AIRFLOW. AT THIS POINT, THE HEATING VALVE SHALL BE MODULATED OPEN AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT THE HEATING SETPOINT.

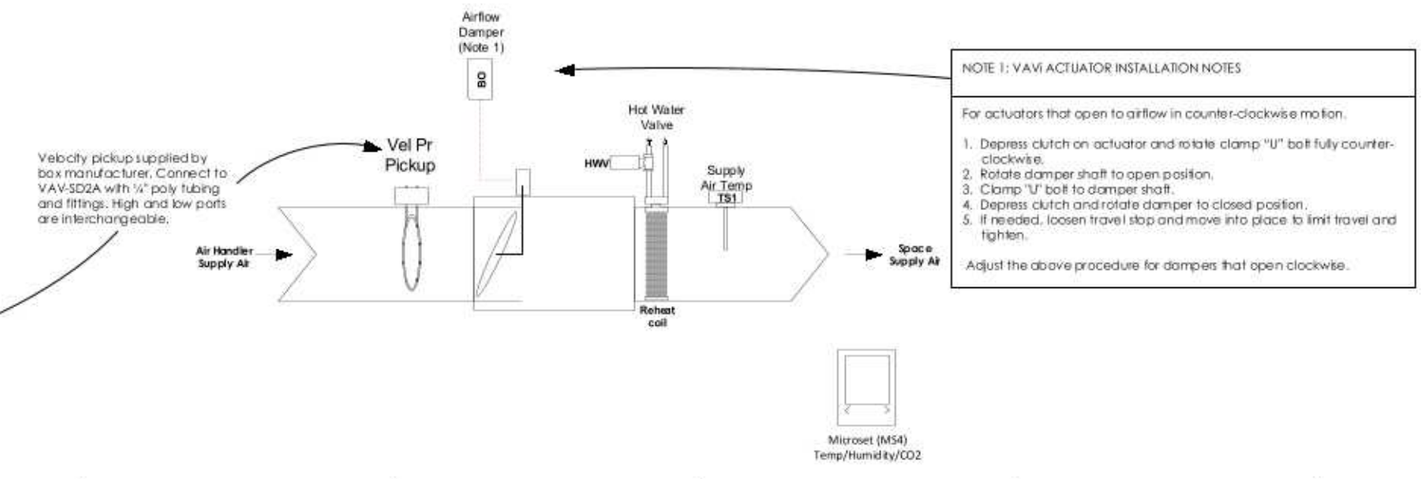
IF DURING THE OCCUPIED CYCLE THE CARBON DIOXIDE (CO2) SENSOR EXCEEDS THE HIGH LIMIT OF 1200 PPM (ADJUSTABLE), THE VAV TERMINAL BOX DAMPER SHALL OPEN TO ITS MAXIMUM SCHEDULED VALUE UNTIL THE ROOM CO2 LEVEL DROPS BELOW THE HIGH LIMIT SETPOINT.

UNOCCUPIED CYCLE: DURING THE UNOCCUPIED CYCLE, THE AIR VALVE ON THE TERMINAL UNIT SHALL DRIVE TO THE UNOCCUPIED MINIMUM CFM. THE SYSTEM FAN AND HEAT SHALL CYCLE TO MAINTAIN A REDUCED SPACE TEMPERATURE (NSB).

UNOCCUPIED CYCLE OVERRIDE: DURING THE UNOCCUPIED CYCLE, THE LOCAL USER SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION ON EACH LOCAL THERMOSTAT. THE OVERRIDE FUNCTION SHALL FUNCTION FOR A TWO (2) HOUR PERIOD.

FREEZE PROTECTION SEQUENCE OF OPERATION:
UPON ACTIVATION OF A FREEZE STAT (N ANY AIR HANDLING UNIT SERVING THIS BUILDING, ALL VAV TERMINAL BOX HEATING WATER CONTROL VALVES SHALL BE FULLY OPENED. UPON RESET OF THE ACTIVATED FREEZE STAT, THE VALVES SHALL RETURN TO NORMAL OPERATION.

THIS SHEET PERTAINS TO THESE TWO ROOMS ONLY. MUSIC CLASSROOM 131 AND MUSIC CLASSROM 316.



NOTE 1: VAVi ACTUATOR INSTALLATION NOTES

For actuators that open to airflow in counter-clockwise motion.

1. Depress clutch on actuator and rotate clamp "U" bolt fully counter-clockwise.
2. Rotate damper shaft to open position.
3. Clamp "U" bolt to damper shaft.
4. Depress clutch and rotate damper to closed position.
5. If needed, loosen travel stop and move into place to limit travel and tighten.

Adjust the above procedure for dampers that open clockwise.

UNIT TYPE	DEVICE INST	MAC ADDR	REP-JOB-APP
VAV-SD2A-E	101001	1	

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

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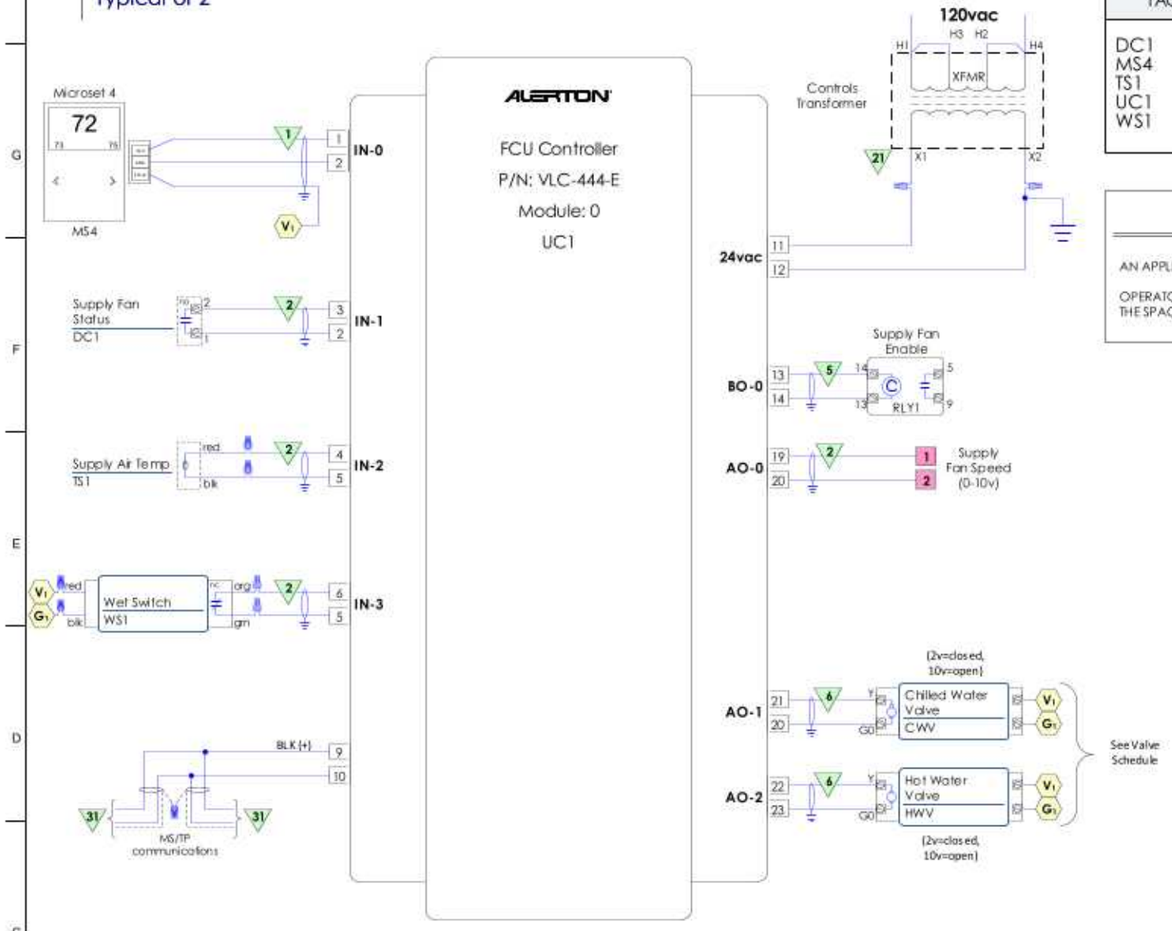
7631 Northshore Place
North Little Rock, AR 72118
Ph: (501) 280-0404 Fax: (501) 280-9200

L23-13452 submittal.vwx

FCU Control Wiring Diagram

Typical of 2

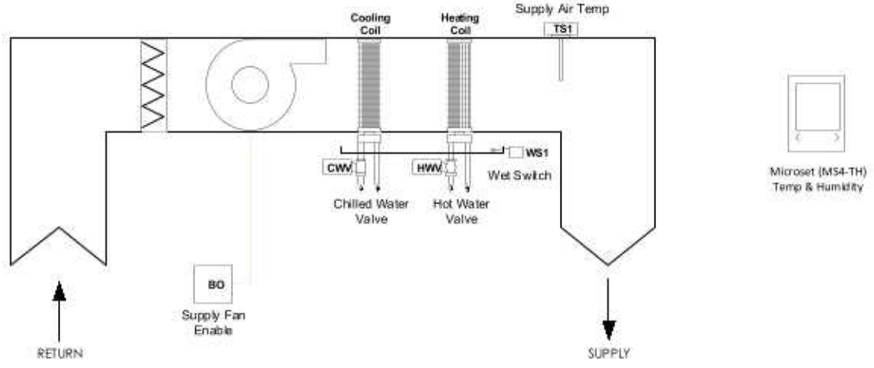


TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DC1	2	H6ECM05	Kele	Split-core current switch, 0.5 to 175A, 0.5A set
MS4	2	MS4-TH	Alerton	Microset 4 with temperature and humidity sensors
TS1	2	TS-2004-FB-10-AA	Alerton	10K duct sensor, 4" probe w/ flange and 6' plenum cable
UC1	2	VLC-444-E	Alerton	Field controller, 4 universal inputs, 4 binary outputs; 4 analog outputs
WS1	2	WS-1	Wagner	Wet switch

Sequence of Operation

AN APPLICATION SPECIFIC DDC CONTROLLER USING ELECTRIC ACTUATION CONTROLS THE FAN COIL UNIT. THE SPACE SERVED BY THE FCU IS CONTROLLED AS FOLLOWS:

OPERATON (OCCUPIED OR UNOCCUPIED MODE) THE CONTROLLER MONITORS THE ROOM TEMPERATURE SENSOR AND MODULATES THE FCU COOLING AND HEATING VALVES AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT OF 75 DEG. F (ADJUSTABLE).



UNIT TYPE	DEVICE INST	MAC ADDR	REP-JOB-APP
VLC-444e	101001	1	northwcs\job\fcu_gym.bd4

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023
Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

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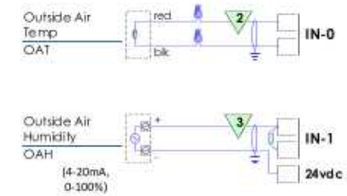
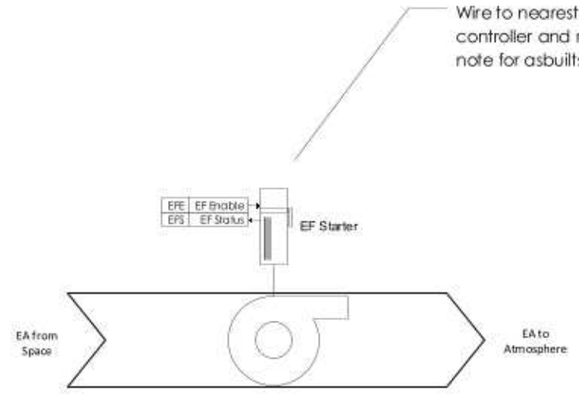
EF and Global Points Control Diagram

Typical of 2



COORDINATE GLOBAL OUTSIDE AIR AND OUTSIDE AIR RELATIVE HUMIDITY POINTS WITH PRGRAMMER FOR CONTROLLER LOCATION AND MAKE NOTE FOR ASBUILTS!



Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
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Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Petiit & Petiit
Mechanical: CSUSA

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Chilled Water System Control Diagram

Typical of 1

Sequence of Operation (CONDENSER WATER SYSTEM)

CONDENSER WATER SYSTEM SEQUENCE OF OPERATION: THE BAS SHALL ENABLE THE LOCAL CHILLED WATER SYSTEM OPERATION BASED ON OWNER DEFINED SCHEDULE. ONCE A CHILLER HAS BEEN ENABLED, THE CONDENSER WATER SYSTEM SHALL ALSO BE ENABLED. IF ANY COMPONENT OF THE COND. WATER SYSTEM FAILS TO START ONCE ENABLED, AN ALARM SHALL BE INDICATED AT THE BAS OPERATOR WORKSTATION.

COOLNG TOWER SEQUENCE OF OPERATION: ONCE ENABLED, THE COOLING TOWER FAN SHALL BE MODULATED VIA VARIABLE FREQUENCY DRIVE TO MAINTAIN A CONDENSER WATER SUPPLY TEMPERATURE OF THE OUTDOOR WET BULB PLUS 5 DEG. F WITH A MINIMUM SUPPLY WATER TEMPERATURE OF 65 DEG. F AND A MAXIMUM SUPPLY WATER TEMPERATURE OF 85 DEG. F. IF REQUIRED, THE COOLING TOWER WATER BYPASS VALVE SHALL BE MODULATED TO AVCHD OVER-COOLNG THE CONDENSER WATER SUPPLY TO THE CHILLER.

COOLING TOWER FREE COOLING SEQUENCE OF OPERATION: WHEN THE OUTDOOR AMBIENT WET BULB TEMP DROPS BELOW 40 DEG. F (ADJ.) FOR A PERIOD OF MORE THAN 15 MINUTES (ADJ.), THE CONDENSER WATER SUPPLY TEMPERATURE SHALL BE RESET DOWNWARD TO 40 DEG. F (ADJ.). THE COOLING TOWER FANS SHALL MODULATE AS REQUIRED TO MAINTAIN THE CONDENSER WATER SUPPLY TEMPERATURE. WHEN THE OUTDOOR AMBIENT WET BULB TEMPERATURE RISES TO 44 DEG. F (ADJ.) OR ABOVE FOR A PERIOD OF MORE THAN 15 MINUTES (ADJ.), THE LEAVING CONDENSER WATER TEMPERATURE SHALL RETURN TO ITS NORMAL RANGE OF A MAXIMUM OF 85 DEG. F AND A MINIMUM OF 65 DEG. F. DURING THIS TRANSITION, THE COOLING TOWER FANS SHALL BE DISABLED AND THE TOWER WATER BYPASS VALVE SHALL OPEN TO BYPASS THE COOLING TOWER FL TO QUICKLY RAISE THE CONDENSER WATER SUPPLY TEMPERATURE BACK TO THE MINIMUM TEMPERATURE OF 65 DEG. F.

CONSTANTSPEED CONDENSER WATER PUMP SEQUENCE QF OPERATION: THE EXISTING CONDENSER WATER PUMPS P-4 AND P-5 ARE CONSTANT SPEED PUMPS AND SHALL BEDUTY-ROTATED EVERY 2 WEEKS. ONCE ENABLED, THE CONDENSER WATER PUMPS SHALL RUN AT CONSTANT SPEED.

ENGINEER NOTES

NOTE 1: AIR HANDUNG UNITS AND FAN COIL UNITS SHALL SHUT DOWN WHILE IN COOLING MODE UPON LOSS OF CHILLED WATER FLOW RATE FROM THE DISTRICT COOLING LOOP AND / OR UPON THE CHILLED WATER SUPPLY TEMPERATURE REACHING THE HIGH LIMIT SETPONTOF 52DEGREES F (ADJUSTABLE).

NOTE 2: UPON A LEAD CHILLED WATER SYSTEM PUMP REACHING A MAXIMUM CONTINUOUS RUN TIME OF 200 HOURS (ADJUSTABLE), THE LAG CHILLED WATER SYSTEM PUMP SHALL BE STARTED AND THE CHILLED WATER SYSTEM PUMP THAT HAS MET THE MAXIMUM CONTIGUOUS RUN TIME LIMIT SHALL THEN BE SHUT DOWN AND BECOME THELAG CHILLED WATER SYSTEM PUMP.

NOTE 3: THE BAS CONTROL SYSTEM GRAPHICS SHALL BE PROVIDED WITH RADIO BUTTONS FOR PUMP DISABLE AND OVERRIDE FUNCTIONS.

NOTE 4: THE BAS CONTROL SYSTEM SHALL POLL EACH OF THE CONTROL VALVES IN THE CHILLED WATER SYSTEM LOOP FOR THE PURPOSE OF DETERMINING VALVE OPEN POSITION. IF ALL CHILLED WATER CONTROL VALVES ARE 90% OR MORE OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL REMAIN AT CURRENT SETPOINT. IF ALL CHILLED WATER CONTROL VALVES ARE BETWEEN 30% AND 90% OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET DOWNWARDS AT 3 PSI (ADJUSTABLE) INCREMENTS UNTIL A CHILLED WATER CONTROL VALVE IS 90% OR MORE OPEN. IF MORE THAN ONE CHILLED WATER CONTROL VALVE IS MORE THAN 95%OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET UPWARDS AT 3 PSI (ADJUSTABLE) INCREMENTS UNTIL THE CRITICAL ZONE VALVEIS AT 90% OPEN.

NOTE 5: THE BAS CONTROL SYSTEM GRAPHICS SHALL BE PROVIDED WITH OVERRIDE FUNCTIONS FOR A MANUAL DIFFERENTIAL PRESSURE SETPOINT AND A START-UP DIFFERENTIAL PRESSURE SETPOINT.

Sequence of Operation (CHILLED WATER SYSTEM)

CHILLER SEQUENCE OF OPERATION: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL ENABLE THE LOCAL CHILLED WATER SYSTEM OPERATION BASED ON OWNER'S PREFERENCE. ONCE THE CHILLER HAS BEEN ENABLED, THE CHILLER'S CHILLED WATER ISOLATION VALVE SHALL BE OPENED. THE CHILLER'S ASSOCIATED CONDENSER WATER PUMP SHALL BE STARTED, AND THE PRIMARY CHILLED WATER SYSTEM PUMP P-3 SHALL BE STARTED. UPON PROOF OF FLOW, THE CHILLER SHALL BE STARTED. ONCE STARTED, THE CHILLER SHALL UTILIZE ITS INTERNAL CONTROLS TO MAINTAIN A CHILLED WATER SYSTEM LEAVING CHILLED WATER SETPOINT OF 42 DEG. F (ADJ.).

THE BAS SHALL ENABLE / DISABLE THE CHILLED WATER SYSTEM OPERATION VIA A DATA COMMUNICATIONS LINK. THE CHILLED WATER PLANT SHALL START IN RESPONSE TO THE OPTIMUM START, NIGHT SETBACK, OR TIMED OVERRIDE OPERATION OF THE BUILDING A|R HANDLING UNITS. IF ANY COMPONENT OF THE CHILLED WATER SYSTEM FAILS TO START ONCE ENABLED, AN ALARM SHALL BE WDICATED AT THE BAS OPERATOR WORKSTATION.

VARIABLE SPEED PUMPING SEQUENCE OF OPERATION: THE BAS SHALL MONITOR THE WATER DIFFERENTIAL PRESSURE SENSOR(S) FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS P-2A (DUTY) AND P-2B (STANDBY) SHALL BE DUTY ROTATED EVERY 2 WEEKS AND ENABLED BY THE BAS CONTROLLER. WHEN ENABLED, THE CHILLED WATER SECONDARY PUMP SHALL START AND SHALL RUN CONTINUOUSLY TO MAINTAIN THE BUILDING DIFFERENTIAL PRESSURE SETPOINT, WHILE RUNNING. THE CHILLED WATER SECONDARY PUMP VARIABLE FREQUENCY DRIVE SHALL MODULATE PUMP SPEED AS REQUIRED TO MAINTAIN THE BUILDING WATER MINIMUM DIFFERENTIAL PRESSURE SETPOINT OF 15 PSI(ADJUSTABLE). IF, FOR ANY REASON, THE CHILLED WATER SECONDARY PUMP FAILS TO START OR THE PUMP STATUS DOES NOT MATCH ITS COMMANDED VALUE, AN ALARM FOR THE FALED PUMP SHALL BE GENERATED AT THE BAS WORKSTATION, AND THE STANDBY PUMP SHALL BE INITIATED.

CHILLED WATER SUPPLY TEMPERATURE RESET SEQUENCE OF OPERATION: THE BAS SHALL CONTINUOUSLY MONITOR THE CHILLER LOADING, THE BUILDING HUMIDISTATS, THE CHILLED WATER VALVE POSITIONS, AND TI-E CHILLED WATER PUMP SPEED(S). IF THE CHILLER LOAD DROPS TO BELOW 80% CAPACITY, THE BAS SHALL INITIATE A CHILLED WATER SUPPLY TEMPERATURE RESET SEQUENCE. THE CHILLED WATER SUPPLY TEMPERATURE SHALL BE RESET UPWARDS BY 0.5 DEG. F IN 15 MINUTE INCREMENTS UNTIL THE CHILLED WATER SUPPLY TEMPERATURE REACHES A MAXIMUM TEMPERATURE OF 46 DEG.F (ADJ.). THE BAS SHALL START TO RESET THE CHILLED WATER SUPPLY TEMPERATURE DOWNWARDS BACK TO THE NORMAL OPERATING TEMPERATURE OF 42 DEG. F (ADJ.) IN 15 MIN. INCREMENTS (ADJ.) ONCE CHILLED WATER SUPPLY TEMPERATURE HAS BEEN RETURNED TO 42 DEG. F (ADJ.), THE CHILLED WATER SYSTEM SHALL RETURN TO NORMAL OPERATION. THE OPERATOR SHALL BE ABLE TO ENABLE / DISABLE THE CHILLED WATER SUPPLY TEMPERATURE RESET SEQUENCE AT ANY TIME.

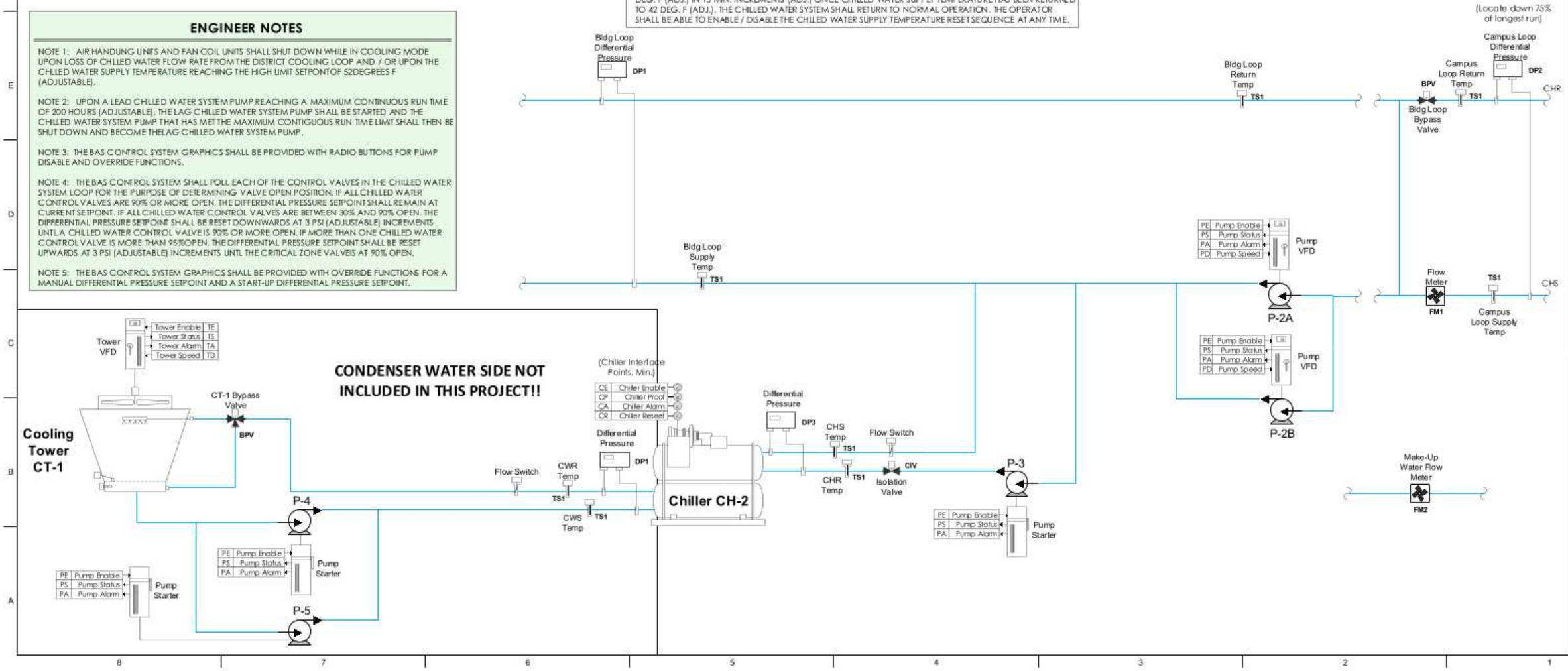
Sequence of Operation (CAMPUS CHILLED WATER SYSTEM)

THE BUILDING SHALL BE SUPPLIED WITH CHILLED WATER BY DEFAULT BY THE CAMPUS CHILLED WATER LOOP. THE BAS SHALL BE CAPABLE OF SWITCHING FROM CAMPUS CHILLED WATER TO THE LOCAL CHILLER, COOLING TOWER REMOTELY. REFER TO LOCAL CHILLED WATER SYSTEM AND CONDENSER WATER SYSTEM SEQUENCE OF OPERATION THIS SHEET.

VARIABLE SPEED PUMPING SEQUENCE OF OPERATION: THE BAS SHALL MONITOR THE WATER DIFFERENTIAL PRESSURE SENSOR(S) FOR THE SYSTEMS SERVED. CHILLED WATER SECONDARY PUMPS P-2A (DUTY) AND P-2B (STANDBY) SHALL BE DUTY ROTATED EVERY2 WEEKS AND ENABLED BY THE BAS CONTROLLER. WHEN ENABLED THE CHILLED WATER SECONDARY PUMP SHALL START AND SHALL RUN CONTINUOUSLY TO MAINTAIN THE BUILDING DEFERENTIAL PRESSURE SETPOINT, WHILE RUNNING. THE CHILLED WATER SECONDARY PUMP VARIABLE FREQUENCY DRIVE SHALL MODULATE PUMP SPEED AS REQUIRED TO MAINTAIN THE BUILDING WATER MINIMUM DIFFERENTIAL PRESSURE SETPONT OF 15 PSI (ADJUSTABLE). IF, FOR ANY REASON, THE CHILLED WATER SECONDARY PUMP FAIS TO START OR THE PUMP STATUS DOES NOT MATCH ITS COMMANDED VALUE, AN ALARM FOR THE FAILED PUMP SHALL BE GENERATED AT THE BAS WORKSTATION, AND THE STANDBY PUMP SHALL BE INITIATED.

THE BUILDING LOOP BYPASS CONTROL VALVE SHALL BE ENABLEDUPON OWNER DEFINED SETPOINTS (ADJUSTABLE) AND / OR OPERATOR COMMAND (PROVIDE RADIO BUTTON IN THE CONTROL GRAPHICS FOR BYPASS MODE ACTIVATION / DEACTIVATION) FROM THE BAS, ONCE ENABLED, THE BUILDING LOOP BYPASS CONTROL VALVE SHALL MODULATE CLOSED ASREQUIRED TO MODULATE THE CAMPUS LOOP CHILLED WATER SUPPLY FLOW OR MAINTAIN THE OWNER DEFINED LEAVING WATER TEMPERATURE SETPOINT OF 55 DEGF (ADJ.). ONCE OWNER DEFINED SETPOINTS HAVE BEEN MET AND / OR BAS OPERATOR COMMAND HAS RESTORED THE BUILDING LOOP BYPASS CONTROL VALVE TO NORMAL OPERATION, THE CAMPUS LOOP CHILLED WATER SYSTEM SHALL BE FULLY UTILIZED TO SERVICE THE BUILDING AIR HANDLING UNITS. THE CHILLED WATER LOOP SUPPLY AND RETURN TEMPERATURES SHALL BE MONITORED AT THE BAS WORKSTATION.

UPON ACTIVATION OF A FREEZE STAT IN ANY AIR HANDLING UNIT SERVING THIS BUILDING, THE BUILDING LOOP BYPASS CONTROL VALVE SHALL BE CLOSED AND PUMP P-2A (DUTY) OR P-2B (STANDBY) SHALL BE ENABLED AND SHALL RUN AT FULL FLOW WITH ALL OF THE AIR HANDLING UNIT CHILLED WATER CONTROL VALVES FULLY OPENED. UPON RESET OF THE ACTIVATED FREEZE STAT, THE SYSTEM SHALL RETURN TO NORMAL OPERATION.



Project name: UCA Snow Fine Arts
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023
Architect:
Engineers: Petfil & Petfil
Mechanical: CSUSA
Drawn by: VWI
Checked by: VWI

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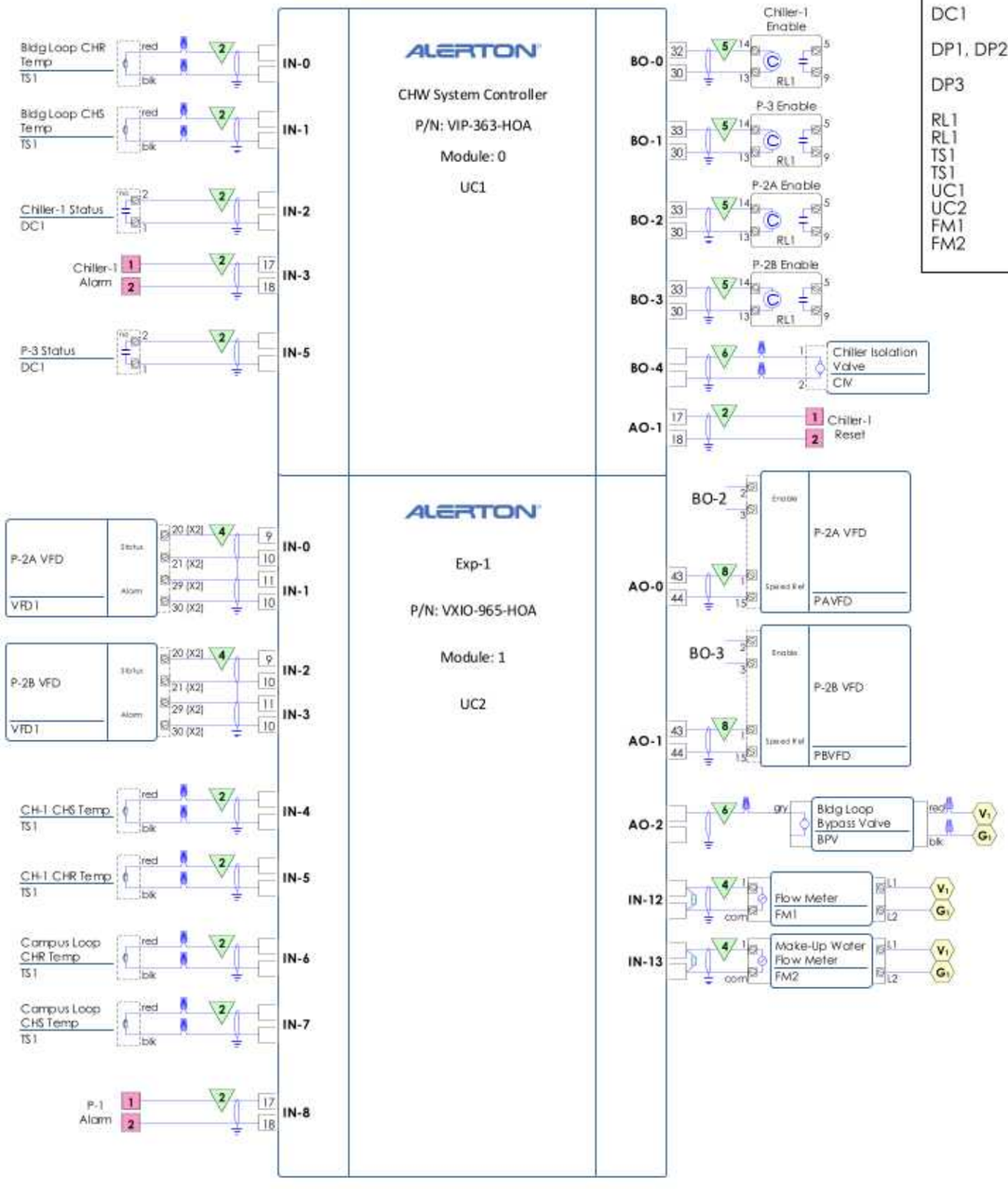
123-13452 submittal.vwi

Chilled Water System Control Wiring Diagram

Typical of 1



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DC1	2	V-H300	Alerton	Micro split-core fixed setpoint digital output current switch, 0.15-200 amp range
DP1, DP2	2	V-PWLX05BP	Alerton	Wet media pressure transducer with LCD display, 0-250psig range, 0-5V/0-10VDC/4-20ma signal, bypass
DP3	1	V-PWLX03S	Alerton	Wet media pressure transducer with LCD display, 0-50psig range, 0-5V/0-10VDC/4-20ma signal
RL1	4	V-VMD2B-F24A	Alerton	Veris VMD2B-F24A; 15A DPDT socket/DIN relay; Full,24VAC
RL1	4	V-VBD2B-C	Alerton	Relay Base DPDT
TS1	6	TS-2104-MH-10-AA	Alerton	10K immersion sensor, 4" probe w/ painted enclosure 1/2 NPT
TS1	6	TS-3104-CI-00-AA	Alerton	SS well for 4" immersion sensor w/ 1/2 NPT threads
UC1	1	VIP-363	Alerton	Field controller, 3 universal inputs, 6 binary outputs, 3 analog inputs/outputs
UC2	2	VXIO-965-HOA	Alerton	Exp module, 9 universal inputs, 6 binary outputs, 5 analog inputs/outputs
FM1	1	TFX-5000	Badger	Ultrasonic flow meter, 24vac, 4-20mA, large pipe
FM2	1	TFX-5000	Badger	Ultrasonic flow meter, 24vac, 4-20mA, small pipe

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Pettit & Pettit
Mechanical: CSUSA

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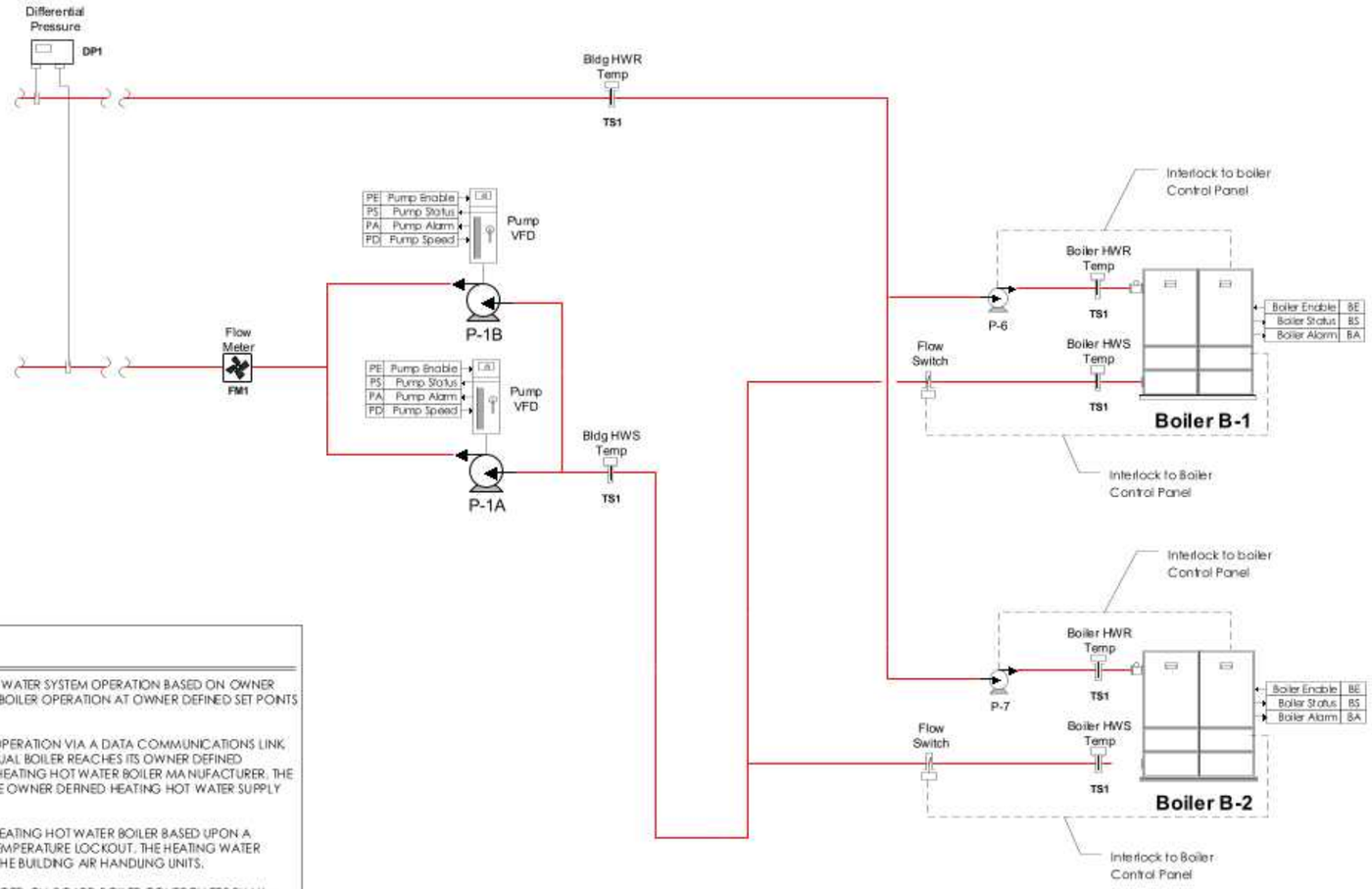
Heating Water System Control Diagram

Typical of 1



ENGINEER NOTES

NOTE 1: AIR HANDLING UNITS AND FAN COIL UNITS SHALL BE FORCED OUT OF DEHUMIDIFICATION MODE UPON LOSS OF HEATING WATER FLOW AND/OR IF THE HEATING WATER SUPPLY TEMPERATURE REACHES THE LOW LIMIT SETPOINT OF 110 DEGREES F (ADJUSTABLE).

NOTE 2: UPON A LEAD HEATING WATER SYSTEM PUMP REACHING A MAXIMUM CONTINUOUS RUN TIME OF 200 HOURS (ADJUSTABLE), THE LAG HEATING WATER SYSTEM PUMP SHALL BE STARTED AND THE HEATING WATER SYSTEM PUMP THAT HAS MET THE MAXIMUM CONTINUOUS RUN TIME LIMIT SHALL THEN BE SHUT DOWN AND BECOME THE LAG HEATING WATER SYSTEM PUMP.

NOTE 3: THE BAS CONTROL SYSTEM GRAPHICS SHALL BE PROVIDED WITH RADIO BUTTONS FOR PUMP DISABLE AND OVERRIDE FUNCTIONS.

NOTE 4: THE BAS CONTROL SYSTEM SHALL POLL EACH OF THE CONTROL VALVES IN THE HEATING WATER SYSTEM LOOP FOR THE PURPOSE OF DETERMINING VALVE OPEN POSITION. IF ALL HEATING WATER CONTROL VALVES ARE 90% OR MORE OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL REMAIN AT CURRENT SETPOINT. IF ALL HEATING WATER CONTROL VALVES ARE BETWEEN 30% AND 90% OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET DOWNWARDS AT 3 PSI (ADJUSTABLE) INCREMENTS UNTIL A HEATING WATER CONTROL VALVE IS 90% OR MORE OPEN. IF MORE THAN ONE HEATING WATER CONTROL VALVE IS MORE THAN 95% OPEN, THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET UPWARDS AT 3 PSI(ADJUSTABLE) INCREMENTS UNTIL THE CRITICAL ZONE VALVE IS AT 90% OPEN.

NOTE 5: THE BAS CONTROL SYSTEM GRAPHICS SHALL BE PROVIDED WITH OVERRIDE FUNCTIONS FOR A MANUAL DIFFERENTIAL PRESSURE SETPOINT AND A START-UP DIFFERENTIAL PRESSURE SETPOINT.

Sequence of Operation

BOILER SEQUENCE OF OPERATION: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL ENABLE THE HEATINGHOT WATER SYSTEM OPERATION BASED ON OWNER DEFINED SET POINTS, AND THE INDIVIDUAL PACKAGED BOILER CONTROLS SHALL ENABLE HEATING HOT WATER BOILER OPERATION AT OWNER DEFINED SET POINTS AND MONITOR HEATING HOT WATER SYSTEM STATUS.

HEATING HOT WATER SYSTEM OVERVIEW: THE BAS SHALL ENABLE / DISABLE THE HEATING HOT WATER SYSTEM OPERATION VIA A DATA COMMUNICATIONS LINK. THE SYSTEM CONTROLLER SHALL ENABLE / DISABLE HEATING HOT WATER PUMP OPERATION. WHEN THE INDIVIDUAL BOILER REACHES ITS OWNER DEFINED SETPOINT AND FLOW IS VERIFIED AT THE HEATING HOT WATER BOILER VIA THE FLOW SWITCH PROVIDED BY THE HEATING HOT WATER BOILER MANUFACTURER, THE HEATING HOT WATER BOILER SHALL ENABLE AND MODULATE OUTPUT CAPACITY AS REQUIRED TO MAINTAIN THE OWNER DERNED HEATING HOT WATER SUPPLY SYSTEM SETPOINT.

HEATING HOT WATER SYSTEM SCHEDULING: THE HEATING HOT WATER SYSTEM CONTROLLER SHALL START THE HEATING HOT WATER BOILER BASED UPON A GRAPHICAL CALENDAR TME OF DAY SCHEDULING APPLICATION WITH THE OPTION TO USE OUTSIDE AMBIENT TEMPERATURE LOCKOUT. THE HEATING WATER PLANT SHALL START IN RESPONSE TO THE OPTNUM START,NIGHT SETBACK, OR TIMED OVERRIDE OPERATION OF THE BUILDING AIR HANDLING UNITS.

HEATING HOT WATER BOILER SEQUENCE OF OPERATION: UPON A CALL FOR HEATING, THE INDIVIDUAL PACKAGED ON-BOARD BOILER CONTROLLERS SHALL ENABLE AND DISABLE HEATING HOT WATER BOLERS AS REQUIRED BY OWNER DEFINED SETPONTS. THE PACKAGED ON-BOARD BOILER CONTROLS SHALL MODULATE FIRING RATE TO MAINTAIN THE SYSTEM LEAVING WATER TEMPERATURE SETPOINT OF 160 DEG. F (ADJ.).

VARIABLE SPEED PUMPING SEQUENCE OF OPERATION: THE BAS SHALL MONITOR THE HEATING HOT WATER DIFFERENTIAL PRESSURE SENSOR. THE HEATING HOT WATER SYSTEM CONTROLLER SHALL CYCLE THE SYSTEM HEATING HOT WATER PUMPS BETWEEN PRIMARY / STANDBY POSITIONS WEEKLY TO ENSURE EQUAL PUMP RUN TIME (OWNER SHALL BE ABLE TO OVERRIDE PUMP SEQUENCING). THE PRIMARY HEATING HOT WATER PUMP SHALL BE ENABLED BY THE HEATING HOT WATER SYSTEM CONTROLLER. WHEN ENABLED, THE PRIMARY HEATING HOT WATER PUMP SHALL START AND SHALL RUN CONTINUOUSLY. WHILE RUNNING, THE PRIMARY HEATING HOT WATER PUMP VARIABLE FREQUENCY DRIVE SHALL MODULATE PUMP SPEED AS REQUIRED TO MAINTAIN THE HEATING HOT WATER MINIMUM DFFERENTIAL PRESSURE SETPOINT OF 15 PSI(ADJ.). IF, FOR ANY REASON, THE PRIMARY HEATING HOT WATER PUMP FAILS TO START OR THE PUMP STATUS DOES NOT MATCH ITS COMMANDED VALUE, THE STANDBY HEATING HOT WATER PUMP SHALL BE STARTED AUTOMATICALLY AND AN ALARM FOR THE FAILED PUMP SHALL BE GENERATED AT THE BAS WORKSTATION.

FREEZE PROTECTION SEQUENCE OF OPERATION: UPON ACTIVATION OF A FREEZE STATIN ANY AIR HANDLING UNIT SERVING THIS BUILDING, THE PRIMARY PUMP SHALL BE ENABLED AND SHALL RUN AT FULL FLOW WITH ALL OF THE AIR HANDLING UNIT AND VAV TERMINAL BOX HEATING WATER CONTROL VALVES FULLY OPENED. UPON RESET OF THE ACTIVATED FREEZE STAT, THE SYSTEM SHALL RETURN TO NORMAL OPERATION.

Outdoor Dry Bulb and Outdoor wet bulb can be determined with the global outside temperature and outside humidity sensors via programming.

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI

Phase: Submittal
Creation Date: 10/27/2023
Revision Date: 10/27/2023

Project name: UCA Snow Fine Arts
Architect:
Engineers: Pettit & Pettit
Mechanical: CSUSA

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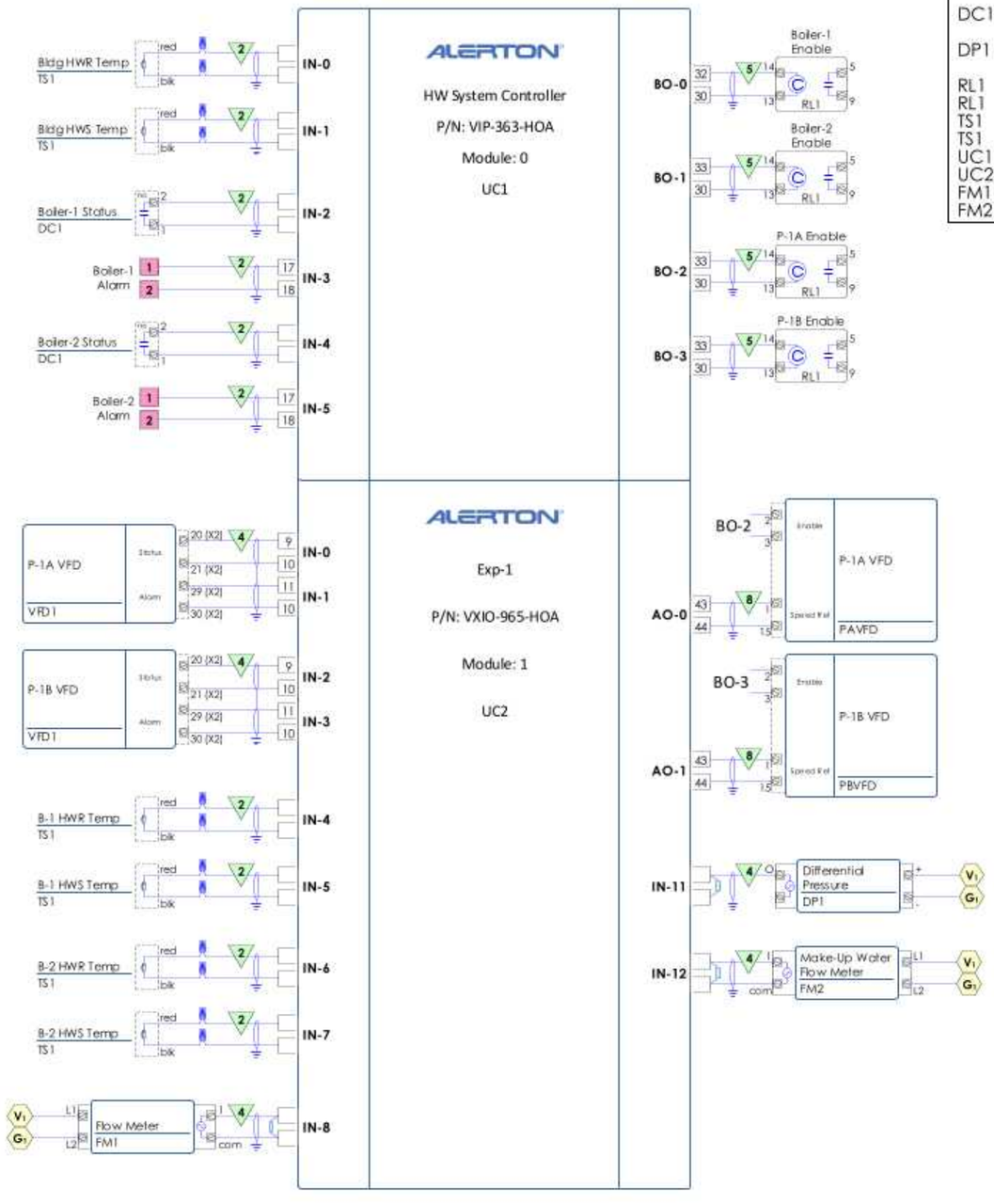
Heating Water System Control Wiring Diagram

Typical of 1



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DC1	2	V-H300	Alerton	Micro split-core fixed setpoint digital output current switch, 0.15-200 amp range
DP1	1	V-PWLX05BP	Alerton	Wet media pressure transducer with LCD display, 0-250psig range, 0-5V/0-10VDC/4-20ma signal, bypass
RL1	4	V-VMD2B-F24A	Alerton	Veris VMD2B-F24A; 15A DPDT socket/DIN relay; Full,24VAC
RL1	4	V-VBD2B-C	Alerton	Relay Base DPDT
TS1	6	TS-2104-MH-10-AA	Alerton	10K immersion sensor, 4" probe w/ painted enclosure 1/2 NPT
TS1	6	TS-3104-CI-00-AA	Alerton	SS well for 4" immersion sensor w/ 1/2 NPT threads
UC1	1	VIP-363	Alerton	Field controller, 3 universal inputs, 6 binary outputs, 3 analog inputs/outputs
UC2	1	VXIO-965-HOA	Alerton	Exp module, 9 universal inputs, 6 binary outputs, 5 analog inputs/outputs
FM1	1	TFX-5000	Badger	Ultrasonic flow meter, 24vac, 4-20mA, large pipe
FM2	1	TFX-5000	Badger	Ultrasonic flow meter, 24vac, 4-20mA, small pipe

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
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Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfil & Petfil
Mechanical: CSUSA

Phase: Submittal
Creation Date: 10/27/2023
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L23-13452 submittal.vwd

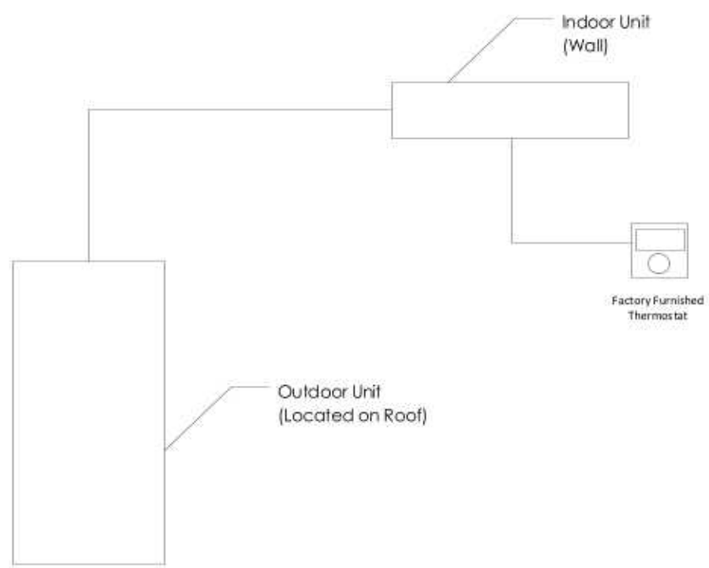
Mini-Split System Control Wiring Diagram (DSFC-1/DSCU-1)

Typical of 1

NWC Scope of Work

All interlock wiring for Mini-Split System equipment to be furnished and installed by NWC.

All control components for Mini-Split Systems to be furnished and factory installed by equipment manufacturer.



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Project name: UCA Snow Fine Arts
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Engineers: Petit & Petit
Mechanical: CSUSA

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Valve Schedule

Typical of 1

VALVE TAG	QUANT	MFR	PRODUCT NUMBER	SIZE	CONFIG.	BODY STYLE	FLOW (GPM)	DESIGN PRESS. DROP (PSI)	CALCULATED Cv	CHOSEN Cv	PRESSURE DROP AT DESIGN FLOW
RTU-1 CWV	1	BELIMO	B252+AFRX24-MFT	2"	2-W MOD.	BALL	127	4	63.50	85	2.23
RTU-1 HWV	1	BELIMO	B231+AFRX24-MFT	1-1/4"	2-W MOD.	BALL	50	4	25.00	25	4.00
RTU-2 CWV	1	BELIMO	B252+AFRX24-MFT	2"	2-W MOD.	BALL	127	4	63.50	85	2.23
RTU-2 HWV	1	BELIMO	B231+AFRX24-MFT	1-1/4"	2-W MOD.	BALL	50	4	25.00	25	4.00
AH-6 CWV	1	BELIMO	B250+AFRX24-MFT	2"	2-W MOD.	BALL	111	4	55.50	57	3.79
AH-6 PHV	1	BELIMO	B231+AFRX24-MFT	1-1/4"	2-W MOD.	BALL	38	4	19.00	25	2.31
AH-6 RHV	1	BELIMO	B231+AFRX24-MFT	1-1/4"	2-W MOD.	BALL	39	4	19.50	25	2.43
FC-01 CWV	1	BELIMO	B210+TFRB24-SR	1/2"	2-W MOD.	BALL	2.5	4	1.25	1.2	4.34
FC-01 HWV	1	BELIMO	B208+TFRB24-SR	1/2"	2-W MOD.	BALL	0.75	4	0.38	0.46	2.66
FC-02 CWV	1	BELIMO	B211+TFRB24-SR	1/2"	2-W MOD.	BALL	3	4	1.50	1.9	2.49
FC-02 HWV	1	BELIMO	B208+TFRB24-SR	1/2"	2-W MOD.	BALL	1	4	0.50	0.46	4.73
ST1-01,ST1-07,ST2-01	3	BELIMO	B309+LRB24-SR	1/2"	3-W MOD.	BALL	1.25	4	0.63	0.8	2.44
SR1-14,ST2-09,ST2-15	3	BELIMO	B308+LRB24-SR	1/2"	3-W MOD.	BALL	1	4	0.50	0.46	4.73
ST1-02,ST1-03,ST1-04, ST2-03,ST2-04,ST2-05	6	BELIMO	B207+LRB24-SR	1/2"	2-W MOD.	BALL	0.25	4	0.13	0.3	0.69
ST1-05, ST1-08	2	BELIMO	B209-LRB24-SR	1/2"	2-W MOD.	BALL	1.25	4	0.63	0.8	2.44
ST1-06, ST2-12, ST2-16, ST2-20	4	BELIMO	B209-LRB24-SR	1/2"	2-W MOD.	BALL	1.5	4	0.75	0.8	3.52
ST1-09,ST1-10,ST1-12	3	BELIMO	B207+LRB24-SR	1/2"	2-W MOD.	BALL	0.5	4	0.25	0.3	2.78
ST1-11,ST1-15,ST1-18	3	BELIMO	B208+LRB24-SR	1/2"	2-W MOD.	BALL	1	4	0.50	0.46	4.73
ALL OTHERS	16	BELIMO	B208+LRB24-SR	1/2"	2-W MOD.	BALL	0.75	4	0.38	0.46	2.66
ST2-13	1	BELIMO	B209-LRB24-SR	1/2"	2-W MOD.	BALL	1.75	4	0.88	0.8	4.79
CHW BLDG BYPASS	1	BRAY	3LNE-06S2C/70-24-0081SVH	6"	2-W MOD.	BUTTERFLY		4	0.00	16	0.00
CHILLER ISO VALVE	1	BRAY	3LNE-06S2C/70-24-0081H	6"	2-W/2-POS.	BUTTERFLY		4	0.00	16	0.00
TOWER BYPASS	1		REUSE EXISTING	8"	3-W MOD.	BUTTERFLY					

ALL VALVES TO BE N.C. PER M-5.1 ADDENDUM.

Project number: L23-13452
Application Engineer: VWI
Drawn by: VWI
Checked by: VWI
Phase: Submittal
Creation Date: 10/27/2023
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Project name: UCA Snow Fine Arts
Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

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GENERAL WIRING NOTES

All controller inputs, outputs and communications trunks must be run separate from any circuits containing voltages greater than30vac.
Do not run signal or communication wires near high voltage sources such as ballasts, transformers or transmitters.
Wires in conduit must not be nicked, stretched or compromised in any way. Use pulling force of less than 50 lbs.
Wires attached to building structures must be suspended in a way that does cause undue stress on the wire. Do not use any securing method that compresses the wire beyond the outside jacket.

All inputs and analog outputs require shielded wire. Use single-point grounding point in each cabinet or controller location Do not ground any shield to the GRN or COM terminals of modules.

Additional general installation information can be found in the following Alerton manuals:

LTBT-TM-SYSDSGN	System design Manual	LTBT-TM-VLX	VLX Installation Manual
LTBT-TM-GEN4VLC	VLC installation manual	LTBT-TM-NETWRK	Network Design and Installation Manual

CONTROLS WIRING SCHEDULE

SYMBOL	DESCRIPTION	PART NUMBER	INSTALLATION NOTES
1	BACtalk thermostats	Connect Air P/N W233C-2560 White jacket, 3 #18 conductor w/shield, plenum rated	Max distance for a BACtalk Microset or Microtouch is 250 feet. Maximum distance for Microset II is 1000ft.
2	Thermistor/resistor inputs	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Maximum distance is 1000 feet.
3	2 wire inputs 4-20ma, 0-5volts, 0-10volts	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Most 4-20ma inputs require input resistors. Consult module page for verification. Do not power controller or attach sensor until verified! Input 0 of the VLC series of controllers require a 470 ohm resister in series with any dry contact.
4	3 or 4 wire inputs 4-20ma, 0-5 volts or 0-10 volts	3-wire use Connect Air P/N W233C-2560 White jacket, 3 #18 conductor w/shield, plenum rated 4-wire use Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated. Run 2 cables, one for signal and 1 for power.	Most 4-20ma inputs require input resistors. Consult module page for verification. Do not power controller or attach sensor until verified.
5	Binary outputs	Use #18 conductors within the mounting cabinet or when the distance to the output load is less than 50 feet (W181P-2540 wire is acceptable). For longer distances consult engineering department.	Return BO loads to transformer ground - not to the controller terminal. Exception are when switching ground based outputs or when the controller load is a pilot relay within 50 feet. Shielded wire can be substituted (of appropriate rating) when in an extremely noisy environment. Connect shield to panel/earth ground at controller end only.
6 7	Analog outputs	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Maximum distance is 1000 feet.
21 22	Unitary controller power	Match power source conductor size to controller or distribution terminals. Always use #18 conductor or larger to controller terminals.	None
31	MS/TP Communications	Connect Air P/N W221P-2544 Raspberry jacket, 2 #22 conductors w/shield, low capacitance, plenum rated.	Maximum segment length (end-to-end) 4000 ft. All devices must be wired in a BUS or daisy-chained wiring arrangement (including global controllers) with termination resistors at each end of the bus. Ground shield drain wire at single point earth (panel) ground --*not VLC ground*. Tape off shield drain wire at other end. Tie shield drain wire through at each VLC. DO NOT GROUND SHIELD AT MULTIPLE LOCATIONS! The preferred location for grounding is in the physical center of the bus. MS/TP repeaters may be required to extend distance. Consult engineering department before using.
41	Ethernet (IEEE 8802.3) Cat 5 Wiring preferred	Connect Air P/N W244P-2030 or W244P-1026 or equivalent.	Maximum segment length is 328 ft. Multiple units require Ethernet hub or switch. See system architecture page for details. End terminations must follow the TIA/EIA-568-A pinout using color code option #1.

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Architect:
Engineers: Petfit & Petfit
Mechanical: CSUSA

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