



PROJECT: Kelly Walsh High School
CONTRACT: 4216-0030

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Creating a better climate for business.

- Environmental Control System
- Facility Management System
- Air and Water System Balancing
- Fire Management System
- Security System
- Lighting Services
- Instrumentation System Installation
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- Planned Service Agreements

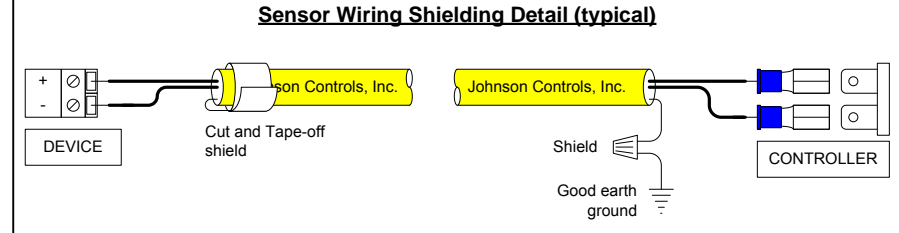
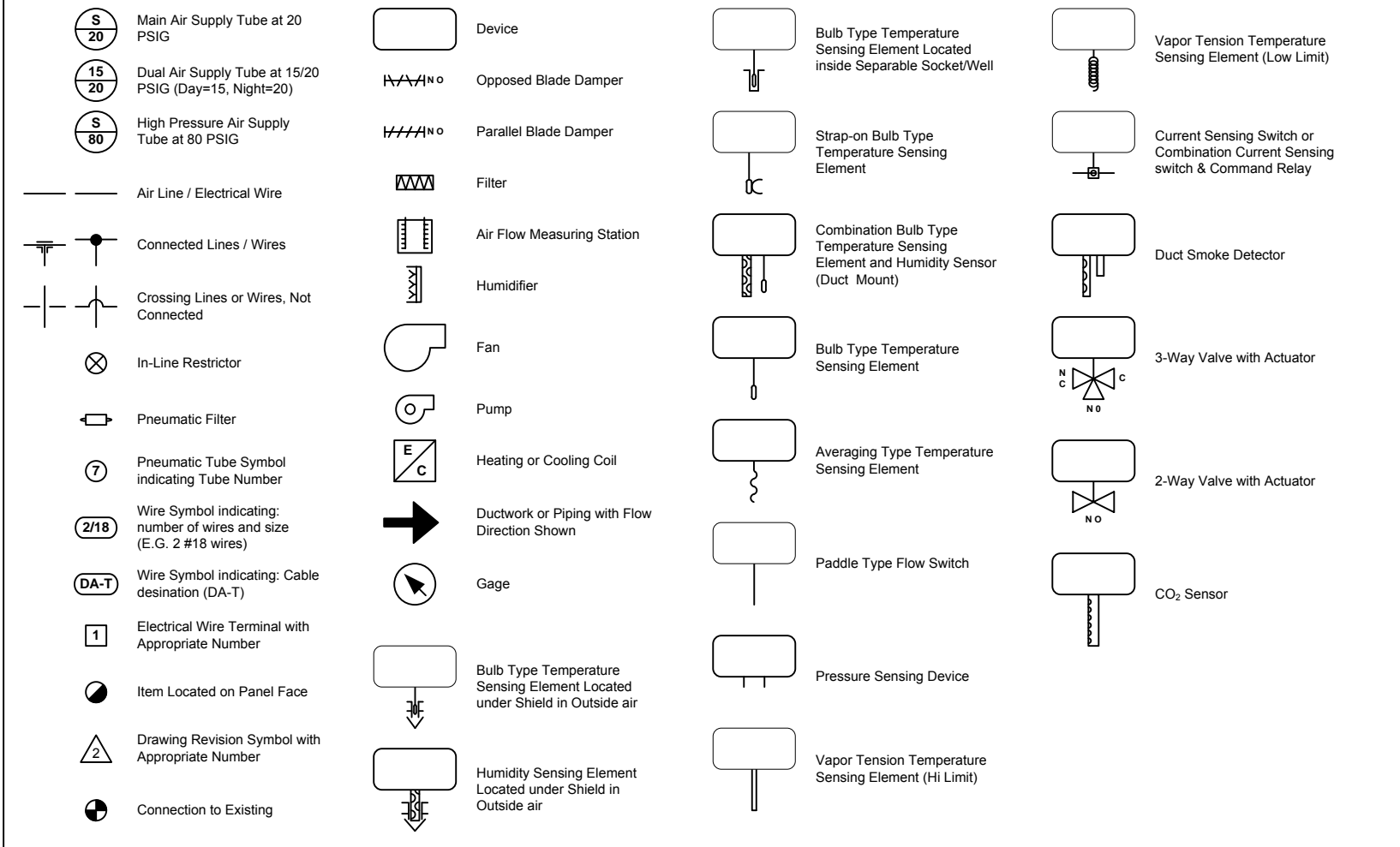
Air Conditioning
 Heating
 Diagnostic Services
 Coil Cleaning
 Refrigeration
 Automatic Temperature Controls
 Facility Management Systems
 Fire Management
 Security Management
 Building Operations and Management
 Water Treatment
 Electrical Equipment
 Emergency Generator / Lighting Equipment
 Industrial Controls / Recording / Indication Equipment

PROJECT TITLE Kelly Walsh High School					
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O&M	3			09/04/15	
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
Johnson Controls			Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		
SALES ENGINEER Travis Gunderson	PROJECT MANAGER Wayne Ramich	APPLICATION ENGINEER Chris Odell	DATE 9/4/15	CONTRACT NUMBER 4216-0030	

ABBREVIATIONS

A	Alarm	GA	Gage	PRV	Pressure Reducing Valve
AC	Air Conditioning	GAL	Gallon	PRV	Power Roof Ventilator
AD	Air Dryer	GD	Guard	PSI	Pounds per Square Inch
ADJ	Adjust	GL	Globe	PSIG	PSI Gage
AFF	Above Finished Floor	GLR	Glycol Return	R	Relay
AHU	Air Handling Unit	GLS	Glycol Supply	RA	Return Air
ALM	Alarm	GPM	Gallons per Minute	RAD	Radiation
ALT	Alternate	GND	Ground	RC	Recool
AMP	Ampere	H	Humidity	REV	Reverse Acting
ASP	Aspirating	H/C	Heating Coil	RF	Return Fan
AUTH	Authority	HC	Humidity	RH	Reheat, Relative Humidity
AUTO	Automatic	HD	Hot Deck	RM	Room
AUX	Auxiliary	HUM	Humidity, Humidifier	RPM	Revolutions per Minute
AVG	Average / Averaging	HL	High Limit	S	Status
BLDG	Building	HOA	Hand-Off-Auto	SA	Supply Air
BLR	Boiler	HP	High Pressure, Heat Pump	SCFM	Standard Cubic Feet per Minute
BTU	British Thermal Unit	HTG	Heating	SCR	Silicon Controlled Rectifier
C	Command / Control, Celsius	HTR	Heater	SET	Setpoint
CC	Cooling Coil	HWP	Hot Water Pump	SF	Supply Fan
CAP	Capillary	HWR	Hot Water Return	SP	Static Pressure
CB	Circuit Breaker	HWS	Hot Water Supply	SPEC	Specification
CD	Cold Deck	HX	Heat Exchanger	SS	Stainless Steel
CFM	Cubic Feet per Minute	Hz	Hertz	STD	Standard
CHLR	Chiller	I	Input	STM	Steam
CHP	Chilled Water Pump	I.D.	Inside Diameter	SUM	Summer
CHW	Chilled Water	IGV	Inlet Guide Vane	SW	Switch
CHWR	Chilled Water Return	"wc	Inches of Water Column	SYS	System
CHWS	Chilled Water Supply	JB	Junction Box	T	Temperature
CIRC	Circulating	JCI	Johnson Controls, Inc.	TC	Temperature Controller
CKT	Circuit	KW	Kilowatt	TDR	Time Delay Relay
CL	Close	KO	Knockout	TE	Temperature Element
CLG	Cooling	LB	Pound	UH	Unit Heater
COM	Common	LL	Low Limit	UL	Underwriters Laboratories
COMPR	Compressor	LPS	Low Pressure Steam	UN	Union
CON	Contact	LT	Low Temperature	UNOCC	Unoccupied
COND	Condenser	MA	Mixed Air	UV	Unit Ventilator
CONV	Convactor, Converter	mA	Milliamp	V	Volt
CT	Cooling Tower	MAN	Manual	VA	Volt Amperes
CUH	Cabinet Unit Heater	MAU	Make-up Air Unit	VAC	Volts Alternating Current
Cv	Flow Coefficient	MAX	Maximum	VAV	Variable Air Volume
CWP	Condenser Water Pump	MBH	1000BTU per Hour	VDC	Volts Direct Current
CWR	Condenser Water Return	MCC	Motor Control Center	VEL	Velocity
CWS	Condenser Water Supply	M.C.	Mechanical Contractor	VSD	Variable Speed Drive
D/N	Day / Night	MECH	Mechanical	VOL	Volume
DA	Discharge Air	MFR	Manufacturer	VP	Velocity Pressure
DB	Dry Bulb	MIN	Minimum	w/	With
DP	Differential Pressure	MT	Mass Temperature	WC	Warmer / Cooler
DHW	Domestic Hot Water	MZ	Multi-Zone	w/o	Without
DIR	Direct Acting	NC	Normally Closed	WB	Wet Bulb
DPR	Damper	NEG	Negative	WG	Water Gage
DWG	Drawing	NO	Normally Open	WIN	Winter
DX	Direct Expansion	NPT	National Pipe Thread	XFR	Transformer
E	Enable, Enthalpy	O	Output	ZN	Zone
EA	Exhaust Air	O.D.	Outside Diameter	%OPN	Percent Open
E.C.	Electrical Contractor	OA	Outside Air	%CLS	Percent Closed
EDH	Electric Duct Heater	OCC	Occupied	%CMD	Percent Command
EF	Exhaust Fan	OL	Overload		
EN	Enclosure	OP	Open		
ENG	Engineer	OSHA	Occupational Safety & Health Act		
EP	Electro-Pneumatic	OWS	Operator Workstation		
EVAP	Evaporator	P	Pilot, Pump		
F	Fahrenheit, Flow	PDC	Push Down to Close		
F&B	Face & Bypass	PDO	Push Down to Open		
FCU	Fan Coil Unit	PE	Pressure Electric		
FF	Flame Fail	PH	Preheat		
FLG	Flange	PL	Pilot Light		
FLTR	Filter	PNEU	Pneumatic		
FPM	Feet per Minute	PS	Pressure Sensor		
FTG	Fitting	PPM	Parts per Million		
F.W.E.	Furnished With Equipment	PROP	Proportional		

LEGEND



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	Project Title	Kelly Walsh High School					
			Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030		DRAWING NUMBER L-1

Filename: jclgd2.vsd
Last Modified: 4/24/15 at 2:10 PM

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	APPROVED

Category	Rules / Maximums Allowed
General	Typically daisy-chained; branch or star configuration acceptable when repeaters are used. See End of Line Switching and Repeater Guideline graphic.
Number of Devices	<p>When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the device and bus segment limits are: 100 devices total per FC Bus (maximum) 3 bus segments per FC Bus (maximum) 50 devices per bus segment (maximum, not to exceed 100 devices per FC Bus)</p> <p>When one or more TEC26xx Series thermostat or third-party MS/TP device is connected on the FC Bus, the device and bus segment limits are: 64 devices total per FC Bus (maximum) 3 bus segments per FC Bus (maximum) 32 devices per bus segment (maximum, not to exceed 64 devices per FC Bus)</p> <p>Note: Metasys MS/TP devices generate less data traffic than third-party MS/TP devices and TEC26xx thermostats. Connecting third-party devices or TEC26xx thermostats to the FC Bus increases data traffic, reduces bus performance, and reduces the number of devices that can be connected to the bus. Bus segments on an FC Bus are connected with repeaters (only). Up to two cascaded repeaters may be applied to an FC Bus (to connect three bus segments).</p>
Line Length and Type	<p>When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the cable length limits are: Each bus segment can be up to 1520 m (5000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). Each FC Bus can be up to 4750 m (15,000 ft) in length (using 22 AWG 3-wire twisted, shielded cable).</p> <p>When one or more TEC26xx Series thermostat or third-party MS/TP device is connected on the FC Bus, the device and bus segment limits are: Each bus segment can be up to 1220 m (4000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). Each FC Bus can be up to 3660 m (12,000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). When using fiber-optic connections: 2,010 m (6,600 ft.) between two fiber modems 22 AWG Stranded, 3-Wire Twisted, Shielded Cable</p>
Cable	22 AWG stranded, 3-wire, twisted shielded cable

EOL Termination
 End-of-Line (EOL) termination is required on the FC Bus to reduce signal reflection when data transmissions reach the end of a bus segment and bounce back. EOL termination is built into some Metasys FC devices and is enabled with a switch or jumper on the device.

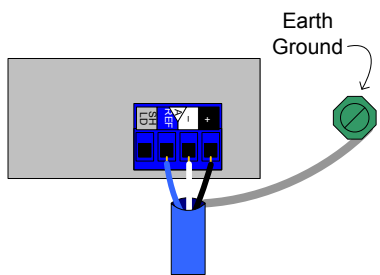
EOL Termination on NAEs
 An EOL switch on an NAE enables EOL termination. For those NAEs with two FC Bus connections, two EOL double-pole switches are provided. Set the EOL switch to the ON (up) position to set the controller as an EOL termination device.

EOL Termination on Switch-Terminating Devices
 Some field controllers have an EOL switch or jumper. Such devices include FECs, IOMs, VMAs, ZFR1810s, and repeaters. Set the EOL termination to On for any of these devices when it is the last device on a bus segment.

EOL Termination on Devices Without EOL Provision
 For the devices such as TECs and third-party controllers in which no EOL provision is provided, install the MS-BACEOL-0 RS485 End-of-Line Terminator at the device if at the end of the bus segment.

EOL Termination Across the FC Bus
 The FC Bus may consist of up to three bus segments. Each bus segment on an FC Bus requires two EOL termination devices, one at each end of the bus segment. All other devices on the FC Bus should have their EOL termination disabled (EOL switches Off). If only one device on an FC segment has an EOL termination, it must be set to On.

EOL on FC Bus Repeater
 When using repeaters in the FC Bus, set the EOL jumpers based on the position of the repeater in the run.



SHIELD GROUNDING

The shield should be earth grounded at one and only one point for the entire bus segment. (Preferably in the NAE Panel.) The shield screws on the controllers are simply a convenient way to continue the daisy chain of the bus. They are not attached to earth ground. You can use the shield terminal or twist together the shield and tape back at each controller.

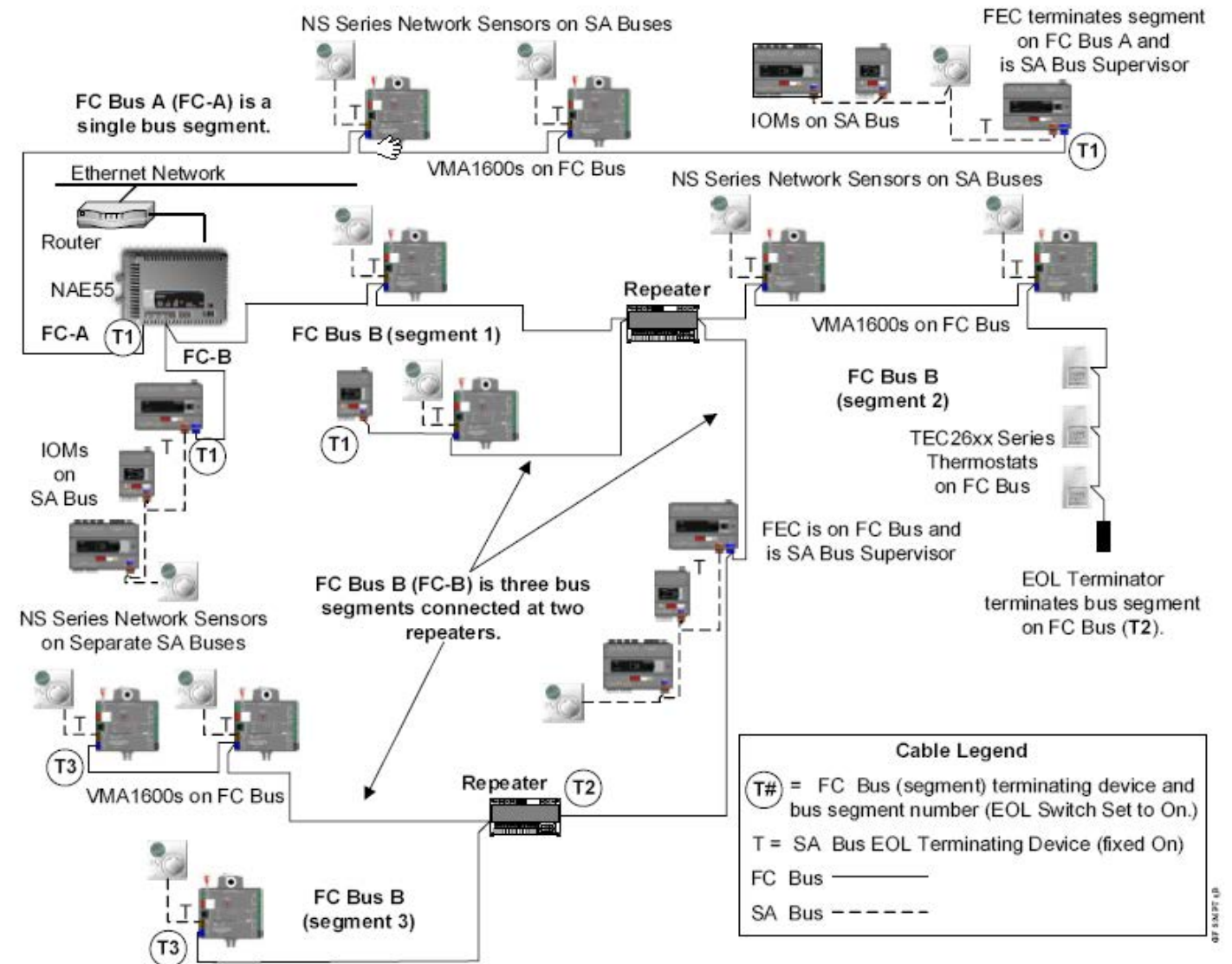
RECOMMENDED MSTP FIELD CONTROLLER BUS CABLE					
Type	Typical Usage	Anixter #	Belden #	pF/ft	Area
22/3c Shielded Plenum	Open Plenum Installations. 38400+ Baud RS-485 Communication.	CBL-22/3-FC-PLN	6501FE	25	0.014
22/3c Shielded PVC	EMT (Raceway) Installations. 38400+ Baud RS-485 Communication.	CBL-22/3-FC-PVC	5501FE	31	0.015

RECOMMENDED MSTP SENSOR ACTUATOR BUS CABLE					
Type	Typical Usage	Anixter #	Belden #	pF/ft	Area
22/2pr Shielded Plenum	Open Plenum Installations. 38400+ Baud RS-485 Communication.	CBL-22/2P-SA-PLN	6541FE	33	0.033
22/2pr Shielded PVC	EMT (Raceway) Installations. 38400+ Baud RS-485 Communication.	CBL-22/2P-SA-PVC	5541FE	31	0.034

METASYS MSTP NETWORK INSTALLATION DETAILS

The information in this document is not intended to replace the published Technical Product Literature for the Johnson Controls systems and products presented. The Installation Instructions that are packed with products, and the Technical Bulletins and Product Bulletins released with Johnson Controls systems and products supersede the information on this page. It is the responsibility of the product installer and product user to obtain and follow the product installation, operation, and safety procedures provided with the products or project specific information required by specification or local codes.

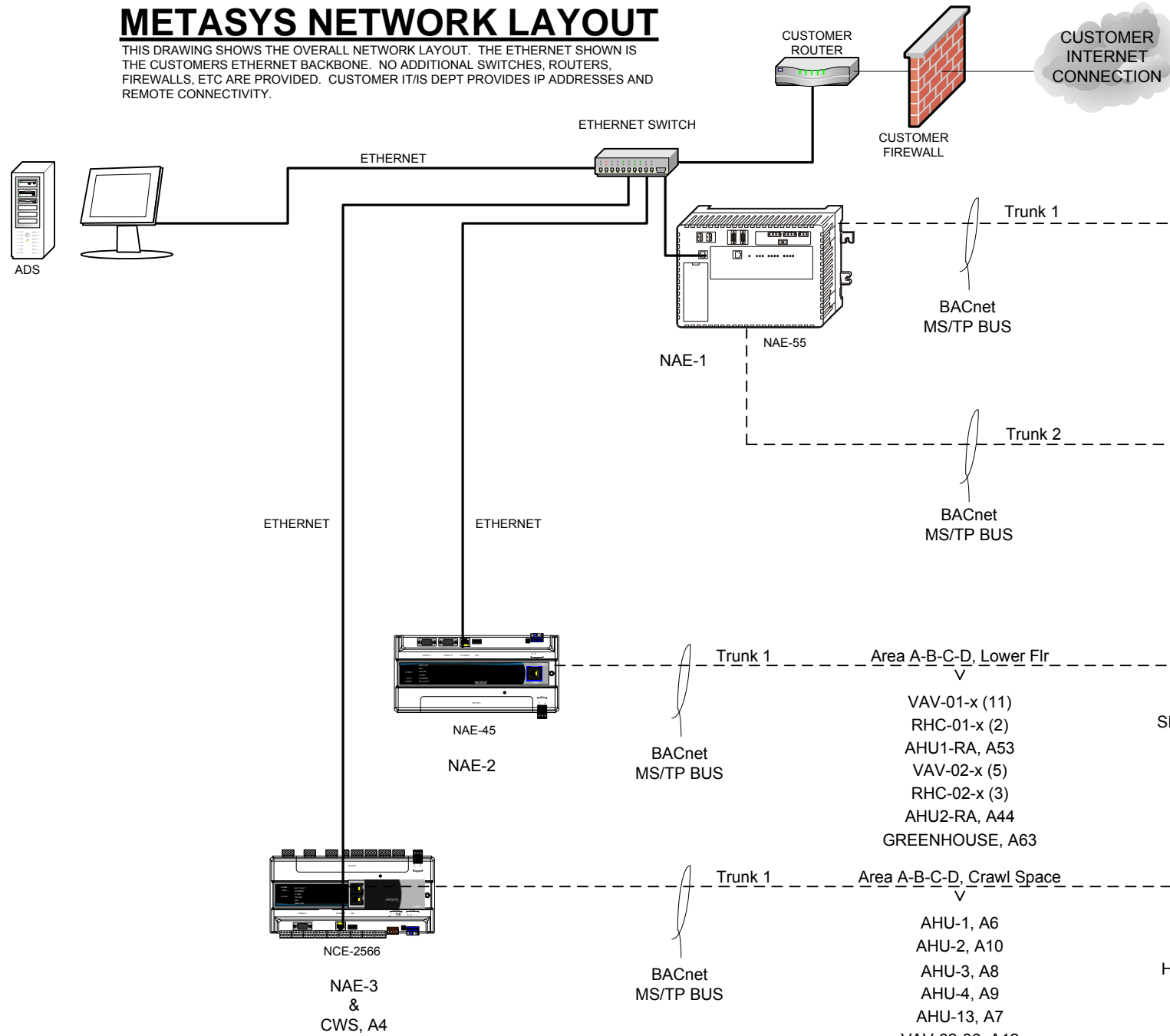
END OF THE LINE SWITCHING AND REPEATER GUIDELINES



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METASYS NETWORK LAYOUT

THIS DRAWING SHOWS THE OVERALL NETWORK LAYOUT. THE ETHERNET SHOWN IS THE CUSTOMERS ETHERNET BACKBONE. NO ADDITIONAL SWITCHES, ROUTERS, FIREWALLS, ETC ARE PROVIDED. CUSTOMER IT/S DEPT PROVIDES IP ADDRESSES AND REMOTE CONNECTIVITY.



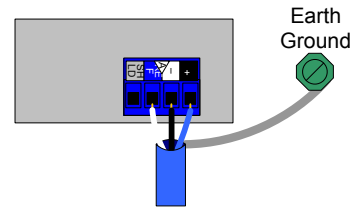
BILL OF MATERIALS

Designation	Qty	Part Number	Description
ADS	1	ADS05USRPC	ADS WORKSTATION PC TURNKEY
NAE-1	1	PAG100001AC0	PANEL, NAE5510-2, 20X24
NAE-2	1	PAGE00001FC0	PANEL NAE4510 16X20
NAE-3			SEE CWS FLOW LAYOUT

Trunk	Area	Equipment	EOL
Trunk 1 (NAE-1)	Area G, Main Flr	VAV-05-x (22) VAV-07-x (21) RELF-5, A78	
	Area G, Upper Flr	VAV-08-x (28) VAV-07-x (4) RELF-7, A79 RELF-8, A80	
	Area H, Upper Flr	VAV-09-x (2) RELF-9, A85	EOL
Trunk 2 (NAE-1)	Area H, Main Flr	VAV-10-x (29) VAV-09-01, A25 FH-H235, A67	
	Area H, Upper Flr	VAV-11-x (28) RELF-10, A64 RELF-11, A65 FH-H335, A42	
	Area G, Main Flr	FH-G252 (68) FH-G253 (69) FH-G254 (70)	EOL
Trunk 1 (NAE-2)	Area A-B-C-D, Lower Flr	VAV-01-x (11) RHC-01-x (2) AHU1-RA, A53 VAV-02-x (5) RHC-02-x (3) AHU2-RA, A44 GREENHOUSE, A63	
	Area E, Lower Flr	VAV-12-x (5) SHX-3 (Crawl Space), A33	
	Area E, Main Flr	VAV-12-x (7) RHC-12-x (2) AHU-12 (Roof), A26	
	Area F, Main Flr	VAV-06-x (17) Kitchen Hoods, 3 rd party, A18 RELF-6, A62	EOL
Trunk 1 (NAE-3)	Area A-B-C-D, Crawl Space	AHU-1, A6 AHU-2, A10 AHU-3, A8 AHU-4, A9 AHU-13, A7 VAV-02-06, A12 SHX-2, A13 SHX-5, A5 SHX-6, A11	
	Area F, Lower Flr	AHU-6, A17 HWS, A15 HWS PROTONODE, A16 VAV-06-18, A14 SHX-1, A18 HW-PMP, A27	
	Area G, Lower Flr	AHU-5, A20 AHU-7, A19 AHU-8, A21	
	Area H, Lower Flr	AHU-9, A23 AHU-10, A25 AHU-11, A24 RHC-09-01, A22 SHX-4, A26	EOL

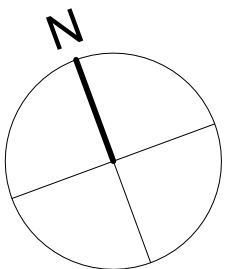
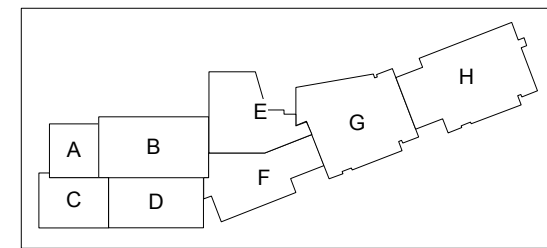
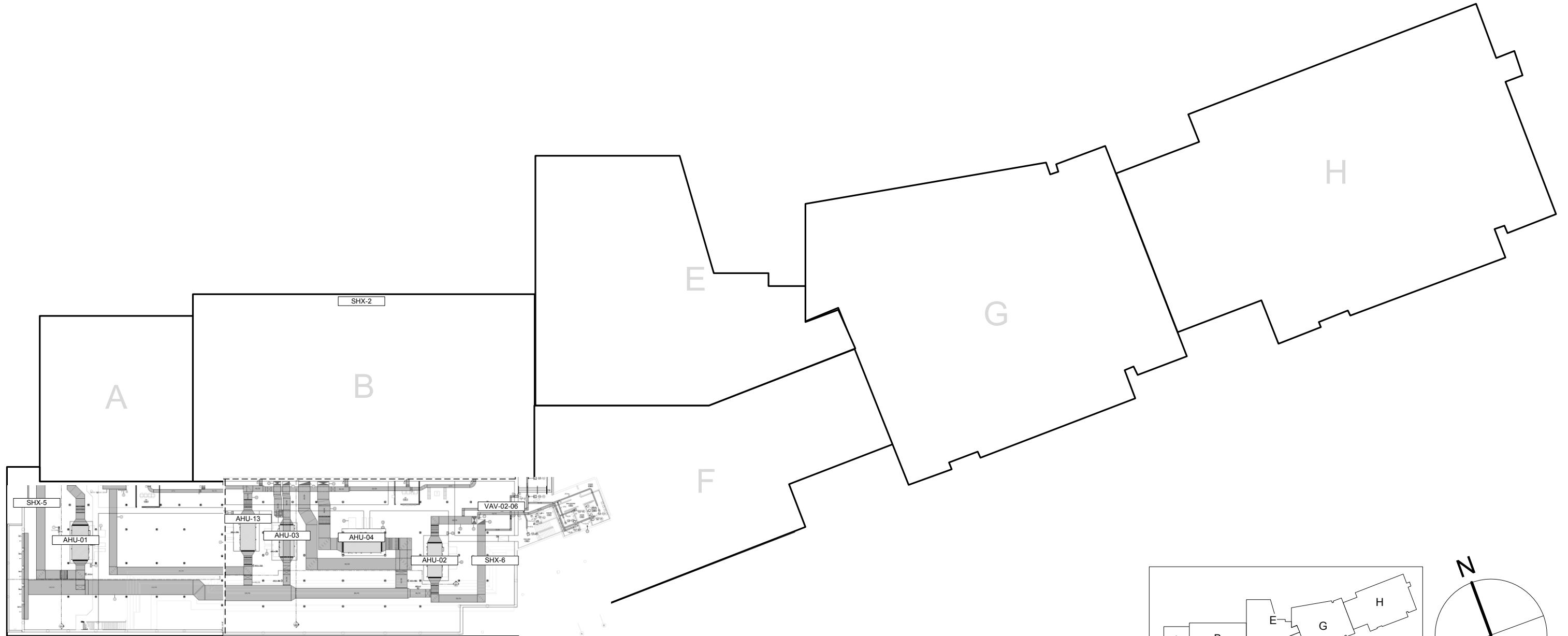
NAE55, MSTP trunk, 100 Metasys Devices, 64 Metasys-3rd Party Devices
 NAE45, MSTP trunk, 100 Metasys Devices, 64 Metasys-3rd Party Devices
 NAE35, MSTP trunk, 50 Metasys Devices, 32 Metasys-3rd Party Devices
 NCE25, MSTP trunk, 32 Metasys Devices, 32 Metasys-3rd Party Devices

SEE ROOM SCHEDULE FOR ADDRESS AND LOCATION INFORMATION OF VAVs



If a shield is used, it should be earth grounded at one and only one point for the entire bus segment. (Preferably in the NAE Panel.) The shield screws on the controllers are simply a convenient way to continue the daisy chain of the bus. They are not attached to earth ground.

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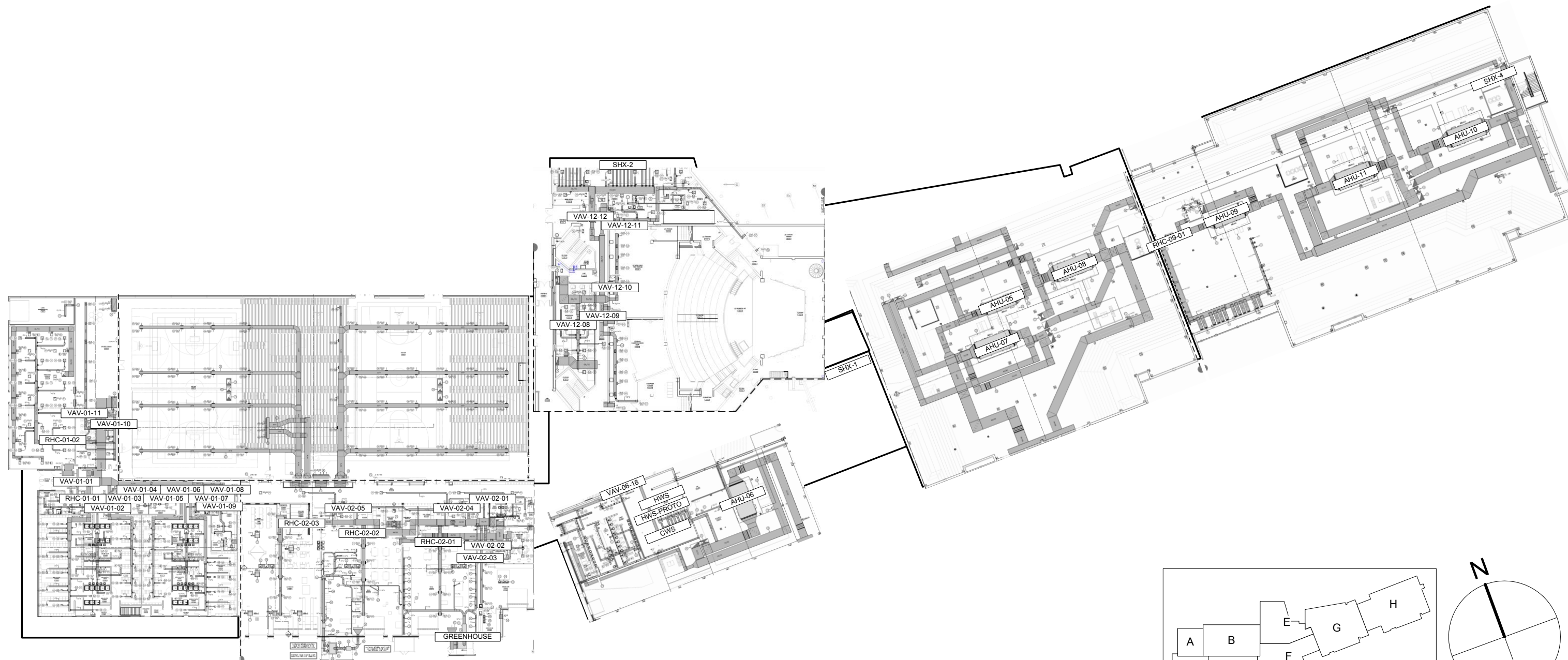
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Drawing Title
**NET Network Riser Basement
 Basement & Crawlspace**

Project Title
Kelly Walsh High School

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Sales Engineer	Project Manager	Application Engineer		DRAWN		APPROVED		
T Gunderson	Wayne Ramich	Chris Odell		BY	DATE	BY	DATE	
Branch Information						CONTRACT NUMBER		
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						DRAWING NUMBER		
						NR-2		




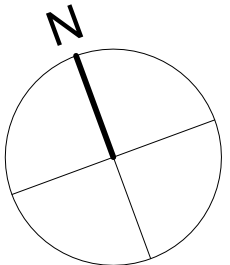
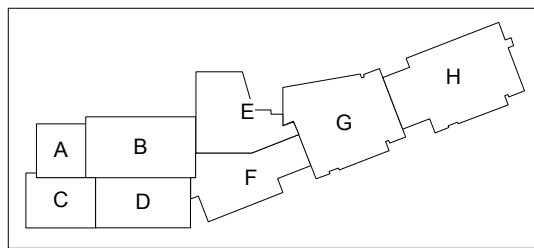
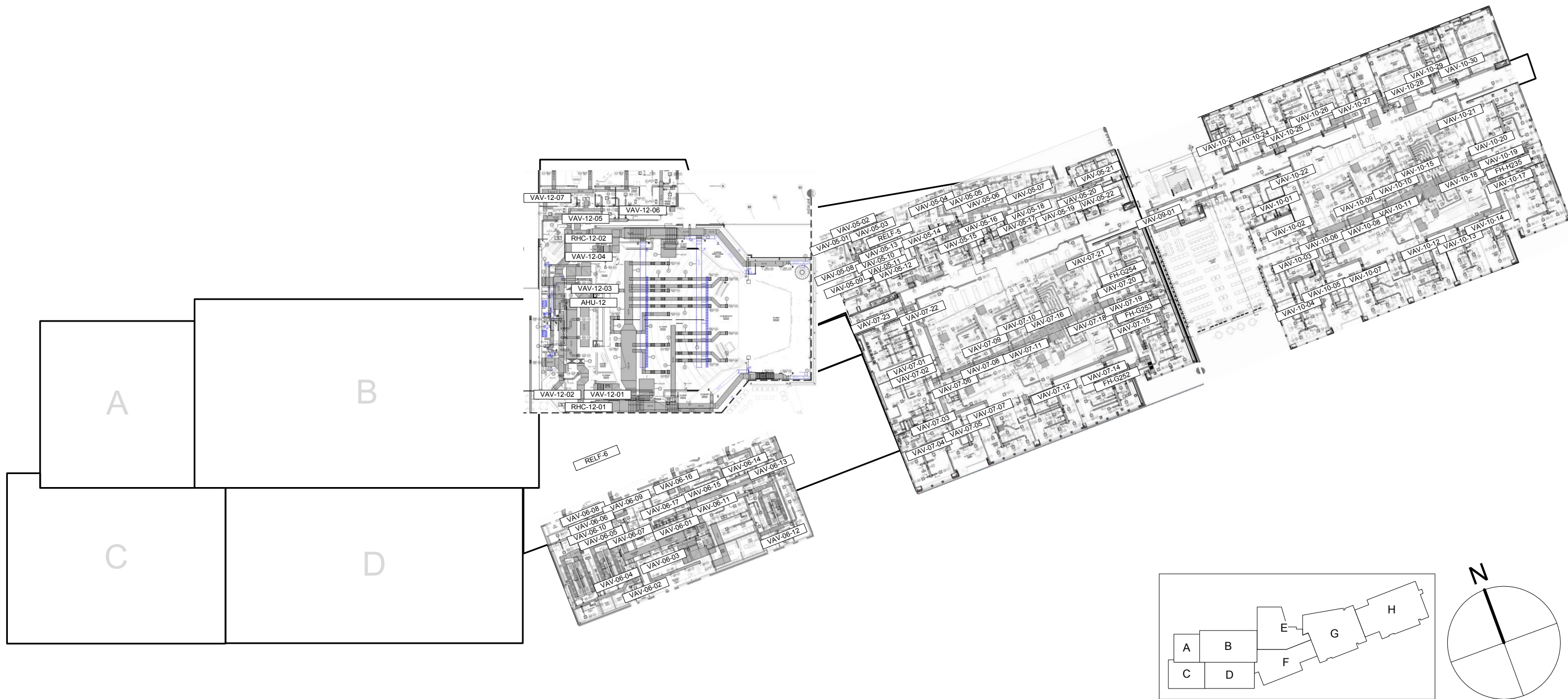
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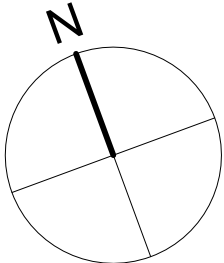
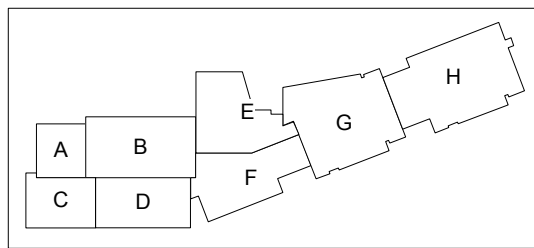
Drawing Title
NET Network Riser Lower

Project Title
Kelly Walsh High School

REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN	DATE	BY
Sales Engineer	Project Manager	Application Engineer		DRAWN		APPROVED		
T Gunderson	Wayne Ramich	Chris Odell		BY	DATE	BY	DATE	
Branch Information							CONTRACT NUMBER	
 Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501							4216-0030	
							DRAWING NUMBER	
							NR-3	

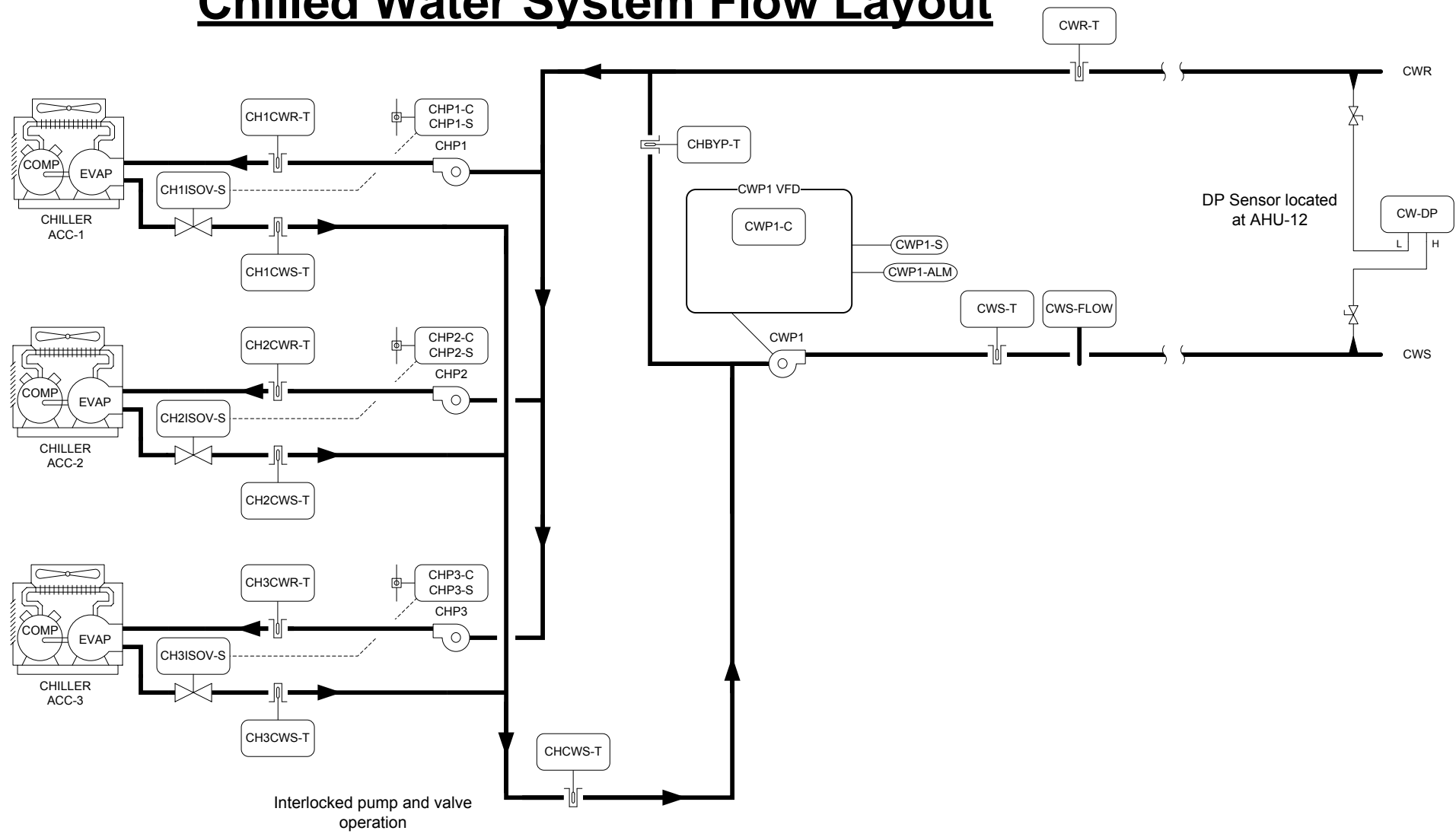


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	<p>Project Title</p> <p>Kelly Walsh High School</p>							
	<p>REFERENCE DRAWING</p> <p>T Gunderson Wayne Ramich</p>		<p>NO.</p> <p>Chris Odell</p>		<p>REVISION-LOCATION</p> <p>BY DATE</p>		<p>ECN DATE</p> <p>APPROVED</p>	
	<p>Branch Information</p> <p>Johnson Controls</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER</p> <p>4216-0030</p>		<p>DRAWING NUMBER</p> <p>NR-4</p>			



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	<p>Project Title</p> <p>Kelly Walsh High School</p>							
				<p>REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY</p>				
		<p>Sales Engineer Project Manager Application Engineer</p> <p>T Gunderson Wayne Ramich Chris Odell</p>		<p>DRAWN BY DATE</p>		<p>APPROVED BY DATE</p>		
		<p>Branch Information</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER</p> <p>4216-0030</p>		<p>DRAWING NUMBER</p> <p>NR-5</p>		

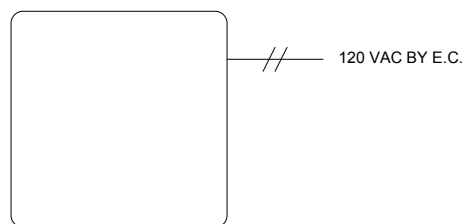
Chilled Water System Flow Layout



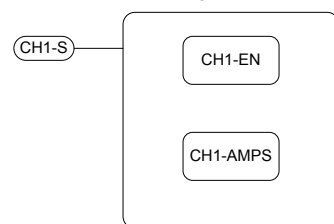
BILL OF MATERIALS

Designation	Qty	Part Number	Description
CWx-DP	1	DPT2302-050D	PRESS SENS,DP,0-50 PSI,VDC,0.25%
CHx-AMPS	3	H421	CURRSENS,4-20MA,SPLIT,800-2400A,2%
CHx-EN	3	RH2B-UAC24-L	DPDT,10A,HC=24 VAC,
	3	SH2B-05	DPDT RELAY BASE FOR RH2B
CHx-S	3	FACTORY	CHILLER STATUS RELAY
CHxCWR-T	3	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	3	TE-631AM-2	WELL TEMP SEN 6" 1K NI
CHxCWS-T	3	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	3	TE-631AM-2	WELL TEMP SEN 6" 1K NI
CHPx-C,-S	3	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
CHCWS-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
CHBYP-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
CWS-FLOW	1	F-1210	FLOW METER, DUAL TURBINE, ANA OUT
	1	F-STD-INSTL1	INSTALL KIT, STD, WELDED
CWP1-C	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
CWP1-ALM	1	FACTORY	VFD ALARM
CWP1-O	1	FACTORY	VFD SPEED CONTROL
CWR-T, CWS-T	2	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	2	TE-631AM-2	WELL TEMP SEN 6" 1K NI
PANEL	1	MS-IOM1711-0	MS-IOM1711-0, 4 POINT IOM
	1	MS-IOM2721-0	MS-IOM2721-0, 6 POINT IOM
	1	PARL00001BH0	24X36 PANEL, MS-NCE2566-0 WITH DISPLAY
CHxISOV-C,-S			SEE VALVE SCHEDULE

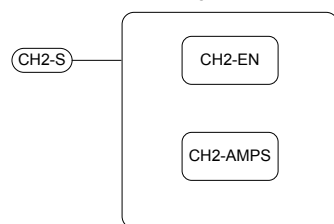
CONTROL PANEL



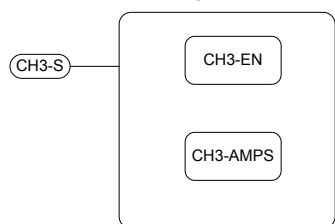
CHILLER 1 CONTROL CABINET



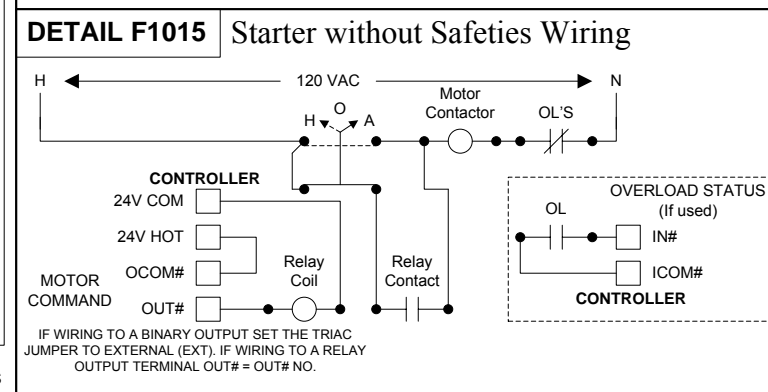
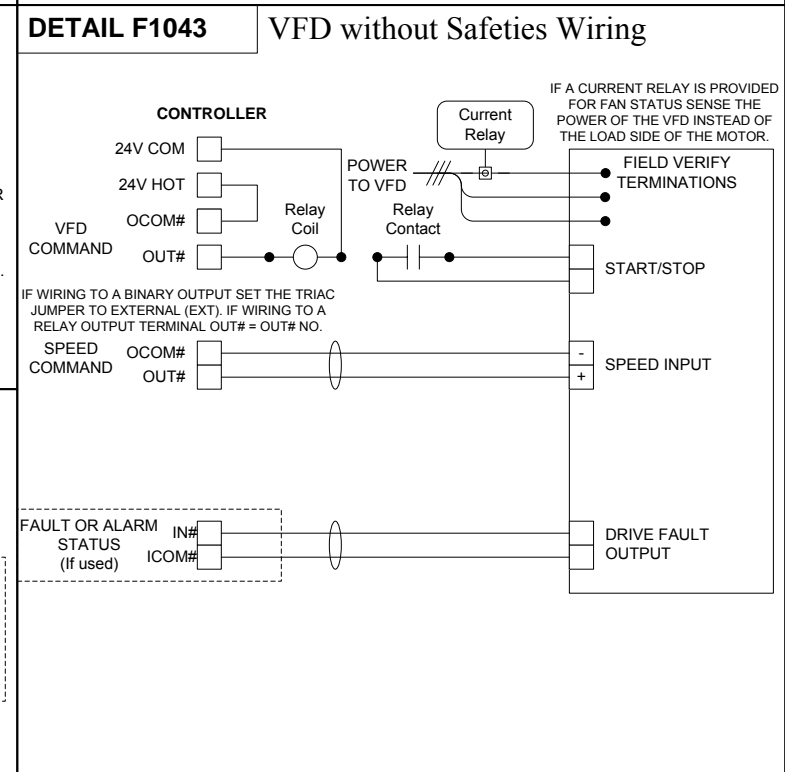
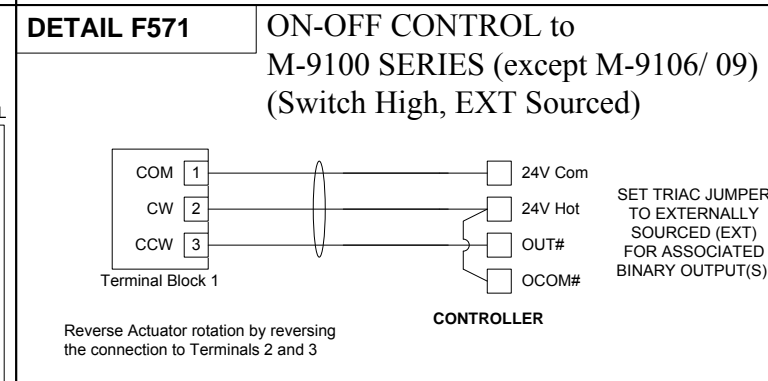
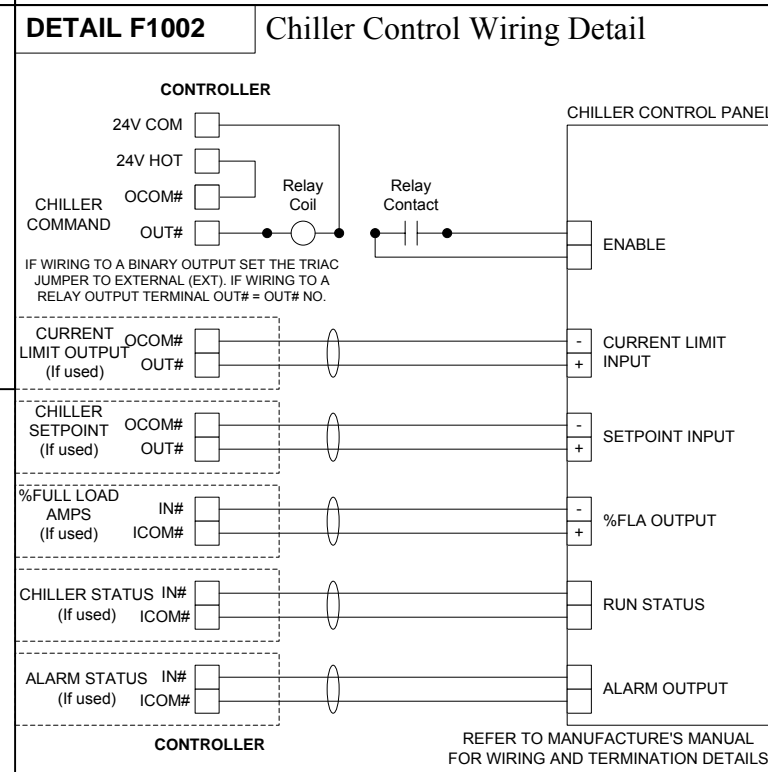
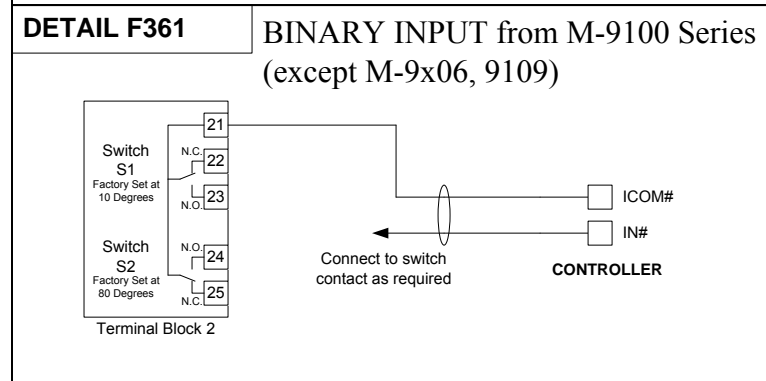
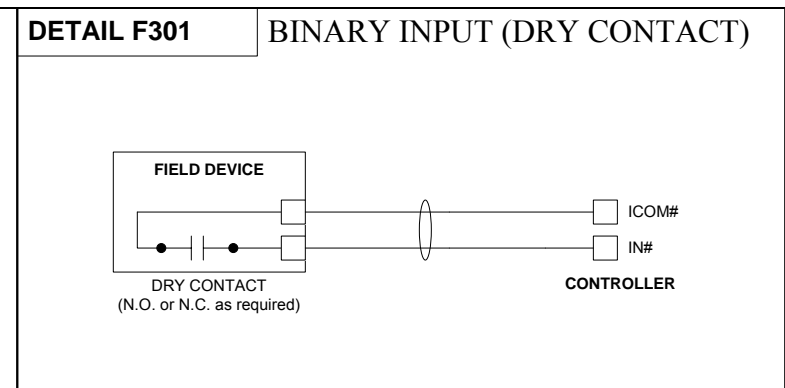
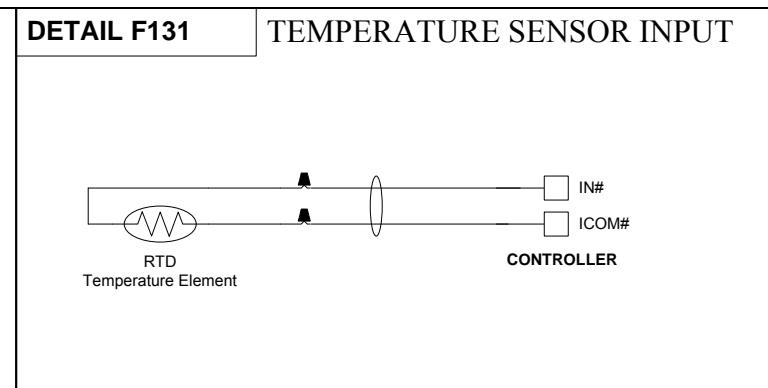
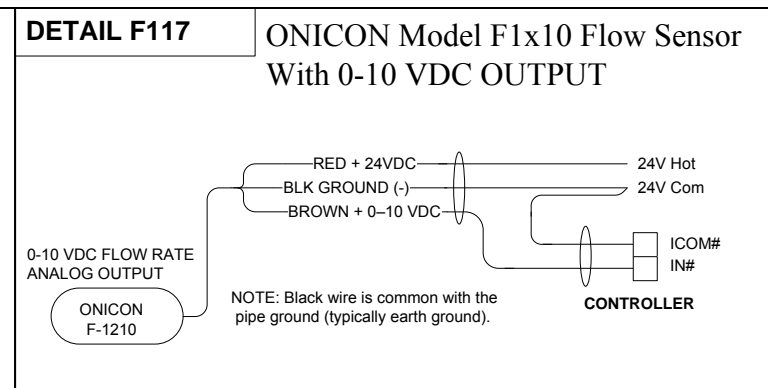
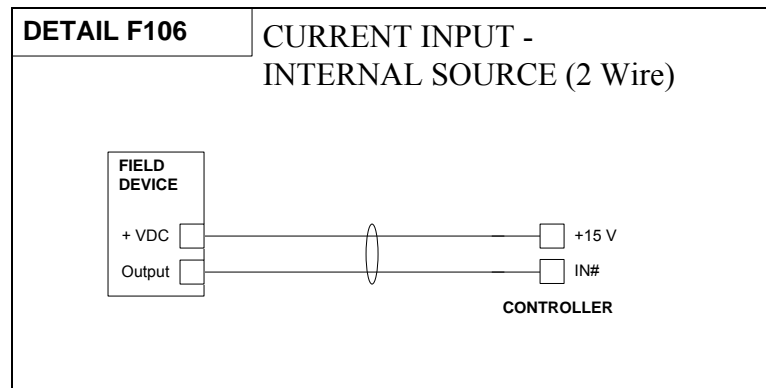
CHILLER 2 CONTROL CABINET



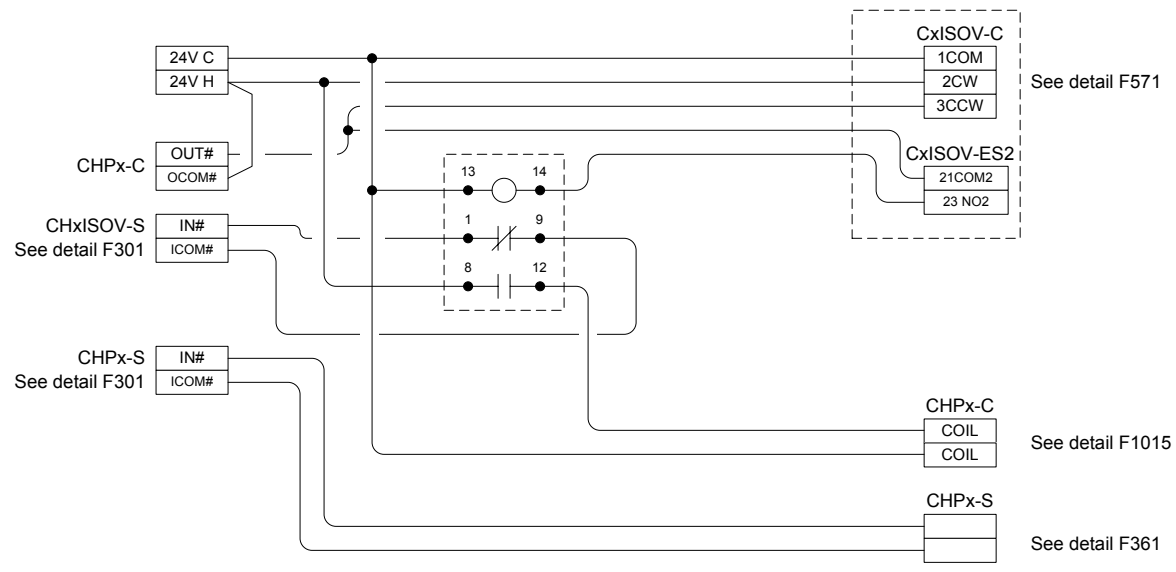
CHILLER 3 CONTROL CABINET



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	CHWS Chiller Layout					
	Project Title		Kelly Walsh High School			
			Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030 DRAWING NUMBER 1-1	
REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY T Gunderson Wayne Ramich Chris Odell BY DATE BY DATE						



Chiller Isolation Valve & Pump Interlock



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Drawing Title		NO.		REVISION-LOCATION		ECN	DATE	BY
CHWS Wiring Details								
Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED			
T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	BY	DATE		
Project Title		Branch Information		CONTRACT NUMBER				
Kelly Walsh High School		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		DRAWING NUMBER		
		Johnson Controls				1-3		

CHWS Sequence Of Operation

SYSTEM ENABLE:

The cooling system will automatically start when the outside air temperature (OA-T) rises above the system enable setpoint (CLGOATLOCKOUT-SP) while the system enable (SYSTEM-EN) is "ON" and there is an AHU call for cooling. When the outside air temperature (OA-T) falls below this setpoint (CLGOATLOCKOUT-SP), the system enable (SYSTEM-EN) is "OFF" or there is no longer a call for cooling, the cooling system will be disabled.

CHILLER CONTROL:

This system consists of three chillers. The chillers shall be controlled via their own internal controls to maintain a chilled water supply temperature. Each chiller (CHx-EN) will be staged on and off in order to maintain the chilled water supply temp (CWS-T) at setpoint (CWST-SP). When a chiller is required, ACC-3 (smallest chiller) shall be enabled as the lead chiller. When the chiller current (CH3-AMPS) rises above the stage up setpoint (95%), the lag chiller (ACC-1 or ACC-2) with the lowest runtime total shall be enabled to run. The lead chiller ACC-3 shall cycle off when the lag chiller starts. Lag chillers will run until the current (CHx-AMPS) drops below the stage down current setpoint (30% for 15min, adj.). A command (CHx-MS) from the FMS may disable each chiller and remove it from rotation.

CHILLED WATER SUPPLY TEMP SETPOINT CONTROL:

The setpoint shall be reset from the design starting setpoint of 50 degF to maintain at least one chilled water coil valve at the full cooling position while maintaining air handler discharge setpoint. The setpoint reset function shall use PID control.

CHILLED WATER PUMP & ISOLATION VALVE CONTROL:

When a chiller is enabled, the associated isolation valve will be commanded to open (wired into the CHPx-C circuit). The chiller pump (CHPx-C) will be started when the isolation valve end switch status (CHXISOV-S) is made. If the pump status (CHPx-S) does not match the command (CHPx-C), an alarm will be generated and the chiller will be stopped. Upon loss of status (CHPx-S), the pump (CHPx-C) will restart after the system reset (SYS-RESET) is activated. After the chiller is commanded off, the pump (CHPx-C) will continue to run for a short time to allow the equipment to coast down. When the pump down time has expired, the pump shall stop and the isolation valve shall close.

PRIMARY LOOP PUMPING:


The primary loop pump (CWP1-C) will be started when the system is enabled. If the pump status (CWP1-S) does not match the command (CWP1-C), an alarm will be generated and the pump and all chilled water systems will be stopped. Upon loss of status (CWP1-S), the pump (CWP1-C) will restart after the system reset (SYS-RESET) is activated. When the VFD alarm (CWP1-ALM) input is activated, the pump and all chilled water systems will shutdown. When the alarm condition (CWP1-ALM) clears, the pump shall restart as required.

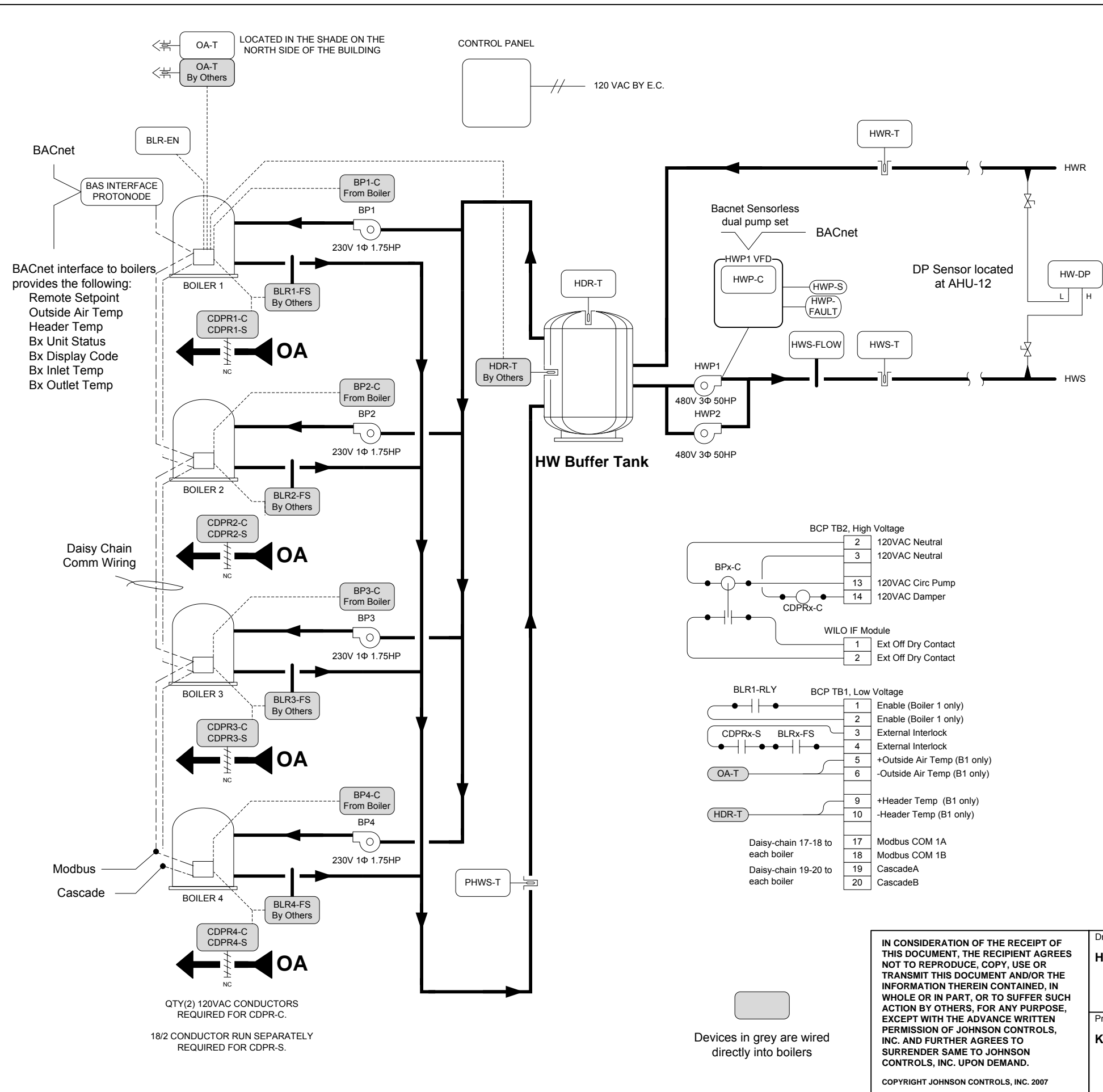
PRIMARY LOOP PRESSURE CONTROL:

When the pump is enabled, the variable speed pump will modulate using Sensorless Quadratic Pressure Control. This control method will reduce head pressure with reducing flow according to a quadratic control curve. The control mode setting and minimum/maximum head setpoints shall be user adjustable from the BAS.

ADDITIONAL POINTS MONITORED BY THE FMS:

- Common Chiller Supply Temp (CHCWS-T)
- Chiller n Leaving Water Temperature (CHnCWS-T)
- Chiller n Entering Water Temperature (CHnCHR-T)
- Chilled Water Return Temperature (CWR-T)
- CWS Flow Meter (CWS-F)
- Chiller Bypass Temperature (CHBYP-T)

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	CHWS Sequence of Operation									
	Project Title									
	Kelly Walsh High School									
	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY	APPROVED			
	T Gunderson	Wayne Ramich	Chris Odell							
	Sales Engineer			Project Manager		Application Engineer		DRAWN		APPROVED
	T Gunderson			Wayne Ramich		Chris Odell		BY		DATE
								BY		DATE
								Branch Information		CONTRACT NUMBER
										4216-0030
								Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		DRAWING NUMBER
										1-4



BILL OF MATERIALS

Designation	Qty	Part Number	Description
BLRx-EN	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
BLRx-FS	4		FLOW SWITCH BY OTHERS
BPx-C	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
CDPRx-C,-S	4		DAMPER AND 120VAC ACTUATOR BY OTHERS
HDR-T	1		HEADER TEMP BY OTHERS
HDR-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
HDR-T	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
HW-DP	1	DPT2302-050D	PRESS SENS,DP,0-50 PSI,VDC,0.25%
HWS-FLOW	1	F-1210	FLOW METER, DUAL TURBINE, ANA OUT
HWS-FLOW	1	F-STD-INSTL1	INSTALL KIT, STD, WELDED
HWP-C	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
HWR-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
HWR-T	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
HWS-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
HWS-T	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
OA-T	1	TE-6313P-1	SENSOR,T-NI,0.1%,3IN OAT
PHWS-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
PHWS-T	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
PANEL	1	PAKGJH002AH0	FEC2611 & IOM3711, PNL 20X24

HWS Sequence Of Operation

SYSTEM ENABLE:

The heating system will run continuously.

BOILER CONTROL:

This system consists of four boilers. The burners, boiler rotation, etc. shall be controlled via their own internal controls. See sequence of operation by boiler manufacturer for control sequence of boiler controls. All programming and start up of boiler manufacturer controls to be by others.

BOILER PUMP CONTROL:

The boiler pump controller shall modulate the speed to control flow to setpoint. The boiler pump shall modulate linearly between min flow and max flow with boiler firing control until the boiler return water temp exceeds 120degF. As the boiler return water temp rises, the boiler pump shall decrease linearly to min flow.

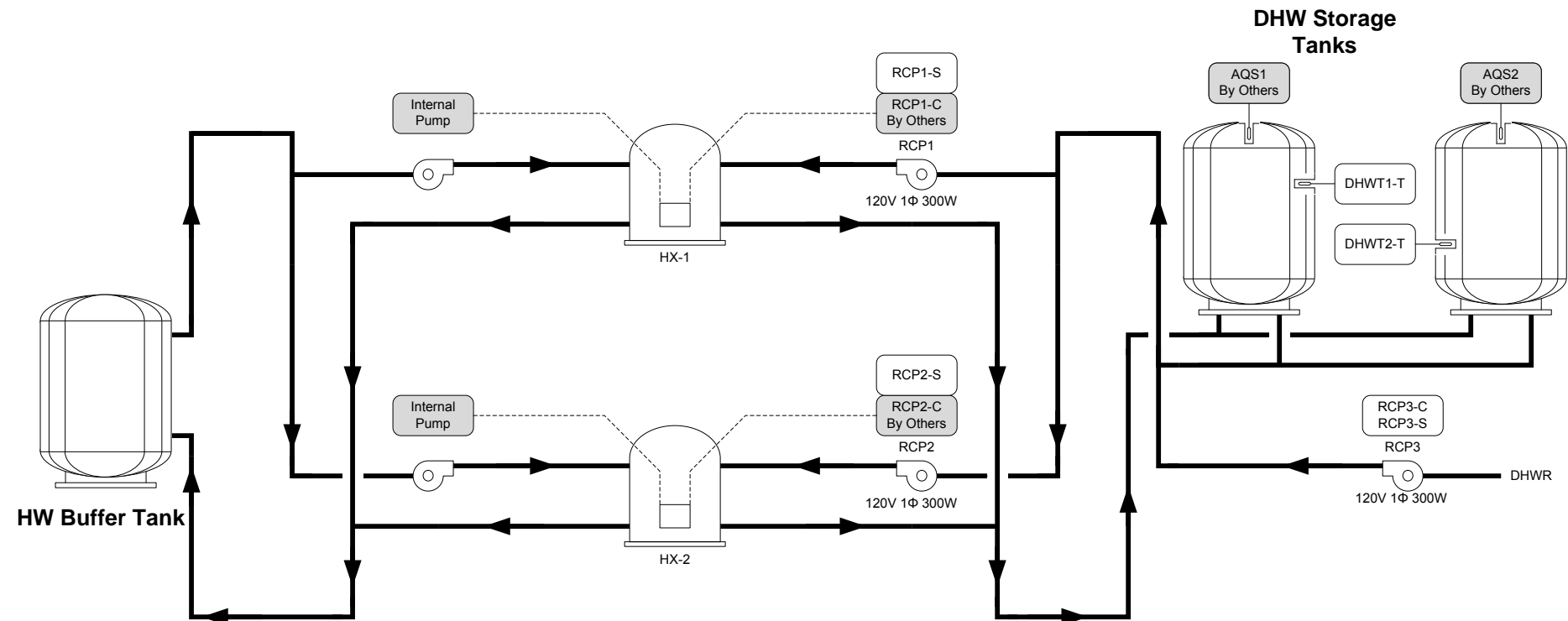
PRIMARY LOOP PRESSURE CONTROL:

When the pump is enabled, the variable speed pump will modulate to control system pressure to setpoint using internal controls. The Sensorless Quadratic Pressure Control control method will reduce head pressure with reducing flow according to a quadratic control curve. The control mode setting and minimum/maximum head setpoints shall be user adjustable from the BAS. Pump lead/lag and rotation shall be accomplished by internal controls.

ADDITIONAL POINTS MONITORED BY THE FMS:

- HW Supply Temperature (HWS-T)
- HW Return Temperature (HWR-T)
- HW Tank Temperature (HDR-T)
- HW Differential Pressure 1 (HW1-DP)
- HW Differential Pressure 2 (HW2-DP)

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	HWS Boiler Layout				
	Project Title	Kelly Walsh High School			
	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE
	T Gunderson	Wayne Ramich	Chris Odell		
	SALES ENGINEER		PROJECT MANAGER		APPLICATION ENGINEER
	BY		DATE		BY
	DATE		DATE		DATE
	BRANCH INFORMATION				CONTRACT NUMBER
					4216-0030
	Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501				DRAWING NUMBER
					2-1



High Voltage

L1	230VAC
L2	230VAC
N	230VAC Neutral

6	120VAC TB2-5
7	120VAC TB2-12

Low Voltage

8	TB1-8
9	TB1-7
10	Aquastat 1-COM
11	Aquastat 2-COM
12	Aquastat 1-NC
13	Aquastat 2-NC



Devices in grey are wired directly into BCP

BILL OF MATERIALS

Designation	Qty	Part Number	Description
RCP3-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
RCPx-S	1	CSD-SF0C0-1	SLD/FIXED .25A W/O RELAY
DHWTx-T	2	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	2	TE-631AM-2	WELL TEMP SEN 6" 1K NI

HWS Sequence Of Operation

SYSTEM ENABLE:
The heating system will run continuously.

HX CONTROL:

This system consists of two heat exchangers. The heat exchangers shall be controlled via their own internal controls. See sequence of operation by HX manufacturer. All programming and start up of HX controls by others.

HOT WATER PUMP CONTROL:

Upon a call for heat from AQS, RCP-x shall cycle on. RCP-3 shall be enabled by the BAS occupied schedule.

ADDITIONAL POINTS MONITORED BY THE FMS:

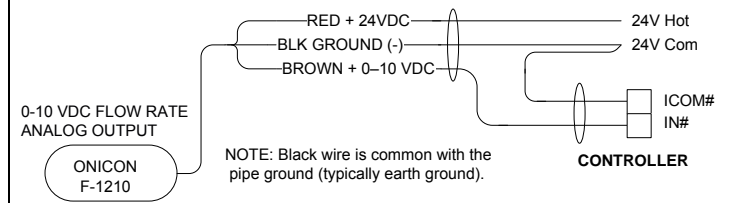
- DHW Tank Temperature (DHWx-T)
- Recirc Pump Status (RCPx-S)

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	DHWS Boiler Layout									
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030	
									DRAWING NUMBER 2-2	

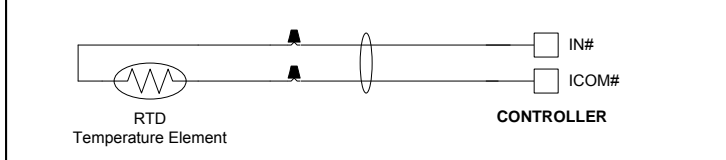
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		HWS			FEC 26xx																					Power to Controller		
		HWS			FEC 26xx	MS/TP	1	15							0											BacNet FC Bus		
UI IN-1	HWS	OA-T	Outdoor Air Temperature		FEC 26xx	MS/TP	1	15 UI IN-1		IN1, ICOM1					0	-4-UI IN-1					2/18	2-Wire	TE		F131			
UI IN-2	HWS	HWS-FLOW	HW Supply Flow		FEC 26xx	MS/TP	1	15 UI IN-2		IN2, ICOM2, 24V					0	-4-UI IN-2					3/18	BRN,BLK, RED	Flow Meter F-1x10 (Vdc)		F117			
UI IN-3	HWS	HWS-T	HW Supply Temperature		FEC 26xx	MS/TP	1	15 UI IN-3		IN3, ICOM3					0	-4-UI IN-3					2/18	2-Wire	TE		F131			
UI IN-4	HWS	HWR-T	HW Return Temperature		FEC 26xx	MS/TP	1	15 UI IN-4		IN4, ICOM4					0	-4-UI IN-4					2/18	2-Wire	TE		F131			
UI IN-5	HWS	PHWS-T	Primary HW Supply Temperat		FEC 26xx	MS/TP	1	15 UI IN-5		IN5, ICOM5					0	-4-UI IN-5					2/18	2-Wire	TE		F131			
UI IN-6	HWS	HDR-T	HW Tank Temp		FEC 26xx	MS/TP	1	15 UI IN-6		IN6, ICOM6					0	-4-UI IN-6					2/18	2-Wire	TE		F131			
BI IN-7	HWS	RCP1-S	DHW RCP-1 Pump Status		FEC 26xx	MS/TP	1	15 BI IN-7		IN7, ICOM7					0	-4-BI IN-7	2/18	OUT, COM	Current Relay	Motor Lead			Motor Lead	See wiring detail	Motor Status (Contact)	F301		
BI IN-8	HWS	RCP2-S	DHW RCP-2 Pump Status		FEC 26xx	MS/TP	1	15 BI IN-8		IN8, ICOM8					0	-4-BI IN-8	2/18	OUT, COM	Current Relay	Motor Lead			Motor Lead	See wiring detail	Motor Status (Contact)	F301		
BO OUT-1	HWS	BLR-EN	Boiler Enable		FEC 26xx	MS/TP	1	15 BO OUT-1		OUT1, 24V COM					0	-4-BO OUT-1	2/18	COIL-, COIL+	Relay	COM, NO			2/18	See wiring detail	Boiler Control Panel (Sw Hi, EXT Src)	F1001		
BO OUT-2	HWS	HWP-C	HW Pump Command		FEC 26xx	MS/TP	1	15 BO OUT-2		OUT2, 24V COM					0	-4-BO OUT-2	2/18	COIL-, COIL+	Relay	COM, NO			2/18	See wiring detail	VFD (w/o Safety) (Sw Hi, EXT)	F1043		
BO OUT-3	HWS	RCP3-C	Recirc Pmp 3 Command		FEC 26xx	MS/TP	1	15 BO OUT-3		OUT3, 24V COM					0	-4-BO OUT-3	2/18	COIL-, COIL+	Relay	COM, NO			2/18	See wiring detail	Motor (Single Phase)	F1030		
CO OUT-4	HWS				FEC 26xx	MS/TP	1	15 CO OUT-4							0	-4-CO OUT-4												
CO OUT-5	HWS				FEC 26xx	MS/TP	1	15 CO OUT-5							0	-4-CO OUT-5												
CO OUT-6	HWS				FEC 26xx	MS/TP	1	15 CO OUT-6							0	-4-CO OUT-6												
CO OUT-7	HWS				FEC 26xx	MS/TP	1	15 CO OUT-7							0	-4-CO OUT-7												
AO OUT-8	HWS				FEC 26xx	MS/TP	1	15 AO OUT-8							0	-4-AO OUT-8												
AO OUT-9	HWS				FEC 26xx	MS/TP	1	15 AO OUT-9							0	-4-AO OUT-9												
		HWS			IOM 3710																					Power to Controller		
		HWS			IOM 3710	SA Bus	1	4							0											BacNet SA Bus		
UI IN-1	HWS	DHWT1-T	DHW Tank 1 Temperature		IOM 3710	SA Bus	1	4 UI IN-1		IN1, ICOM1					0	4--4-UI IN-1					2/18	2-Wire	TE		F131			
UI IN-2	HWS	DHWT2-T	DHW Tank 2 Temperature		IOM 3710	SA Bus	1	4 UI IN-2		IN2, ICOM2					0	4--4-UI IN-2					2/18	2-Wire	TE		F131			
UI IN-3	HWS				IOM 3710	SA Bus	1	4 UI IN-3							0	4--4-UI IN-3												
UI IN-4	HWS	RCP3-S	Recirc Pmp 3 Status		IOM 3710	SA Bus	1	4 UI IN-4		IN4, ICOM4					0	4--4-UI IN-4	2/18	OUT, COM	Current Relay	Motor Lead			Motor Lead	See wiring detail	Motor Status (Contact)	F301		
RO OUT-1	HWS				IOM 3710	SA Bus	1	4 RO OUT-1							0	4--4-RO OUT-1												
RO OUT-2	HWS				IOM 3710	SA Bus	1	4 RO OUT-2							0	4--4-RO OUT-2												
RO OUT-3	HWS				IOM 3710	SA Bus	1	4 RO OUT-3							0	4--4-RO OUT-3												
RO OUT-4	HWS				IOM 3710	SA Bus	1	4 RO OUT-4							0	4--4-RO OUT-4												
UO OUT-5	HWS				IOM 3710	SA Bus	1	4 UO OUT-5							0	4--4-UO OUT-5												
UO OUT-6	HWS				IOM 3710	SA Bus	1	4 UO OUT-6							0	4--4-UO OUT-6												
UO OUT-7	HWS				IOM 3710	SA Bus	1	4 UO OUT-7							0	4--4-UO OUT-7												
UO OUT-8	HWS				IOM 3710	SA Bus	1	4 UO OUT-8							0	4--4-UO OUT-8												

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	Project Title		Kelly Walsh High School						
	<p>REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY</p> <p>Sales Engineer Project Manager Application Engineer DRAWN APPROVED</p> <p>T Gunderson Wayne Ramich Chris Odell BY DATE BY DATE</p>				<p>Branch Information</p> <p>Johnson Controls</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>				<p>CONTRACT NUMBER</p> <p>4216-0030</p> <p>DRAWING NUMBER</p> <p>2-3</p>

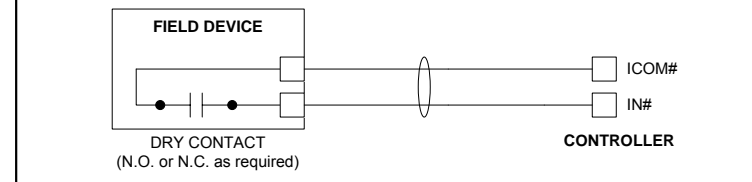
DETAIL F117 ONICON Model F1x10 Flow Sensor With 0-10 VDC OUTPUT



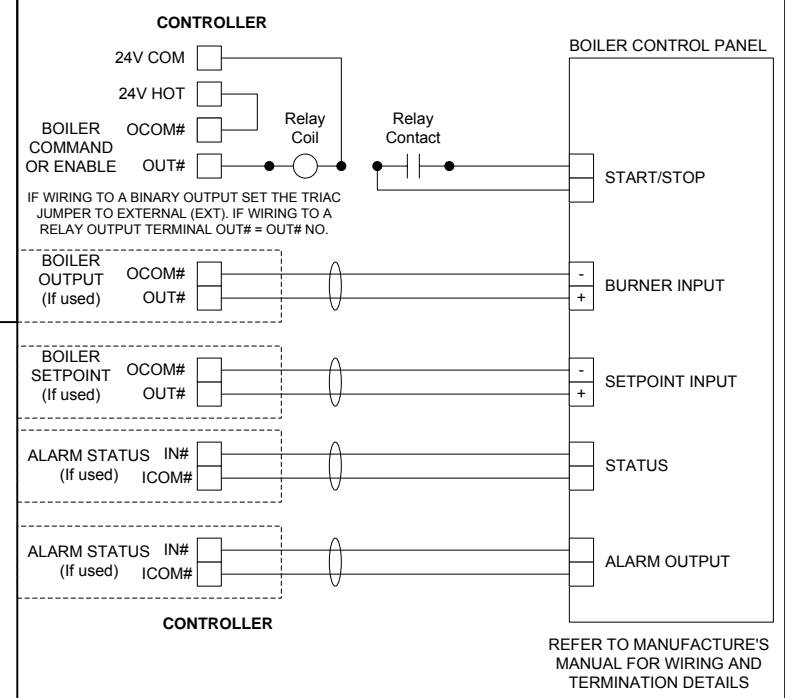
DETAIL F131 TEMPERATURE SENSOR INPUT



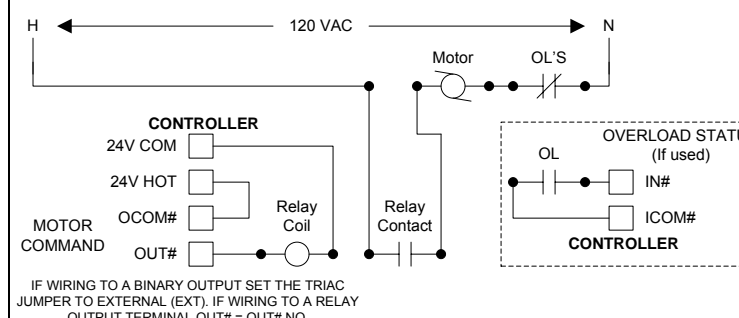
DETAIL F301 BINARY INPUT (DRY CONTACT)



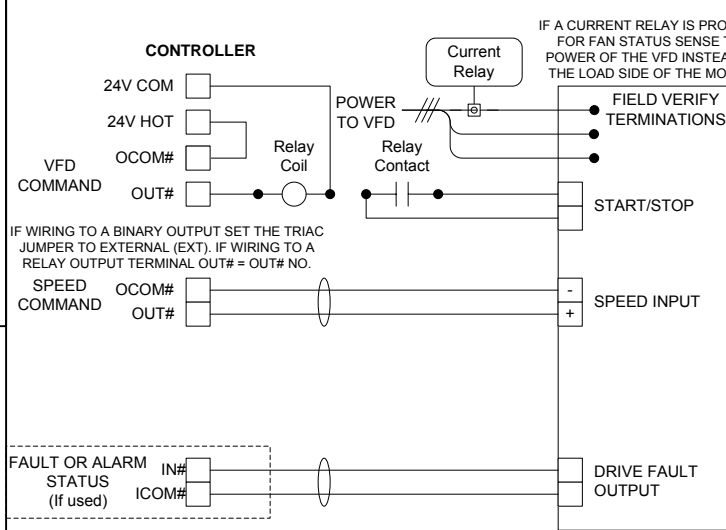
DETAIL F1001 Boiler Control Wiring Detail



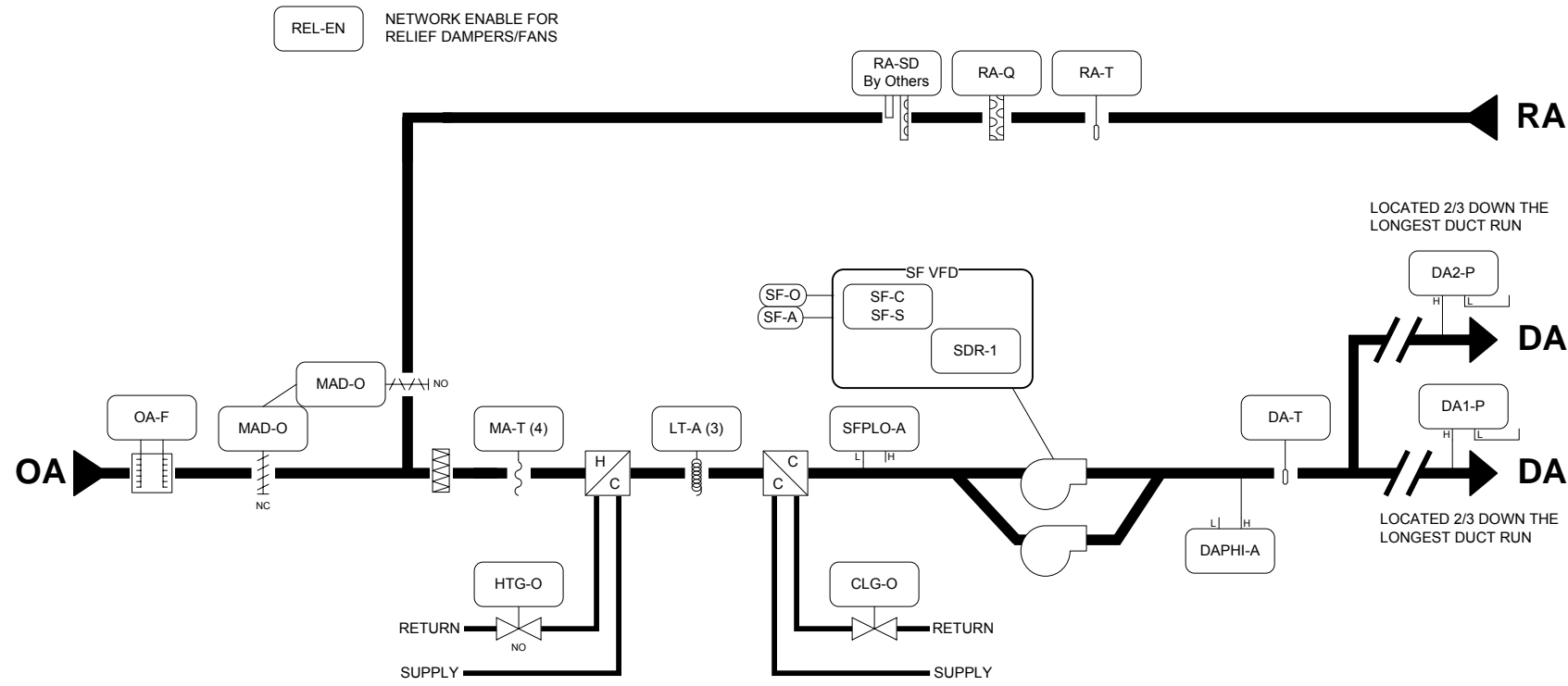
DETAIL F1030 Single Phase Motor Wiring



DETAIL F1043 VFD without Safeties Wiring



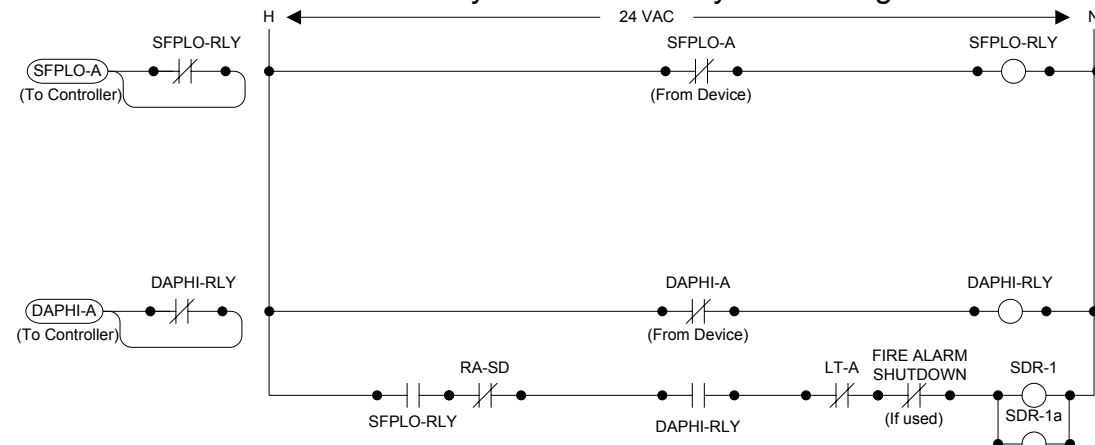
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		HWS Wiring Details			
		Project Title		Kelly Walsh High School	
<p>REFERENCE DRAWING</p> <p>T Gunderson</p>		<p>NO.</p> <p>Wayne Ramich</p>		<p>REVISION-LOCATION</p> <p>Chris Odell</p>	
<p>SALES ENGINEER</p> <p>T Gunderson</p>		<p>PROJECT MANAGER</p> <p>Wayne Ramich</p>		<p>APPLICATION ENGINEER</p> <p>Chris Odell</p>	
<p>BY</p> <p>T Gunderson</p>		<p>DATE</p>		<p>BY</p> <p>Chris Odell</p>	
<p>DATE</p>		<p>DATE</p>		<p>DATE</p>	
<p>BRANCH INFORMATION</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER</p> <p>4216-0030</p>		<p>DRAWING NUMBER</p> <p>2-4</p>	



BILL OF MATERIALS

Designation	Qty	Part Number	Description
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
DAx-P	2	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
DAPHI-A	2	FTG18A-600R	REMOTE MTD PROBE
	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
LT-A	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC,
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
MA-T	3	A70HA-1C	DUCT,MLT,SP=15-55 F (-9-13 C),STG=2
	3	TE-6001-8	AVERAGING ELEMENT HOLDER
MA-T	1	TE-6001-8	AVERAGING ELEMENT HOLDER
MAD-O	4	TE-6316M-1	NICKEL DUCT AVERAGE,17 FEET
MAD-O	2	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
OA-F	1		SEE AIRFLOW MEASURING STATION SCHEDULE
PANEL	1	PAKLJJ002BH0	MS-FAC2611-0 AND IOM4711, 24X36, DUAL PS
RA-Q	1	CDLSXX	VERIS DUCT CO2 TRANS, DISPLAY, 0-2000PPM
RA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
SDR-1	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
SF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SFPLO-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
HTG-O, CLG-O	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC,
HTG-O, CLG-O	1	SH2B-05	DPDT RELAY BASE FOR RH2B
HTG-O, CLG-O			SEE VALVE SCHEDULE

Safety Shutdown Relay Coil Wiring Detail



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FOR WIRING OF SAFETY SHUTDOWN RELAY (SDR-N) CONTACTS, SEE DESIGNATION ON STARTER/VFD DETAIL.

CONTROL PANEL
120 VAC BY E.C.

SALES ENGINEER: T Gunderson
PROJECT MANAGER: Wayne Ramich
APPLICATION ENGINEER: Chris Odell

DATE: _____
DATE: _____
DATE: _____

CONTRACT NUMBER: 4216-0030
DRAWING NUMBER: 3-1

JOHNSON CONTROLS
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501

JOHNSON CONTROLS, INC. 2013

Drawing Title: **AHU-1/2 Flow Layout Typical of 2**

Project Title: **Kelly Walsh High School**

REFERENCE DRAWING: _____ NO. _____ REVISION-LOCATION: _____ ECN: _____ DATE: _____ BY: _____

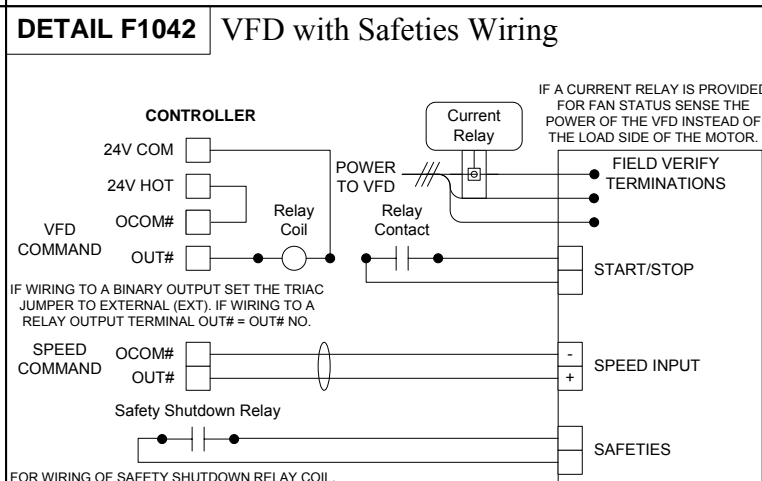
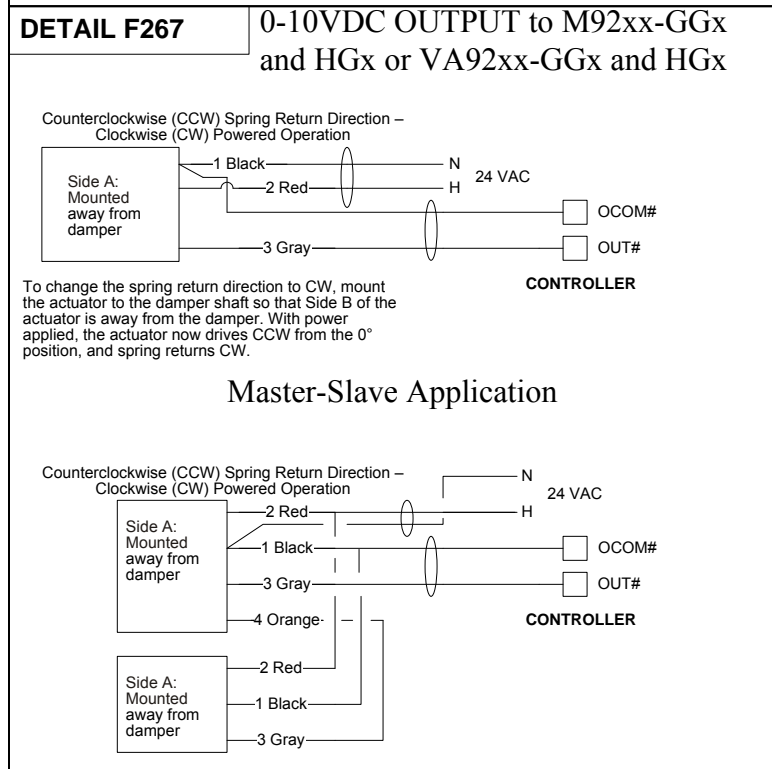
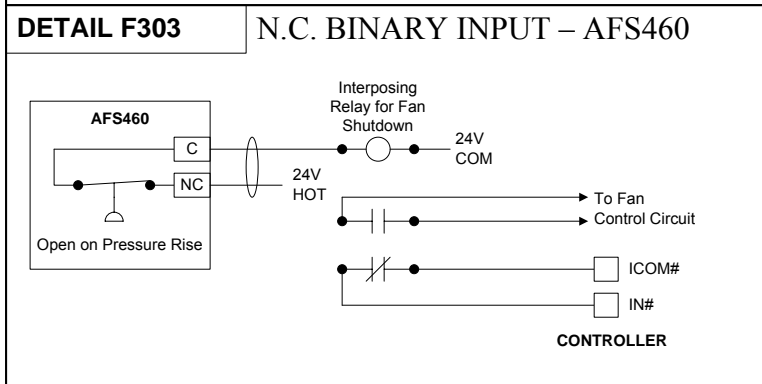
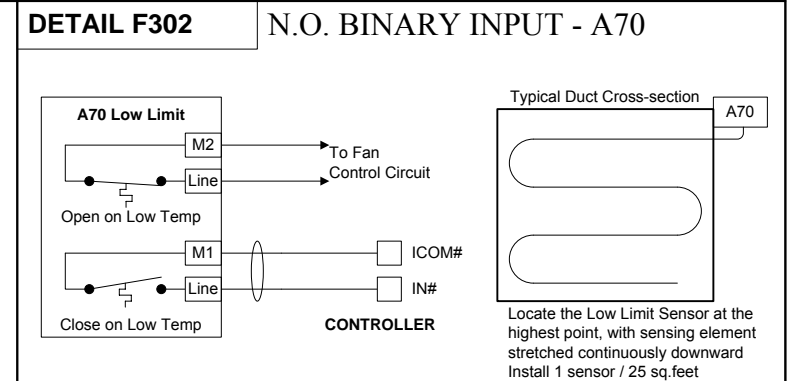
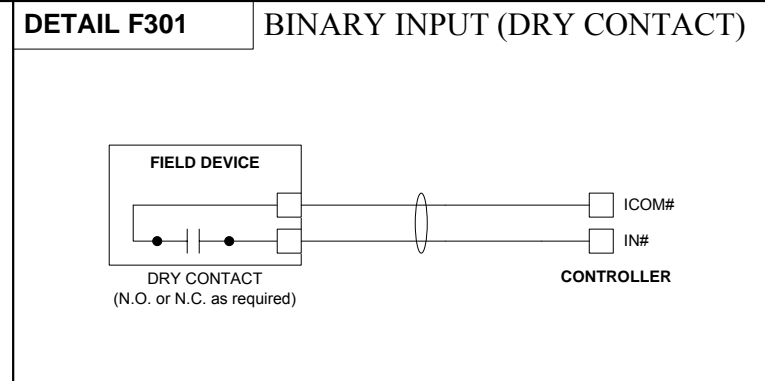
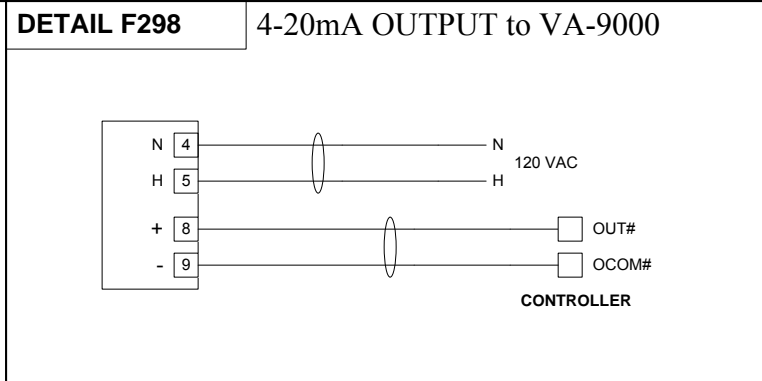
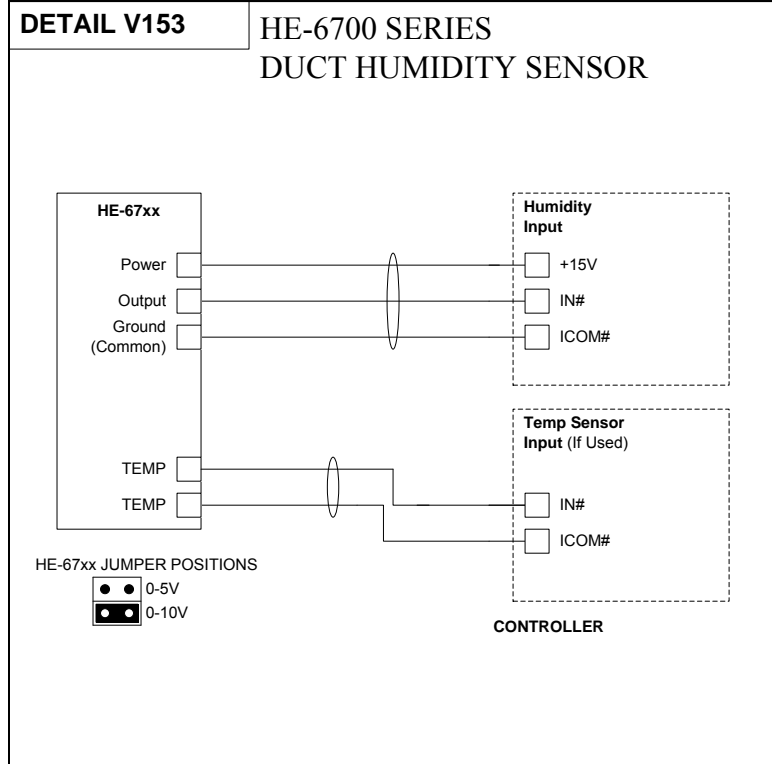
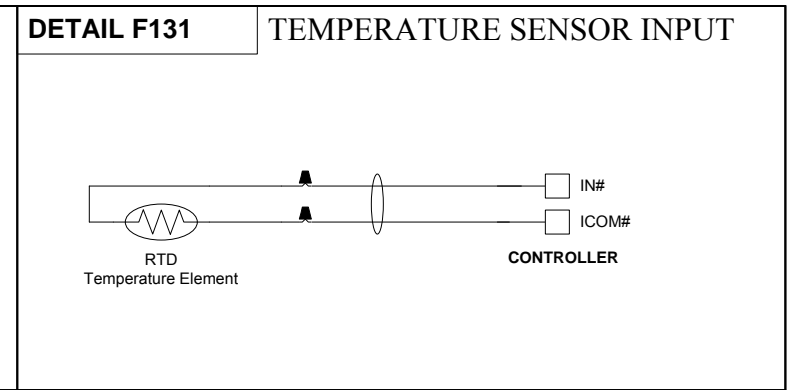
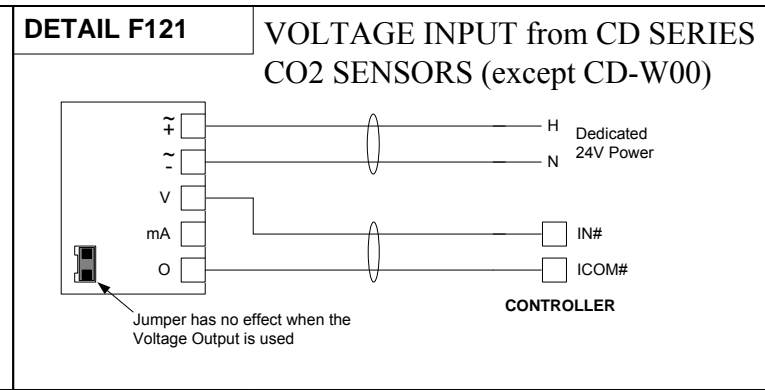
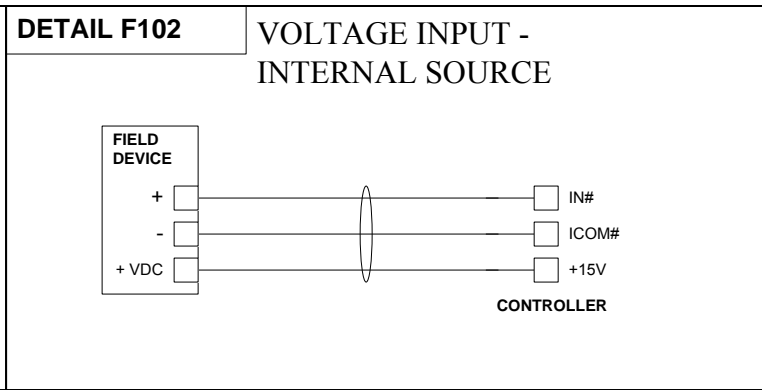
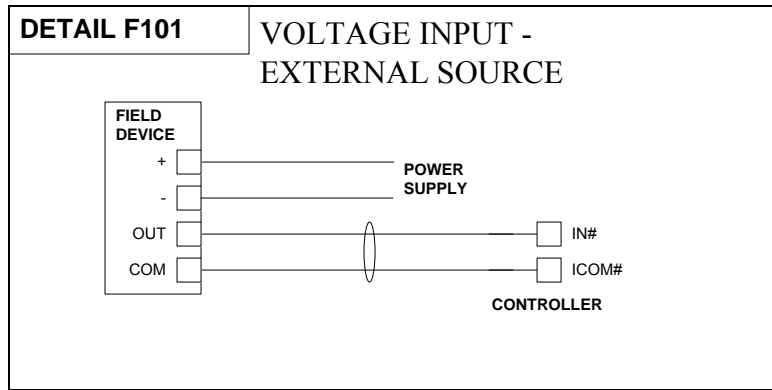
SALES ENGINEER: T Gunderson PROJECT MANAGER: Wayne Ramich APPLICATION ENGINEER: Chris Odell

DATE: _____ BY: _____ DATE: _____

CONTRACT NUMBER: **4216-0030**

DRAWING NUMBER: **3-1**

Branch Information:
Johnson Controls, Inc.
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501



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Drawing Title: **AHU-1/2 Wiring Details Typical of 2**

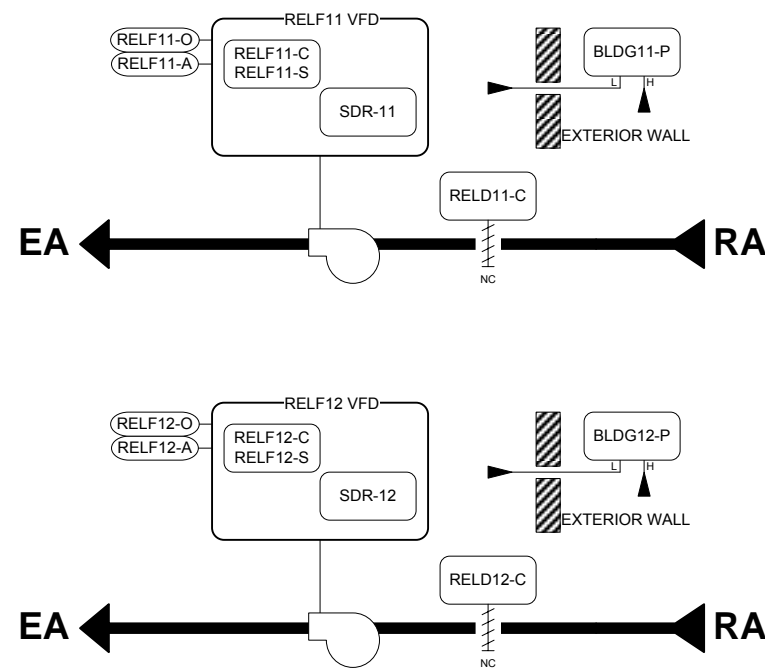
Project Title: **Kelly Walsh High School**

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	BY

Branch Information: **Johnson Controls, Inc.**
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501

CONTRACT NUMBER: **4216-0030**

DRAWING NUMBER: **3-3**



BILL OF MATERIALS

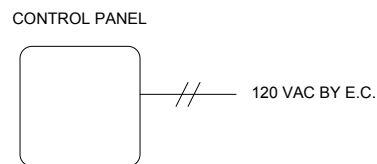
Designation	Qty	Part Number	Description
BLDGx-P	3	A-306-K	OUTDOOR AIR STATIC
	3	DPT2640-R25B-1	DP TRANS, DIF, -.025 TO
	3	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	3	SD-01	SURGE DAMPENER
RELDx-C	3		ELEC, 24VAC, SPRING RETURN
RELFx-C	3	RIB2401B	SPDT, 20A, HC=24 VAC/DC, W/LED
RELF-VFD	3		VFDs PROVIDED WITH EXHAUST FANS
RELFx-S			VFD AUX RUN CONTACT
TX-1	1	Y64T15-0	TRANSFORMER UL CLASS 2, 92VA
PANEL	1	EN-EWC25-0	UPM DUAL W/TRANSFORMER
	1	MS-FEC2611-0	FEC2611-0, FEC17
	1	MS-IOM4711-0	IOM4711, IOM 17 POINT, UL

Relief Air Sequence Of Operation

RELIEF FAN CONTROL:

In occupied mode when the air handler enables the relief air system the following shall occur: When the building static pressure exceeds setpoint (BLDGP-SP) the isolation dampers (RELDx-C) will open while the relief fans are off. On a further rise in static pressure the relief fans (RELFx-C) will be commanded to run. The relief fans (RELFx-O) will modulate to maintain the building static pressure at setpoint (BLDGP-SP). When the relief fan frequency converter fault input (RLF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.

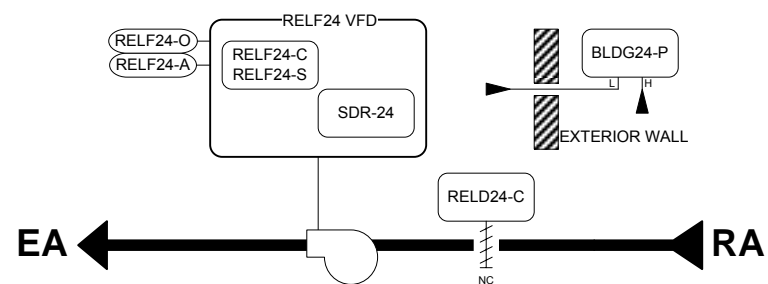
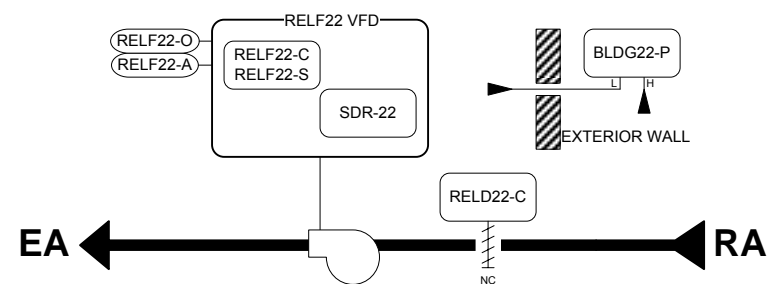
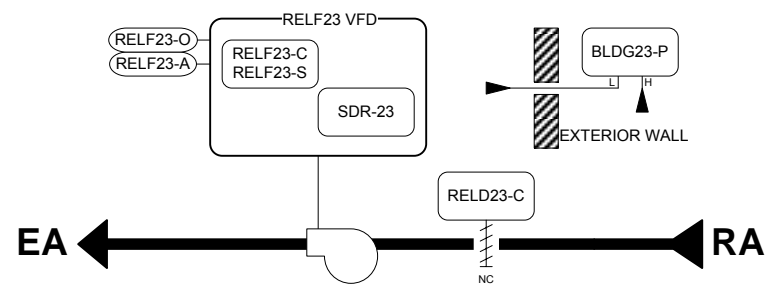
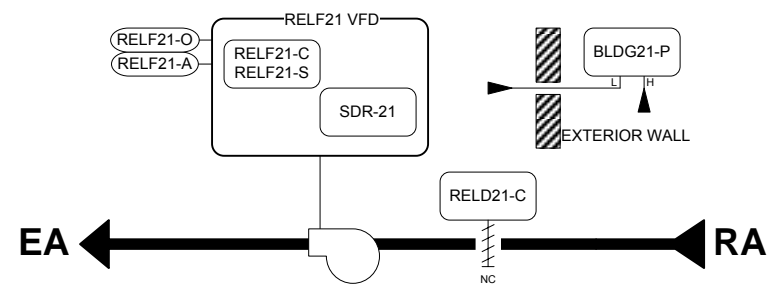
In unoccupied mode the relief air dampers (RELDx-C) will closed while the relief fans (RELFx-C) will be commanded off.



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	AHU-1 RA Flow Layout								
	Project Title		NO.		REVISION-LOCATION		ECN		
	Kelly Walsh High School		DATE		DATE		DATE		
		Sales Engineer		Project Manager		Application Engineer		DRAWN	
		T Gunderson		Wayne Ramich		Chris Odell		BY DATE	
								APPROVED	
								BY DATE	
								CONTRACT NUMBER	
								4216-0030	
								DRAWING NUMBER	
								3-5	

Johnson Controls

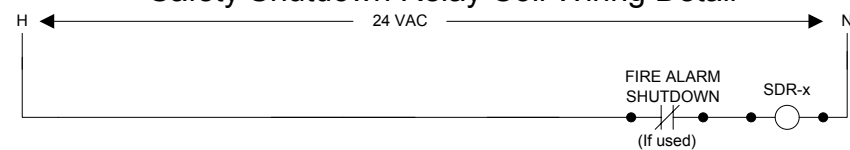
Branch Information
 Johnson Controls, Inc.
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501



BILL OF MATERIALS

Designation	Qty	Part Number	Description
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	4	DPT2640-R25B-1	DP TRANS, DIF, -.025 TO
	4	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	4	SD-01	SURGE DAMPENER
RELDx-C	4		ELEC, 24VAC, SPRING RETURN
RELFx-C	4	RIB2401B	SPDT, 20A, HC=24 VAC/DC, W/LED
RELF-VFD	4		VFD PROVIDED WITH EXHAUST FANS
RELFx-S	4		VFD AUX RUN CONTACT
TX-1	1	Y64T15-0	TRANSFORMER UL CLASS 2, 92VA
PANEL	1	EN-EWC25-0	UPM DUAL W/TRANSFORMER
	1	MS-FEC2611-0	FEC2611-0, FEC17
	1	MS-IOM4711-0	IOM4711, IOM 17 POINT, UL

Safety Shutdown Relay Coil Wiring Detail

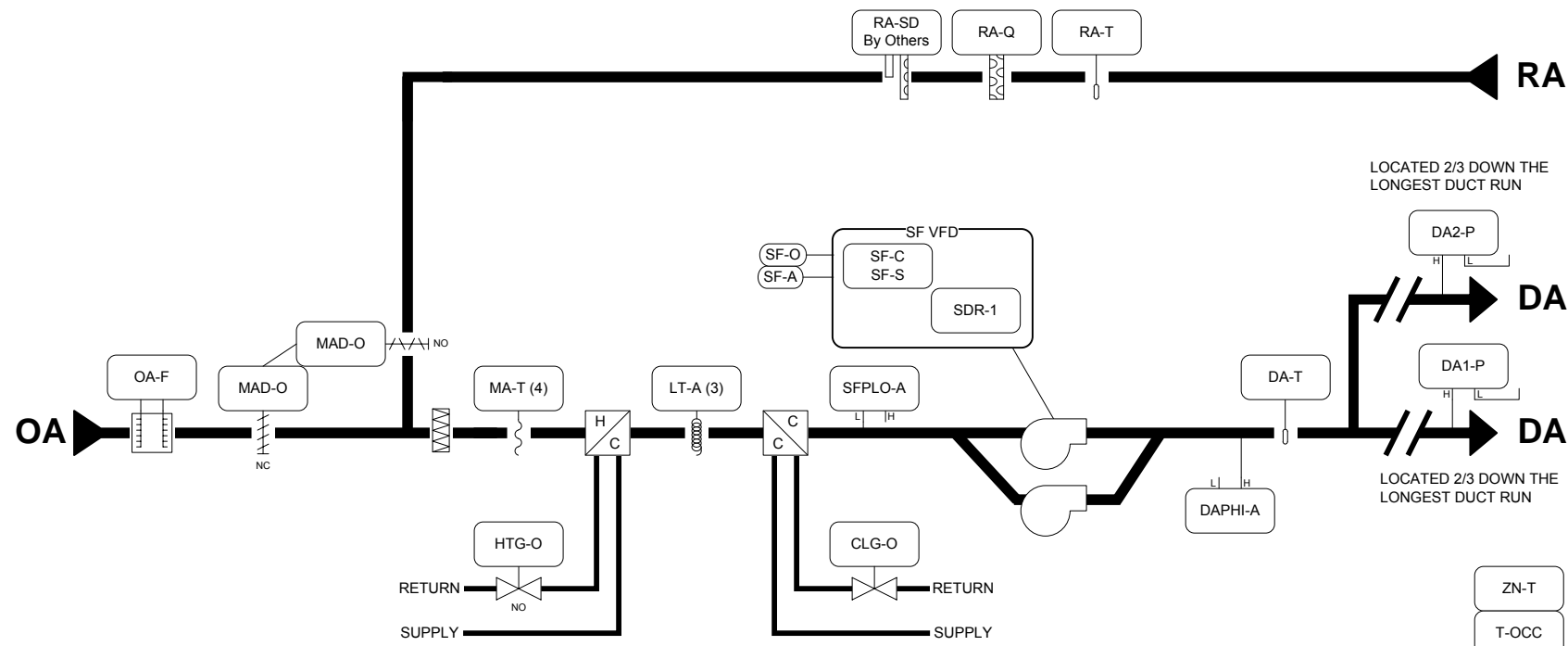


FOR WIRING OF SAFETY SHUTDOWN RELAY (SDR-N) CONTACTS, SEE DESIGNATION ON STARTER/ VFD DETAIL.

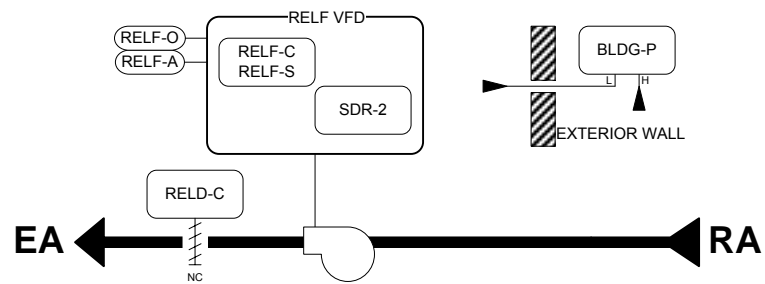
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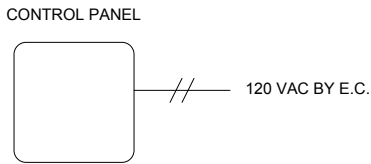
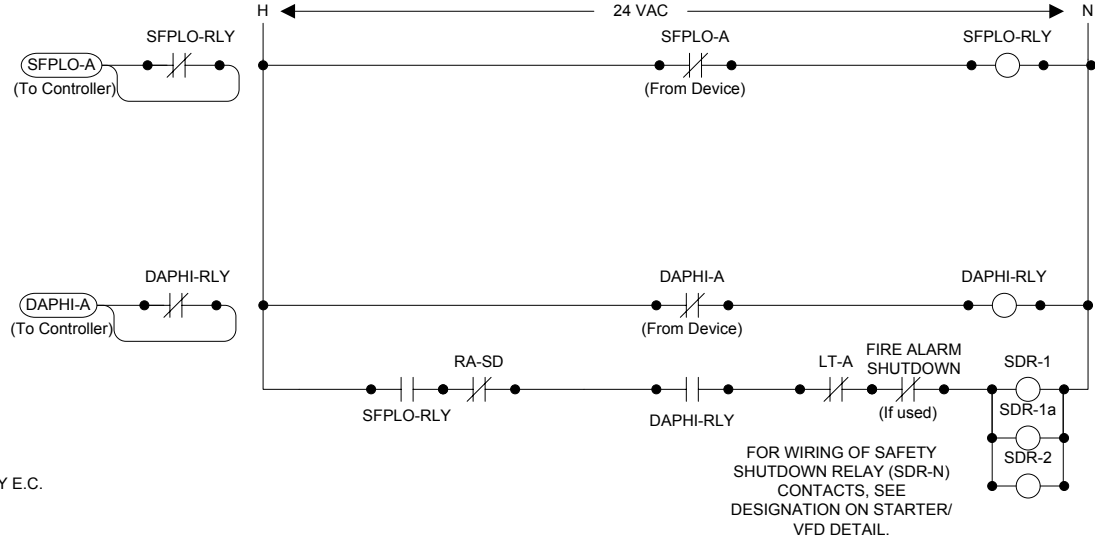
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Kelly Walsh High School		T Gunderson		Wayne Ramich		Chris Odell		BY DATE	
		DATE		DATE		DATE		DATE	
		Branch Information		CONTRACT NUMBER					
Johnson Controls		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		DRAWING NUMBER		3-7	



ZN-T NETWORK TEMP FOR SUPPLY AIR TEMP RESET
T-OCC NETWORK TEMPORARY OCC PUSHBUTTONS



Safety Shutdown Relay Coil Wiring Detail

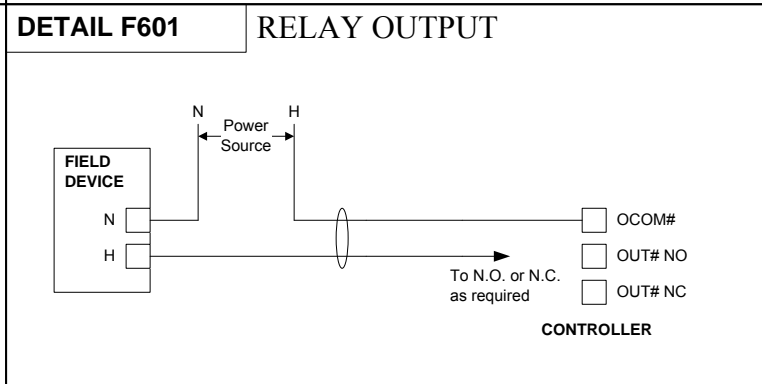
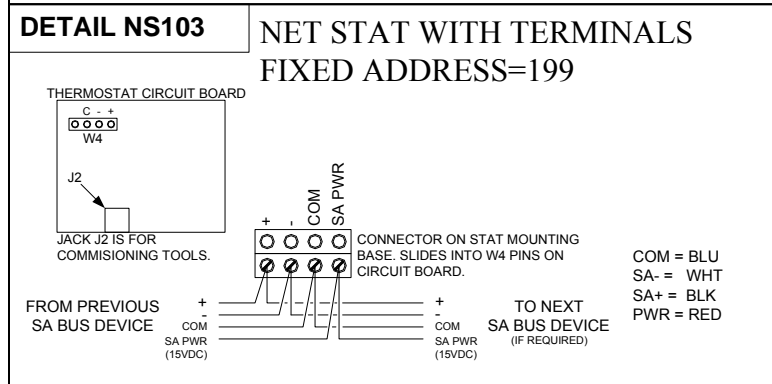
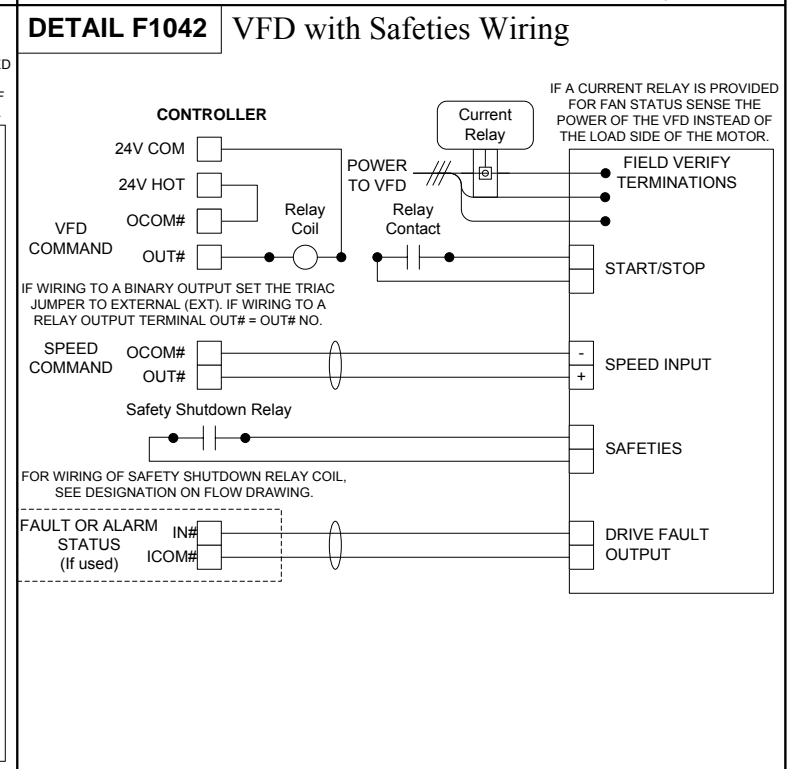
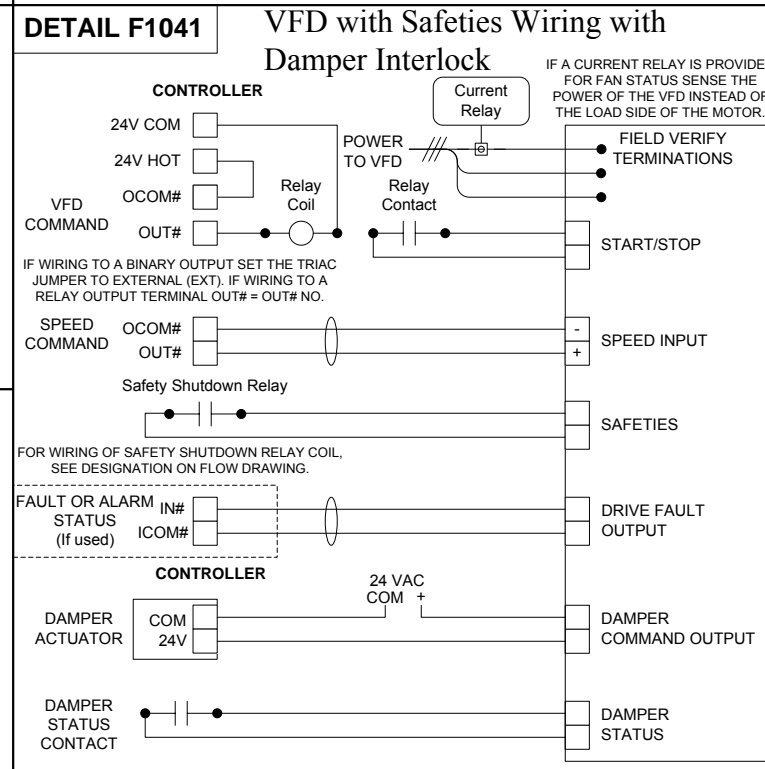
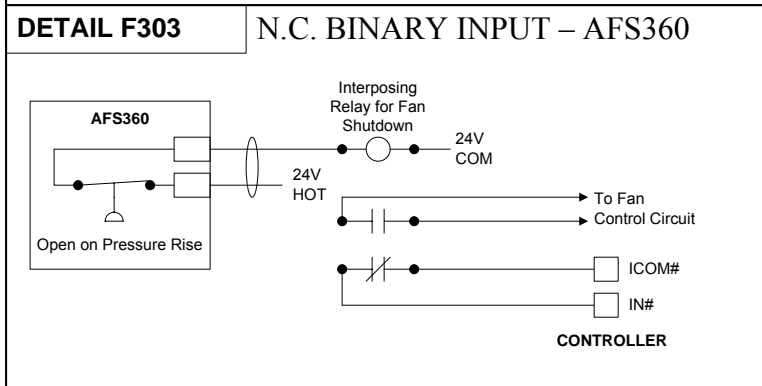
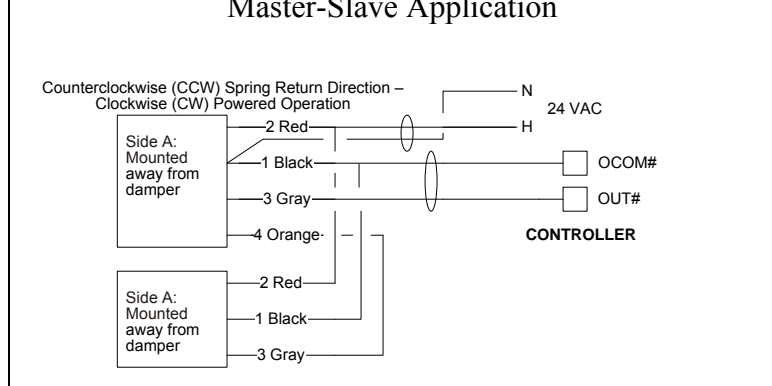
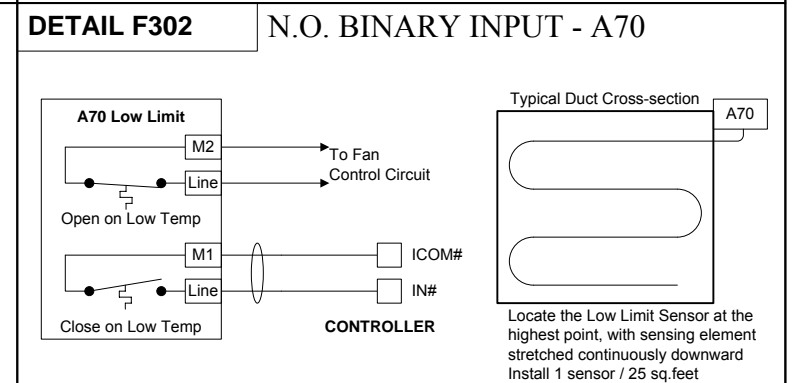
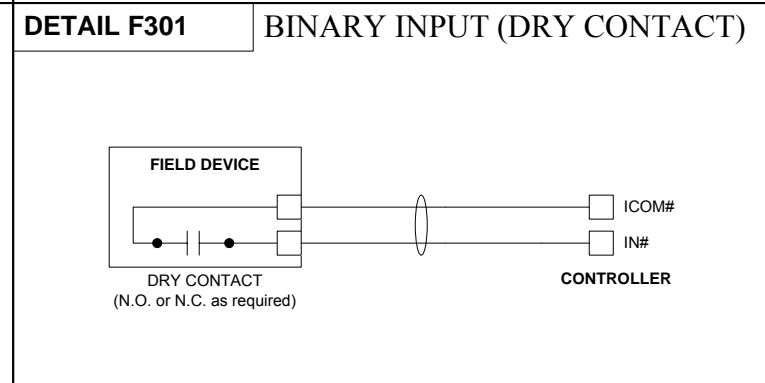
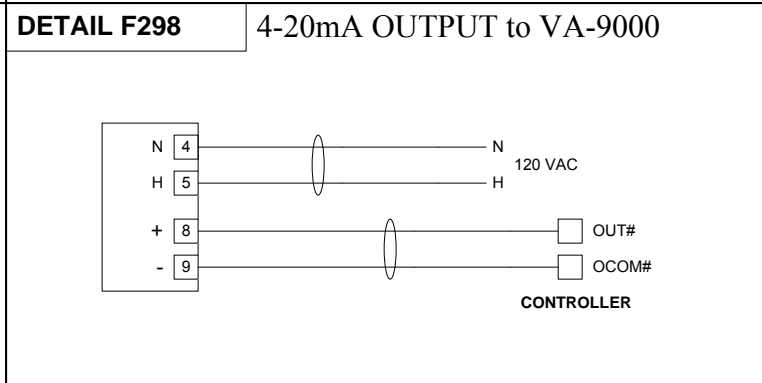
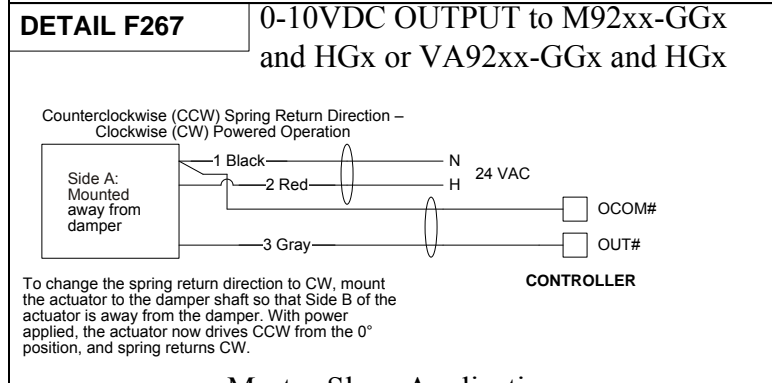
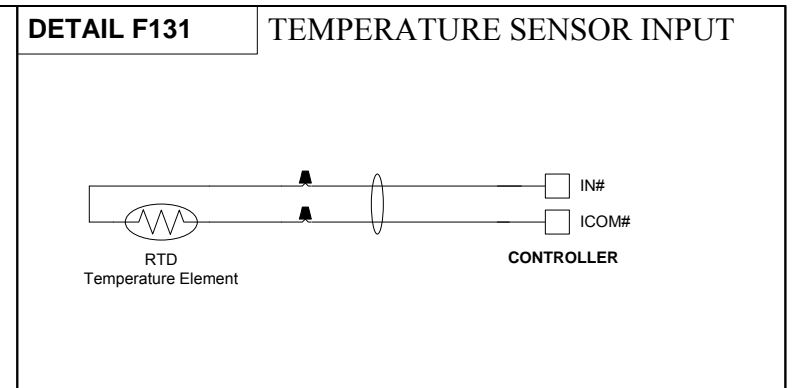
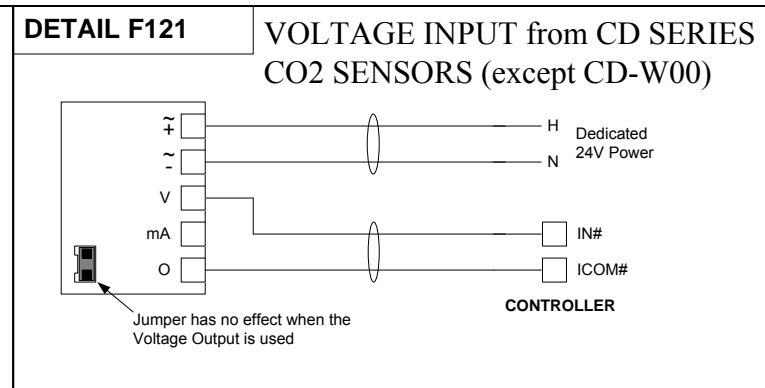
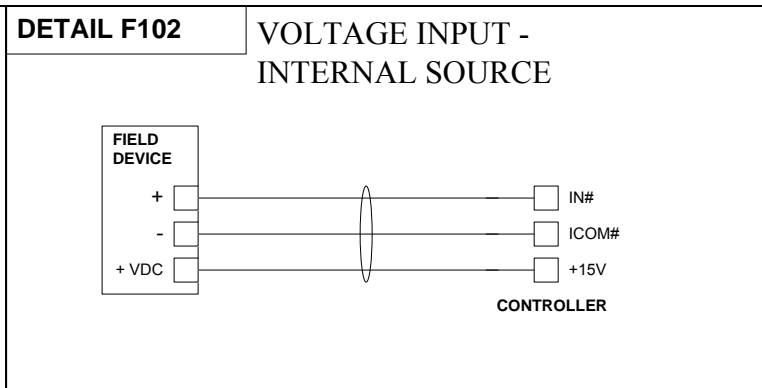
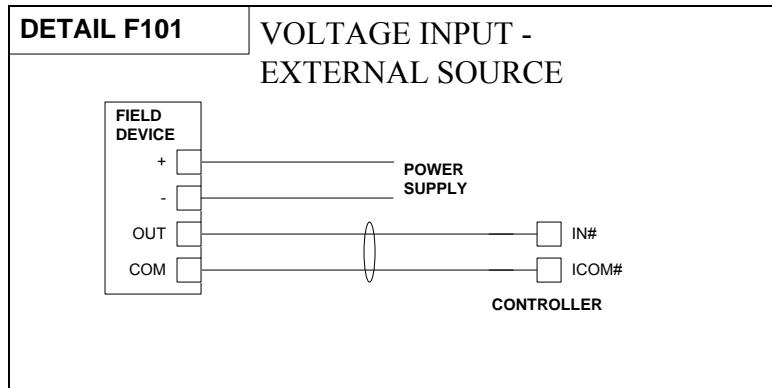


BILL OF MATERIALS

Designation	Qty	Part Number	Description
BLDG-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -.025 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
DAx-P	2	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
	2	FTG18A-600R	REMOTE MTD PROBE
DAPHI-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
LT-A	3	A70HA-1C	DUCT,MLT,SP=15-55 F (-9-13 C),STG=2
	3	TE-6001-8	AVERAGING ELEMENT HOLDER
MA-T	1	TE-6001-8	AVERAGING ELEMENT HOLDER
	4	TE-6316M-1	NICKEL DUCT AVERAGE,17 FEET
MAD-O	2	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
OA-F	1		SEE AIRFLOW MEASURING STATION SCHEDULE
PANEL	1	PAKLJJ002BH0	MS-FAC2611-0 AND IOM4711, 24X36, DUAL PS
	1	MS-IOM2711-0	MS-IOM2711-0 6 POINT
RA-Q	1	CDLSXX	VERIS DUCT CO2 TRANS, DISPLAY, 0-2000PPM
RA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
RELD-C	1	OTHERS	DPR ACT,24 VAC, PROVIDED WITH DAMPER
RELF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SDR-1/2	2	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
SF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SFPLO-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
ZN-T,-SP,-TOCC	1	NS-BTB7001-0	TE, F/C, DIS, ADJ, OCC, PJ
HTG-O, CLG-O			SEE VALVE SCHEDULE

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Drawing Title AHU-3/4 Flow Layout Typical of 2		NO.		REVISION-LOCATION		ECN	DATE	BY
Project Title Kelly Walsh High School		Application Engineer Chris Odell		DRAWN		BY	DATE	APPROVED
Sales Engineer T Gunderson		Project Manager Wayne Ramich		Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030		DRAWING NUMBER 4-1



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Drawing Title: **AHU-3/4 Wiring Details Typical Of 2**

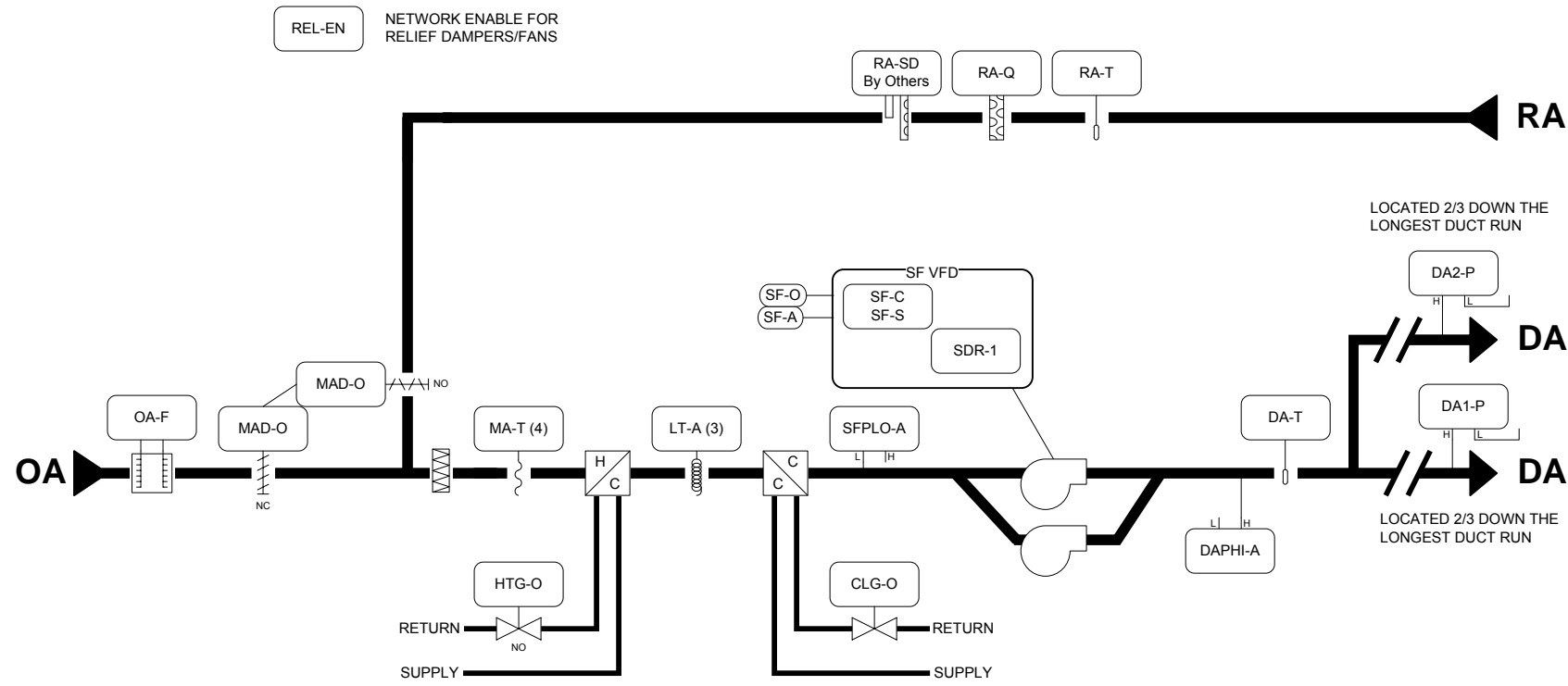
Project Title: **Kelly Walsh High School**

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	BY

Branch Information: **Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501**

CONTRACT NUMBER: **4216-0030**

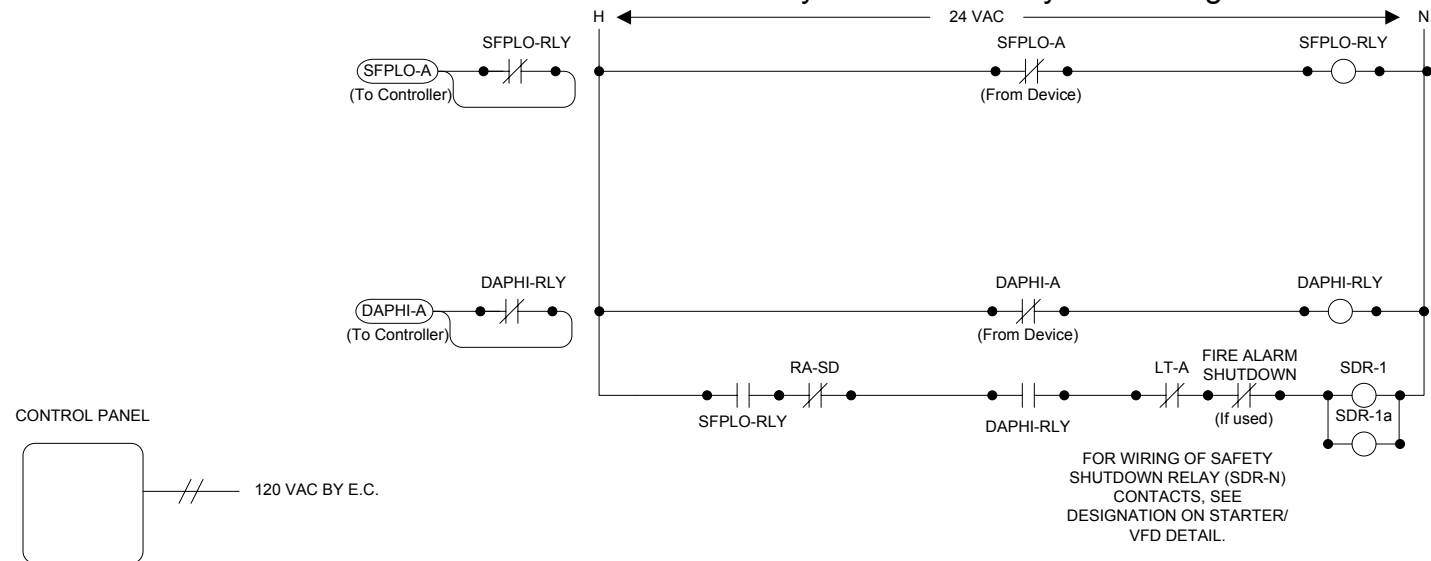
DRAWING NUMBER: **4-3**



BILL OF MATERIALS

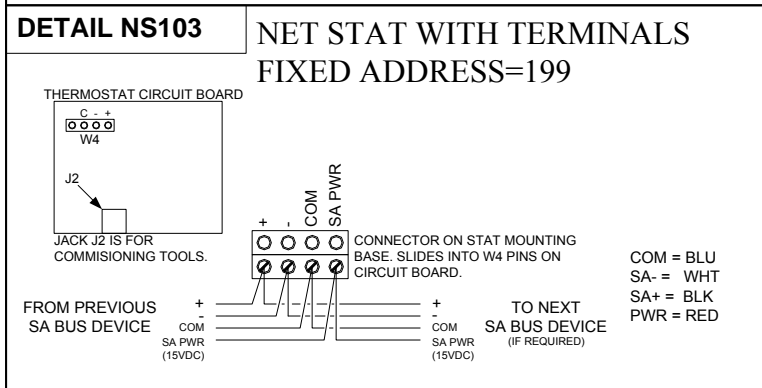
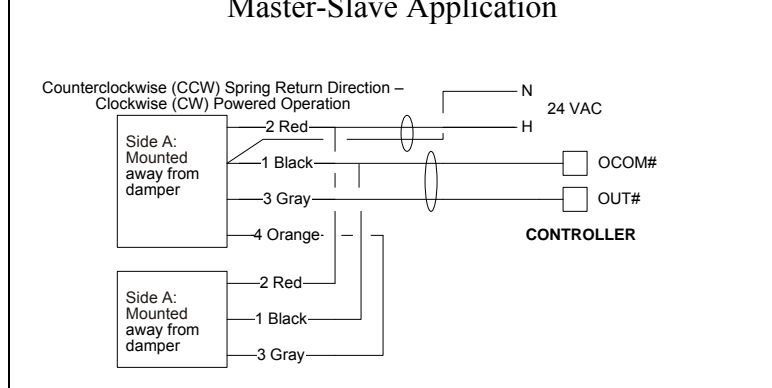
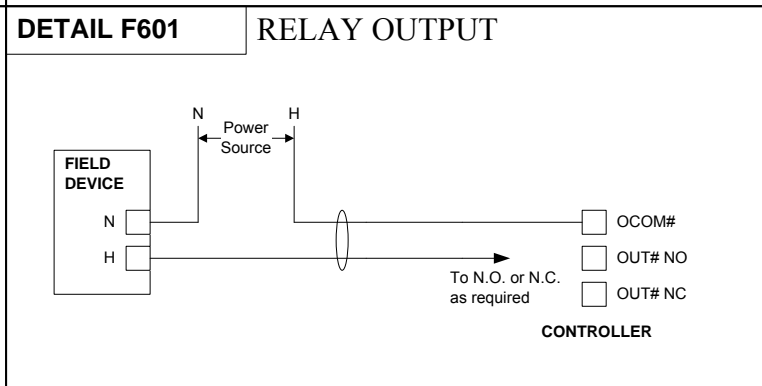
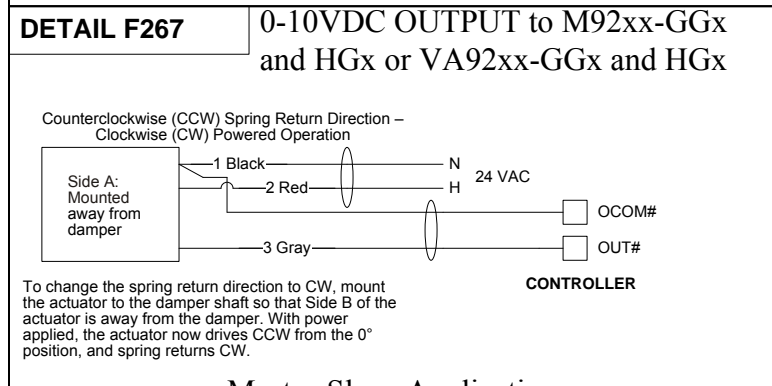
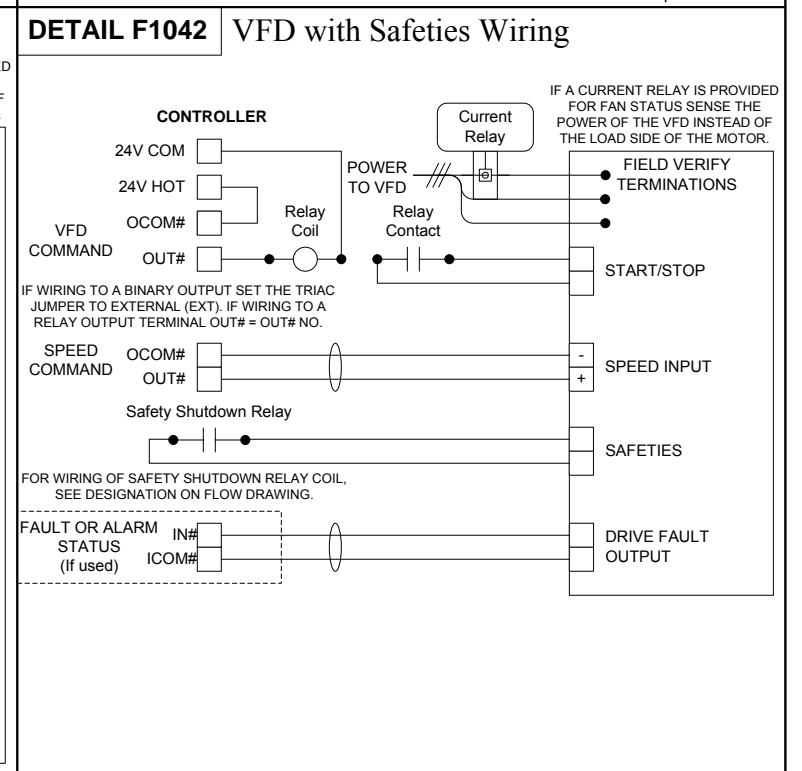
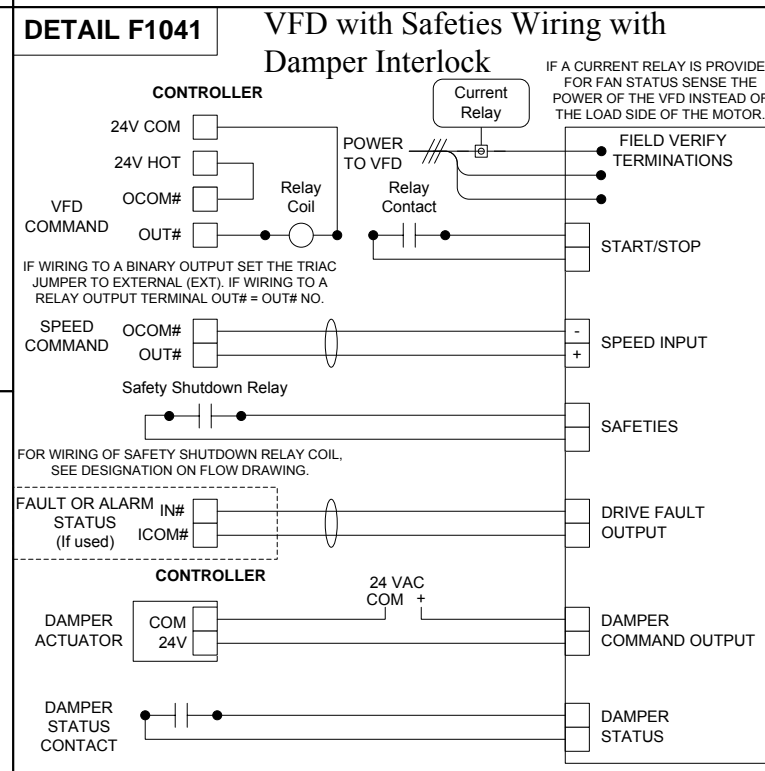
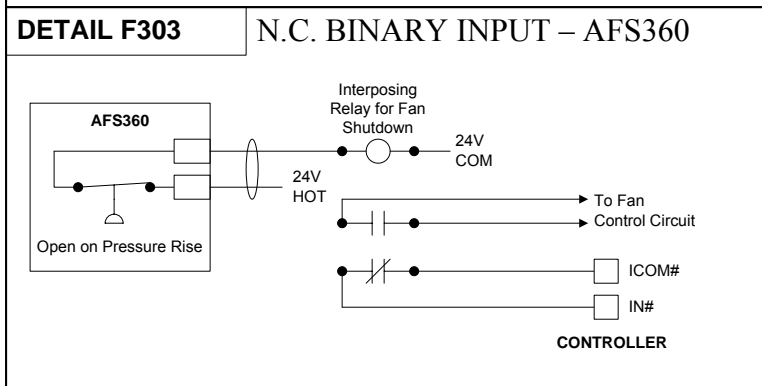
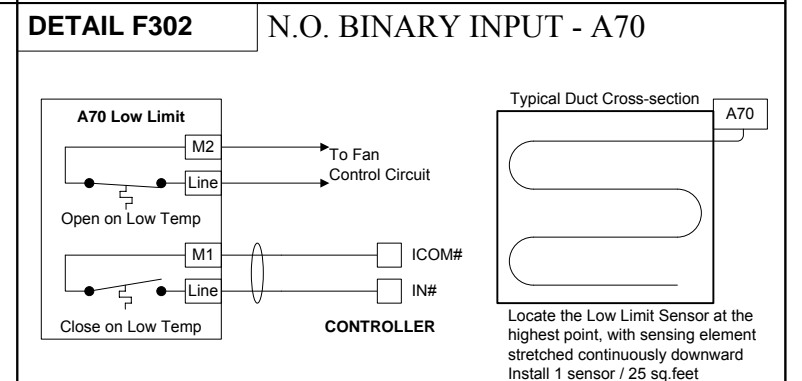
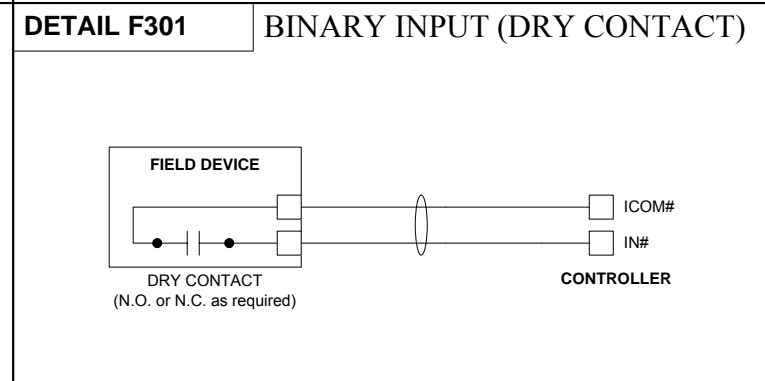
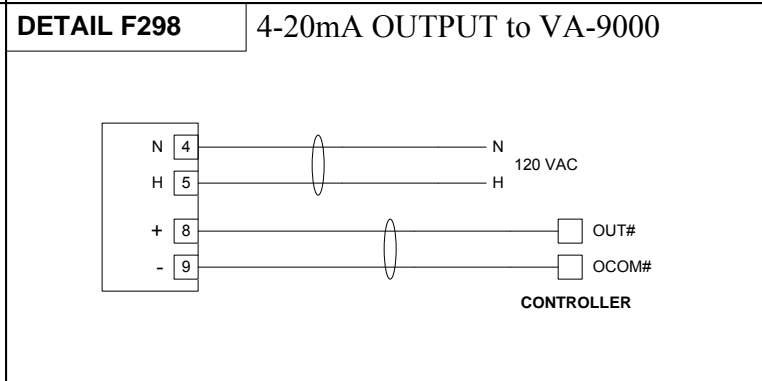
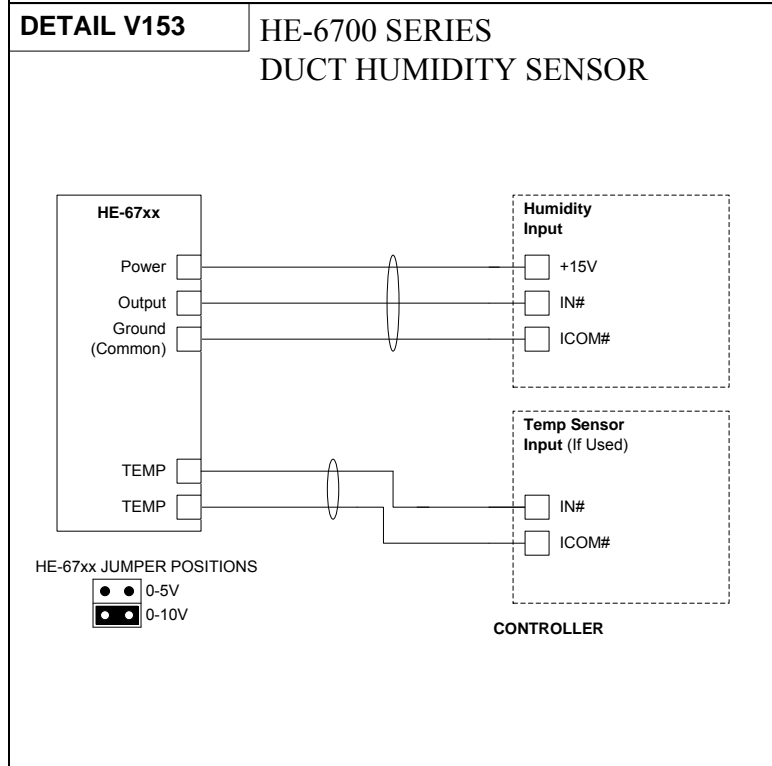
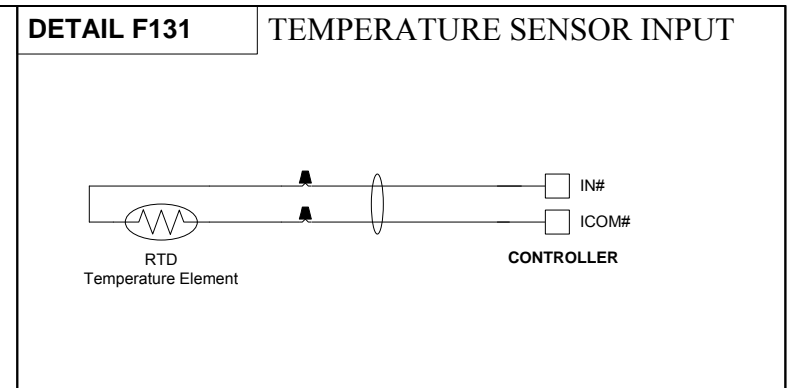
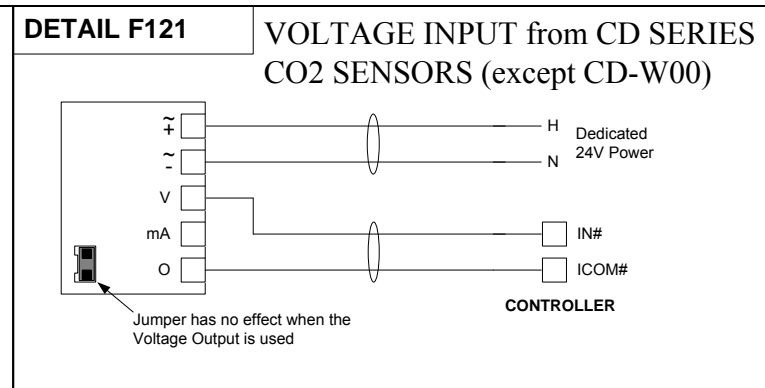
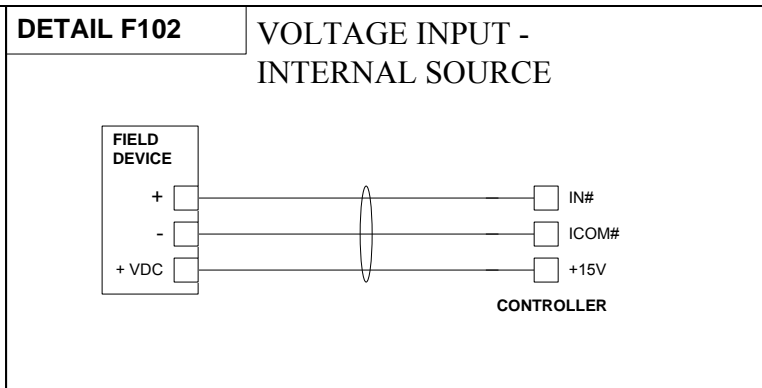
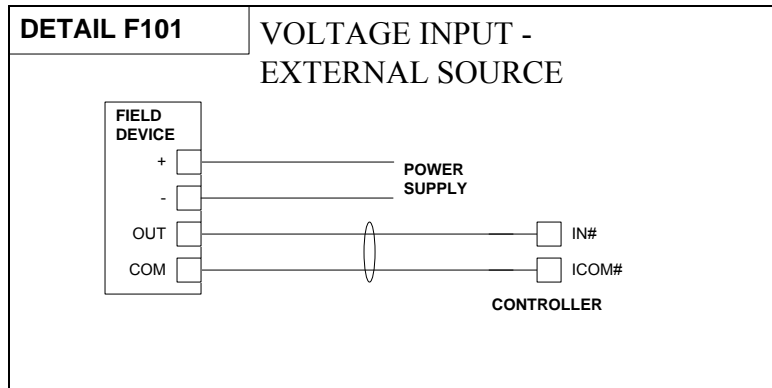
Designation	Qty	Part Number	Description
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
DAx-P	2	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
DAPHI-A	2	FTG18A-600R	REMOTE MTD PROBE
	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
LT-A	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
MA-T	1	SH2B-05	DPDT RELAY BASE FOR RH2B
	3	A70HA-1C	DUCT,MLT,SP=15-55 F (-9-13 C),STG=2
MAD-O	3	TE-6001-8	AVERAGING ELEMENT HOLDER
	1	TE-6001-8	AVERAGING ELEMENT HOLDER
OA-F	4	TE-6316M-1	NICKEL DUCT AVERAGE,17 FEET
PANEL	2	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
RA-Q	1		SEE AIRFLOW MEASURING STATION SCHEDULE
RA-T	1	PAKLJJ002BH0	MS-FAC2611-0 AND IOM4711, 24X36, DUAL PS
SDR-1	1	CDLSXX	VERIS DUCT CO2 TRANS, DISPLAY, 0-2000PPM
SF-C,-S	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
SFPLO-A	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
HTG-O, CLG-O	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
HTG-O, CLG-O	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
HTG-O, CLG-O	1	SH2B-05	DPDT RELAY BASE FOR RH2B
HTG-O, CLG-O			SEE VALVE SCHEDULE

Safety Shutdown Relay Coil Wiring Detail



Typical of:
AHU-5, AHU-6, AHU-7, AHU-8,
AHU-9, AHU-10, AHU-11

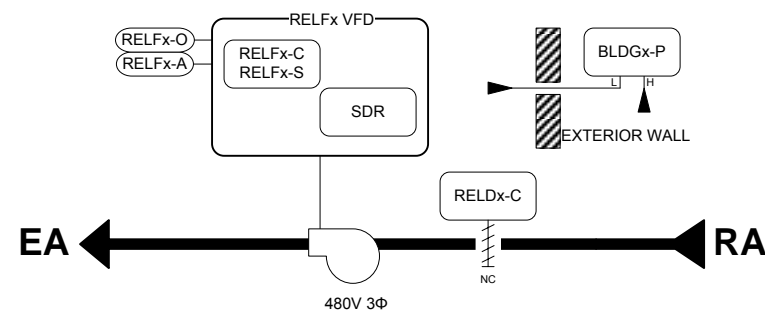
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		<p>Project Title</p> <p>Kelly Walsh High School</p>			
<p>REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY</p> <p>Sales Engineer Project Manager Application Engineer DRAWN APPROVED</p> <p>T Gunderson Wayne Ramich Chris Odell BY DATE BY DATE</p>		<p>Branch Information</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER</p> <p>4216-0030</p> <p>DRAWING NUMBER</p> <p>5-1</p>	



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Drawing Title									
AHU-5 to 11 Wiring Details Typical Of 7									
Project Title		Kelly Walsh High School							
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN		DATE	
T Gunderson		Wayne Ramich		Chris Odell		BY		DATE	
SALES ENGINEER		PROJECT MANAGER		APPLICATION ENGINEER		DRAWN		APPROVED	
Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER		4216-0030		DRAWING NUMBER	
		Johnson Controls						5-3	



BILL OF MATERIALS

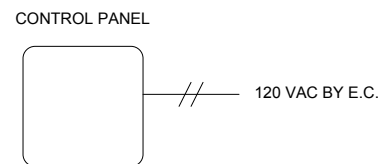
Designation	Qty	Part Number	Description
BLDGx-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -0.25 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
	1		ELEC, 24VAC, SPRING RETURN
RELDx-C	1		ELEC, 24VAC, SPRING RETURN
RELFx-C	1	RIB2401B	SPDT, 20A, HC=24 VAC/DC, W/LED
RELF-VFD	1		VFD PROVIDED WITH EXHAUST FANS
RELFx-S	1		VFD AUX RUN CONTACT
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
PANEL	1	EN-EWC25-0	UPM DUAL W/TRANSFORMER
	1	MS-FEC1611-0	FEC1611-0, 10PT

Relief Air Sequence Of Operation

RELIEF FAN CONTROL:

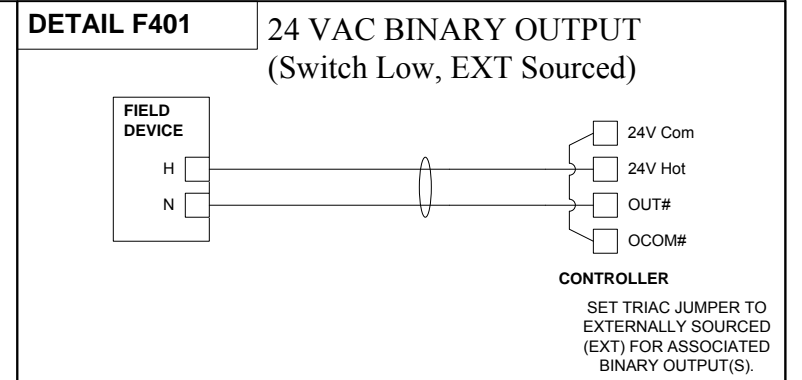
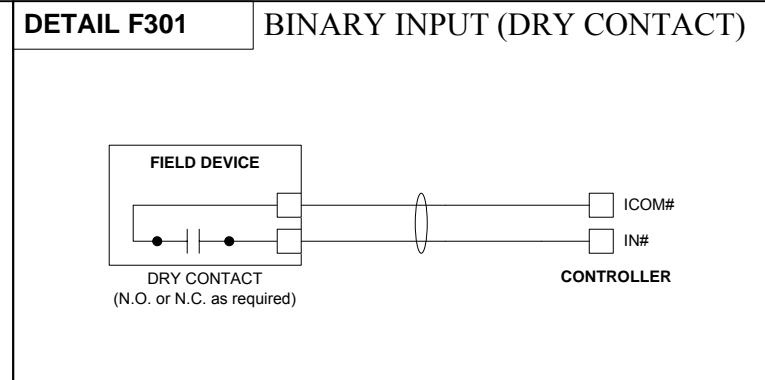
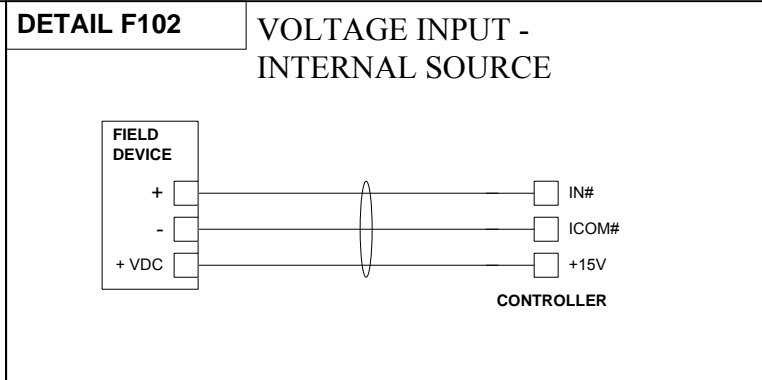
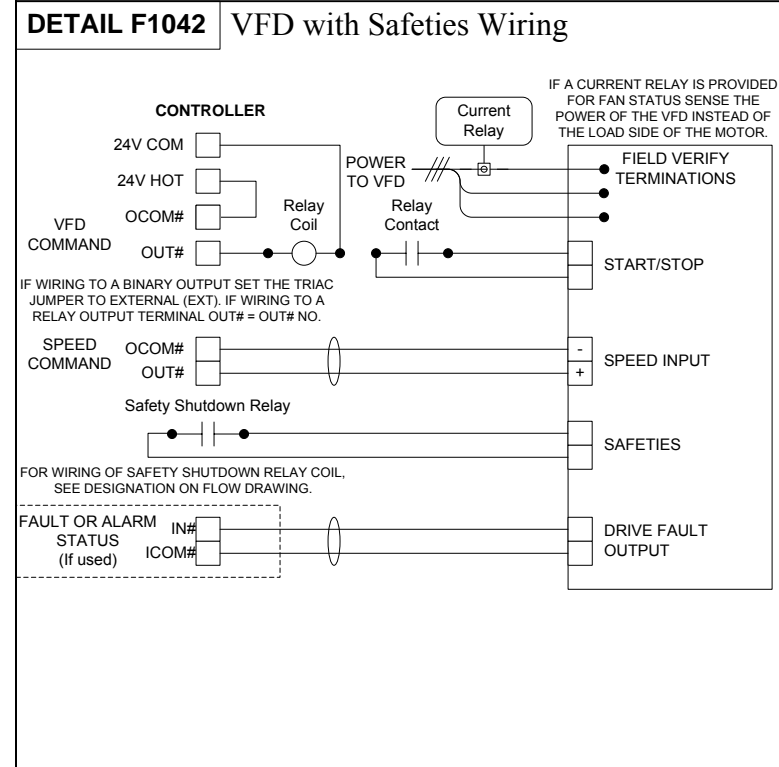
In occupied mode when the air handler enables the relief air system the following shall occur: When the building static pressure exceeds setpoint (BLDGP-SP) the isolation dampers (RELDx-C) will open while the relief fans are off. On a further rise in static pressure the relief fans (RELFx-C) will be commanded to run. The relief fans (RELFx-O) will modulate to maintain the building static pressure at setpoint (BLDGP-SP). When the relief fan frequency converter fault input (RLF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.

In unoccupied mode the relief air dampers (RELDx-C) will closed while the relief fans (RELFx-C) will be commanded off.



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	AHU-5 to 11 RA Flow Layout									
	Typical of 7									
	Project Title		Project Manager		Application Engineer		DRAWN		APPROVED	
Kelly Walsh High School		Wayne Ramich		Chris Odell		BY DATE		BY DATE		
						Branch Information		CONTRACT NUMBER		
						<p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		4216-0030		
								DRAWING NUMBER		
								5-4		

Tag	Point Information				Controller Information					Panel Information				Intermediate Device					Field Device				Ref Detail Shape	Comment		
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing			Termination In	Device
FEC		AHU-RELx			FEC 16xx																					Power to Controller BacNet FC Bus
FEC	UI IN-1	AHU-RELx	BLDGx-P	Building Static Pressure 1	FEC 16xx	MS/TP	1	x	UI IN-1		IN1, ICOM1, +15V				0	-4-UI IN-1										F102
FEC	UI IN-2	AHU-RELx	RELFX-A	Relief Fan 1 Alarm	FEC 16xx	MS/TP	1	x	UI IN-2		IN2, ICOM2				0	-4-UI IN-2										
FEC	BI IN-3	AHU-RELx	RELFX-S	Relief Fan 1 Status	FEC 16xx	MS/TP	1	x	BI IN-3		IN3, ICOM3				0	-4-BI IN-3	2/18	OUT, COM	Current Relay	Motor Lead		2/18	See wiring detail	Motor Status (Contact)		F301
FEC	BO OUT-1	AHU-RELx	RELFX-C	Relief Fan 1 Command	FEC 16xx	MS/TP	1	x	BO OUT-1		OUT1, 24V COM				0	-4-BO OUT-1	2/18	COIL-, COIL+	Relay	COM, NO		2/18	See wiring detail	VFD (w/ Safety) (Sw Hi, EXT)	F1042	
FEC	BO OUT-2	AHU-RELx	RELDx-C	Relief Damper 1 Command	FEC 16xx	MS/TP	1	x	BO OUT-2		OUT2, 24V HOT				0	-4-BO OUT-2						2/18	See wiring detail	24VAC OUT (Sw Low, EXT Source)	F401	
FEC	BO OUT-3	AHU-RELx			FEC 16xx	MS/TP	1	x	BO OUT-3						0	-4-BO OUT-3										
FEC	CO OUT-4	AHU-RELx	RELFX-O	Relief Fan 1 Output	FEC 16xx	MS/TP	1	x	CO OUT-4		OUT4, OCOM4				0	-4-CO OUT-4						2/18	See VFD Detail	VFD Speed Control (Vdc)		
FEC	CO OUT-5	AHU-RELx			FEC 16xx	MS/TP	1	x	CO OUT-5						0	-4-CO OUT-5										
FEC	CO OUT-6	AHU-RELx			FEC 16xx	MS/TP	1	x	CO OUT-6						0	-4-CO OUT-6										
FEC	CO OUT-7	AHU-RELx			FEC 16xx	MS/TP	1	x	CO OUT-7						0	-4-CO OUT-7										



Drawing Title											
AHU-5 to 11 RA Wiring Details Typical of 7											
REFERENCE DRAWING			NO.			REVISION-LOCATION			ECN	DATE	BY
Sales Engineer	Project Manager	Application Engineer	DRAWN			BY	DATE	BY	DATE		
T Gunderson	Wayne Ramich	Chris Odell									
Project Title		Branch Information		CONTRACT NUMBER		DRAWING NUMBER					
Kelly Walsh High School		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		5-5					

Air Handlers AHU-5 to AHU-11 Sequences Of Operation

SUPPLY FAN CONTROL:

The variable speed supply fans (SFx-C) will be started based on occupancy schedule (OCC-SCHEDULE) When either supply fan status (SFx-S) indicates a fan started, the control sequence will be enabled. The supply fans (SFx-O) will modulate in unison to maintain the discharge static, as determined from the minimum of two duct static pressure sensors (DAX-P), at setpoint (DAP-SP) Upon a loss of airflow (SFx-S) on either fan, the fan will stop until the unit is manually reset (SYS-RESET) When the supply fan frequency converter fault input (SF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.

OCCUPIED MODE:

The occupancy mode will be controlled via a network input (OCC-SCHEDULE) The occupancy mode can also be overridden by a network input (OCC-OVERRIDE).

UNOCCUPIED MODE:

The unit will cycle to maintain unoccupied zone setpoints (CLGUNOCC-SP & HTGUNOCC-SP) during unoccupied periods.

STATIC PRESSURE SETPOINT CONTROL:

In the warm-up and night setback modes the setpoint (DAP-SP) shall be set to the minimum occupied value. In the occupied mode reset the setpoint (DAP-SP) shall be reset between a min and max setpoint using a PI loop to maintain at least one VAV box damper fully open.

TEMPERATURE CONTROL:

The unit will sequence the heating valve, cooling valve, and mixed air dampers control to maintain a discharge air temperature (OA-T) at a setpoint (DAT-SP) of 55 degF (adj.). The discharge air temperature setpoint (DAT-SP) shall be reset between a min and max setpoint based on the warmest space temperature.

ECONOMIZER CONTROL AND DEMAND CONTROLLED VENTILATION:

When the outdoor air (OA-T) is cooler than the economizer setpoint, the economizer will act as the initial stage of cooling, working in sequence with the cooling coil. When the outdoor air (OA-T) is warmer than the economizer setpoint, the economizer will be commanded to the minimum outside air position. The return air CO₂ sensor (RA-Q) will be used for Demand Controlled Ventilation (DCV) to reset the damper minimum position. The DCV control shall reset the Outside Air flow between a min and max setpoint based on a setpoint (RAQ-SP) of 1100 ppm.

MINIMUM OA CONTROL:

The unit will adjust the minimum damper position to meet the OA flow setpoint. The fresh air intake of the unit will be limited to prevent the preheat temperature (PH-T) from falling below the low limit setpoint (OALT-SP).

HEATING COIL:

The heating (HTG-O) will modulate to maintain the temperature setpoint When the unit is shutdown, the heating coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT-SP)

COOLING COIL:

The cooling coil (CLG-O) will modulate to maintain the temperature setpoint. When the unit is shutdown, the cooling coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT-SP)

WARMUP/COOLDOWN MODE:

The warmup/cooldown mode will be initiated by the network input (WC-C). The unit will control to occupied setpoints (CLGOCC-SP & HTGOCC-SP) during warmup and cooldown cycles. The Outside Air dampers shall be closed and the Return Air dampers shall be open during this mode.

RELIEF DAMPER AND FAN CONTROL

In occupied mode when the air handler enables the relief air system the following shall occur: When the building static pressure exceeds setpoint (BLDGP-SP) the isolation dampers (RELDx-C) will open while the relief fans are off. On a further rise in static pressure the relief fans (RELFx-C) will be commanded to run. The relief fans (RELFx-O) will modulate to maintain the building static pressure at setpoint (BLDGP-SP). When the relief fan frequency converter fault input (RLF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.


In unoccupied mode the relief air dampers (RELDx-C) will closed while the relief fans (RELFx-C) will be commanded off.

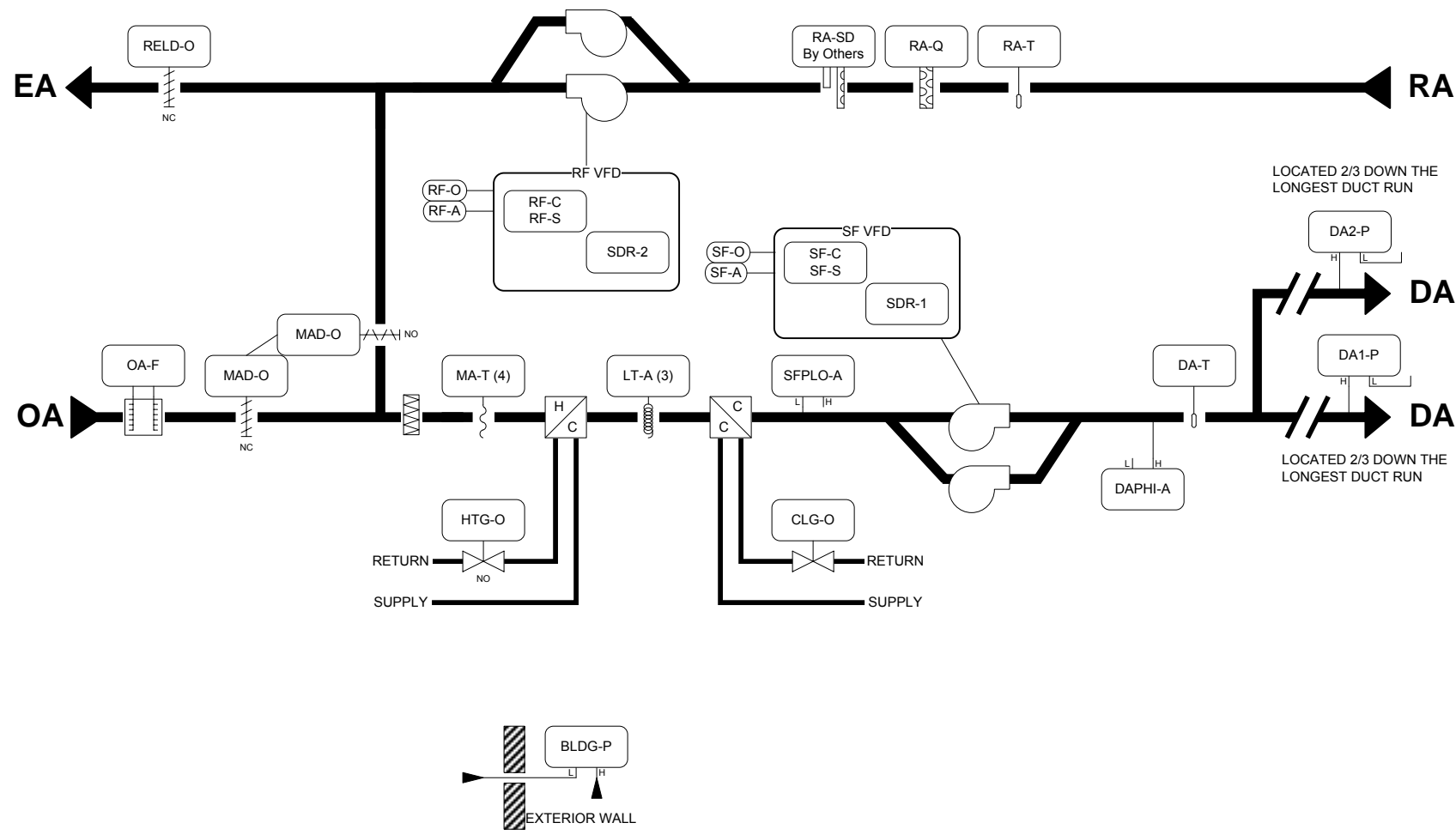
UNIT PROTECTION:

- Low Temperature Alarm (LT-A)- When in "Alarm", the control sequence will stop running, the valve(s) will open and the fan(s) will be disabled via a hard wired shutdown circuit.
- Discharge Air High Duct Pressure Alarm (DAPHI-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Supply Fan Low Pressure Alarm (SFPLO-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Return Air Smoke Detector (RA-SD)- Disables the fan(s) via a hard wired shutdown circuit.

ADDITIONAL POINTS MONITORED BY THE FMS:

- Mixed Air Temperature (MA-T)
- Return Air Temperature (RA-T)

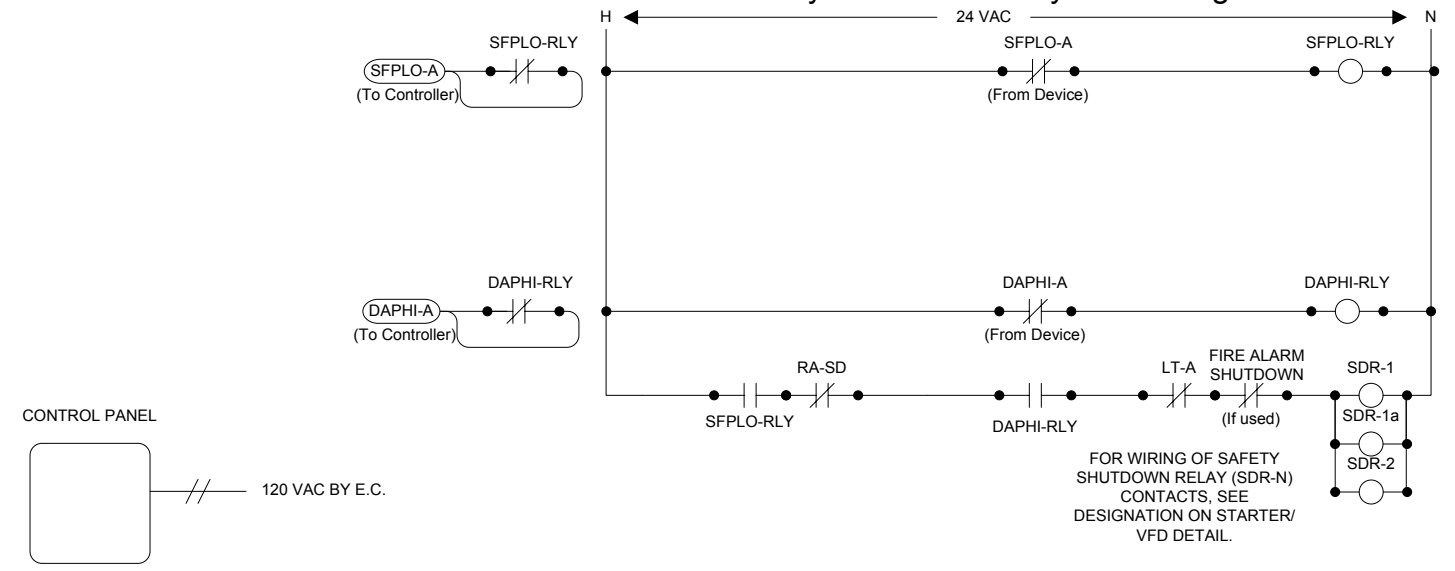
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		AHU-5 to 11 Sequence of Operation Typical of 7								
		Project Title								
		Kelly Walsh High School								
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY				
T Gunderson	Wayne Ramich	Chris Odell					APPROVED			
Branch Information		CONTRACT NUMBER								
 <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		4216-0030								
		DRAWING NUMBER		5-6						



BILL OF MATERIALS

Designation	Qty	Part Number	Description
BLDG-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -0.25 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENR
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
DAx-P	2	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
	2	FTG18A-600R	REMOTE MTD PROBE
DAPHI-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
LT-A	3	A70HA-1C	DUCT,MLT,SP=15-55 F (-9-13 C),STG=2
	3	TE-6001-8	AVERAGING ELEMENT HOLDER
MA-T	1	TE-6001-8	AVERAGING ELEMENT HOLDER
	4	TE-6316M-1	NICKEL DUCT AVERAGE,17 FEET
MAD-O	2	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
OA-F	1		SEE AIRFLOW MEASURING STATION SCHEDULE
PANEL	1	PAKLJ002BH0	MS-FAC2611-0 AND IOM4711, 24X36, DUAL PS
	1	MS-IOM1711-0	MS-IOM1711-0 IOM 4 POINT
RA-Q	1	CDLSXX	VERIS DUCT CO2 TRANS, DISPLAY, 0-2000PPM
RA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
RELD-O	1	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
RF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SDR-1/2	2	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
SF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SFPLO-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
HTG-O, CLG-O			SEE VALVE SCHEDULE

Safety Shutdown Relay Coil Wiring Detail




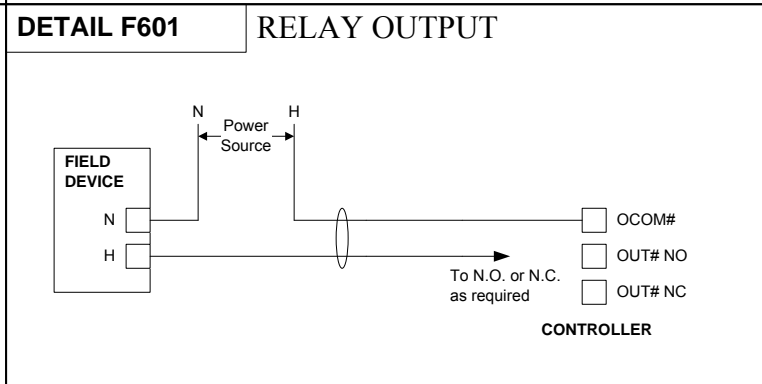
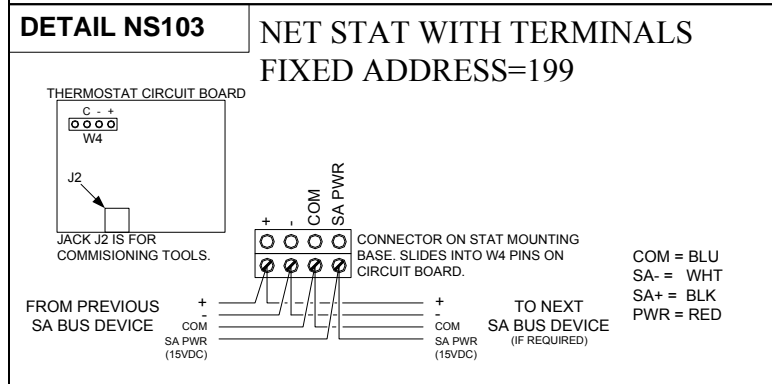
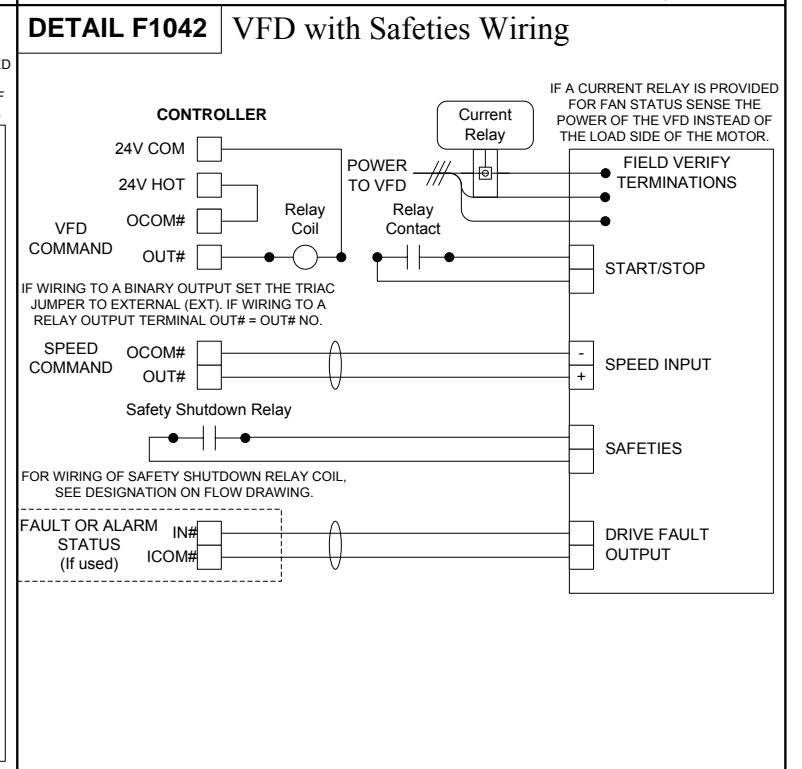
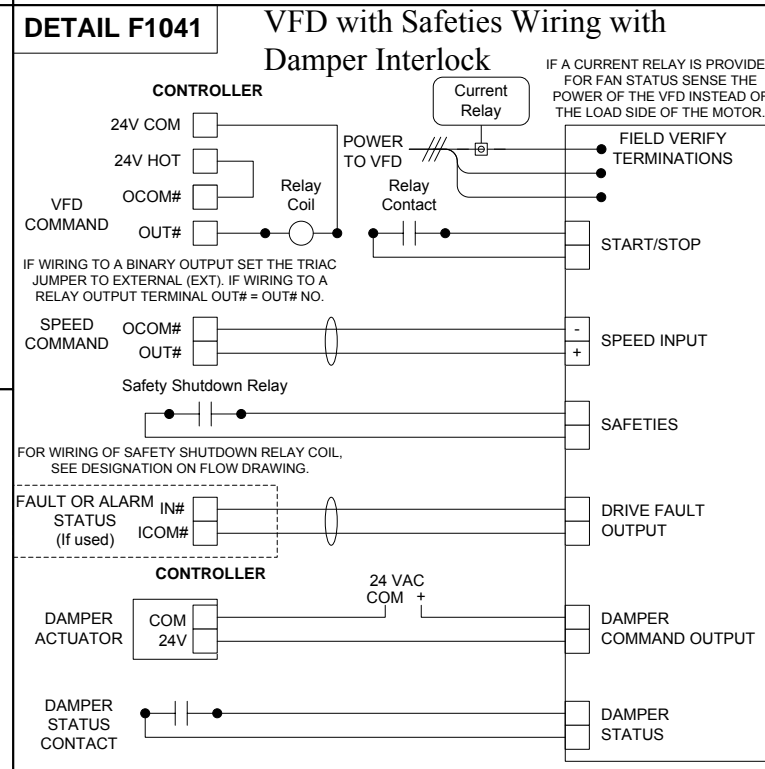
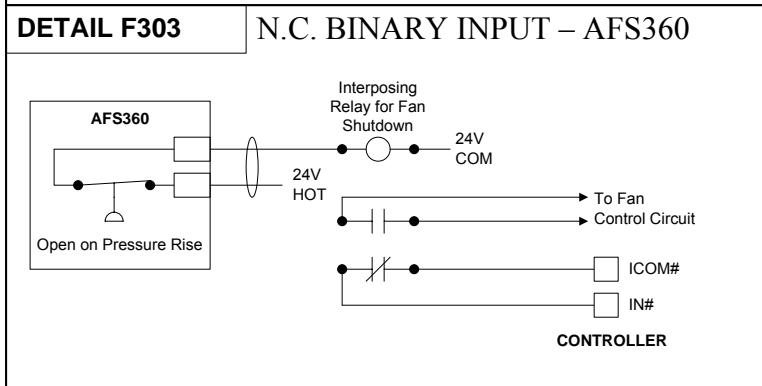
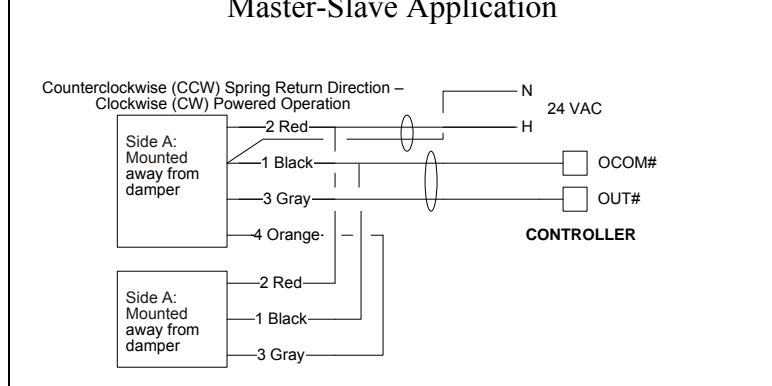
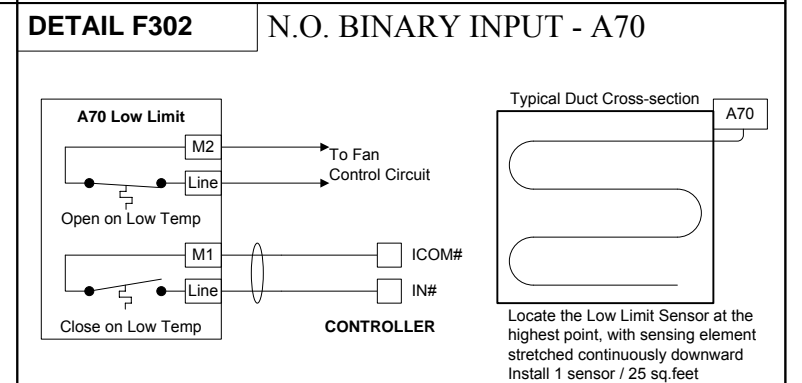
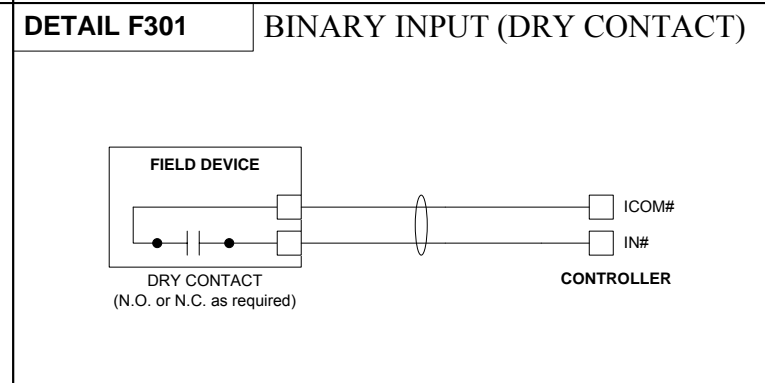
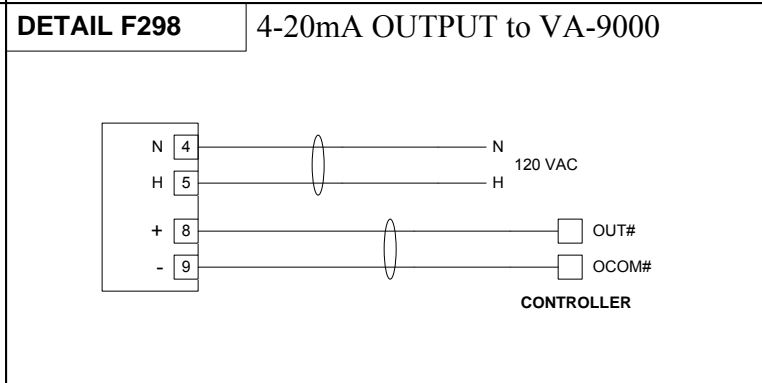
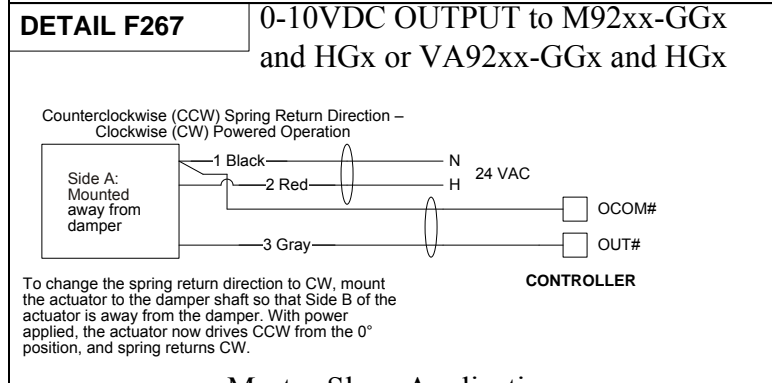
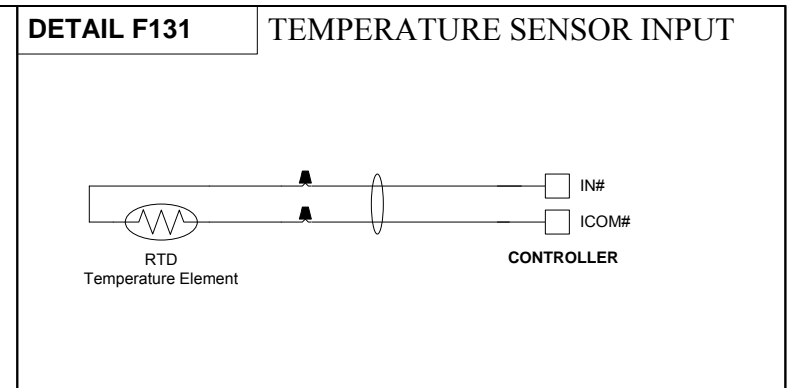
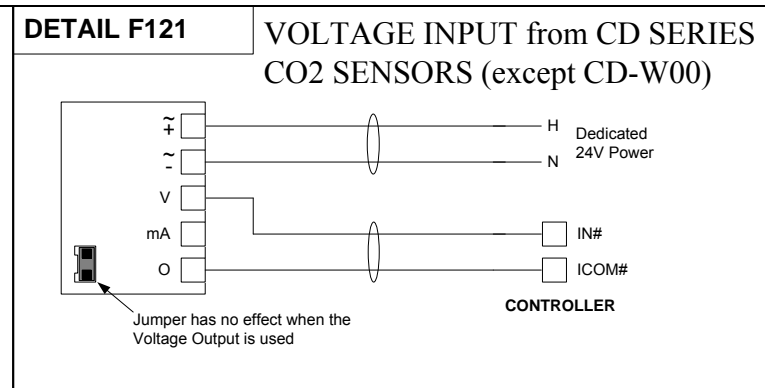
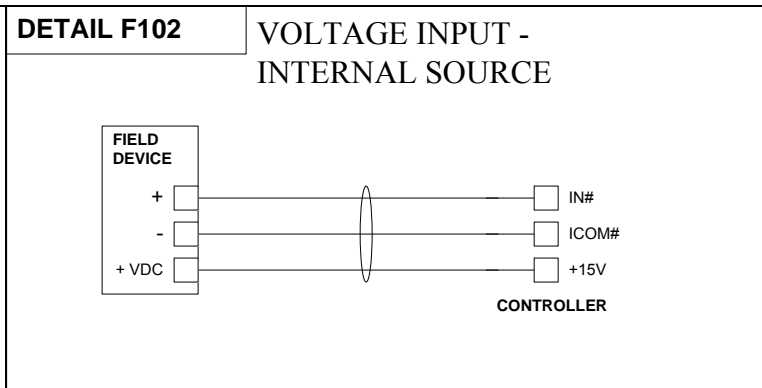
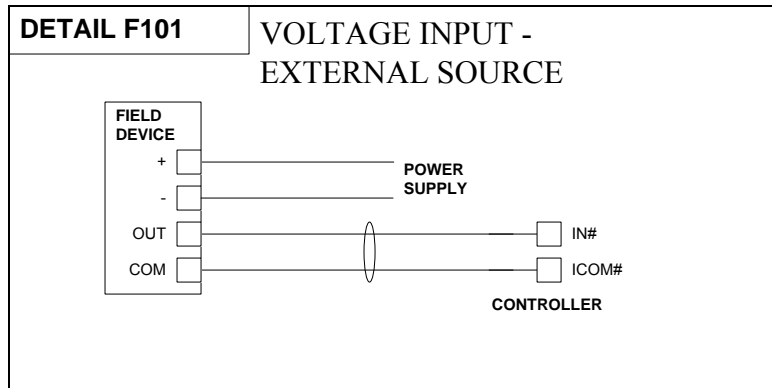
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Drawing Title AHU-12 Flow Layout		NO.		REVISION-LOCATION		ECN	DATE	BY
Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED			
T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	BY	DATE		
Project Title Kelly Walsh High School		Branch Information		CONTRACT NUMBER				
		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030				
				DRAWING NUMBER 6-1				

Tag	Point Information				Controller Information						Panel Information				Intermediate Device					Field Device				Ref Detail Shape	Comment	
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing	Termination In			Device
FAC		AHU12-FAC			FAC 2611																					Power to Controller
FAC		AHU12-FAC			FAC 2611	MS/TP	1	26							0											BacNet FC Bus
FAC	UI IN-1	AHU12-FAC	DA-T	Discharge Air Temperature	FAC 2611	MS/TP	1	26	UI IN-1		IN1, ICOM1				0											
FAC	UI IN-2	AHU12-FAC	MA-T	Mixed Air Temperature	FAC 2611	MS/TP	1	26	UI IN-2		IN2, ICOM2				0											
FAC	UI IN-3	AHU12-FAC	DA1-P	Discharge Air Static Pressure 1	FAC 2611	MS/TP	1	26	UI IN-3		IN3, ICOM3, +15V				0											
FAC	UI IN-4	AHU12-FAC	DA2-P	Discharge Air Static Pressure 2	FAC 2611	MS/TP	1	26	UI IN-4		IN4, ICOM4, +15V				0											
FAC	UI IN-5	AHU12-FAC	OA-F	Outdoor Air Flow	FAC 2611	MS/TP	1	26	UI IN-5		IN5, ICOM5				0											
FAC	UI IN-6	AHU12-FAC	RA-SD	Return Air Smoke Alarm	FAC 2611	MS/TP	1	26	UI IN-6		IN6, ICOM6				0											
FAC	BI IN-7	AHU12-FAC	SF-S	Supply Fan Status	FAC 2611	MS/TP	1	26	BI IN-7		IN7, ICOM7				0											
FAC	BI IN-8	AHU12-FAC	SF-A	Supply Fan Alarm	FAC 2611	MS/TP	1	26	BI IN-8		IN8, ICOM8				0											
FAC	BO OUT-1	AHU12-FAC	SF-C	Supply Fan Command	FAC 2611	MS/TP	1	26	BO OUT-1		OUT1, 24V COM				0											
FAC	BO OUT-2	AHU12-FAC	RF-C	Return Fan Command	FAC 2611	MS/TP	1	26	BO OUT-2						0											
FAC	BO OUT-3	AHU12-FAC			FAC 2611	MS/TP	1	26	BO OUT-3						0											
FAC	CO OUT-4	AHU12-FAC	SF-O	Supply Fan Output	FAC 2611	MS/TP	1	26	CO OUT-4		OUT4, OCOM4				0											
FAC	CO OUT-5	AHU12-FAC	RF-O	Return Fan Output	FAC 2611	MS/TP	1	26	CO OUT-5						0											
FAC	CO OUT-6	AHU12-FAC	MAD-O	Mixed Air Damper Output	FAC 2611	MS/TP	1	26	CO OUT-6		OUT6, OCOM6, 24VAC, COM				0											
FAC	CO OUT-7	AHU12-FAC	RELD-O	Relief Air Damper Output	FAC 2611	MS/TP	1	26	CO OUT-7						0											
FAC	AO OUT-8	AHU12-FAC			FAC 2611	MS/TP	1	26	AO OUT-8						0											
FAC	AO OUT-9	AHU12-FAC			FAC 2611	MS/TP	1	26	AO OUT-9						0											
IOM		AHU12-FAC			IOM 4710																					Power to Controller
IOM		AHU12-FAC			IOM 4710	SA Bus	1	5							0											BacNet SA Bus
IOM	UI IN-1	AHU12-FAC	RA-T	Return Air Temperature	IOM 4710	SA Bus	1	5	UI IN-1		IN1, ICOM1				0											
IOM	UI IN-2	AHU12-FAC	CHW-DP	Chilled Water Differential Press	IOM 4710	SA Bus	1	5	UI IN-2						0											
IOM	UI IN-3	AHU12-FAC	RA-Q	Return Air Quality	IOM 4710	SA Bus	1	5	UI IN-3		IN3, ICOM3, 24V HOT, 24V COM				0											
IOM	UI IN-4	AHU12-FAC	BLDG-P	Building Static Pressure	IOM 4710	SA Bus	1	5	UI IN-4						0											
IOM	UI IN-5	AHU12-FAC	LT-A	Low Temperature Alarm	IOM 4710	SA Bus	1	5	UI IN-5		IN5, ICOM5				0											
IOM	UI IN-6	AHU12-FAC	HW-DP	Hot Water Differential Pressure	IOM 4710	SA Bus	1	5	UI IN-6						0											
IOM	BI IN-7	AHU12-FAC	DAPHI-A	Discharge Air High Duct Pressu	IOM 4710	SA Bus	1	5	BI IN-7		IN7, ICOM7				0											
IOM	BI IN-8	AHU12-FAC	SFPLO-A	Supply Fan Low Duct Pressure	IOM 4710	SA Bus	1	5	BI IN-8		IN8, ICOM8				0											
IOM	BO OUT-1	AHU12-FAC			IOM 4710	SA Bus	1	5	BO OUT-1						0											
IOM	BO OUT-2	AHU12-FAC			IOM 4710	SA Bus	1	5	BO OUT-2						0											
IOM	BO OUT-3	AHU12-FAC			IOM 4710	SA Bus	1	5	BO OUT-3						0											
IOM	CO OUT-4	AHU12-FAC			IOM 4710	SA Bus	1	5	CO OUT-4						0											
IOM	CO OUT-5	AHU12-FAC			IOM 4710	SA Bus	1	5	CO OUT-5						0											
IOM	CO OUT-6	AHU12-FAC			IOM 4710	SA Bus	1	5	CO OUT-6						0											
IOM	CO OUT-7	AHU12-FAC			IOM 4710	SA Bus	1	5	CO OUT-7						0											
IOM	AO OUT-8	AHU12-FAC	HTG-O	Heating Output	IOM 4710	SA Bus	1	5	AO OUT-8		OUT8, OCOM8, 120V				0											
IOM	AO OUT-9	AHU12-FAC	CLG-O	Cooling Output	IOM 4710	SA Bus	1	5	AO OUT-9		OUT9, OCOM9, 24VAC, COM				0											
IOM		AHU12-FAC			IOM 1710																					Power to Controller
IOM		AHU12-FAC			IOM 1710	SA Bus	1	6							0											BacNet SA Bus
IOM	BI IN-1	AHU12-FAC	RLF-S	Relief Fan Status	IOM 1710	SA Bus	1	6	BI IN-1		IN1, ICOM1				0											
IOM	BI IN-2	AHU12-FAC	RLF-A	Relief Fan Alarm	IOM 1710	SA Bus	1	6	BI IN-2		IN2, ICOM2				0											
IOM	BI IN-3	AHU12-FAC			IOM 1710	SA Bus	1	6	BI IN-3						0											
IOM	BI IN-4	AHU12-FAC			IOM 1710	SA Bus	1	6	BI IN-4						0											

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		Project Title		Kelly Walsh High School									
		Sales Engineer		Project Manager		Application Engineer		DRAWN		ECN		BY	
		T Gunderson		Wayne Ramich		Chris Odell		BY DATE		BY DATE		APPROVED	
				Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER		4216-0030			
								DRAWING NUMBER		6-2			



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	AHU-12 Wiring Details					
	Project Title					
	Kelly Walsh High School					
	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
	T Gunderson	Wayne Ramich	Chris Odell			
	Branch Information			CONTRACT NUMBER		
				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030 DRAWING NUMBER 6-3

Air Handler AHU-12 Sequences Of Operation

SUPPLY FAN CONTROL:

The variable speed supply fans (SFx-C) will be started based on occupancy schedule (OCC-SCHEDULE) When either supply fan status (SFx-S) indicates a fan started, the control sequence will be enabled. The supply fans (SFx-O) will modulate in unison to maintain the discharge static, as determined from the minimum of two duct static pressure sensors (DAX-P), at setpoint (DAP-SP) Upon a loss of airflow (SFx-S) on either fan, the fan will stop until the unit is manually reset (SYS-RESET) When the supply fan frequency converter fault input (SF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.

RETURN FAN CONTROL:

After the supply fan (SF-C) has been started, the variable speed return fans (RFx-C) will be started. The return fans (RFx-O) will track the supply fans. If the fan status (RF-S) does not match the command (RF-C), an alarm will be generated at the BAS.

OCCUPIED MODE:

The occupancy mode will be controlled via a network input (OCC-SCHEDULE) The occupancy mode can also be overridden by a network input (OCC-OVERRIDE).

UNOCCUPIED MODE:

The unit will cycle to maintain unoccupied zone setpoints (CLGUNOCC-SP & HTGUNOCC-SP) during unoccupied periods.

STATIC PRESSURE SETPOINT CONTROL:

In the warm-up and night setback modes the setpoint (DAP-SP) shall be set to the minimum occupied value. In the occupied mode reset the setpoint (DAP-SP) shall be reset between a min and max setpoint using a PI loop to maintain at least one VAV box damper fully open.

TEMPERATURE CONTROL:

The unit will sequence the heating valve, cooling valve, and mixed air dampers control to maintain a discharge air temperature (OA-T) at a setpoint (DAT-SP) of 55 degF (adj.). The discharge air temperature setpoint (DAT-SP) shall be reset between a min and max setpoint based on the warmest space temperature.

ECONOMIZER CONTROL AND DEMAND CONTROLLED VENTILATION:

When the outdoor air (OA-T) is cooler than the economizer setpoint, the economizer will act as the initial stage of cooling, working in sequence with the cooling coil. When the outdoor air (OA-T) is warmer than the economizer setpoint, the economizer will be commanded to the minimum outside air position. The return air CO₂ sensor (RA-Q) will be used for Demand Controlled Ventilation (DCV) to reset the damper minimum position. The DCV control shall reset the Outside Air flow between a min and max setpoint based on a setpoint (RAQ-SP) of 1100 ppm.

MINIMUM OA CONTROL:

The unit will adjust the minimum damper position to meet the OA flow setpoint. The fresh air intake of the unit will be limited to prevent the preheat temperature (PH-T) from falling below the low limit setpoint (OALT-SP).

HEATING COIL:

The heating (HTG-O) will modulate to maintain the temperature setpoint When the unit is shutdown, the heating coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT -SP)

COOLING COIL:

The cooling coil (CLG-O) will modulate to maintain the temperature setpoint. When the unit is shutdown, the cooling coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT-SP)

WARMUP/COOLDOWN MODE:

The warmup/cooldown mode will be initiated by the network input (WC-C). The unit will control to occupied setpoints (CLGOCC-SP & HTGOCC-SP) during warmup and cooldown cycles. The Outside Air dampers shall be closed and the Return Air dampers shall be open during this mode.

EXHAUST AIR DAMPER CONTROL

In occupied mode the exhaust air dampers (EAD-O) will modulate to maintain the building static pressure at a setpoint of 0.05 inwc (BLDGP-SP).


In unoccupied mode the exhaust air dampers (EAD-O) will close.

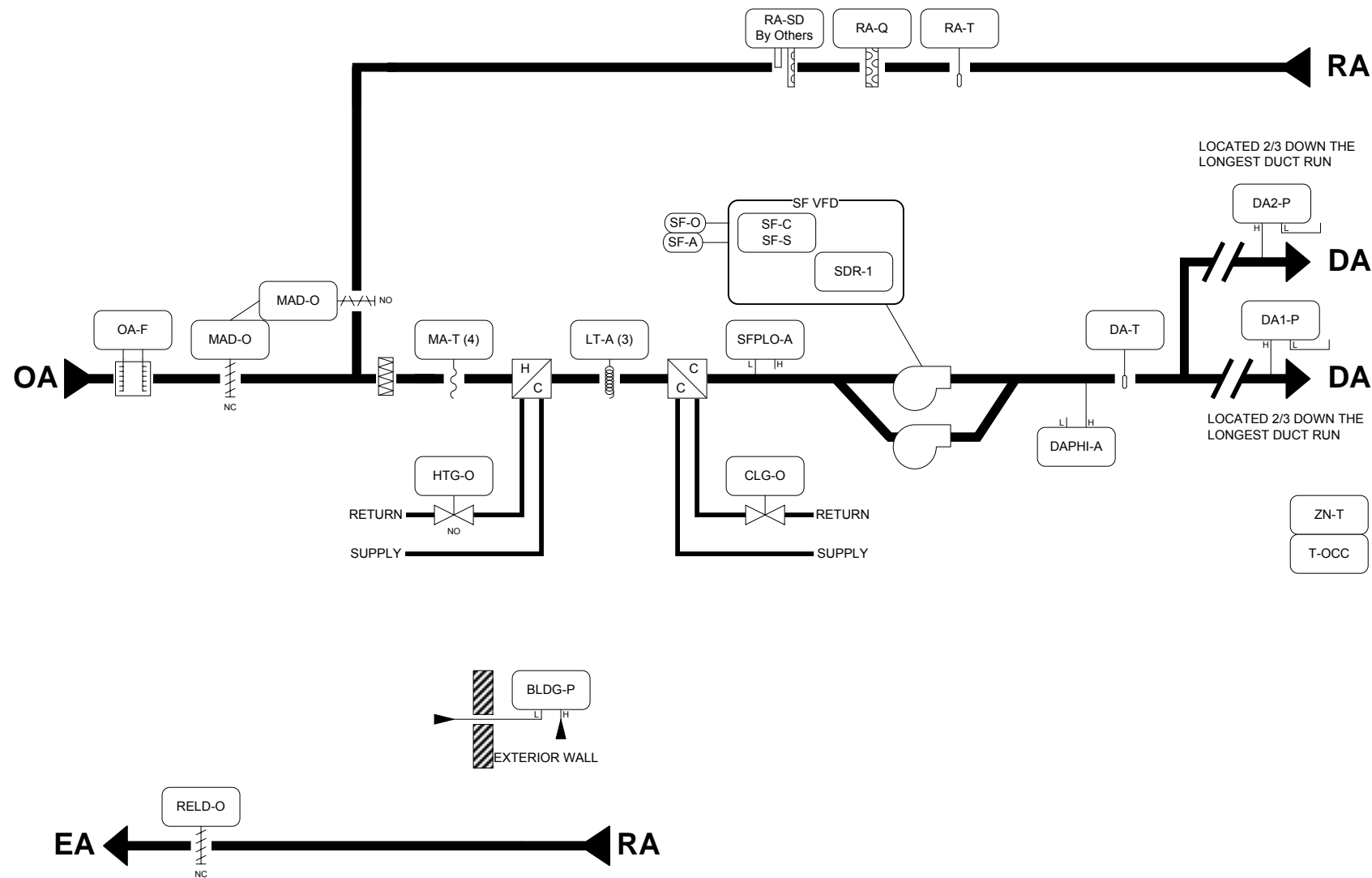
UNIT PROTECTION:

- Low Temperature Alarm (LT-A)- When in "Alarm", the control sequence will stop running, the valve(s) will open and the fan(s) will be disabled via a hard wired shutdown circuit.
- Discharge Air High Duct Pressure Alarm (DAPHI-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Supply Fan Low Pressure Alarm (SFPLO-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Return Air Smoke Detector (RA-SD)- Disables the fan(s) via a hard wired shutdown circuit.

ADDITIONAL POINTS MONITORED BY THE FMS:

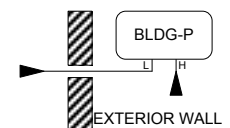
- Mixed Air Temperature (MA-T)
- Return Air Temperature (RA-T)

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		AHU-12 Sequence of Operation							
Project Title		Project Manager		Application Engineer		DRAWN		APPROVED	
Kelly Walsh High School		T Gunderson	Wayne Ramich	Chris Odell	BY	DATE	BY	DATE	
		Branch Information		CONTRACT NUMBER		DRAWING NUMBER			
		 <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		4216-0030		6-4			

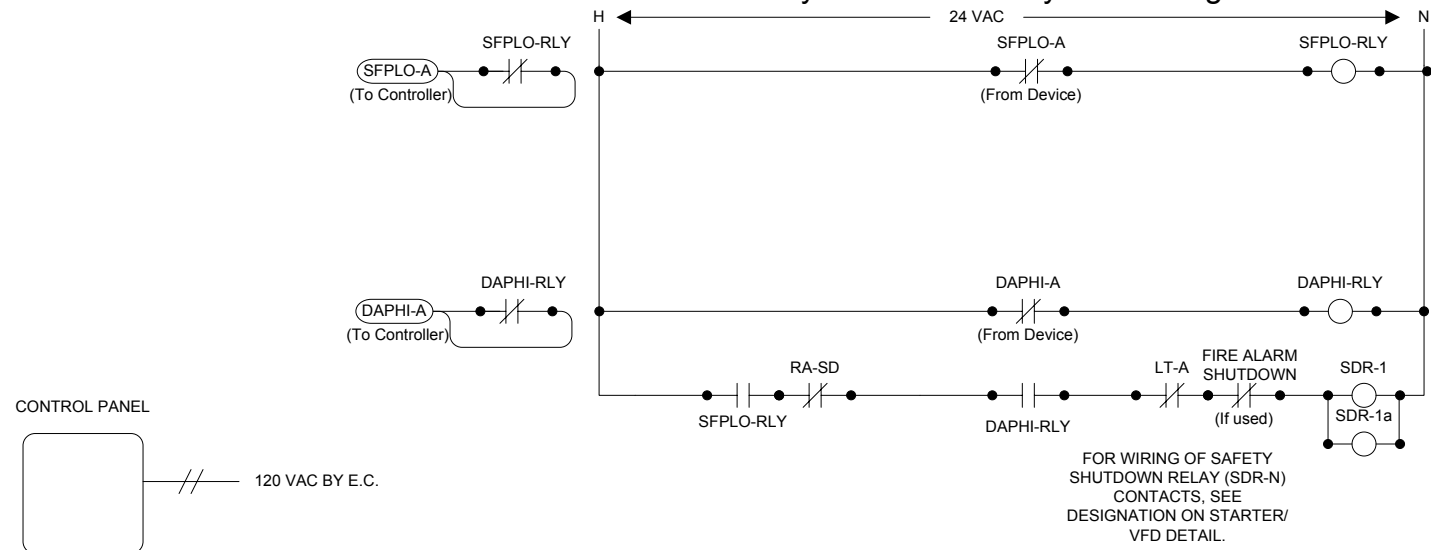


BILL OF MATERIALS			
Designation	Qty	Part Number	Description
BLDG-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -0.25 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
DAX-P	2	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
	2	FTG18A-600R	REMOTE MTD PROBE
DAPHI-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
LT-A	3	A70HA-1C	DUCT,MLT,SP=15-55 F (-9-13 C),STG=2
	3	TE-6001-8	AVERAGING ELEMENT HOLDER
MA-T	1	TE-6001-8	AVERAGING ELEMENT HOLDER
	4	TE-6316M-1	NICKEL DUCT AVERAGE,17 FEET
MAD-O	2	M9220-GGA-3	20NM,SR,DPR ACT,0-10 VDC,24 VAC
OA-F	1		SEE AIRFLOW MEASURING STATION SCHEDULE
PANEL	1	PAKLJJ002BH0	MS-FAC2611-0 AND IOM4711, 24X36, DUAL PS
RA-Q	1	CDLSXX	VERIS DUCT CO2 TRANS, DISPLAY, 0-2000PPM
RA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
SDR-1	1	RIB2401B	SPDT,20A,HC=24 VAC/DC,W/LED
SF-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
SFPLO-A	1	AFS-460	DIF,0.4 - 12 INWC,DIF=MR,NC
	1	FTG18A-600R	REMOTE MTD PROBE
	1	RH2B-UAC24-L	DPDT,10A,HC=24 VAC
	1	SH2B-05	DPDT RELAY BASE FOR RH2B
	1	NS-BTB7001-0	TE, F/C, DIS, ADJ, OCC, PJ
			SEE VALVE SCHEDULE
ZN-T,-SP,-TOCC			
HTG-O, CLG-O			

ZN-T NETWORK TEMP FOR SUPPLY AIR TEMP RESET
T-OCC NETWORK TEMPORARY OCC PUSHBUTTONS



Safety Shutdown Relay Coil Wiring Detail



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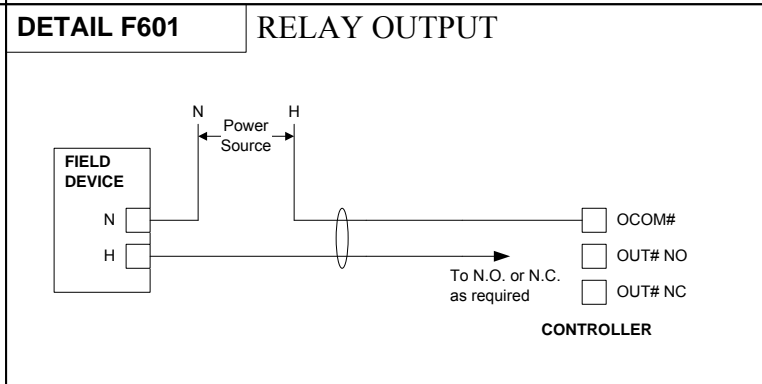
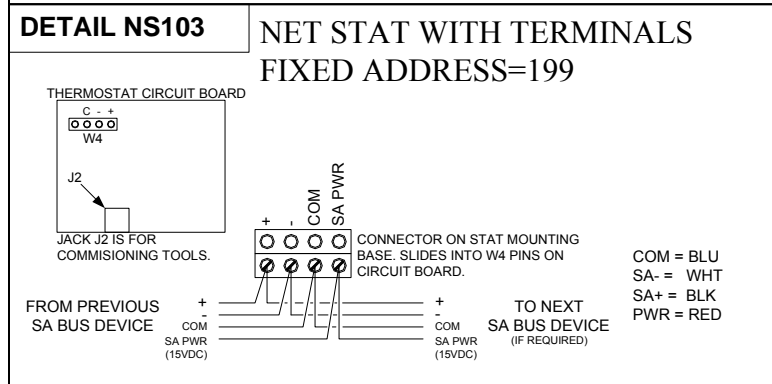
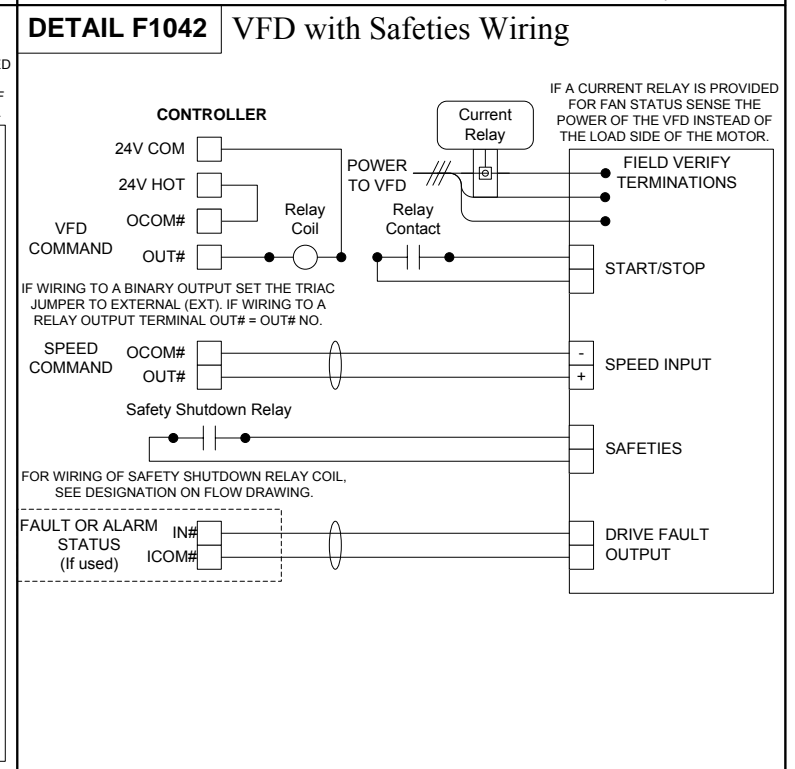
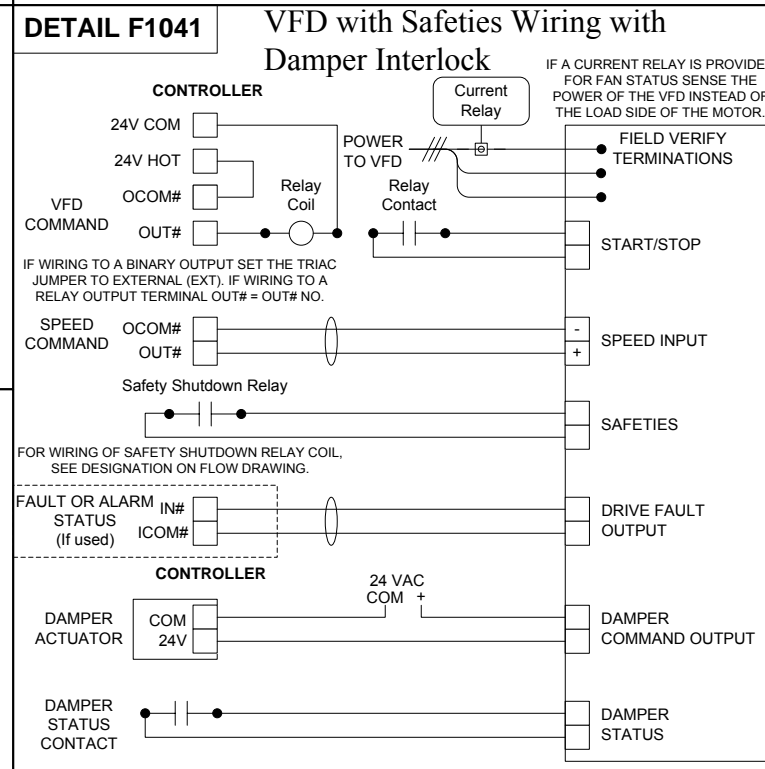
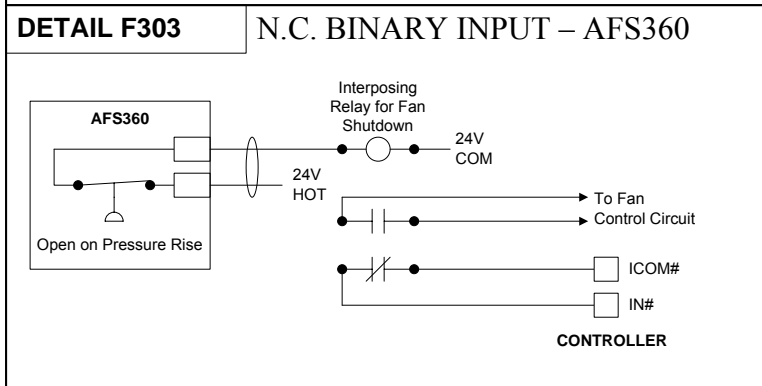
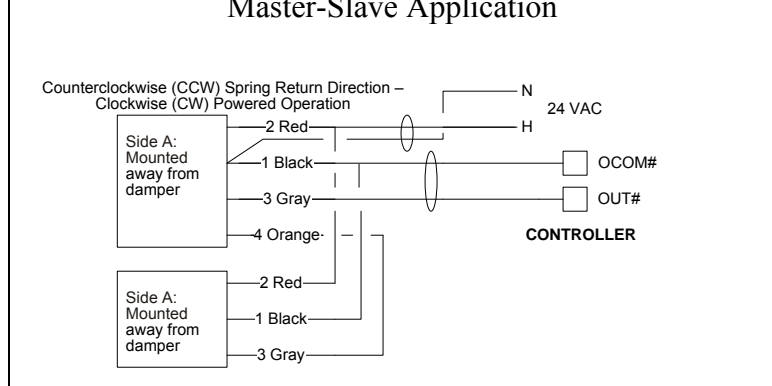
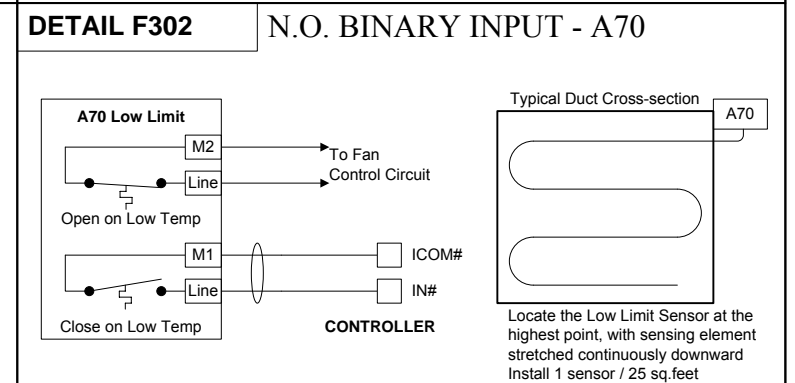
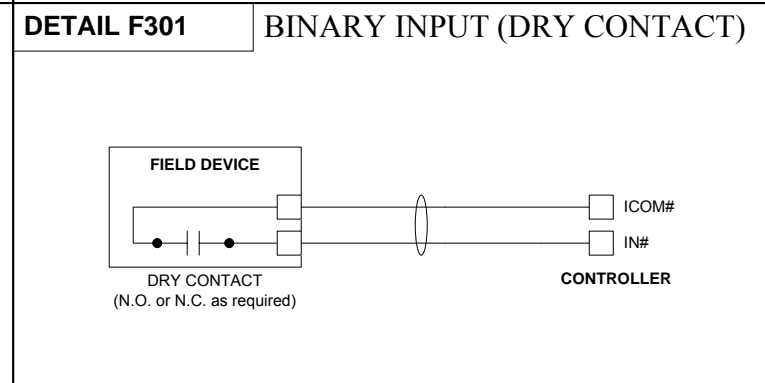
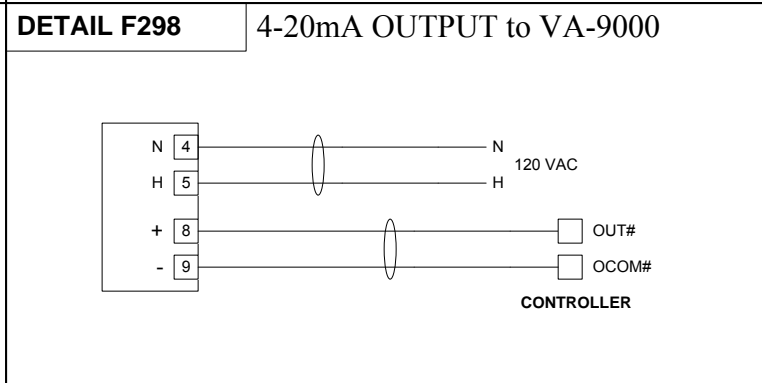
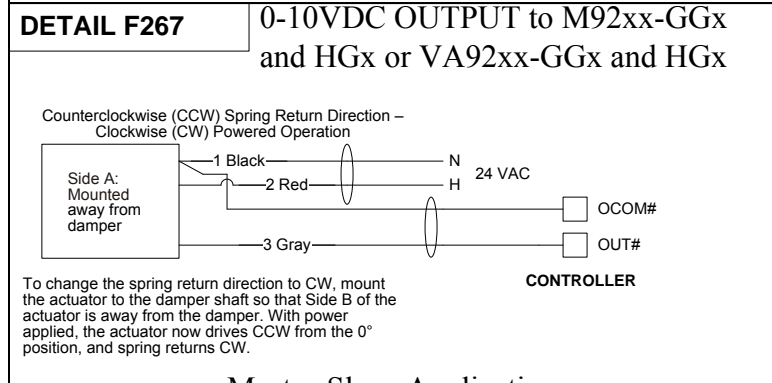
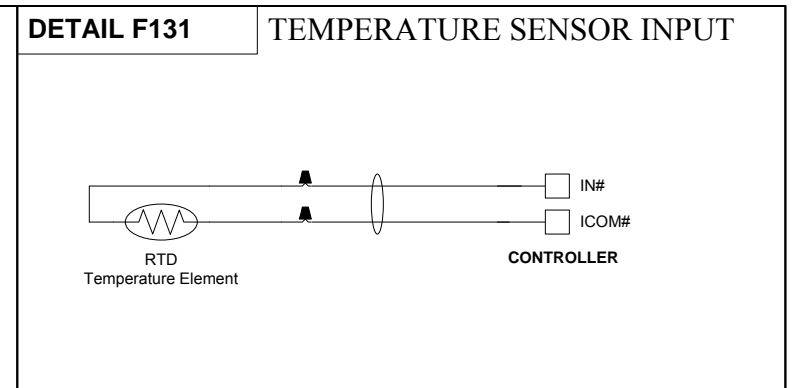
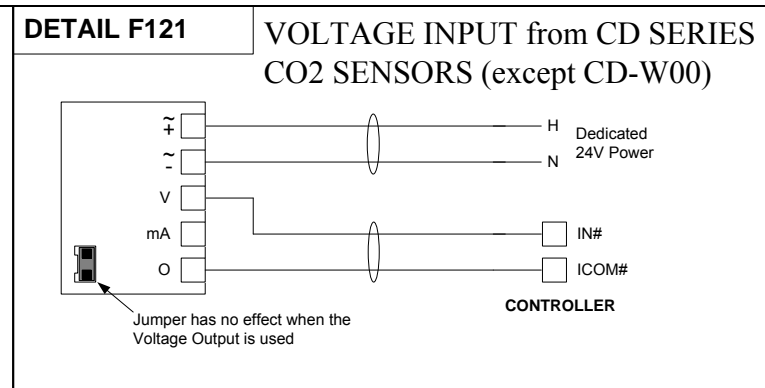
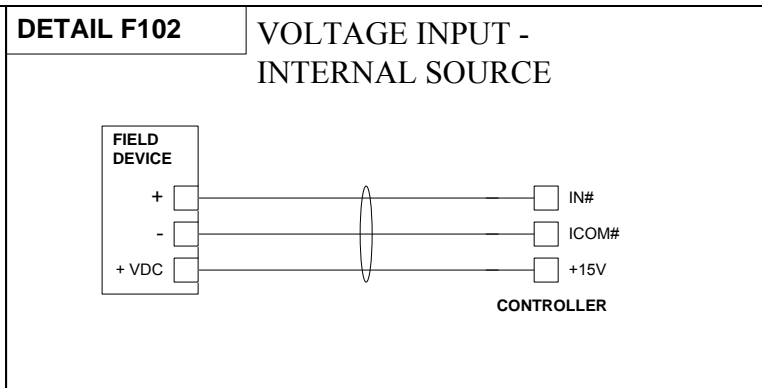
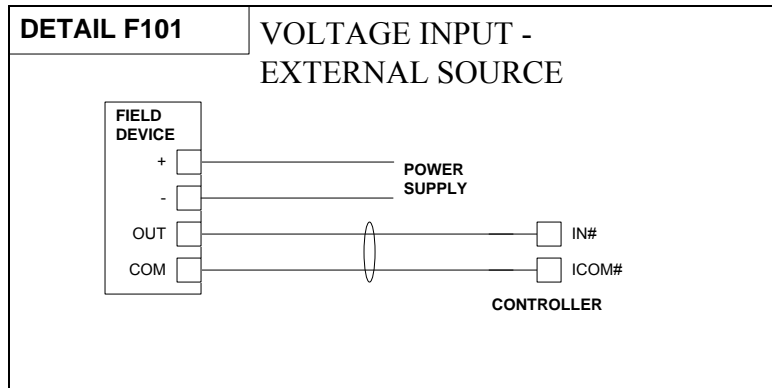
Drawing Title									
AHU-13 Flow Layout									
Project Title		NO.		REVISION-LOCATION		ECN		DATE	
Kelly Walsh High School		T Gunderson		Wayne Ramich		Chris Odell		BY DATE	
		Application Engineer		DRAWN		BY DATE		APPROVED	
		Branch Information						CONTRACT NUMBER	
		Johnson Controls, Inc.		5125 Carroll Ct.		Suite 400		4216-0030	
		Evansville, WY 82636		Phone: 307-265-0771		Fax: 307-265-9501		DRAWING NUMBER	
								7-1	

Tag	Point Information			Controller Information						Panel Information					Intermediate Device					Field Device				Ref Detail Shape	Comment						
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Termination In			Device	Location				
FAC		AHU13-FAC			FAC 2611																								Power to Controller		
FAC		AHU13-FAC			FAC 2611	MS/TP	1	7							0														BacNet FC Bus		
FAC	UI IN-1	AHU13-FAC	DA-T	Discharge Air Temperature	FAC 2611	MS/TP	1	7	UI IN-1		IN1, ICOM1				0	-5-UI IN-1					2/18	2-Wire	TE					F131			
FAC	UI IN-2	AHU13-FAC	MA-T	Mixed Air Temperature	FAC 2611	MS/TP	1	7	UI IN-2		IN2, ICOM2				0	-5-UI IN-2					2/18	2-Wire	TE					F131			
FAC	UI IN-3	AHU13-FAC	DA1-P	Discharge Air Static Pressure 1	FAC 2611	MS/TP	1	7	UI IN-3		IN3, ICOM3, +15V				0	-5-UI IN-3					3/18	OUT.COM,EXC	DPT2xxx (Vdc)					F102			
FAC	UI IN-4	AHU13-FAC	DA2-P	Discharge Air Static Pressure 2	FAC 2611	MS/TP	1	7	UI IN-4		IN4, ICOM4, +15V				0	-5-UI IN-4					3/18	OUT.COM,EXC	DPT2xxx (Vdc)					F102			
FAC	UI IN-5	AHU13-FAC	OA-F	Outdoor Air Flow	FAC 2611	MS/TP	1	7	UI IN-5		IN5, ICOM5				0	-5-UI IN-5					2/18	See wiring detail	Voltage Input (External Pwr)					F101			
FAC	UI IN-6	AHU13-FAC	RA-SD	Return Air Smoke Alarm	FAC 2611	MS/TP	1	7	UI IN-6		IN6, ICOM6				0	-5-UI IN-6					2/18	See wiring detail	Dry Contact					F301			
FAC	BI IN-7	AHU13-FAC	SF-S	Supply Fan Status	FAC 2611	MS/TP	1	7	BI IN-7		IN7, ICOM7				0	-5-BI IN-7	2/18	OUT, COM	Current Relay	Motor Lead	Motor Lead	See wiring detail	Motor Status (Contact)					F301			
FAC	BI IN-8	AHU13-FAC	SF-A	Supply Fan Alarm	FAC 2611	MS/TP	1	7	BI IN-8		IN8, ICOM8				0	-5-BI IN-8					2/18	See VFD Detail	VFD Fault								
FAC	BO OUT-1	AHU13-FAC	SF-C	Supply Fan Command	FAC 2611	MS/TP	1	7	BO OUT-1		OUT1, 24V COM				0	-5-BO OUT-1	2/18	COIL-, COIL+	Relay	COM, NO		2/18	See wiring detail	VFD (w/ Safety) (Sw Hi, EXT)					F1042		
FAC	BO OUT-2	AHU13-FAC			FAC 2611	MS/TP	1	7	BO OUT-2						0	-5-BO OUT-2															
FAC	BO OUT-3	AHU13-FAC			FAC 2611	MS/TP	1	7	BO OUT-3						0	-5-BO OUT-3															
FAC	CO OUT-4	AHU13-FAC	SF-O	Supply Fan Output	FAC 2611	MS/TP	1	7	CO OUT-4		OUT4, OCOM4				0	-5-CO OUT-4					2/18	See VFD Detail	VFD Speed Control (Vdc)								
FAC	CO OUT-5	AHU13-FAC			FAC 2611	MS/TP	1	7	CO OUT-5						0	-5-CO OUT-5															
FAC	CO OUT-6	AHU13-FAC	MAD-O	Mixed Air Damper Output	FAC 2611	MS/TP	1	7	CO OUT-6		OUT6, OCOM6, 24VAC, COM				0	-5-CO OUT-6					2/18 / 2/18	GRY, BLK/BLK, RED	M92xx-GGx-x (Vdc) (Ext Source)					F267			
FAC	CO OUT-7	AHU13-FAC	RELD-O	Relief Air Damper Output	FAC 2611	MS/TP	1	7	CO OUT-7						0	-5-CO OUT-7					2/18 / 2/18	GRY, BLK/BLK, RED	M92xx-GGx-x (Vdc) (Ext Source)					F267			
FAC	AO OUT-8	AHU13-FAC			FAC 2611	MS/TP	1	7	AO OUT-8						0	-5-AO OUT-8															
FAC	AO OUT-9	AHU13-FAC			FAC 2611	MS/TP	1	7	AO OUT-9						0	-5-AO OUT-9															
IOM		AHU13-FAC			IOM 4710																								Power to Controller		
IOM		AHU13-FAC			IOM 4710	SA Bus	1	5							0														BacNet SA Bus		
IOM	UI IN-1	AHU13-FAC	RA-T	Return Air Temperature	IOM 4710	SA Bus	1	5	UI IN-1		IN1, ICOM1				0	5-4-UI IN-1					2/18	2-Wire	TE					F131			
IOM	UI IN-2	AHU13-FAC			IOM 4710	SA Bus	1	5	UI IN-2						0	5-4-UI IN-2															
IOM	UI IN-3	AHU13-FAC	RA-Q	Return Air Quality	IOM 4710	SA Bus	1	5	UI IN-3		IN3, ICOM3, 24V HOT, 24V COM				0	5-4-UI IN-3					2/18 / 2/18	V, O, +, -	CD Series CO2 (Vdc)					F121			
IOM	UI IN-4	AHU13-FAC	BLDG-P	Building Static Pressure	IOM 4710	SA Bus	1	5	UI IN-4						0	5-4-UI IN-4					3/18	OUT.COM,EXC	DPT2xxx (Vdc)					F102			
IOM	UI IN-5	AHU13-FAC	LT-A	Low Temperature Alarm	IOM 4710	SA Bus	1	5	UI IN-5		IN5, ICOM5				0	5-4-UI IN-5					2/18 / 2/18 (UI LINE, M1, (LINE, M2)	A70 (NO)						F302			
IOM	UI IN-6	AHU13-FAC	SP1-A	Sump Pump 1 Alarm	IOM 4710	SA Bus	1	5	UI IN-6		IN6, ICOM6				0	5-4-UI IN-6					2/18	See wiring detail	Dry Contact					F301			
IOM	BI IN-7	AHU13-FAC	DAPHI-A	Discharge Air High Duct Pressure	IOM 4710	SA Bus	1	5	BI IN-7		IN7, ICOM7				0	5-4-BI IN-7					2/18 / 2/18 (UI See Detail)	AFS-460 (NC)							F303		
IOM	BI IN-8	AHU13-FAC	SFPLO-A	Supply Fan Low Duct Pressure	IOM 4710	SA Bus	1	5	BI IN-8		IN8, ICOM8				0	5-4-BI IN-8					2/18 / 2/18 (UI See Detail)	AFS-460 (NC)							F303		
IOM	BO OUT-1	AHU13-FAC			IOM 4710	SA Bus	1	5	BO OUT-1						0	5-4-BO OUT-1															
IOM	BO OUT-2	AHU13-FAC			IOM 4710	SA Bus	1	5	BO OUT-2						0	5-4-BO OUT-2															
IOM	BO OUT-3	AHU13-FAC			IOM 4710	SA Bus	1	5	BO OUT-3						0	5-4-BO OUT-3															
IOM	CO OUT-4	AHU13-FAC			IOM 4710	SA Bus	1	5	CO OUT-4						0	5-4-CO OUT-4															
IOM	CO OUT-5	AHU13-FAC			IOM 4710	SA Bus	1	5	CO OUT-5						0	5-4-CO OUT-5															
IOM	CO OUT-6	AHU13-FAC			IOM 4710	SA Bus	1	5	CO OUT-6						0	5-4-CO OUT-6															
IOM	CO OUT-7	AHU13-FAC			IOM 4710	SA Bus	1	5	CO OUT-7						0	5-4-CO OUT-7															
IOM	AO OUT-8	AHU13-FAC	HTG-O	Heating Output	IOM 4710	SA Bus	1	5	AO OUT-8		OUT8, OCOM8, 120V				0	5-4-AO OUT-8					2/18 / 2/18	8, 9, 5, 4	VA-9000						F298		
IOM	AO OUT-9	AHU13-FAC	CLG-O	Cooling Output	IOM 4710	SA Bus	1	5	AO OUT-9		OUT9, OCOM9, 24VAC, COM				0	5-4-AO OUT-9					2/18 / 2/18	GRY, BLK/BLK, RED	M92xx-GGx-x (Vdc) (Ext Source)						F267		

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Drawing Title				AHU-13 Point Schedule			
Project Title				Kelly Walsh High School			
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY	APPROVED	
T Gunderson	Wayne Ramich	Chris Odell					
Sales Engineer		Project Manager		Application Engineer		DRAWN	
Branch Information				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030 DRAWING NUMBER 7-2	



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	AHU-13 Wiring Details					
	Project Title					
	Kelly Walsh High School					
	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
	T Gunderson	Wayne Ramich	Chris Odell			
	Branch Information			CONTRACT NUMBER		
				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030 DRAWING NUMBER 7-3

Air Handler AHU-13 Sequences Of Operation

SUPPLY FAN CONTROL:

The variable speed supply fans (SFx-C) will be started based on occupancy schedule (OCC-SCHEDULE) When either supply fan status (SFx-S) indicates a fan started, the control sequence will be enabled. The supply fans (SFx-O) will modulate in unison to maintain the discharge static, as determined from the minimum of two duct static pressure sensors (DAX-P), at setpoint (DAP-SP) Upon a loss of airflow (SFx-S) on either fan, the fan will stop until the unit is manually reset (SYS-RESET) When the supply fan frequency converter fault input (SF-A) is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.

OCCUPIED MODE:

The occupancy mode will be controlled via a network input (OCC-SCHEDULE) The occupancy mode can also be overridden by a network input (OCC-OVERRIDE).

UNOCCUPIED MODE:

The unit will cycle to maintain unoccupied zone setpoints (CLGUNOCC-SP & HTGUNOCC-SP) during unoccupied periods.

STATIC PRESSURE SETPOINT CONTROL:

In the warm-up and night setback modes the setpoint (DAP-SP) shall be set to the minimum occupied value. In the occupied mode reset the setpoint (DAP-SP) shall be reset between a min and max setpoint using a PI loop to maintain at least one VAV box damper fully open.

TEMPERATURE CONTROL:

The unit will sequence the heating valve, cooling valve, and mixed air dampers control to maintain a discharge air temperature (OA-T) at a setpoint (DAT-SP) of 55 degF (adj.). The discharge air temperature setpoint (DAT-SP) shall be reset between a min and max setpoint based on the warmest space temperature.

ECONOMIZER CONTROL AND DEMAND CONTROLLED VENTILATION:

When the outdoor air (OA-T) is cooler than the economizer setpoint, the economizer will act as the initial stage of cooling, working in sequence with the cooling coil. When the outdoor air (OA-T) is warmer than the economizer setpoint, the economizer will be commanded to the minimum outside air position. The return air CO₂ sensor (RA-Q) will be used for Demand Controlled Ventilation (DCV) to reset the damper minimum position. The DCV control shall reset the Outside Air flow between a min and max setpoint based on a setpoint (RAQ-SP) of 1100 ppm.

MINIMUM OA CONTROL:

The unit will adjust the minimum damper position to meet the OA flow setpoint. The fresh air intake of the unit will be limited to prevent the preheat temperature (PH-T) from falling below the low limit setpoint (OALT-SP).

HEATING COIL:

The heating (HTG-O) will modulate to maintain the temperature setpoint When the unit is shutdown, the heating coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT -SP)

COOLING COIL:

The cooling coil (CLG-O) will modulate to maintain the temperature setpoint. When the unit is shutdown, the cooling coil will be commanded to a preset position should the outdoor air temperature (OA-T) fall below the low outdoor air temperature setpoint (OALT-SP)

WARMUP/COOLDOWN MODE:

The warmup/cooldown mode will be initiated by the network input (WC-C). The unit will control to occupied setpoints (CLGOCC-SP & HTGOCC-SP) during warmup and cooldown cycles. The Outside Air dampers shall be closed and the Return Air dampers shall be open during this mode.

RELIEF DAMPER


In occupied mode when the building static pressure exceeds setpoint (BLDGP-SP) the isolation dampers (RELDx-O) will modulate to maintain the building static pressure at setpoint (BLDGP-SP). In unoccupied mode the relief air dampers (RELDx-O) shall be closed.

UNIT PROTECTION:

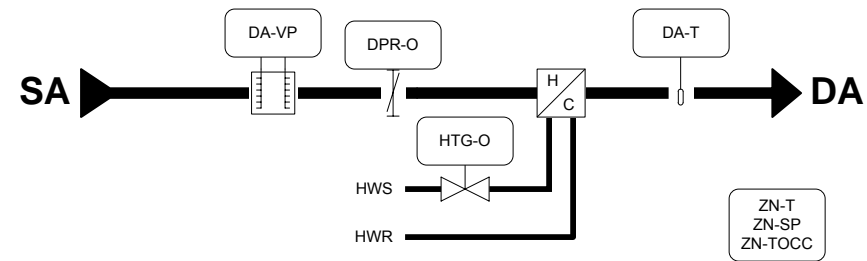
- Low Temperature Alarm (LT-A)- When in "Alarm", the control sequence will stop running, the valve(s) will open and the fan(s) will be disabled via a hard wired shutdown circuit.
- Discharge Air High Duct Pressure Alarm (DAPHI-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Supply Fan Low Pressure Alarm (SFPLO-A)- When in "Alarm", the control sequence will stop running and the fan(s) will be disabled via a hard wired shutdown circuit.
- Return Air Smoke Detector (RA-SD)- Disables the fan(s) via a hard wired shutdown circuit.

ADDITIONAL POINTS MONITORED BY THE FMS:

- Mixed Air Temperature (MA-T)
- Return Air Temperature (RA-T)
- Zone Temperature (ZN-T)

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	AHU-13 Sequence of Operation									
	Project Title		Kelly Walsh High School							
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY				
Sales Engineer	Project Manager	Application Engineer		DRAWN		APPROVED				
T Gunderson	Wayne Ramich	Chris Odell		BY	DATE	BY	DATE			
				Branch Information		CONTRACT NUMBER				
				 <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		4216-0030				
						DRAWING NUMBER		7-4		

VAV Typical Flow Layout



BILL OF MATERIALS

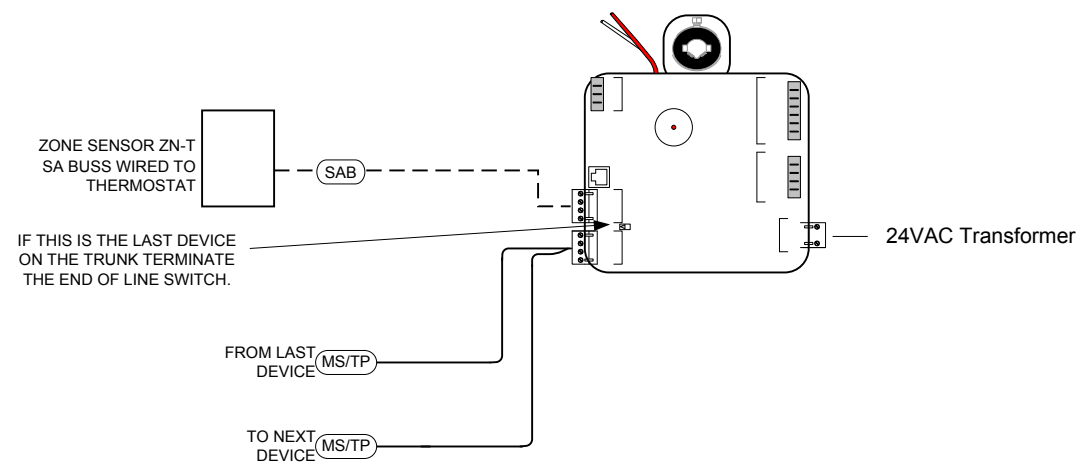
Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1615-0	VMA 3 UI & 2BO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE

Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

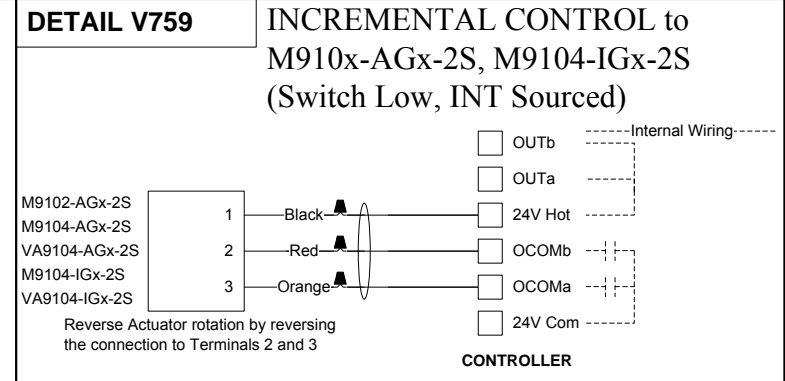
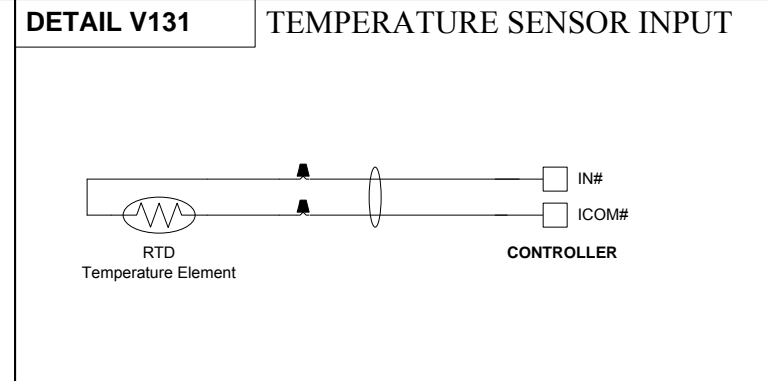
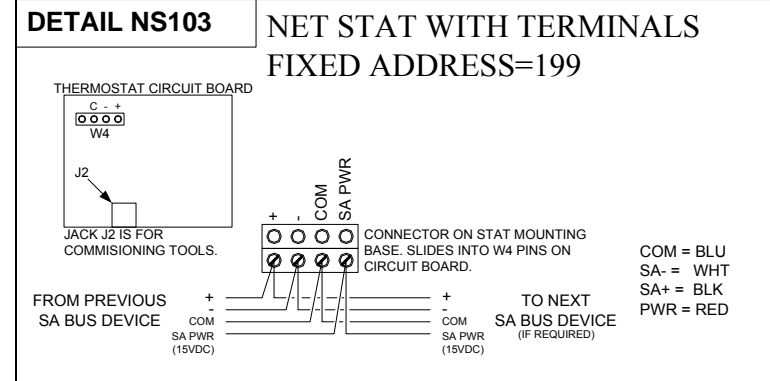
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV Flow Layout Typical Of 139							
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501	
	CONTRACT NUMBER		4216-0030		DRAWING NUMBER		8-1	
REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY T Gunderson Wayne Ramich Chris Odell		SALES ENGINEER PROJECT MANAGER APPLICATION ENGINEER T Gunderson Wayne Ramich Chris Odell		DRAWN BY DATE Chris Odell		APPROVED BY DATE Chris Odell		

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment				
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device	Location
	VAV				VMA 1615																						Power to Controller BacNet FC Bus
	VAV				VMA 1615	MS/TP	1	x						0													
	UI IN-1	VAV	DA-T	Discharge Air Temperature	VMA 1615	MS/TP	1	x	UI IN-1		IN1, ICOM1			0	4-UI IN-1							2/18	2-Wire	TE		V131	
	UI IN-2	VAV			VMA 1615	MS/TP	1	x	UI IN-2					0	4-UI IN-2												
	UI IN-3	VAV			VMA 1615	MS/TP	1	x	UI IN-3					0	4-UI IN-3												
	BO OUT-1	VAV	HTG-O	Heating Output	VMA 1615	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT			0	4-BO OUT-1						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759				
	BO OUT-2	VAV	HTG-O	Heating Output	VMA 1615	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT			0	4-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759				
		VAV			NET STAT									0													
		VAV			NET STAT	SA Bus	1		199					0													
	STAT	VAV	ZN-T	Zone Temperature	NET STAT	SA Bus	1		199 STAT		+,-,COM,SA PWR			0	199-STAT						4/22	+,-,COM,SA PWR	NetSensor (Term.Fixed Address=199) NS103				

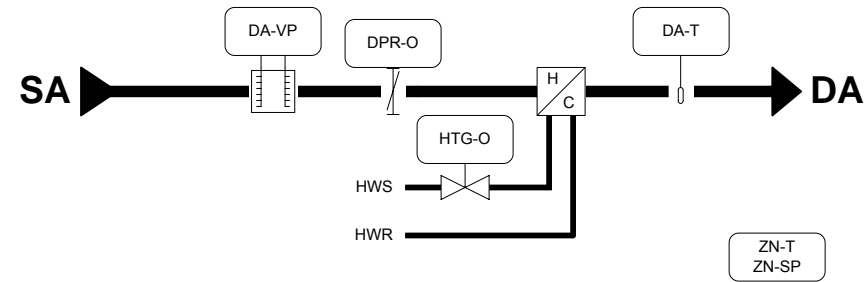


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Drawing Title		VAV Wiring Details	
Project Title		Kelly Walsh High School	
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN
T Gunderson	Wayne Ramich	Chris Odell	
SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	BY DATE
Branch Information		CONTRACT NUMBER	
		4216-0030	
Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		DRAWING NUMBER	
		8-2	

VAV-EF Typical Flow Layout



BILL OF MATERIALS

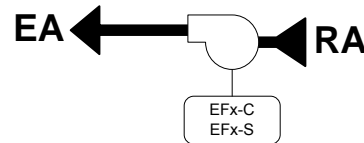
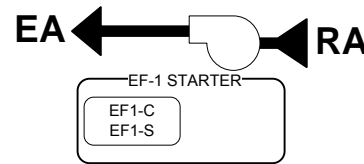
Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
EF1-C/S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
EFx-C/S	1	H120	CSR,N.O.,24V,FRAC HP,N.O.,SERIES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE

WIRE EXHAUST FAN TO LISTED VAV

VAV	EX FAN	POWER	INTERLOCK
VAV-11-27	EF-1	208V 3Φ 1HP	AHU-11
VAV-11-20	EF-2	115V 1Φ 1/4HP	AHU-11
VAV-11-23	EF-3	115V 1Φ 1/6HP	AHU-11
VAV-08-29	EF-4	115V 1Φ 1/4HP	AHU-8
VAV-08-24	EF-5	115V 1Φ 1/6HP	AHU-8
VAV-08-20	EF-6	115V 1Φ 1/4HP	AHU-8
VAV-08-22	EF-7	115V 1Φ 1/3HP	AHU-8
VAV-06-07	EF-9	115V 1Φ 1/3HP	AHU-6
VAV-06-03	EF-18	115V 1Φ 1/6HP	AHU-6
VAV-12-02	EF-34	115V 1Φ 1/4HP	AHU-12
VAV-12-06	EF-37	115V 1Φ 1/6HP	AHU-12

Note: See VAV-02-01 flow layout for EF-8 & EF-19

Note: Wire CSD relay into 3Φ starter



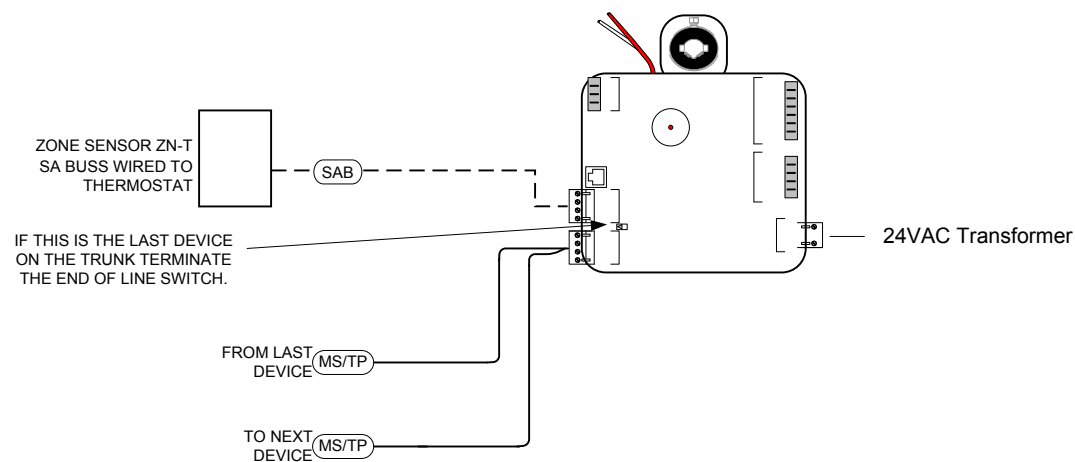
Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

EXHAUST FAN: INTERLOCK THE EXHAUST FAN WITH THE LISTED AHU, TURN FAN ON WHEN AHU IS OCCUPIED.

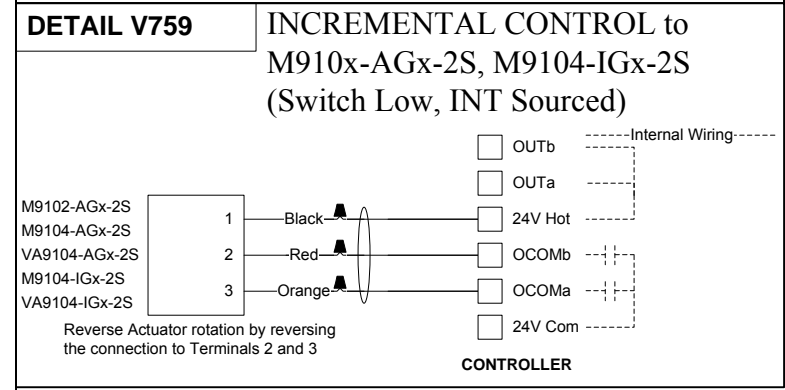
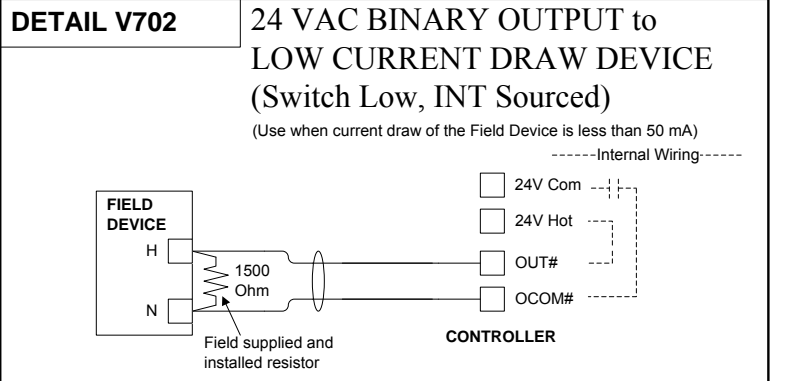
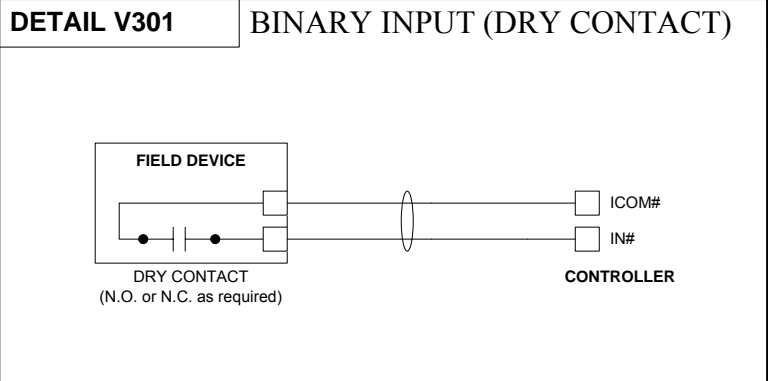
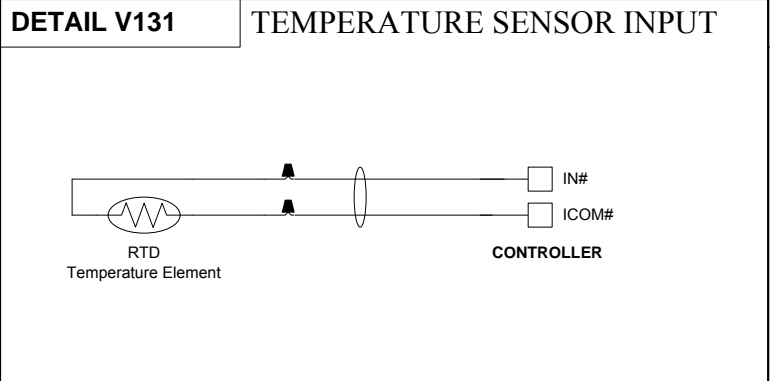
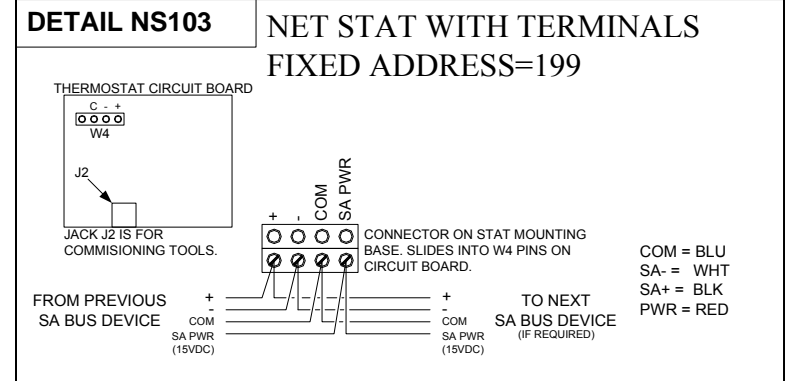
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV EF Flow Layout Typical Of 11							
	Project Title		NO.		REVISION-LOCATION		ECN DATE BY	
	Kelly Walsh High School		T Gunderson Wayne Ramich		Chris Odell		BY DATE BY DATE	
		Branch Information		CONTRACT NUMBER				
		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		DRAWING NUMBER		
		Johnson Controls				8-3		

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment			
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device
	VAV-EF				VMA 1630																					Power to Controller BacNet FC Bus
	VAV-EF				VMA 1630	MS/TP	1	x							0											
UI IN-1	VAV-EF	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1				0	-5-UI IN-1						2/18	2-Wire	TE		V131
UI IN-2	VAV-EF	EFx-S	EFx Status		VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2				0	-5-UI IN-2										V301
UI IN-3	VAV-EF				VMA 1630	MS/TP	1	x	UI IN-3						0	-5-UI IN-3										
BO OUT-1	VAV-EF	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT				0	-5-BO OUT-1						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-2	VAV-EF	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT				0	-5-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-3	VAV-EF	EFx-C	EFx Command		VMA 1630	MS/TP	1	x	BO OUT-3		OUT3, OCOM3				0	-5-BO OUT-3	2/18	COIL (24V, Com)	Current Relay	COM, NO		2/18	See wiring detail	Starter (NO) (Sw Low, INT Source)		V702
CO OUT-4	VAV-EF				VMA 1630	MS/TP	1	x	CO OUT-4						0	-5-CO OUT-4										
CO OUT-5	VAV-EF				VMA 1630	MS/TP	1	x	CO OUT-5						0	-5-CO OUT-5										
	VAV-EF				NET STAT																					
	VAV-EF				NET STAT	SA Bus	1		199						0											BacNet SA Bus
STAT	VAV-EF	ZNT	Zone Temperature		NET STAT	SA Bus	1		199 STAT		+, -.COM,SA PWR				0	5--199-STAT						4/22	+, -.COM,SA PWR	NetSensor (Term,Fixed Address=199) NS103		



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Drawing Title
VAV EF Wiring Details

Project Title
Kelly Walsh High School

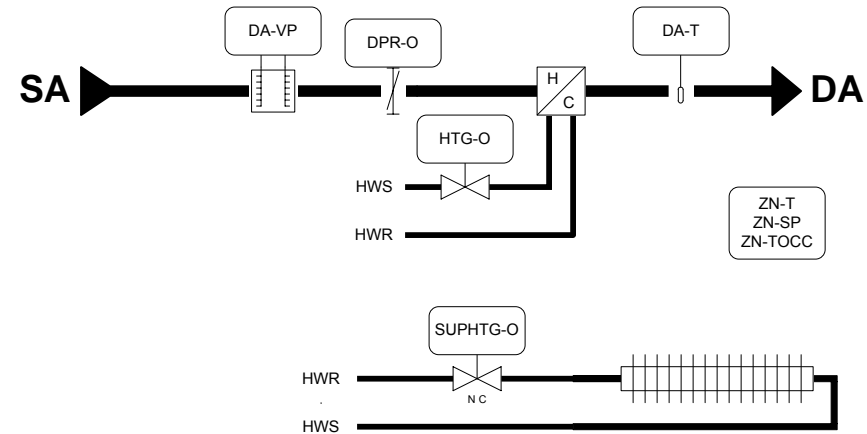
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

Branch Information
Johnson Controls, Inc.
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501

CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-4

VAV with Fin Tube Flow Layout



BILL OF MATERIALS

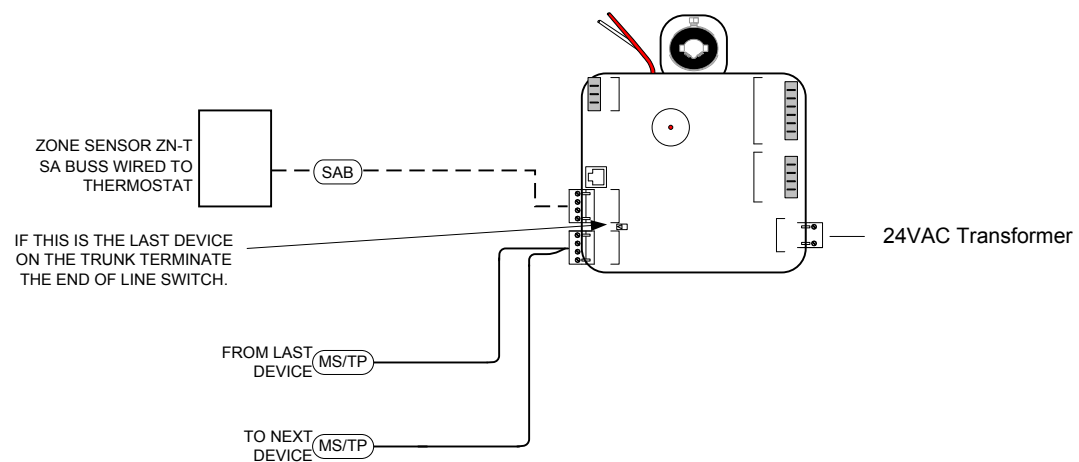
Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3BO & 2CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE
SUPHTG-O	1		SEE VALVE SCHEDULE

Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE SUPPLEMENTAL HEATING WILL MODULATE AS THE FIRST STAGE OF HEATING. THE SECOND STAGE OF HEATING IS THE REHEAT COIL. THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

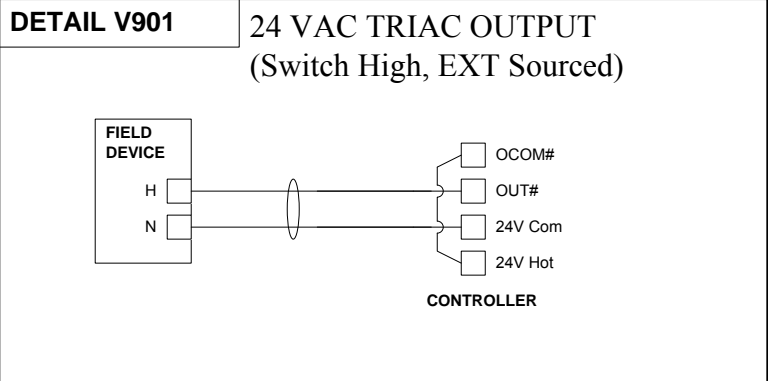
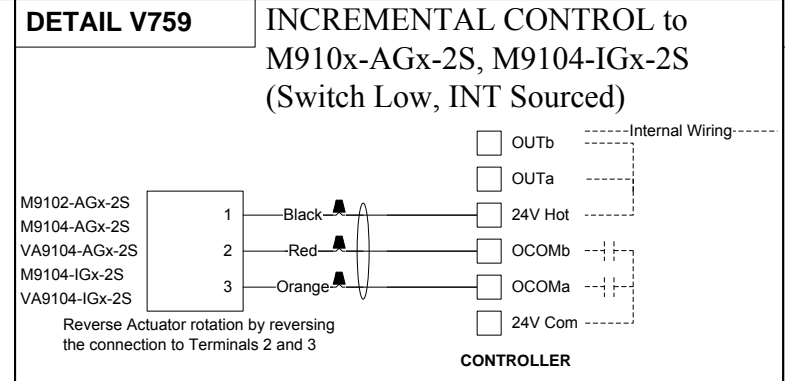
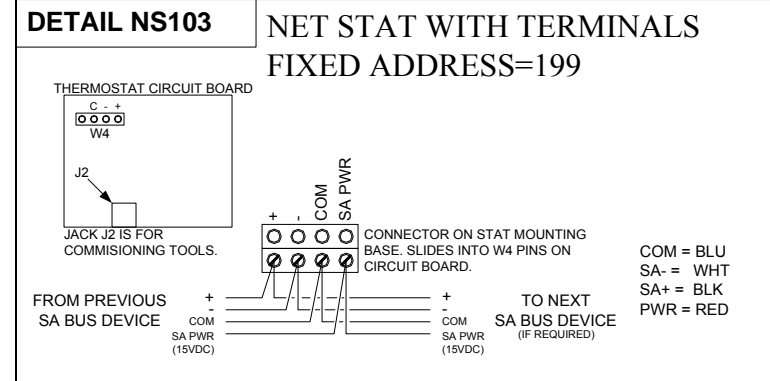
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV FT Flow Layout Typical Of 8							
	Project Title		Kerry Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501	
					CONTRACT NUMBER		4216-0030	
				DRAWING NUMBER		8-5		

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment				
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device	Location
	VAV-FT				VMA 1630																						Power to Controller BacNet FC Bus
UI IN-1	VAV-FT	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1						0	-5-UI IN-1											M910x-AGx-2S (Incr) (Sw TE)
UI IN-2	VAV-FT				VMA 1630	MS/TP	1	x	UI IN-2						0	-5-UI IN-2											
UI IN-3	VAV-FT				VMA 1630	MS/TP	1	x	UI IN-3						0	-5-UI IN-3											
BO OUT-1	VAV-FT	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT				0	-5-BO OUT-1					3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759				
BO OUT-2	VAV-FT	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT				0	-5-BO OUT-2					3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759				
BO OUT-3	VAV-FT				VMA 1630	MS/TP	1	x	BO OUT-3						0	-5-BO OUT-3											
CO OUT-4	VAV-FT	SUPHTG-O	Supplemental Heating Output		VMA 1630	MS/TP	1	x	CO OUT-4		OUT4, 24V COM				0	-5-CO OUT-4					2/18	See wiring detail	24VAC OUT (Sw Hi, EXT Source)	V901			
CO OUT-5	VAV-FT	SUPHTG-O	Supplemental Heating Output		VMA 1630	MS/TP	1	x	CO OUT-5		OUT5, 24V COM				0	-5-CO OUT-5					2/18	See wiring detail	24VAC OUT (Sw Hi, EXT Source)	V901			
	VAV-FT				NET STAT																						
	VAV-FT				NET STAT	SA Bus	1		199						0												BacNet SA Bus
STAT	VAV-FT	ZNT	Zone Temperature		NET STAT	SA Bus	1		199 STAT		+-,COM,SA PWR				0	5--199-STAT					4/22	+-,COM,SA PWR	NetSensor (Term,Fixed Address=199) NS103				



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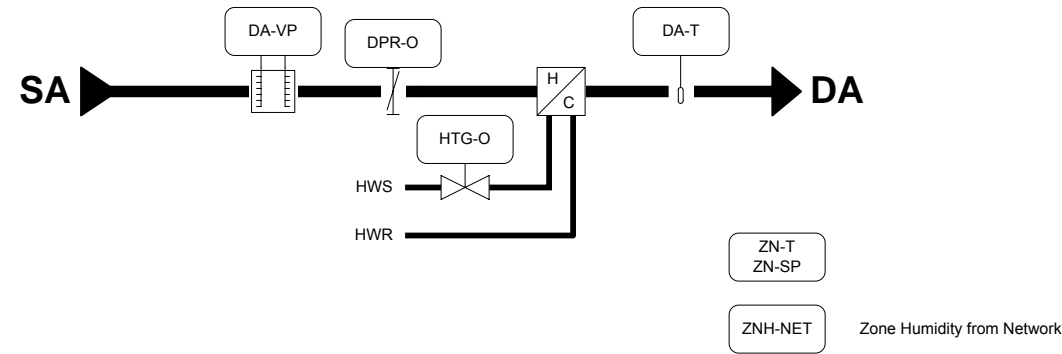
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Project Title		Kelly Walsh High School	
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN
T Gunderson	Wayne Ramich	Chris Odell	
SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	BY
			DATE
DATE		DATE	
DATE		DATE	

Branch Information
Johnson Controls
 Johnson Controls, Inc.
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501

CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-6

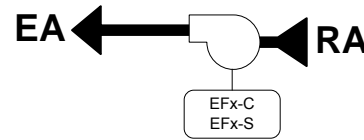
VAV Humidity Exhaust Fan Flow Layout



WIRE EXHAUST FAN TO LISTED VAV

VAV	EX FAN	POWER	ZNH LOCATION
VAV-11-18	EF-11	115V 1Φ 1/6HP	AHU-10
VAV-06-01	EF-12	115V 1Φ 1/6HP	AHU-6
VAV-01-01	EF-14	115V 1Φ 1/6HP	AHU-1
VAV-06-04	EF-15	115V 1Φ 1/6HP	VAV-02-06
VAV-12-07	EF-16	115V 1Φ 1/6HP	VAV-12-12
VAV-01-10	EF-17	115V 1Φ 1/6HP	AHU-1

Note: See VAV-08-18 flow layout for EF-10



BILL OF MATERIALS

Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
EF-C/S	1	H120	CSR,N.O.,24V,FRAC HP,N.O.,SERIES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
ZN-H	1	HT-6703-0N00P	HUM SENS DUCT,4-20MA 0-10V W/JUMPER,3%RH
HTG-O	1		SEE VALVE SCHEDULE

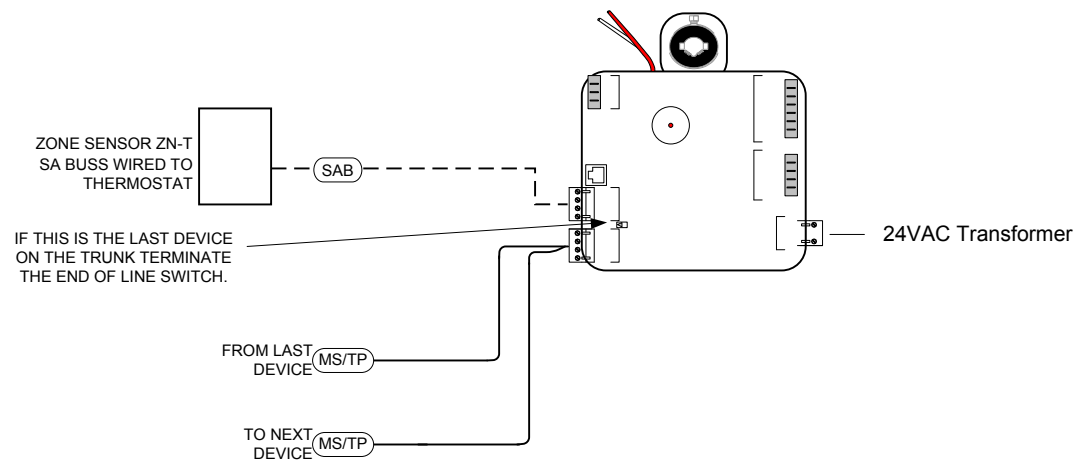
Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

EXHAUST FAN: ON A RISE IN ZONE HUMIDITY ABOVE THE HUMIDITY SETPOINT, START THE HUMIDITY EXHAUST FAN. ON A DROP IN ZONE HUMIDITY BELOW THE HUMIDITY SETPOINT, STOP THE HUMIDITY EXHAUST FAN.

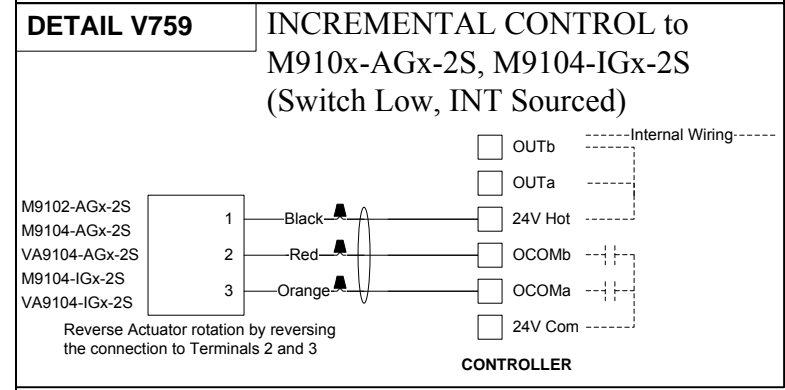
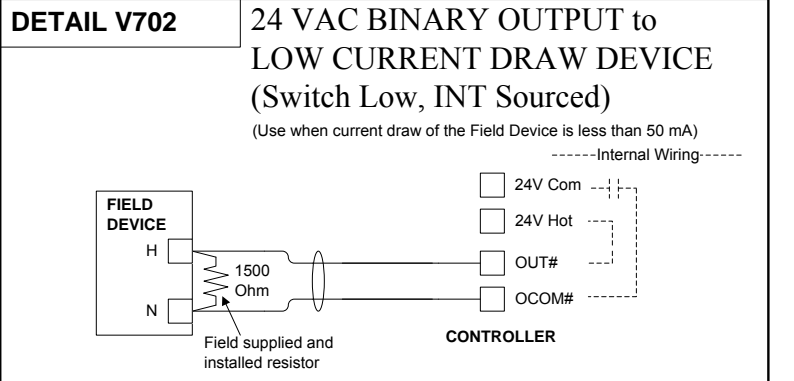
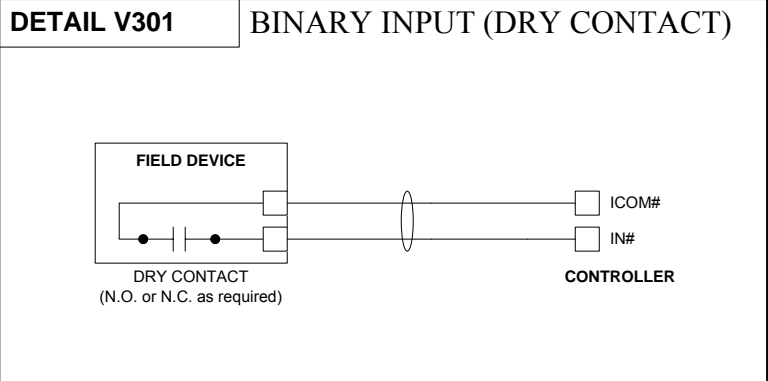
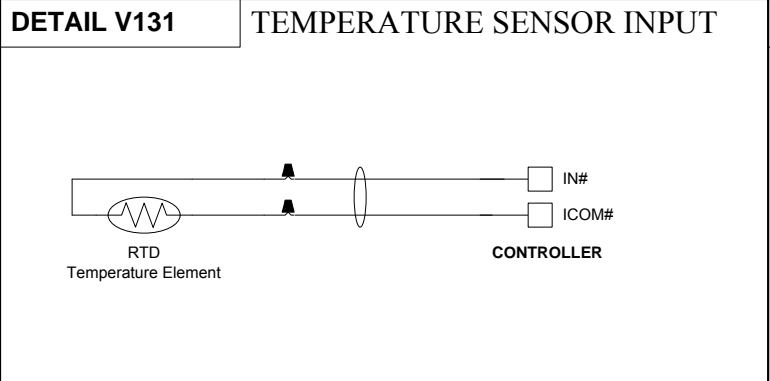
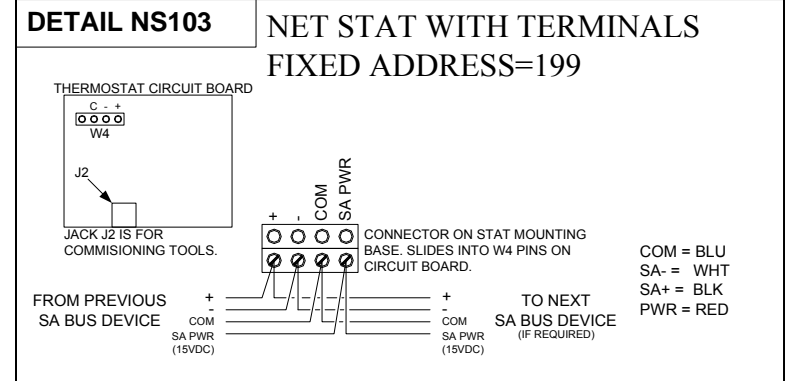
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV EFH Flow Layout Typical Of 6							
	Project Title		Kerry Walsh High School					
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN	DATE	BY
Sales Engineer		Project Manager		Application Engineer		DRAWN		APPROVED
T Gunderson		Wayne Ramich		Chris Odell		BY		DATE
						BY		DATE
				Branch Information		CONTRACT NUMBER		
				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		
				Johnson Controls		DRAWING NUMBER		8-7

Electrician/Fitter Tag	Point Information			Controller Information					Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment					
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out			Location	Wiring /Tubing	Termination In	Device	Location
	VAV-EFH				VMA 1630																					Power to Controller BacNet FC Bus	
UI IN-1	VAV-EFH	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1											2/18	2-Wire	TE		V131	
UI IN-2	VAV-EFH	EFHx-S	EFHx Status		VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2															V301	
UI IN-3	VAV-EFH				VMA 1630	MS/TP	1	x	UI IN-3																		
BO OUT-1	VAV-EFH	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT											3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759			
BO OUT-2	VAV-EFH	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT												3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-3	VAV-EFH	EFHx-C	EFHx Command		VMA 1630	MS/TP	1	x	BO OUT-3		OUT3, OCOM3											2/18	See wiring detail	Starter (NO) (Sw Low, INT Source)		V702	
CO OUT-4	VAV-EFH				VMA 1630	MS/TP	1	x	CO OUT-4																		
CO OUT-5	VAV-EFH				VMA 1630	MS/TP	1	x	CO OUT-5																		
	VAV-EFH				NET STAT																						
	VAV-EFH				NET STAT	SA Bus	1		199																	BacNet SA Bus	
STAT	VAV-EFH	ZNT	Zone Temperature		NET STAT	SA Bus	1		199 STAT		+, -, COM, SA PWR											4/22	+, -, COM, SA PWR	NetSensor (Term, Fixed Address=199) NS103			



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Drawing Title
VAV EFH Wiring Details

Project Title
Kelly Walsh High School

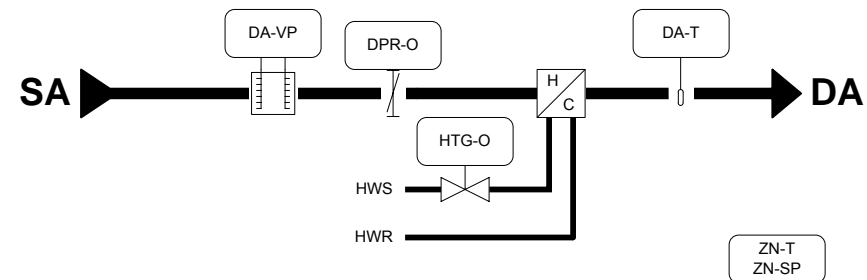
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

Branch Information
Johnson Controls, Inc.
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501

CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-8

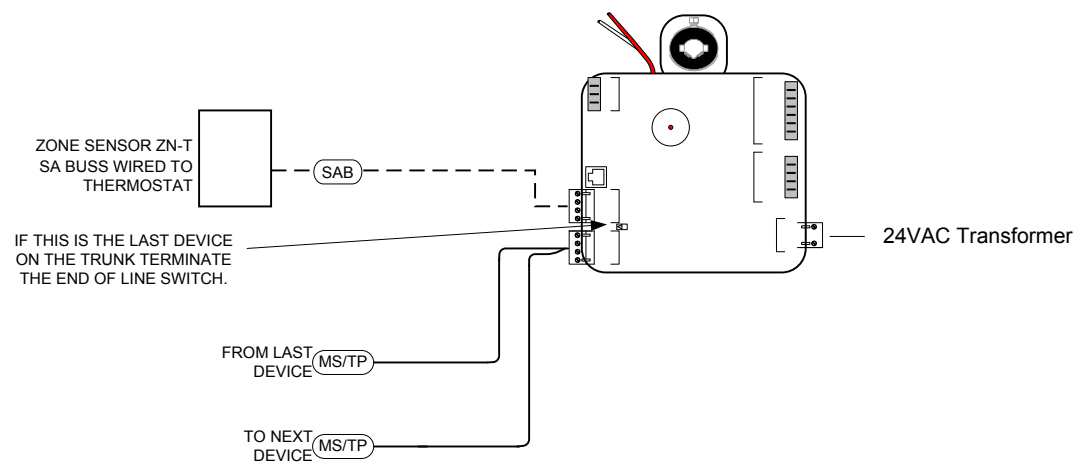
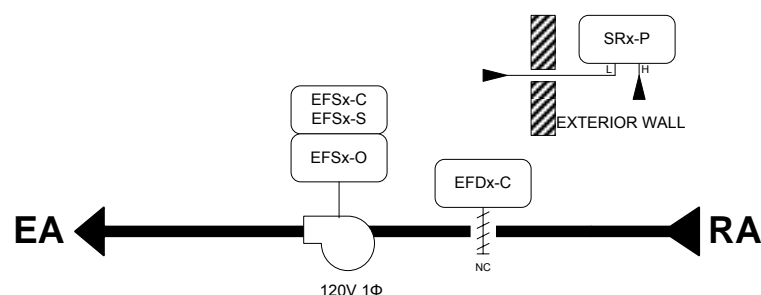
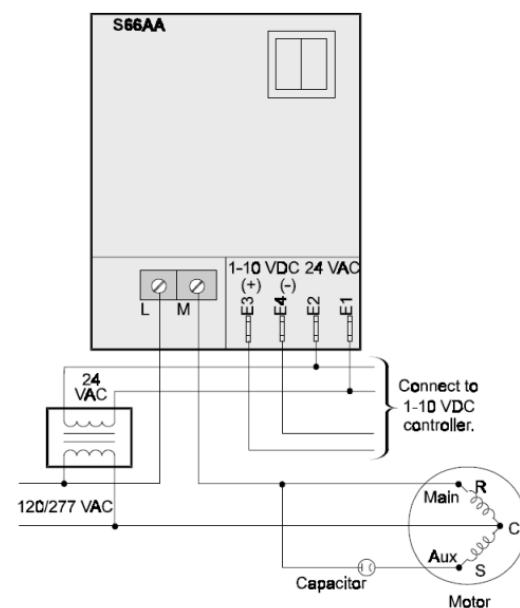
VAV Science Exhaust Fan Flow Layout



WIRE EXHAUST FAN TO LISTED VAV

VAV	EX FAN	POWER	INTERLOCK
VAV-08-19	EF-20	115V 1Φ 1/2HP	AHU-8
VAV-07-20	EF-21	115V 1Φ 1/2HP	AHU-7
VAV-07-15	EF-22	115V 1Φ 1/2HP	AHU-7
VAV-08-15	EF-23	115V 1Φ 1/2HP	AHU-8
VAV-07-14	EF-24	115V 1Φ 1/2HP	AHU-7
VAV-08-14	EF-25	115V 1Φ 1/2HP	AHU-8
VAV-11-19	EF-26	115V 1Φ 1/2HP	AHU-11
VAV-10-20	EF-27	115V 1Φ 1/2HP	AHU-10
VAV-10-17	EF-28	115V 1Φ 1/2HP	AHU-10
VAV-11-15	EF-29	115V 1Φ 1/2HP	AHU-11

EF Speed Control Wiring Diagram



BILL OF MATERIALS

Designation	Qty	Part Number	Description
SR-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -.025 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
EFDx-C	1		ELEC, 24VAC, SPRING RETURN
EF-C/S	1	H120	CSR,N.O.,24V,FRAC HP,N.O.,SERIES
EFx-O	1	S66	ELECTRONIC MOTOR CONTROL
	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE

Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

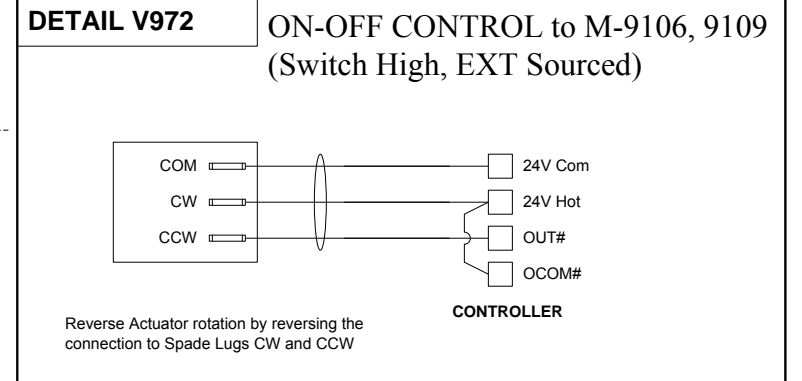
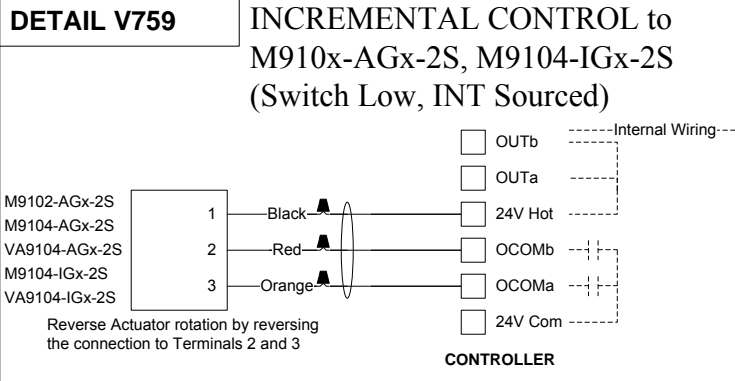
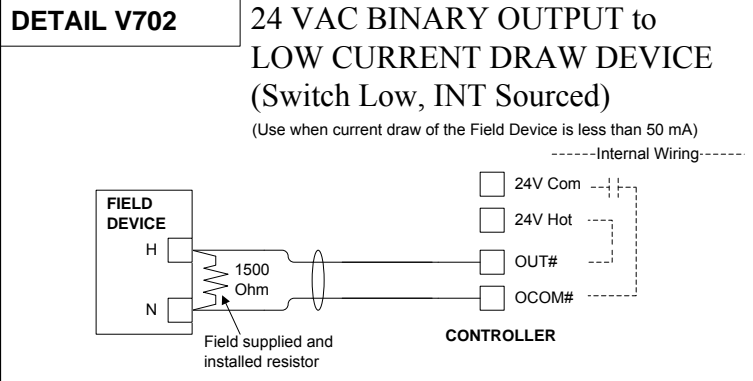
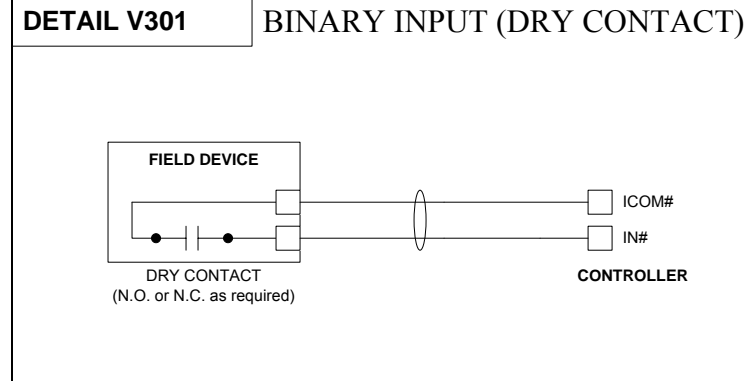
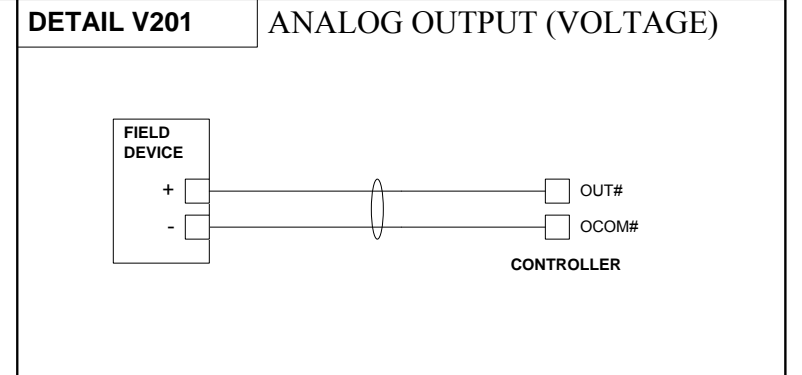
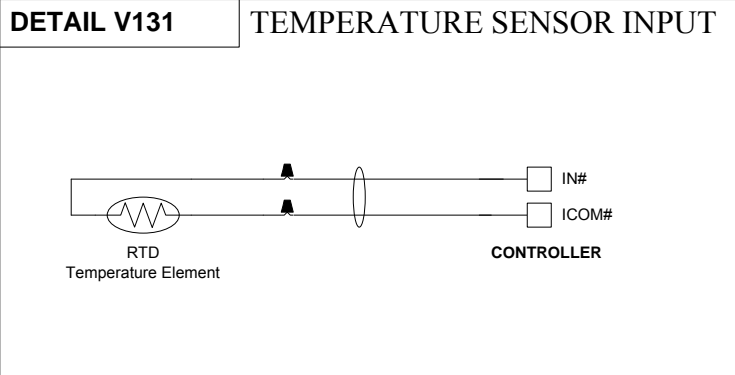
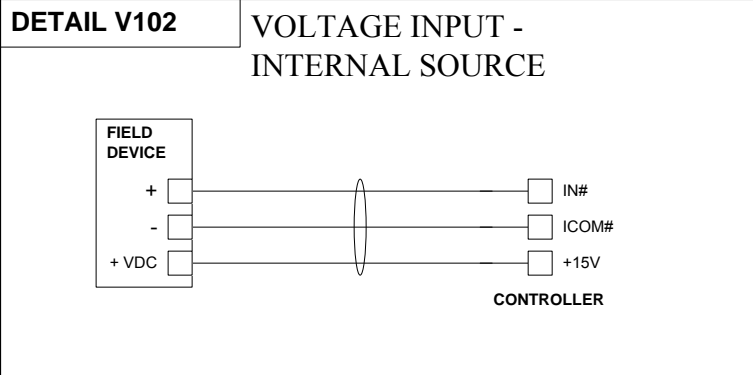
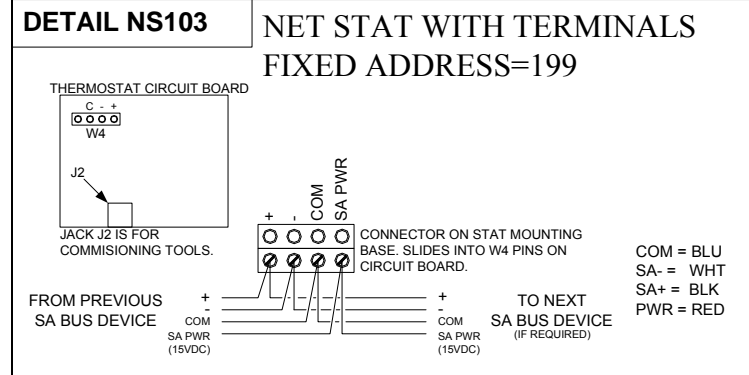
EXHAUST FAN: INTERLOCK THE EXHAUST FAN WITH THE LISTED AHU. IN OCCUPIED MODE WHEN THE AIR HANDLER ENABLES THE RELIEF AIR SYSTEM THE FOLLOWING SHALL OCCUR: WHEN THE BUILDING STATIC PRESSURE EXCEEDS SETPOINT (BLDGP-SP) THE ISOLATION DAMPERS (RELDX-C) WILL OPEN WHILE THE RELIEF FANS ARE OFF. ON A FURTHER RISE IN STATIC PRESSURE THE RELIEF FANS (RELFX-C) WILL BE COMMANDED TO RUN. THE RELIEF FANS (RELFX-O) WILL MODULATE TO MAINTAIN THE BUILDING STATIC PRESSURE AT SETPOINT (BLDGP-SP). WHEN THE RELIEF FAN FREQUENCY CONVERTER FAULT INPUT (RLF-A) IS ACTIVATED, THE SYSTEM WILL SHUTDOWN. WHEN THE FAULT CONDITION CLEARS, THE SYSTEM SHALL RESTART AS REQUIRED. IN UNOCCUPIED MODE THE RELIEF AIR DAMPERS (RELDX-C) WILL CLOSED WHILE THE RELIEF FANS (RELFX-C) WILL BE COMMANDED OFF.

DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE

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	VAV EFS Flow Layout Typical Of 10								
	Project Title		NO.		REVISION-LOCATION		ECN DATE BY		
	Kelly Walsh High School		T Gunderson		Wayne Ramich		Chris Odell		
		Sales Engineer		Project Manager		Application Engineer		DRAWN	
		BY		DATE		BY		DATE	
		Branch Information		CONTRACT NUMBER		APPROVED			
		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		DRAWING NUMBER		8-9	

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment			
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device
	VAV-EFS				VMA 1630																					Power to Controller BacNet FC Bus
	VAV-EFS				VMA 1630	MS/TP	1	x						0												
UI IN-1	VAV-EFS	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1			0		-5-UI IN-1						2/18	2-Wire	TE		V131
UI IN-2	VAV-EFS	EFSx-S	EFSx Status		VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2			0		-5-UI IN-2						3/18	OUT,COM,EXC	Motor Status (Contact)		V301
UI IN-3	VAV-EFS	SRP-P	Science Rm Pressure		VMA 1630	MS/TP	1	x	UI IN-3		IN3, ICOM3, +15V			0		-5-UI IN-3						3/18	DPT2xxx (Vdc)			V102
BO OUT-1	VAV-EFS	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT			0		-5-BO OUT-1						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-2	VAV-EFS	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT			0		-5-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-3	VAV-EFS	EFSx-C	EFSx Command		VMA 1630	MS/TP	1	x	BO OUT-3		OUT3, OCOM3			0		-5-BO OUT-3	2/18	COIL (13,14)	IDEC Relay	COM, NO (9,5)		2/18	See wiring detail	Starter (NO) (Sw Low, INT Source)		V702
CO OUT-4	VAV-EFS	EFDx-C	EFDx Command		VMA 1630	MS/TP	1	x	CO OUT-4		OUT4, 24V HOT, 24V COM			0		-5-CO OUT-4						3/18	CCW,CW,COM	M-9106,9109 (On-Off) (Sw Hi, EXT Sc V972		
CO OUT-5	VAV-EFS	EFSx-O	EFSx Output		VMA 1630	MS/TP	1	x	CO OUT-5		OUT5, OCOM5			0		-5-CO OUT-5						2/18	See wiring detail	Output (Voltage)		V201
	VAV-EFS				NET STAT																					
	VAV-EFS				NET STAT	SA Bus	1		199					0												BacNet SA Bus
STAT	VAV-EFS	ZNT	Zone Temperature		NET STAT	SA Bus	1		199 STAT		+,COM,SA PWR			0		5--199-STAT						4/22	+,COM,SA PWR	NetSensor (Term,Fixed Address=199)	NS103	



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Drawing Title		VAV EFS Wiring Details	
Project Title		Kelly Walsh High School	
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN
T Gunderson	Wayne Ramich	Chris Odell	
SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DRAWN
BY	DATE	BY	DATE

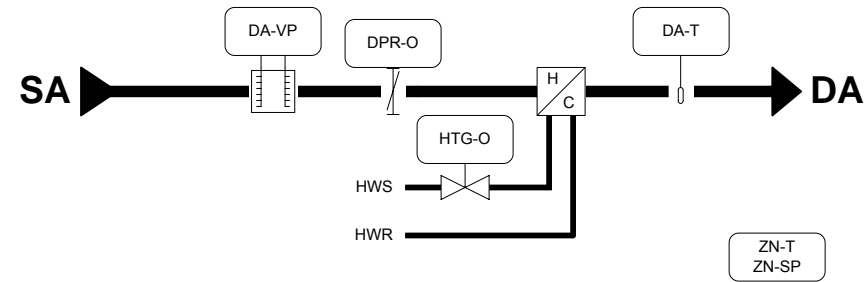
Branch Information

Johnson Controls
 Johnson Controls, Inc.
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501

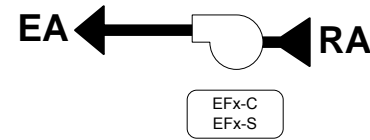
CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-10

VAV-2-1 Dual Exhaust Fan Flow Layout



EX FAN	POWER	INTERLOCK
EF-8	115V 1Φ 1/8HP	AHU-2
EF-19	115V 1Φ 1/6HP	AHU-2



BILL OF MATERIALS

Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
EFx-C/S	2	H120	CSR,N.O.,24V,FRAC HP,N.O.,SERIES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE

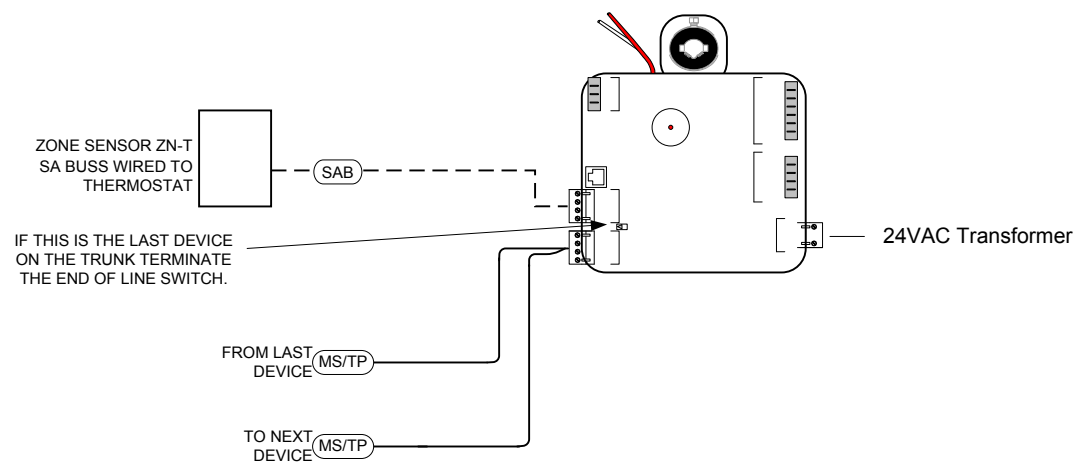
Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

EXHAUST FAN: INTERLOCK THE EXHAUST FAN WITH THE LISTED AHU, TURN FAN ON WHEN AHU IS OCCUPIED.

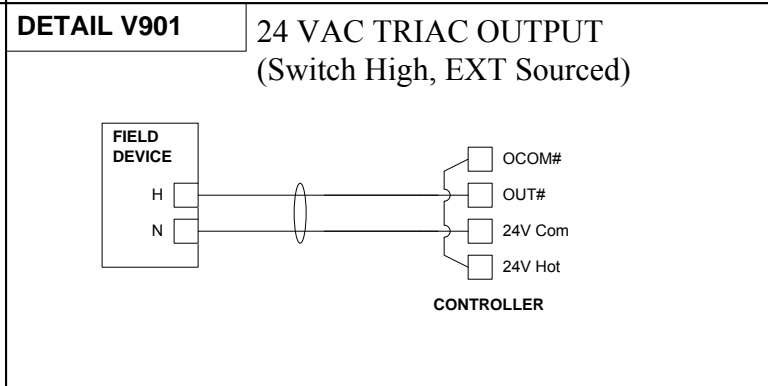
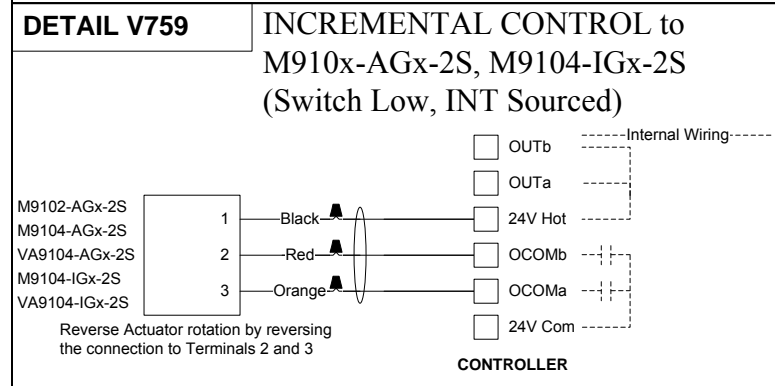
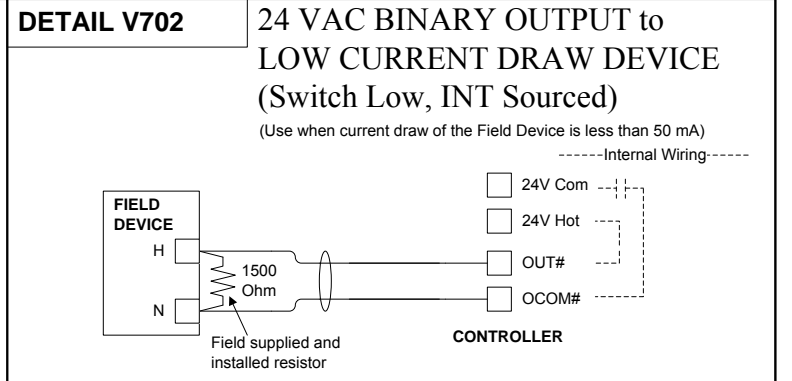
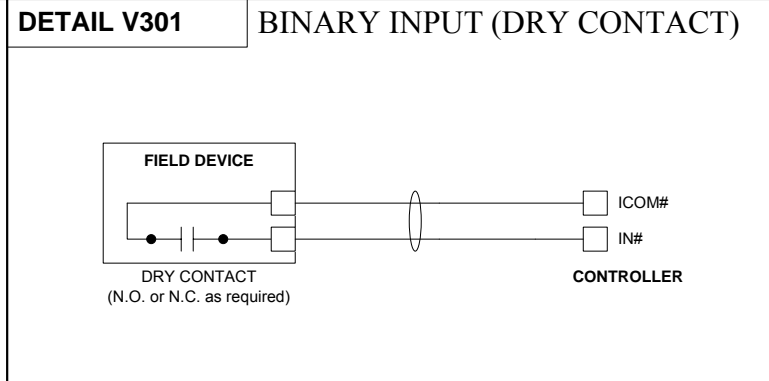
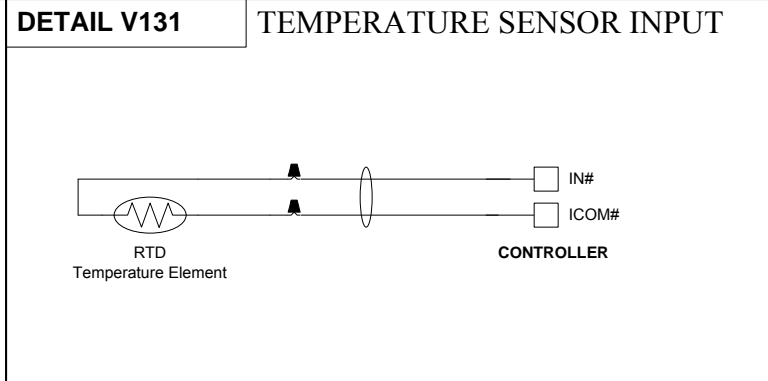
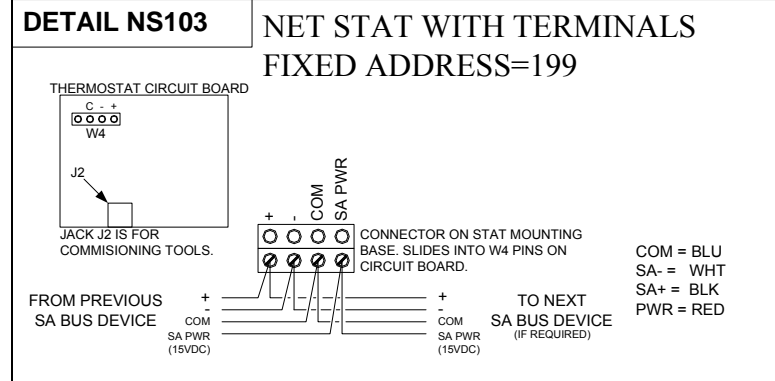
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	VAV-2-1 Flow Layout							
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501	
					CONTRACT NUMBER		4216-0030	
				DRAWING NUMBER		8-11		

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment				
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device	Location
	VAV 2-1				VMA 1630																					Power to Controller BacNet FC Bus	
UI IN-1	VAV 2-1	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1											2/18	2-Wire	TE		V131	
UI IN-2	VAV 2-1	EF8-S	EF8 Status		VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2												Motor Lead	See wiring detail	Motor Status (Contact)	V301	
UI IN-3	VAV 2-1	EF19-S	EF-19 Status		VMA 1630	MS/TP	1	x	UI IN-3		IN3, ICOM3												Motor Lead	See wiring detail	Motor Status (Contact)	V301	
BO OUT-1	VAV 2-1	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b, OCOM-a, 24V HOT											3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759			
BO OUT-2	VAV 2-1	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b, OCOM-a, 24V HOT												3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
BO OUT-3	VAV 2-1	EF8-C	EF8 Command		VMA 1630	MS/TP	1	x	BO OUT-3		OUT3, OCOM3												2/18	See wiring detail	Starter (NO) (Sw Low, INT Source)	V702	
CO OUT-4	VAV 2-1	EF19-C	EF-19 Command		VMA 1630	MS/TP	1	x	CO OUT-4		OUT4, 24V COM												2/18	See wiring detail	24VAC OUT (Sw Hi, EXT Source)	V901	
CO OUT-5	VAV 2-1				VMA 1630	MS/TP	1	x	CO OUT-5																		
	VAV 2-1				NET STAT																						
	VAV 2-1				NET STAT	SA Bus	1		199																	BacNet SA Bus	
STAT	VAV 2-1	ZNT	Zone Temperature		NET STAT	SA Bus	1		199 STAT		+, -COM, SA PWR																



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Drawing Title
VAV-2-1 Wiring Details

Project Title
Kelly Walsh High School

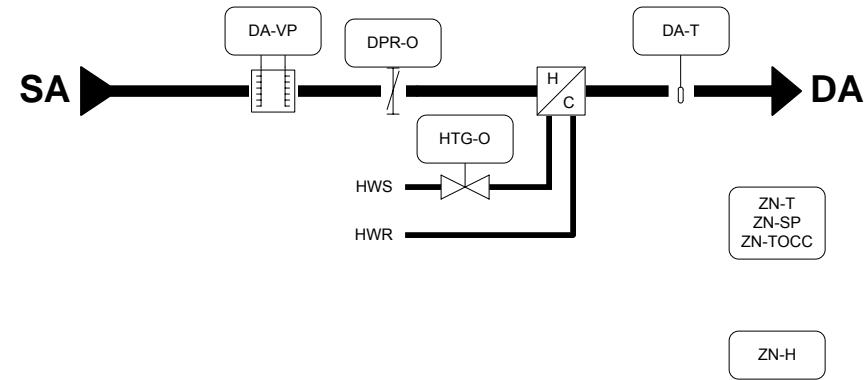
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

Branch Information
Johnson Controls, Inc.
5125 Carroll Ct.
Suite 400
Evansville, WY 82636
Phone: 307-265-0771
Fax: 307-265-9501

CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-12

VAV with Humidity Typical Flow Layout



BILL OF MATERIALS

Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1615-0	VMA 3 UI & 2BO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
ZN-H	1	HT-6703-0N00P	HUM SENS DUCT,4-20MA 0-10V W/JUMPER,3%RH
HTG-O	1		SEE VALVE SCHEDULE

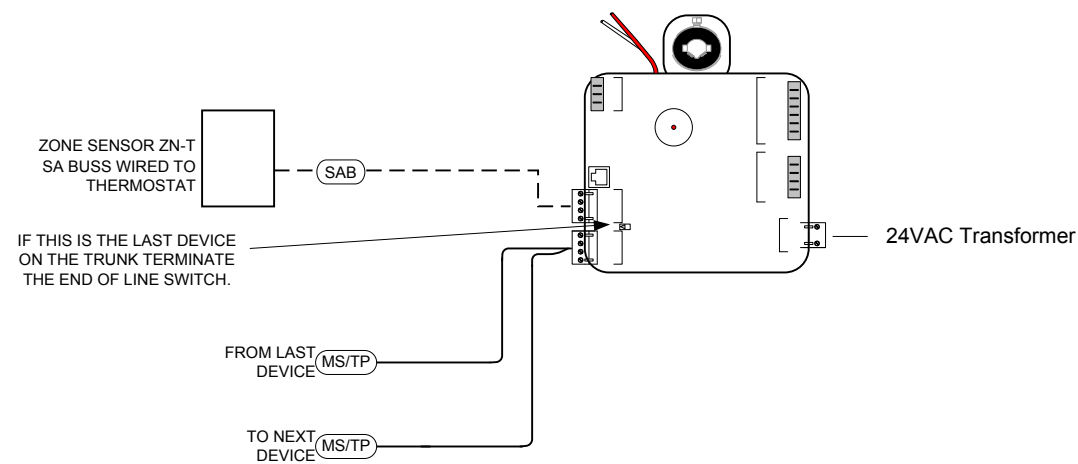
Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

ZONE HUMIDITY SENSOR: A HUMIDITY SENSOR WILL MONITOR THE CRAWL SPACE FOR HUMIDITY EXHAUST FAN CONTROL. SEE HUMIDITY EXHAUST FAN FLOW DIAGRAM FOR SEQUENCE.

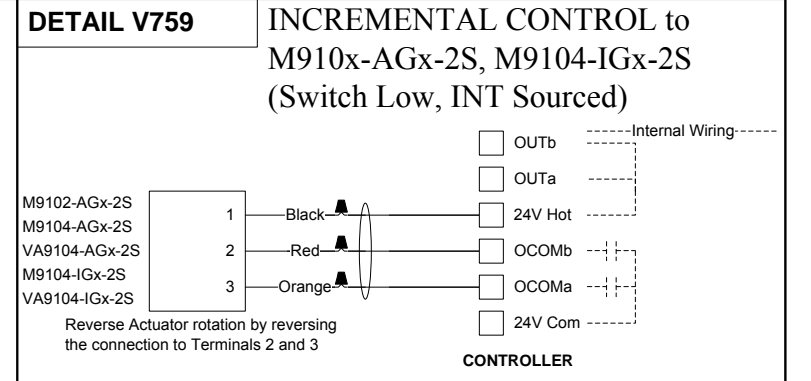
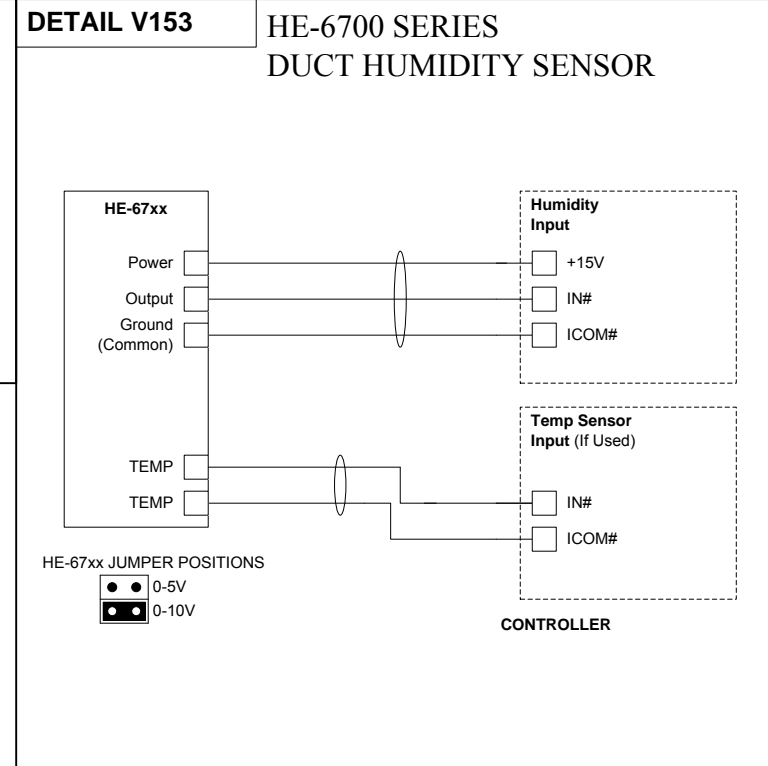
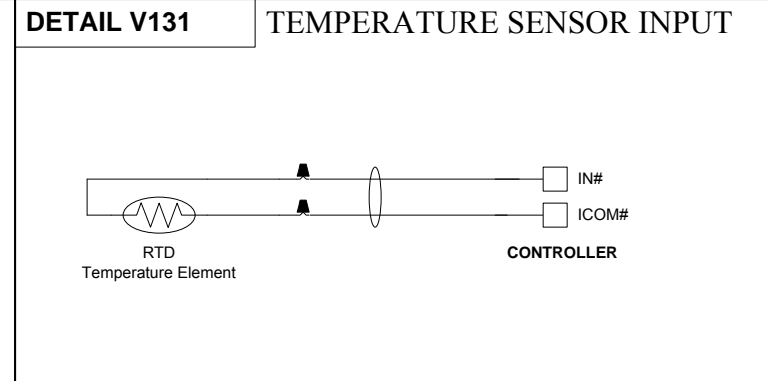
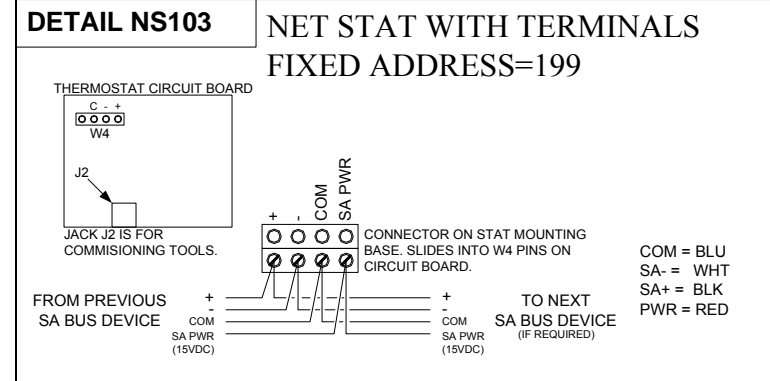
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV HU Flow Layout Typical Of 2							
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501	
					CONTRACT NUMBER		4216-0030	
				DRAWING NUMBER		8-13		

Electrician/Fitter Tag	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment			
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location			Wiring /Tubing	Termination In	Device
	VAV HU				VMA 1615																					Power to Controller BacNet FC Bus
	VAV HU				VMA 1615	MS/TP	1	x						0												
	UI IN-1	VAV HU	DA-T	Discharge Air Temperature	VMA 1615	MS/TP	1	x	UI IN-1		IN1, ICOM1			0	4-UI IN-1							2/18	2-Wire	TE		V131
	UI IN-2	VAV HU	ZN-H	Zone Humidity	VMA 1615	MS/TP	1	x	UI IN-2		IN2, ICOM2, +15V			0	4-UI IN-2							3/18	OUT, GND, PWR	HE-6700(Duct Mnt) - HE		V153
	UI IN-3	VAV HU			VMA 1615	MS/TP	1	x	UI IN-3					0	4-UI IN-3											
	BO OUT-1	VAV HU	HTG-O	Heating Output	VMA 1615	MS/TP	1	x	BO OUT-1		OCOM-b, OCOM-a, 24V HOT			0	4-BO OUT-1							3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
	BO OUT-2	VAV HU	HTG-O	Heating Output	VMA 1615	MS/TP	1	x	BO OUT-2		OCOM-b, OCOM-a, 24V HOT			0	4-BO OUT-2							3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759		
		VAV HU			NET STAT									0												
		VAV HU			NET STAT	SA Bus	1		199					0												
	STAT	VAV HU	ZN-T	Zone Temperature	NET STAT	SA Bus	1		199 STAT		+,-,COM,SA PWR			0	199-STAT							4/22	+,-,COM,SA PWR	NetSensor (Term,Fixed Address=199) NS103		



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Drawing Title: **VAV HU Wiring Details**

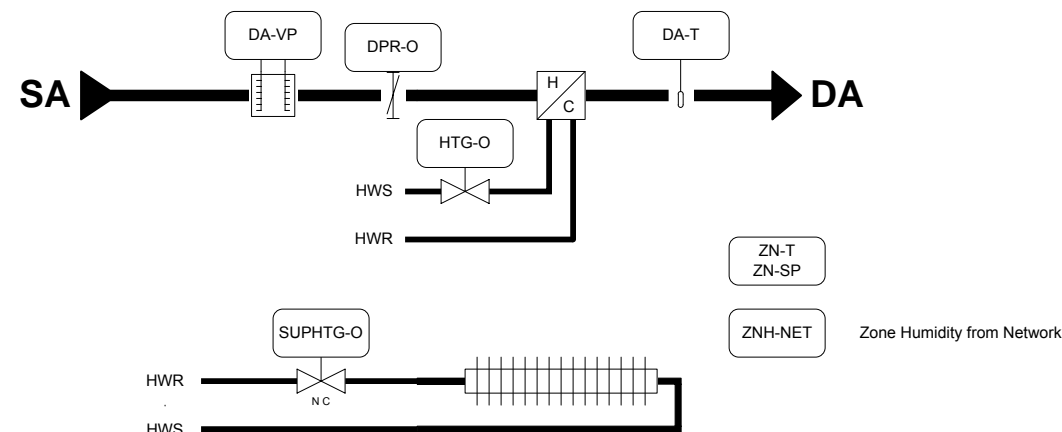
Project Title: **Kelly Walsh High School**

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

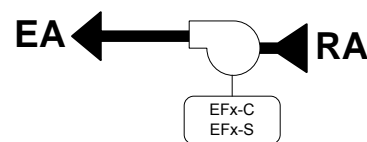
Branch Information:
Johnson Controls, Inc.
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501

CONTRACT NUMBER: **4216-0030**
 DRAWING NUMBER: **8-14**

VAV Science Exhaust Fan Flow Layout



EX FAN	POWER	ZNH LOCATION
EF-10	115V 1Φ 1/6HP	AHU-8



BILL OF MATERIALS

Designation	Qty	Part Number	Description
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
EF-C/S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE
SUPHTG-O	1		SEE VALVE SCHEDULE

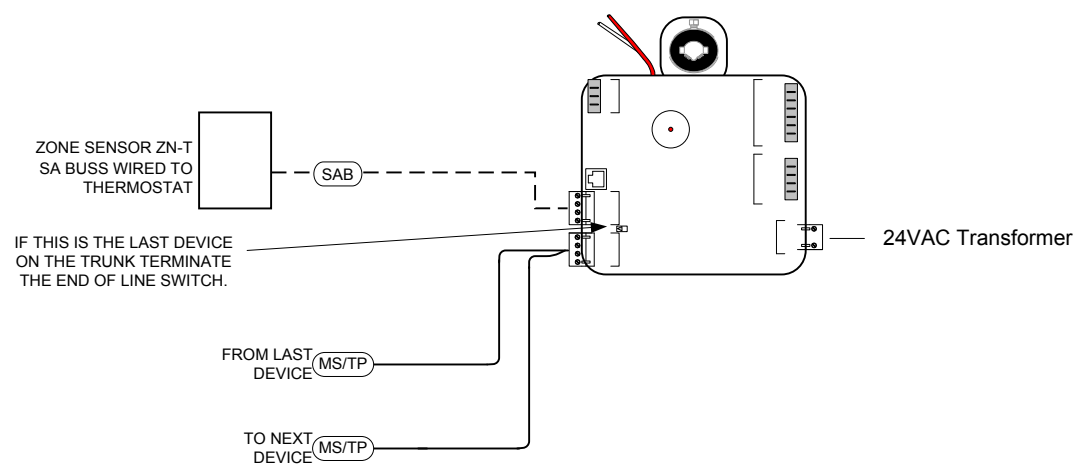
Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

EXHAUST FAN: ON A RISE IN ZONE HUMIDITY ABOVE THE HUMIDITY SETPOINT, START THE HUMIDITY EXHAUST FAN. ON A DROP IN ZONE HUMIDITY BELOW THE HUMIDITY SETPOINT, STOP THE HUMIDITY EXHAUST FAN.

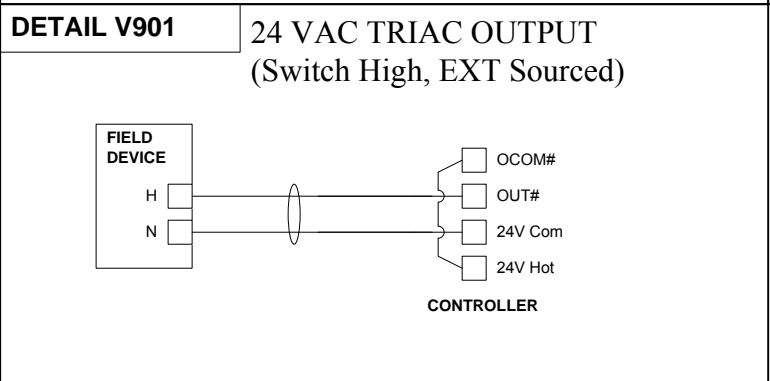
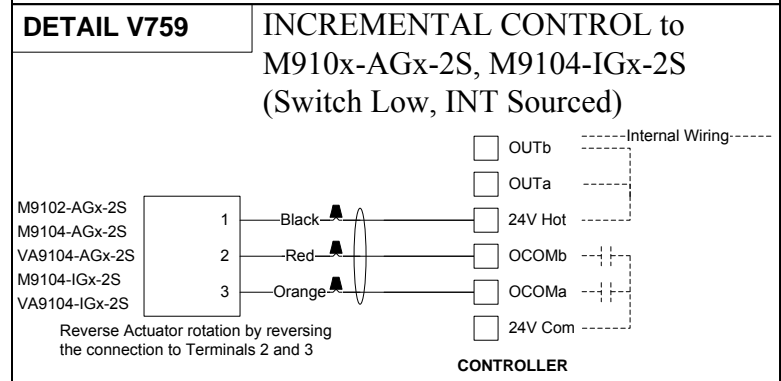
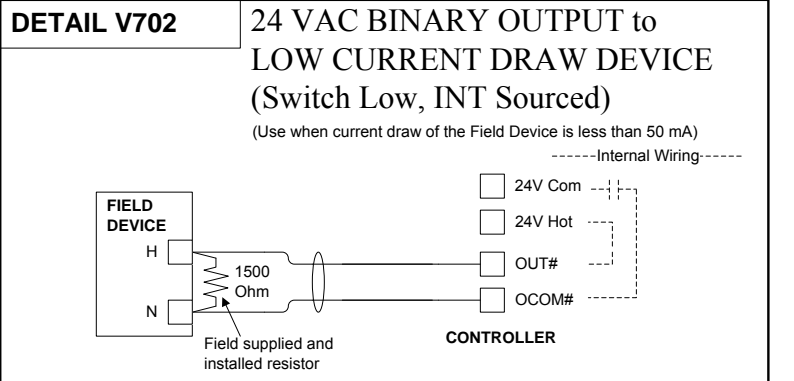
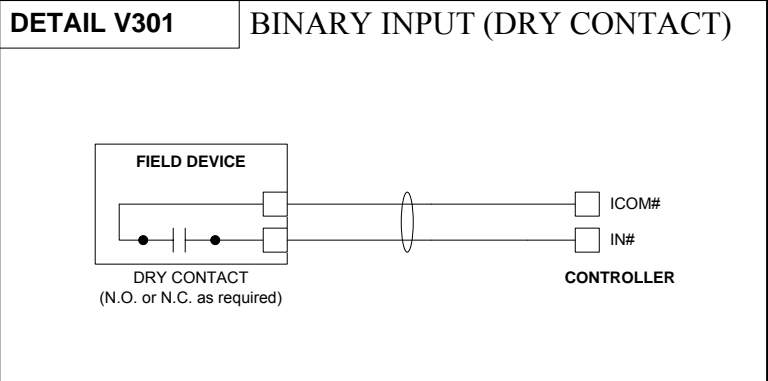
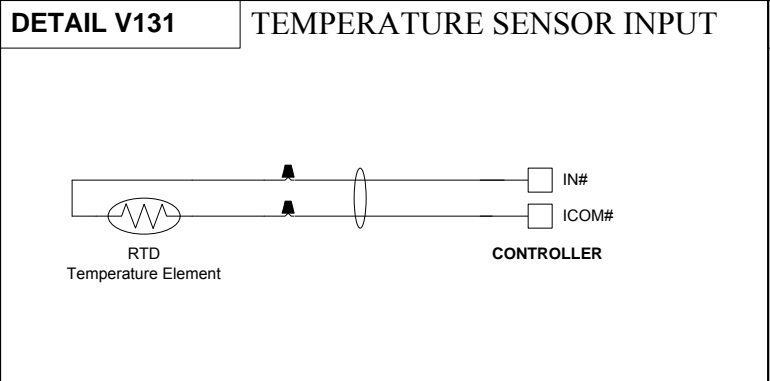
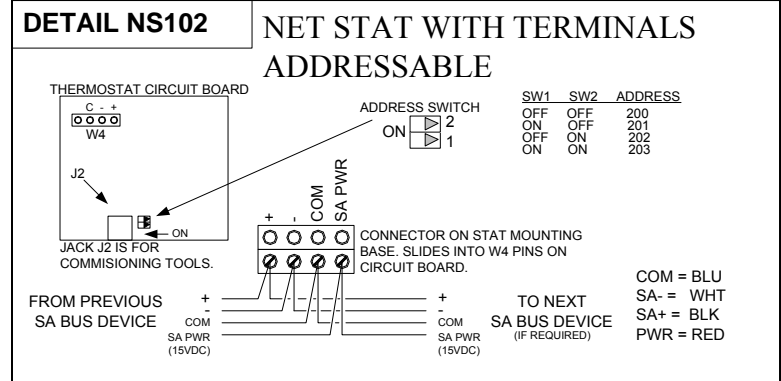
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



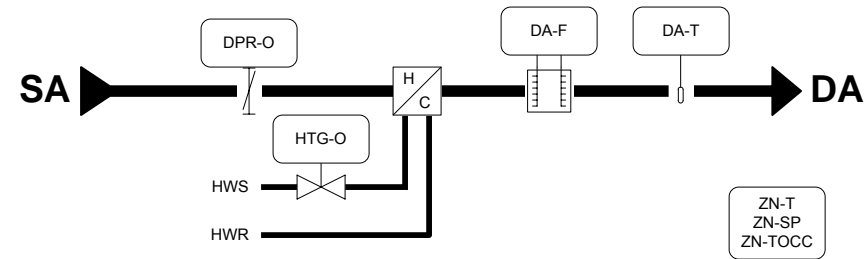
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	VAV-8-18 Flow Layout							
	Project Title		Kerry Walsh High School		Branch Information		CONTRACT NUMBER	
					<p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>4216-0030</p> <p>DRAWING NUMBER</p> <p>8-15</p>	
		REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY	
		T Gunderson	Wayne Ramich	Chris Odell				

Electrician/Fitter Tag	Point Information			Controller Information							Panel Information				Intermediate Device				Field Device				Ref Detail Shape		
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing		Termination In	Device
	VAV 8-18				VMA 1630																				
	VAV 8-18				VMA 1630	MS/TP	1	67						0											
UI IN-1	VAV 8-18	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	67	UI IN-1		IN1, ICOM1			0	-5-UI IN-1							2/18	2-Wire	TE	V131
UI IN-2	VAV 8-18	EFH10-S	EFH10 Status		VMA 1630	MS/TP	1	67	UI IN-2		IN2, ICOM2			0	-5-UI IN-2	2/18	OUT, COM	Current Relay	Motor Lead			Motor Lead	See wiring detail	Motor Status (Contact)	V301
UI IN-3	VAV 8-18				VMA 1630	MS/TP	1	67	UI IN-3					0	-5-UI IN-3										
BO OUT-1	VAV 8-18	HTG-O	Heating Output		VMA 1630	MS/TP	1	67	BO OUT-1		OCOM-b, OCOM-a, 24V HOT			0	-5-BO OUT-1							3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759	
BO OUT-2	VAV 8-18	HTG-O	Heating Output		VMA 1630	MS/TP	1	67	BO OUT-2		OCOM-b, OCOM-a, 24V HOT			0	-5-BO OUT-2							3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759	
BO OUT-3	VAV 8-18	EFH10-C	EFH10 Command		VMA 1630	MS/TP	1	67	BO OUT-3		OUT3, OCOM3			0	-5-BO OUT-3	2/18	COIL (13,14)	IDEC Relay	COM, NO (9,5)			2/18	See wiring detail	Starter (NO) (Sw Low, INT Source)	V702
CO OUT-4	VAV 8-18	SUPHTG-O	Supplemental Heating Output		VMA 1630	MS/TP	1	67	CO OUT-4		OUT4, 24V COM			0	-5-CO OUT-4							2/18	See wiring detail	24VAC OUT (Sw Hi, EXT Source)	V901
CO OUT-5	VAV 8-18	SUPHTG-O	Supplemental Heating Output		VMA 1630	MS/TP	1	67	CO OUT-5		OUT5, 24V COM			0	-5-CO OUT-5							2/18	See wiring detail	24VAC OUT (Sw Hi, EXT Source)	V901
	VAV 8-18				NET STAT									0											
	VAV 8-18				NET STAT	SA Bus	1	199						0											
STAT	VAV 8-18	ZN-T	Zone Temperature		NET STAT	SA Bus	1	199	STAT		+, -, COM, SA PWR			0	5-199-STAT							4/22	+, -, COM, SA PWR	NetSensor (Term, Addressable)	NS102



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	VAV-8-18 Wiring Details				
	Project Title	Kelly Walsh High School			
	<p>REFERENCE DRAWING</p> <p>T Gunderson</p>		<p>NO.</p> <p>Wayne Ramich</p>		<p>REVISION-LOCATION</p> <p>Chris Odell</p>
<p>DATE</p>		<p>DATE</p>		<p>DATE</p>	
<p>BY</p>		<p>BY</p>		<p>BY</p>	
<p>APPROVED</p>		<p>APPROVED</p>		<p>APPROVED</p>	
		<p>Branch Information</p> <p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER</p> <p>4216-0030</p> <p>DRAWING NUMBER</p> <p>8-16</p>	

RHC Typical Flow Layout



BILL OF MATERIALS

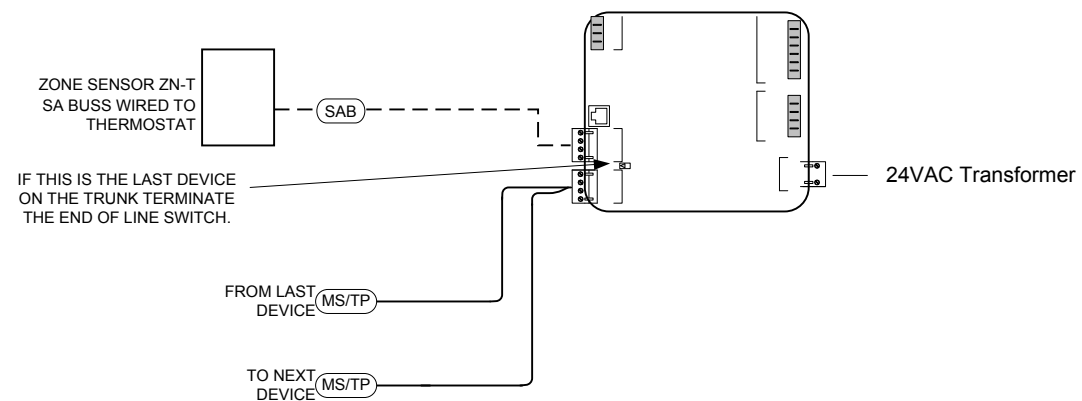
Designation	Qty	Part Number	Description
DA-T	1	TE-6311M-1	8" 1000 OHM NI DUCT TEMP
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
FEC	1	EN-EWC15-0	UPM SINGLE W/TRANSFORMER
	1	MS-FEC1611-0	FEC1611-0, FEC9, W/O
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
HTG-O	1		SEE VALVE SCHEDULE
DPR-O	1		SEE DAMPER SCHEDULE

Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

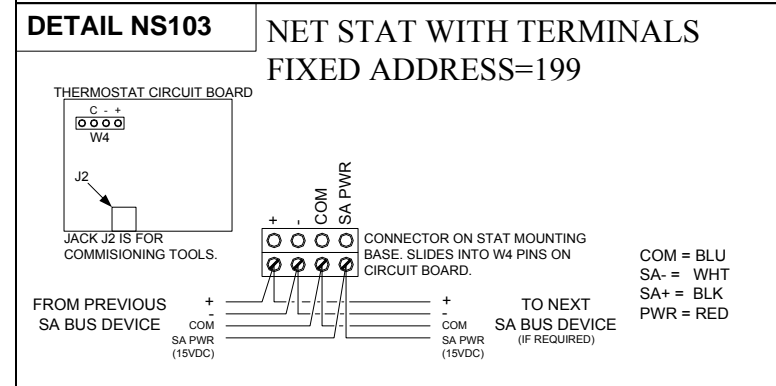
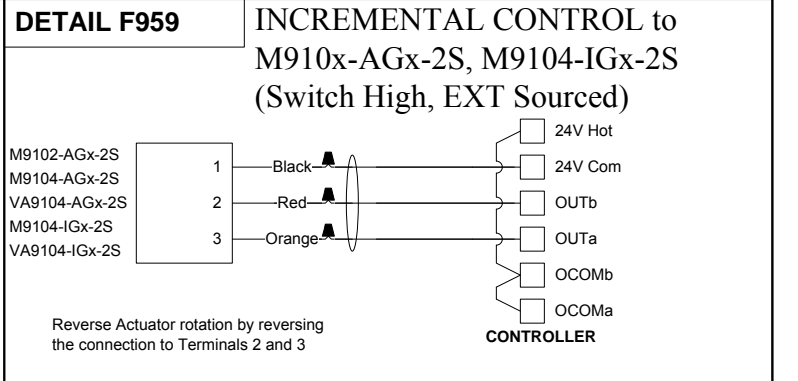
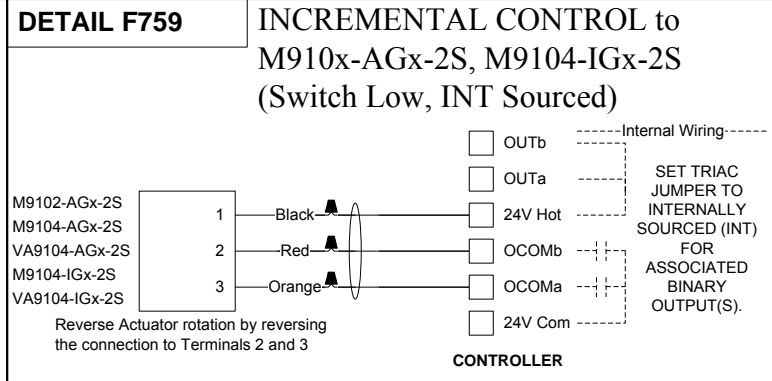
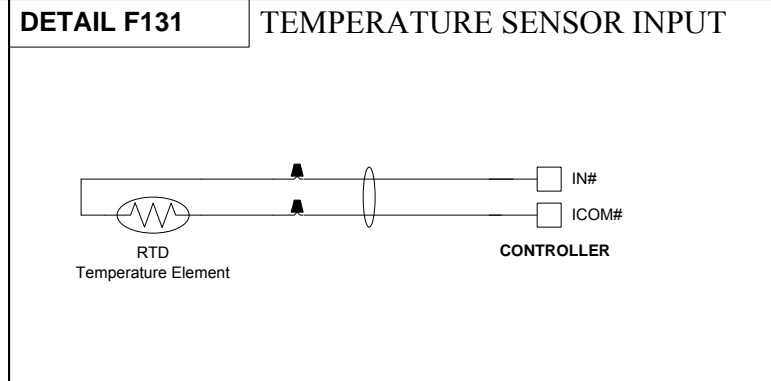
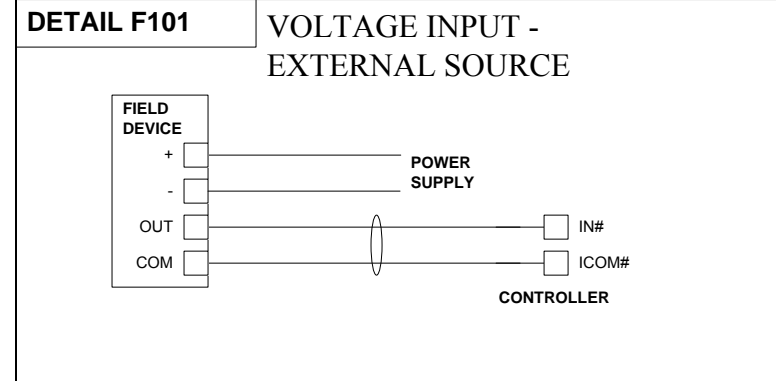
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	RHC Flow Layout Typical Of 8										
	Project Title		Kelly Walsh High School								
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN		DATE		BY	
Sales Engineer		Project Manager		Application Engineer		DRAWN		APPROVED			
T Gunderson		Wayne Ramich		Chris Odell		BY		DATE		BY	
										CONTRACT NUMBER	
										4216-0030	
										DRAWING NUMBER	
										8-17	

Electrician/Fitter Tag	Point Information			Controller Information							Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment		
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing			Termination In	Device
		RHC			FEC 16xx																					Power to Controller BacNet FC Bus
	UI IN-1	RHC	DA-T	Discharge Air Temperature	FEC 16xx	MS/TP	1	x	UI IN-1		IN1, ICOM1				0	-4-UI IN-1						2/18	2-Wire	TE		F131
	UI IN-2	RHC	DA-F	Discharge Air Flow	FEC 16xx	MS/TP	1	x	UI IN-2		IN2, ICOM2				0	-4-UI IN-2						2/18	See wiring detail	Voltage Input (External Pwr)		F101
	BI IN-3	RHC			FEC 16xx	MS/TP	1	x	BI IN-3						0	-4-BI IN-3										
	BO OUT-1	RHC	HTG-O	Heating Output	FEC 16xx	MS/TP	1	x	BO OUT-1		OCOM-b,OCOM-a,24V HOT				0	-4-BO OUT-1						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S F759		
	BO OUT-2	RHC	HTG-O	Heating Output	FEC 16xx	MS/TP	1	x	BO OUT-2		OCOM-b,OCOM-a,24V HOT				0	-4-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S F759		
	BO OUT-3	RHC			FEC 16xx	MS/TP	1	x	BO OUT-3						0	-4-BO OUT-3										
	CO OUT-4	RHC	DPR-O	Supply Air Damper Output	FEC 16xx	MS/TP	1	x	CO OUT-4		OUT-a,OUT-b,24V COM				0	-4-CO OUT-4						3/18	ORG, RED, BLK	M910x-AGx-2S (Incr) (Sw HI, EXT S F959		
	CO OUT-5	RHC	DPR-O	Supply Air Damper Output	FEC 16xx	MS/TP	1	x	CO OUT-5		OUT-a,OUT-b,24V COM				0	-4-CO OUT-5						3/18	ORG, RED, BLK	M910x-AGx-2S (Incr) (Sw HI, EXT S F959		
	CO OUT-6	RHC			FEC 16xx	MS/TP	1	x	CO OUT-6						0	-4-CO OUT-6										
	CO OUT-7	RHC			FEC 16xx	MS/TP	1	x	CO OUT-7						0	-4-CO OUT-7										
		RHC			NET STAT																					
		RHC			NET STAT	SA Bus	1		199						0											BacNet SA Bus
	STAT	RHC	ZN-T	Zone Temperature	NET STAT	SA Bus	1		199 STAT		+, -,COM,SA PWR				0	4--199-STAT						4/22	+, -,COM,SA PWR	NetSensor (Term,Fixed Address=199) NS103		



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Drawing Title: **RHC Wiring Details**

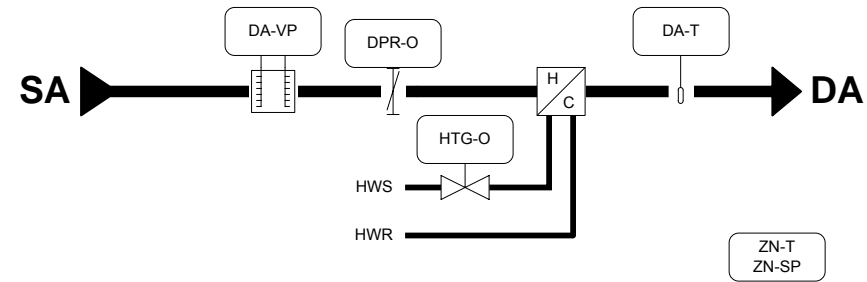
Project Title: **Kelly Walsh High School**

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

Branch Information:
Johnson Controls
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501

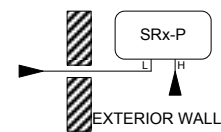
CONTRACT NUMBER: **4216-0030**
 DRAWING NUMBER: **8-18**

VAV Science Prep with ACV and LEF Flow Layout

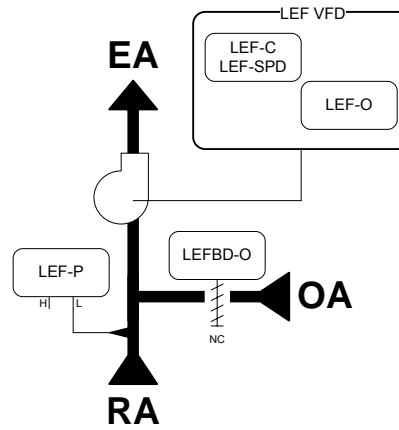


WIRE ACV TO LISTED VAV

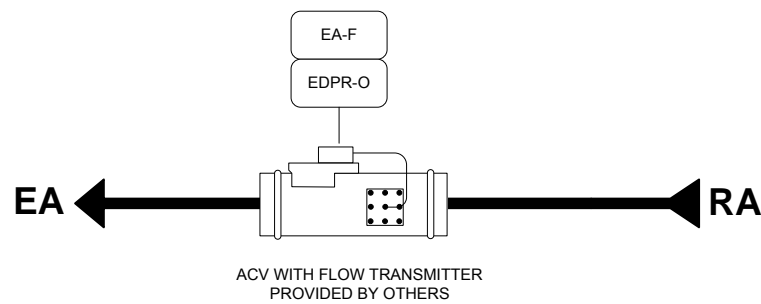
VAV	ACV
VAV-08-17	ACV-5
VAV-11-17	ACV-8



Lab EF Flow Layout



Exhaust ACV Flow Layout



BILL OF MATERIALS

Designation	Qty	Part Number	Description
SR-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -.025 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE
LEF-IOM	1	MS-IOM2711-0	MS-IOM2711-0, 6 POINT
LEF-P	1	DPT2640-005D-1	DP TRANS, DIF, 0 TO 5
	1	FTG18A-600R	REMOTE MTD PROBE
LEFBD-O	1	M9208-GGA-3	ACT.ROTARY PROPORTIONAL
LEF-VFD	1		VFD PROVIDED WITH LAB EXHAUST FAN

Sequence of Operation

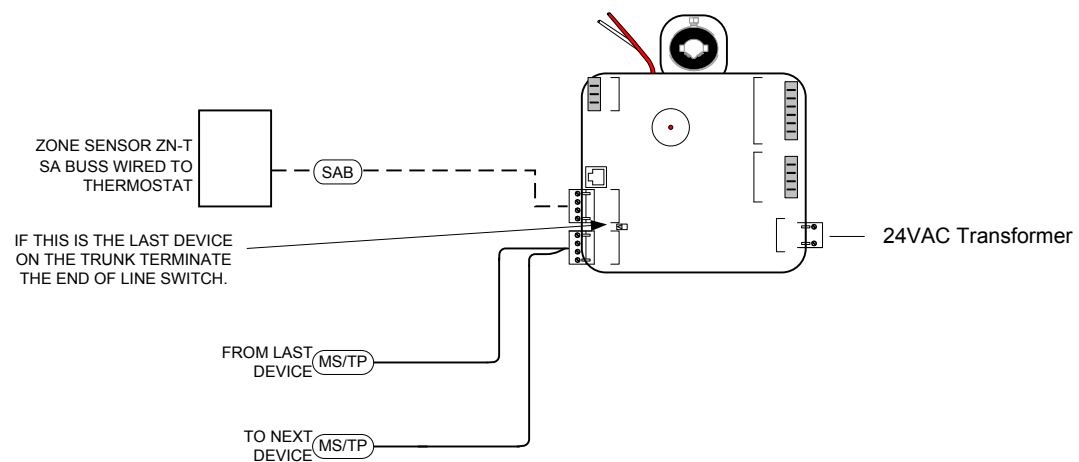
OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

EXHAUST AIR CONTROL VALVE (ACV): THE ACV SHALL RUN CONSTANTLY. WHEN THE ROOM STATIC PRESSURE EXCEEDS SETPOINT (SR-SP) THE EXHAUST ACV (EDPR-O) WILL MODULATE WITHIN A FLOW RANGE TO MAINTAIN THE ROOM STATIC PRESSURE AT SETPOINT (SR-SP).

LAB EXHAUST FAN (LEF): THE LAB EXHAUST FAN SHALL RUN CONSTANTLY. THE BYPASS DAMPER (LEFBD-O) WILL MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE (LEF-P) AT SETPOINT.

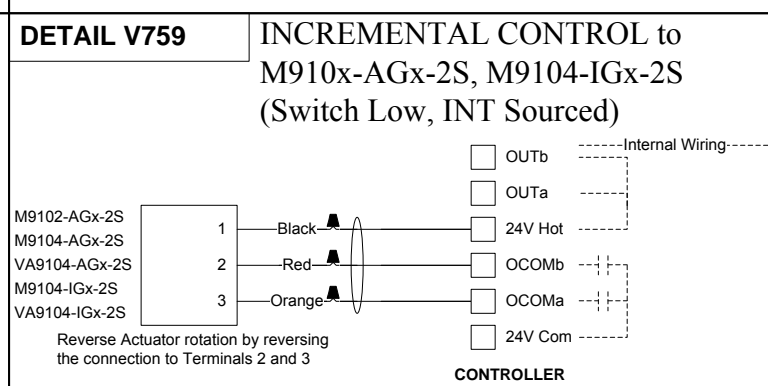
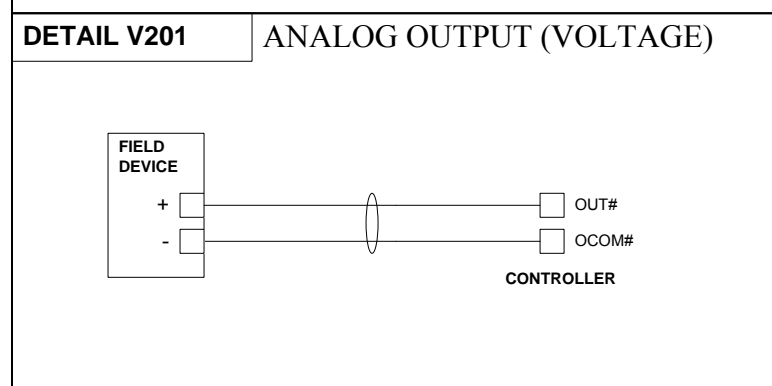
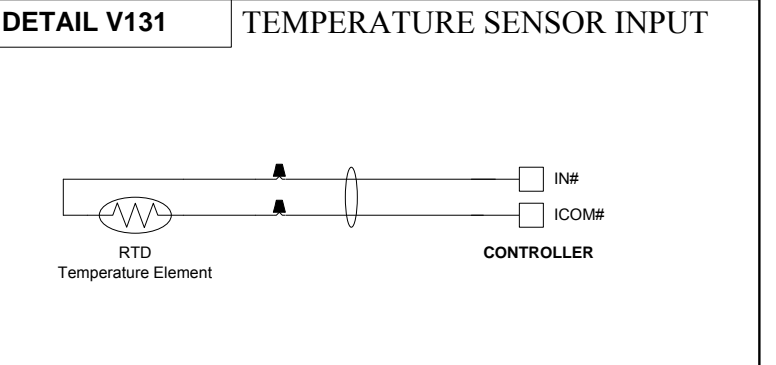
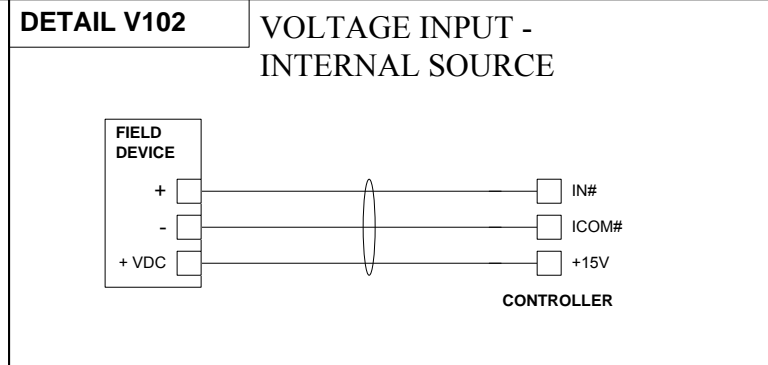
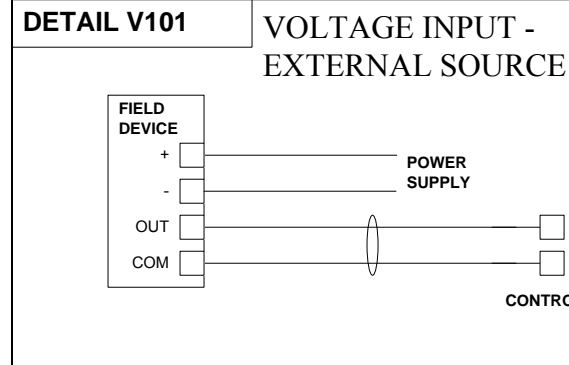
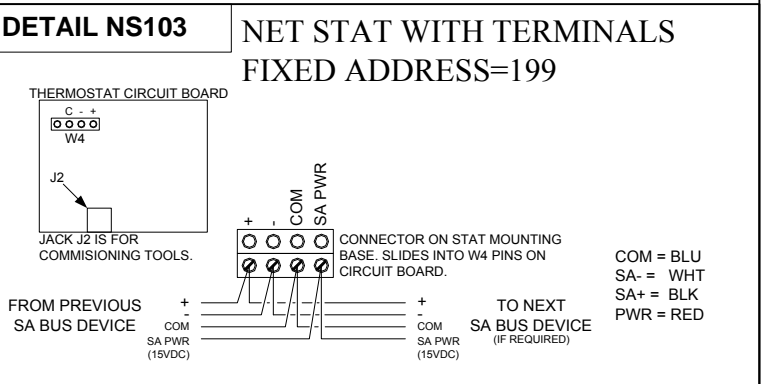
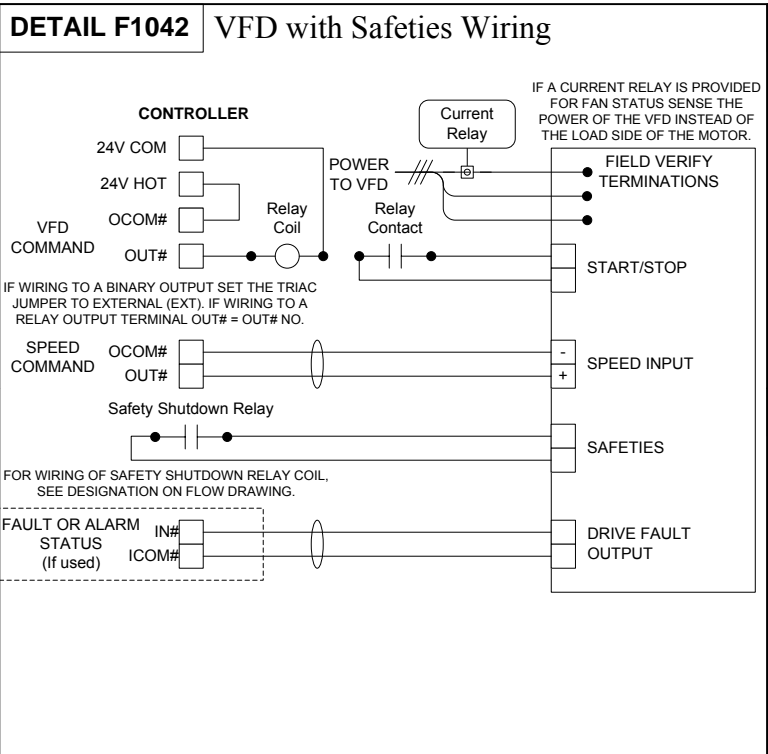
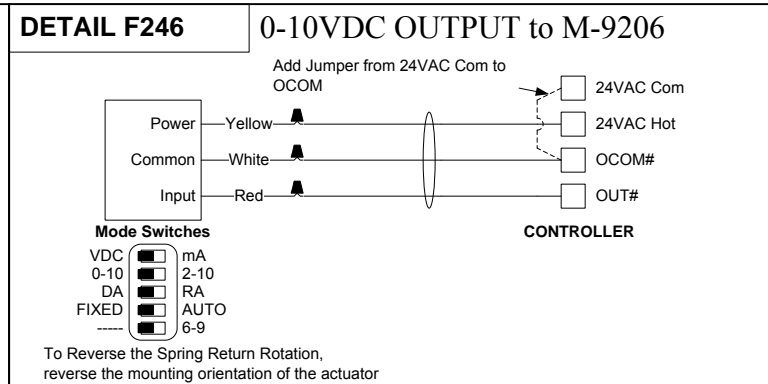
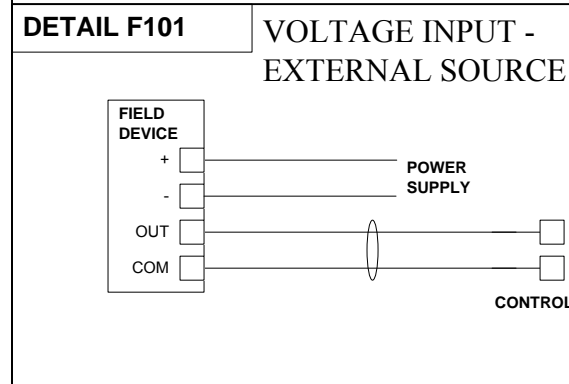
DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	VAV Sci Prep with LEF Flow Layout Typical Of 2							
	Project Title		Kerry Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501	
					CONTRACT NUMBER		4216-0030	
				DRAWING NUMBER		8-19		

Electrician/Fitter		Point Information			Controller Information						Panel Information				Intermediate Device					Field Device								
Tag	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing	Termination In	Device	Location	Ref Detail Shape	Comment	
		VAV SP LEF			VMA 1630																						Power to Controller BacNet FC Bus	
	UI IN-1	VAV SP LEF	DA-T	Discharge Air Temperature	VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1					0						2/18	2-Wire	TE		V131		
	UI IN-2	VAV SP LEF	EA-F	Exhaust Air Flow	VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2					0						2/18	See wiring detail	Voltage Input (External Pwr)		V101		
	UI IN-3	VAV SP LEF	SRP-P	Science Rm Pressure	VMA 1630	MS/TP	1	x	UI IN-3		IN3, ICOM3, +15V					0						3/18	OUT, COM, EXC	DPT2xxx (Vdc)		V102		
	BO OUT-1	VAV SP LEF	HTG-O	Heating Output	VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b, OCOM-a, 24V HOT					0						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759)				
	BO OUT-2	VAV SP LEF	HTG-O	Heating Output	VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b, OCOM-a, 24V HOT					0						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT S V759)				
	BO OUT-3	VAV SP LEF			VMA 1630	MS/TP	1	x	BO OUT-3							0												
	CO OUT-4	VAV SP LEF			VMA 1630	MS/TP	1	x	CO OUT-4							0												
	CO OUT-5	VAV SP LEF	EDPR-O	Exhaust Damper Output	VMA 1630	MS/TP	1	x	CO OUT-5		OUT5, OCOM5					0						2/18	See wiring detail	Output (Voltage)		V201		
		VAV SP LEF			IOM 2710																						Power to Controller BacNet SA Bus	
	UI IN-1	VAV SP LEF	LEFX-P	Lab Exhaust Fan Pressure	IOM 2710	SA Bus	1		5 UI IN-1		IN1, ICOM1					0						2/18	See wiring detail	DPT2xxx (Vdc)		F101		
	UI IN-2	VAV SP LEF	LEFX-SPD	Lab EF Speed	IOM 2710	SA Bus	1		5 UI IN-2		IN2, ICOM2					0						2/18	See wiring detail	Voltage Input (External Pwr)		F101		
	RO OUT-1	VAV SP LEF	LEFX-C	Lab EF Command	IOM 2710	SA Bus	1		5 RO OUT-1		OUT1, 24V COM					0						2/18	See wiring detail	VFD (w/ Safety) (Sw Hi, EXT)		F1042		
	RO OUT-2	VAV SP LEF			IOM 2710	SA Bus	1		5 RO OUT-2							0												
	UO OUT-3	VAV SP LEF	LEFX-O	Lab EF Output	IOM 2710	SA Bus	1		5 UO OUT-3		OUT3, 24V COM					0						2/18	See wiring detail	VFD (w/ Safety) (Sw Hi, EXT)		F1042		
	UO OUT-4	VAV SP LEF	LEFBDx-O	Lab EF Bypass Damper Output	IOM 2710	SA Bus	1		5 UO OUT-4		OUT4, OCOM4, 24V HOT					0						3/18	Red, White, Yellow	M-9206 (Vdc) (Int Source)		F246		
		VAV SP LEF			NET STAT																						BacNet SA Bus	
	STAT	VAV SP LEF	ZN-T	Zone Temperature	NET STAT	SA Bus	1	199	STAT		+, -, COM, SA PWR					0						4/22	+, -, COM, SA PWR	NetSensor (Term, Fixed Address=199) NS103				

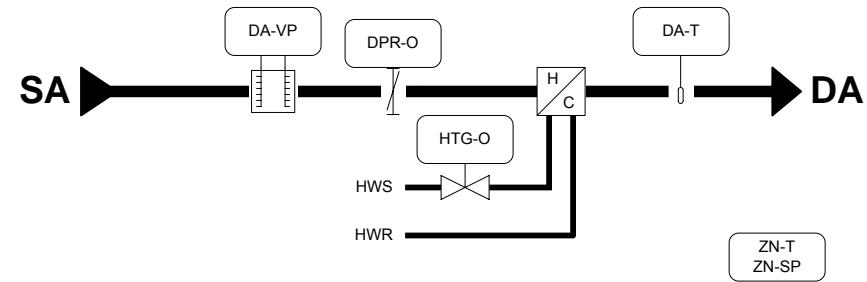


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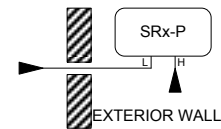
Drawing Title VAV Sci Prep with LEF Wiring Details		Project Title Kelly Walsh High School		Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030	
REFERENCE DRAWING NO.		REVISION-LOCATION		ECN		DATE BY	
Sales Engineer T Gunderson		Project Manager Wayne Ramich		Application Engineer Chris Odell		DRAWN BY DATE BY DATE	
						DRAWING NUMBER 8-20	

VAV Science Prep with ACV Flow Layout

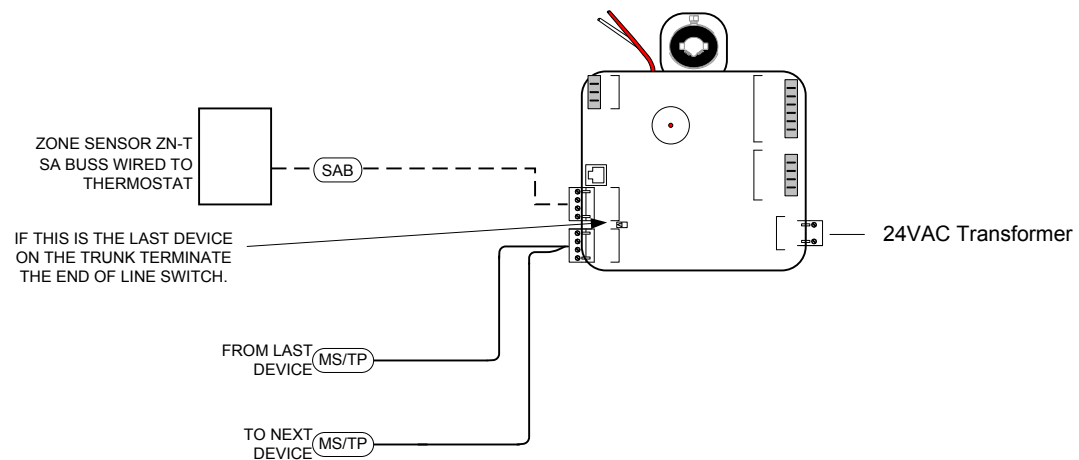
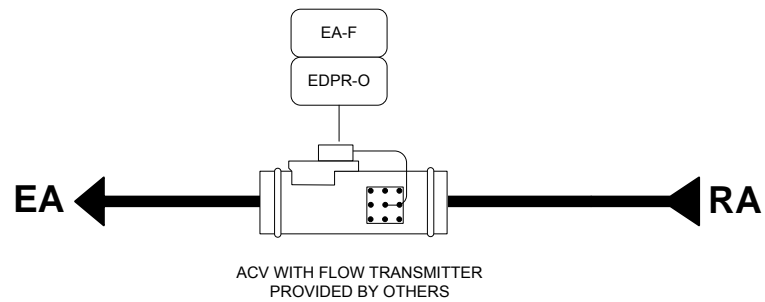


WIRE ACV TO LISTED VAV

VAV	ACV
VAV-07-19	ACV-4
VAV-10-19	ACV-9



Exhaust ACV Flow Layout



BILL OF MATERIALS

Designation	Qty	Part Number	Description
SR-P	1	A-306-K	OUTDOOR AIR STATIC
	1	DPT2640-R25B-1	DP TRANS, DIF, -0.25 TO
	1	RPS	STAINLESS STEEL RM PRESS SENSOR 1/4 BARB
	1	SD-01	SURGE DAMPENER
DA-T	1	TE-631GV-2	NICKEL DUCT PROB,4 INCHES
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
VMA	1	MS-VMA1630-0	VMA 3 UI & 3 BO 2 CO
ZN-T,-SP	1	NS-BTB7002-0	3X4.5.T.F/C.D.ADJ.TB
HTG-O	1		SEE VALVE SCHEDULE

Sequence of Operation

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL CONTROL TO THE MINIMUM CFM AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL CONTROL TO AN INCREASING CFM AND THERE WILL BE NO MECHANICAL HEATING. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX COOLING FLOW SETPOINT. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT COIL WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE, THE PRIMARY AIR DAMPER IS CONTROLLED TO AN INCREASING CFM. THE CFM SETPOINT WILL INCREASE FROM THE MIN SETPOINT TO THE MAX HEATING FLOW SETPOINT.

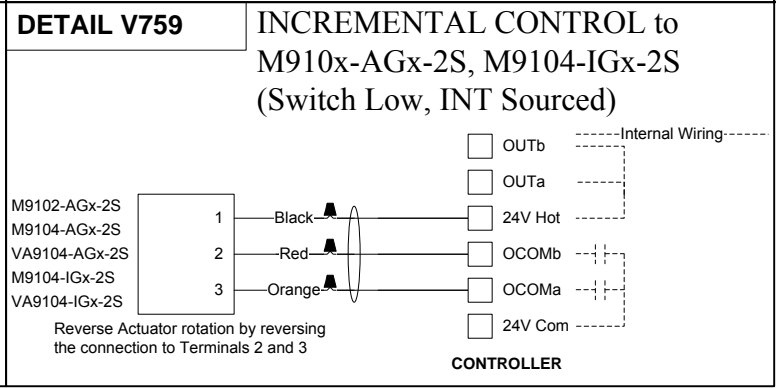
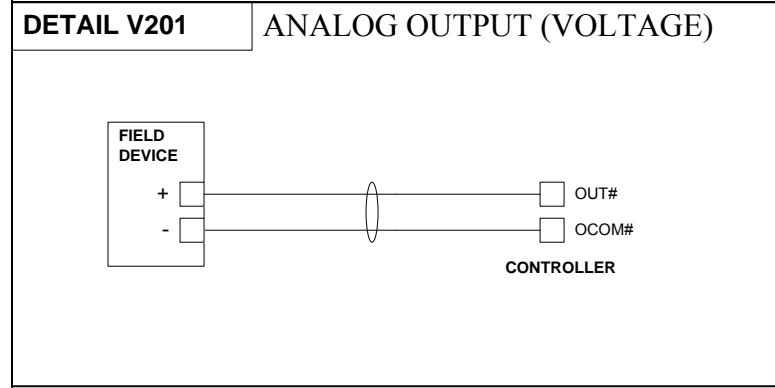
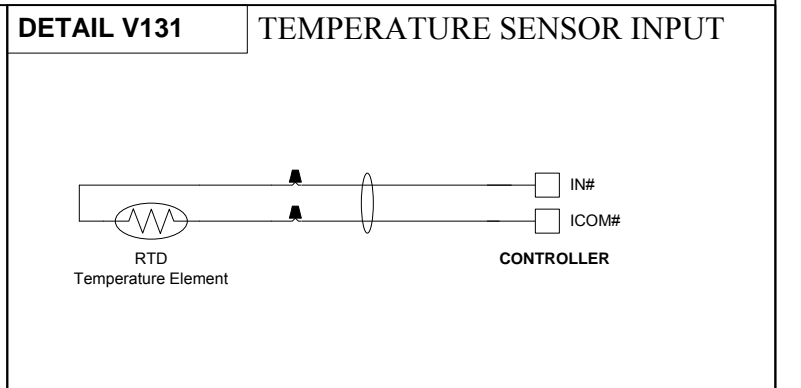
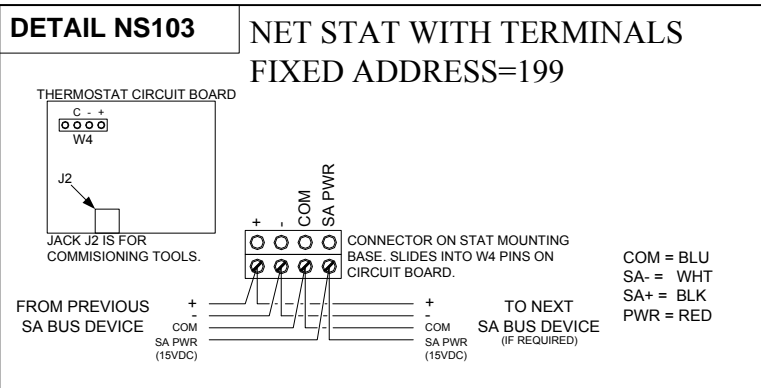
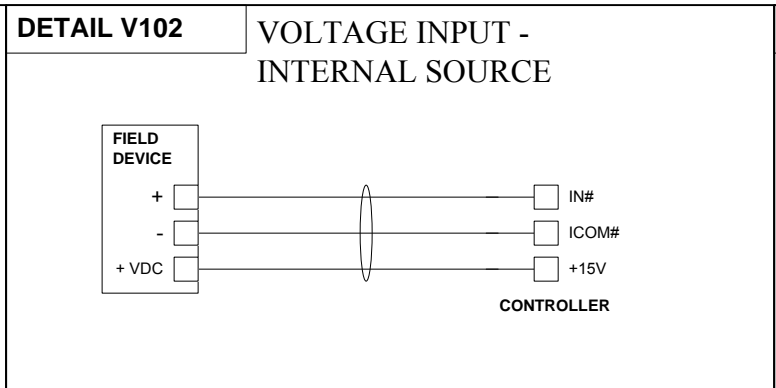
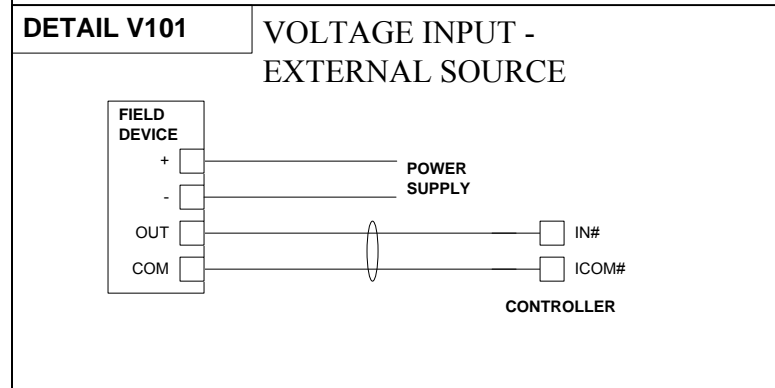
EXHAUST AIR CONTROL VALVE (ACV): THE ACV SHALL RUN CONSTANTLY. WHEN THE ROOM STATIC PRESSURE EXCEEDS SETPOINT (SR-SP) THE EXHAUST ACV (EDPR-O) WILL MODULATE WITHIN A FLOW RANGE TO MAINTAIN THE ROOM STATIC PRESSURE AT SETPOINT (SR-SP).

DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE

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	VAV Sci Prep Flow Layout Typical Of 2							
	Project Title		Kerry Walsh High School		Branch Information		CONTRACT NUMBER	
					<p>Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		4216-0030	
				DRAWING NUMBER		8-21		

Electrician/Fitter Tag	Point Information			Controller Information							Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment		
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing			Termination In	Device
	VAV SP				VMA 1630																					Power to Controller BacNet FC Bus
UI IN-1	VAV SP	DA-T	Discharge Air Temperature		VMA 1630	MS/TP	1	x	UI IN-1		IN1, ICOM1				0	-5-UI IN-1						2/18	2-Wire	TE		V131
UI IN-2	VAV SP	EA-F	Exhaust Air Flow		VMA 1630	MS/TP	1	x	UI IN-2		IN2, ICOM2				0	-5-UI IN-2						2/18	See wiring detail	Voltage Input (External Pwr)		V101
UI IN-3	VAV SP	SRP-P	Science Rm Pressure		VMA 1630	MS/TP	1	x	UI IN-3		IN3, ICOM3, +15V				0	-5-UI IN-3						3/18	ORG, RED, BLK	DPT2xxx (Vdc)		V102
BO OUT-1	VAV SP	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-1		OCOM-b, OCOM-a, 24V HOT				0	-5-BO OUT-1						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT SV759)		
BO OUT-2	VAV SP	HTG-O	Heating Output		VMA 1630	MS/TP	1	x	BO OUT-2		OCOM-b, OCOM-a, 24V HOT				0	-5-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, INT SV759)		
BO OUT-3	VAV SP				VMA 1630	MS/TP	1	x	BO OUT-3						0	-5-BO OUT-3										
CO OUT-4	VAV SP				VMA 1630	MS/TP	1	x	CO OUT-4						0	-5-CO OUT-4										
CO OUT-5	VAV SP	EDPR-O	Exhaust Damper Output		VMA 1630	MS/TP	1	x	CO OUT-5		OUT5, OCOM5				0	-5-CO OUT-5						2/18	See wiring detail	Output (Voltage)		V201
	VAV SP				NET STAT																					
	VAV SP				NET STAT	SA Bus	1	199							0											BacNet SA Bus
STAT	VAV SP	ZN-T	Zone Temperature		NET STAT	SA Bus	1	199 STAT			+,-,COM,SA PWR				0	5--199-STAT						4/22	+,-,COM,SA PWR	NetSensor (Term,Fixed Address=199)	NS103	



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Drawing Title
VAV Sci Prep Wiring Details

Project Title
Kelly Walsh High School

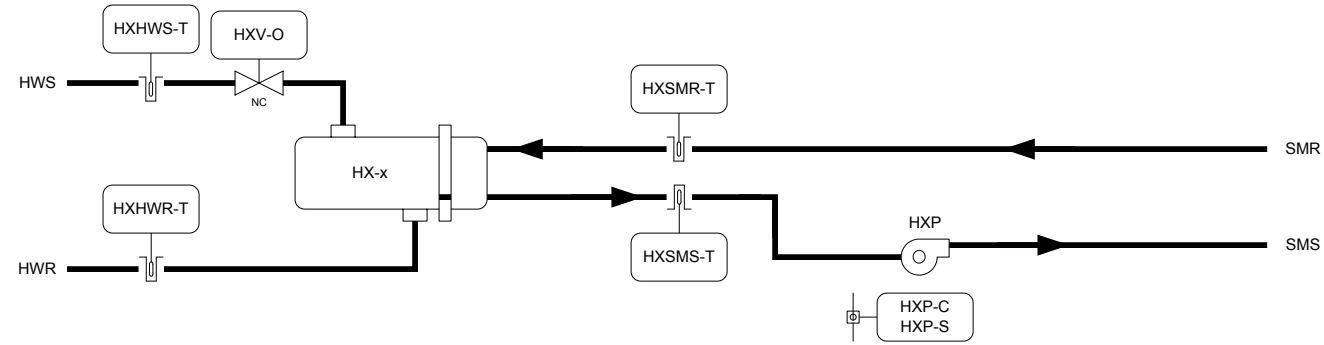
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
T Gunderson	Wayne Ramich	Chris Odell			

Branch Information
Johnson Controls
 5125 Carroll Ct.
 Suite 400
 Evansville, WY 82636
 Phone: 307-265-0771
 Fax: 307-265-9501

CONTRACT NUMBER
4216-0030

DRAWING NUMBER
8-22

Snowmelt Flow Layout



BILL OF MATERIALS

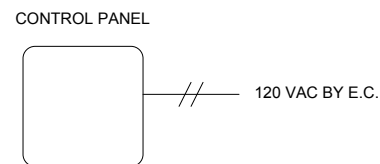
Designation	Qty	Part Number	Description
HXHWR-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
HXHWS-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
HXP-C,-S	1	CSD-CA1G1-1	SPLT/ADJ LED 1.25A W/RLY
HXSMR-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
HXSMS-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
SLAB-T	1	TE-6300W-101	T-WELL 6" BRASS DIR MNT
	1	TE-631AM-2	WELL TEMP SEN 6" 1K NI
SM-S	1	DS-2B	Rain/Snow Sensor
PANEL	1	PAKG00001FH0	FEC2611,16X20
HXV-O			SEE VALVE SCHEDULE

Sequence of Operation

IDLE MODE: WHEN THE SLAB TEMP IS BELOW THE ENABLE SETPOINT (SLABEN-SP) OF 45DEGF (ADJ.), START THE PUMP (HXP-C) AND MODULATE THE VALVE (HXV-O) TO MAINTAIN THE SLAB TEMP AT SETPOINT (SLABIDLE-SP) OF 33DEGF (ADJ.).


MELT MODE: WHEN THE SLAB TEMP IS BELOW THE ENABLE SETPOINT (SLABEN-SP) OF 45DEGF (ADJ.) AND THE SNOWMELT SENSOR (SM-S) DETECTS SNOW OR ICE, START THE PUMP (HXP-C) AND MODULATE THE VALVE (HXV-O) TO MAINTAIN THE SLAB TEMP AT SETPOINT (SLABMELT-SP) OF 39DEGF (ADJ.).

SYSTEM SHUTDOWN: WHEN THE SLAB TEMP IS ABOVE THE ENABLE SETPOINT (SLABEN-SP) OF 45DEGF (ADJ.), STOP THE PUMP (HXP-C) AND CLOSE THE VALVE (HXV-O).

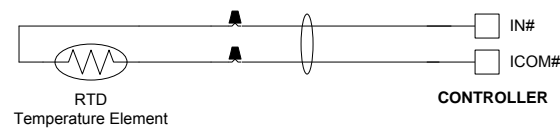


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	Snowmelt Heat Exchanger Layout Typical Of 6				
	Project Title	Kelly Walsh High School			
	<p>Johnson Controls</p> <p>Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501</p>		<p>CONTRACT NUMBER 4216-0030</p> <p>DRAWING NUMBER 9-1</p>		

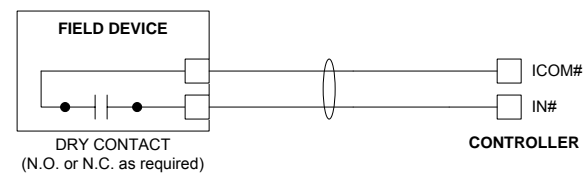
Electrician/Fitter Tag	Point Information			Controller Information							Panel Information					Intermediate Device					Field Device					Ref Detail Shape	Comment
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing	Termination In	Device	Location		
		Snowmelt			FEC 26xx																					Power to Controller BacNet FC Bus	
	UI IN-1	Snowmelt	HXSMR-T	HX Snowmelt Return Tempera	FEC 26xx	MS/TP	1	x	UI IN-1					0	-4-UI IN-1						2/18	2-Wire	TE			F131	
	UI IN-2	Snowmelt	HXSMS-T	HX Snowmelt Supply Tempera	FEC 26xx	MS/TP	1	x	UI IN-2					0	-4-UI IN-2						2/18	2-Wire	TE			F131	
	UI IN-3	Snowmelt	HXHWR-T	HX HW Return Temperature	FEC 26xx	MS/TP	1	x	UI IN-3					0	-4-UI IN-3						2/18	2-Wire	TE			F131	
	UI IN-4	Snowmelt	HXHWS-T	HX HW Supply Temperature	FEC 26xx	MS/TP	1	x	UI IN-4					0	-4-UI IN-4						2/18	2-Wire	TE			F131	
	UI IN-5	Snowmelt	SLAB-T	Slab Temperature	FEC 26xx	MS/TP	1	x	UI IN-5					0	-4-UI IN-5						2/18	2-Wire	TE			F131	
	UI IN-6	Snowmelt			FEC 26xx	MS/TP	1	x	UI IN-6					0	-4-UI IN-6												
	BI IN-7	Snowmelt	HXP-S	HX Pump Status	FEC 26xx	MS/TP	1	x	BI IN-7					0	-4-BI IN-7	2/18	OUT, COM	Current Relay	Motor Lead		Motor Lead	See wiring detail	Motor Status (Contact)			F301	
	BI IN-8	Snowmelt	SM-S	Snowmelt Snow-Ice Sensor	FEC 26xx	MS/TP	1	x	BI IN-8					0	-4-BI IN-8						2/18, 2/18	See wiring detail	Dry Contact (Device Pwr 24V)			F305	
	BO OUT-1	Snowmelt	HXP-C	HX Pump Command	FEC 26xx	MS/TP	1	x	BO OUT-1					0	-4-BO OUT-1	2/18	COIL-, COIL+	Relay	COM, NO		2/18	See wiring detail	Starter (w/o Safeties) (Sw Hi, EXT)			F1015	
	BO OUT-2	Snowmelt	HXV-O	Heat Exchanger Valve Output	FEC 26xx	MS/TP	1	x	BO OUT-2					0	-4-BO OUT-2						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, EXT)			F459	
	BO OUT-3	Snowmelt	HXV-O	Heat Exchanger Valve Output	FEC 26xx	MS/TP	1	x	BO OUT-3					0	-4-BO OUT-3						3/18	ORG, RED, BLK	VA910x-AGx-2S (Incr) (Sw Low, EXT)			F459	
	CO OUT-4	Snowmelt			FEC 26xx	MS/TP	1	x	CO OUT-4					0	-4-CO OUT-4												
	CO OUT-5	Snowmelt			FEC 26xx	MS/TP	1	x	CO OUT-5					0	-4-CO OUT-5												
	CO OUT-6	Snowmelt			FEC 26xx	MS/TP	1	x	CO OUT-6					0	-4-CO OUT-6												
	CO OUT-7	Snowmelt			FEC 26xx	MS/TP	1	x	CO OUT-7					0	-4-CO OUT-7												
	AO OUT-8	Snowmelt			FEC 26xx	MS/TP	1	x	AO OUT-8					0	-4-AO OUT-8												
	AO OUT-9	Snowmelt			FEC 26xx	MS/TP	1	x	AO OUT-9					0	-4-AO OUT-9												

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	Snowmelt Point Schedule Typical of 6												
	Project Title		Kelly Walsh High School										
Sales Engineer		Project Manager		Application Engineer		DRAWN		ECN		DATE		BY	
T Gunderson		Wayne Ramich		Chris Odell		BY DATE		BY DATE		BY DATE			
				Branch Information				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER		4216-0030	
										DRAWING NUMBER		9-2	

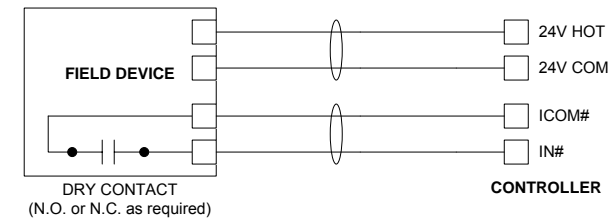
DETAIL F131 TEMPERATURE SENSOR INPUT



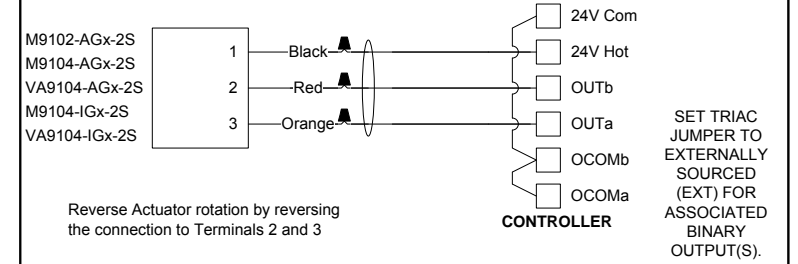
DETAIL F301 BINARY INPUT (DRY CONTACT)



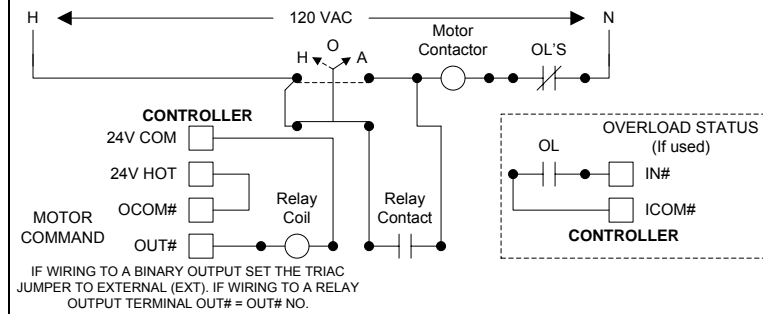
DETAIL F305 BINARY INPUT (DRY CONTACT) DEVICE POWERED 24VAC



DETAIL F459 INCREMENTAL CONTROL to M910x-AGx-2S, M9104-IGx-2S (Switch Low, EXT Sourced)

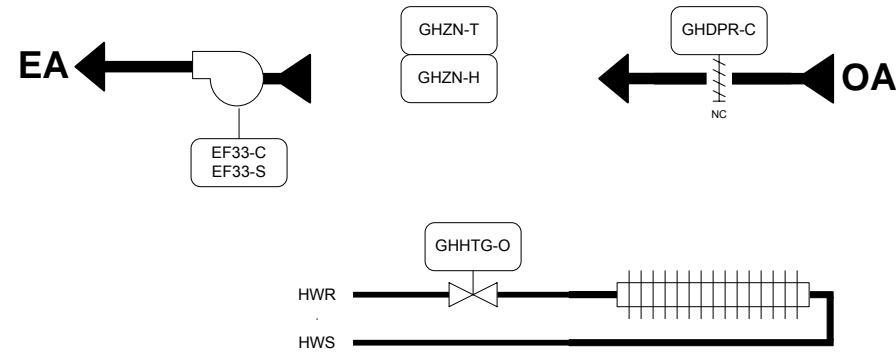


DETAIL F1015 Starter without Safeties Wiring



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		Snowmelt Wiring Details Typical Of 6																															
		Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030																							
						DRAWING NUMBER 9-3																											
				<table border="1"> <tr> <th>REFERENCE DRAWING</th> <th>NO.</th> <th>REVISION-LOCATION</th> <th>ECN</th> <th>DATE</th> <th>BY</th> </tr> <tr> <td>T Gunderson</td> <td>Wayne Ramich</td> <td>Chris Odell</td> <td></td> <td></td> <td></td> </tr> </table>		REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY	T Gunderson	Wayne Ramich	Chris Odell				<table border="1"> <tr> <th>SALES ENGINEER</th> <th>PROJECT MANAGER</th> <th>APPLICATION ENGINEER</th> <th>DATE</th> <th>BY</th> <th>DATE</th> </tr> <tr> <td>T Gunderson</td> <td>Wayne Ramich</td> <td>Chris Odell</td> <td></td> <td></td> <td></td> </tr> </table>		SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DATE	BY	DATE	T Gunderson	Wayne Ramich	Chris Odell					
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY																												
T Gunderson	Wayne Ramich	Chris Odell																															
SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DATE	BY	DATE																												
T Gunderson	Wayne Ramich	Chris Odell																															

Green House Flow Layout



EX FAN	POWER
EF-33	115V 1Φ 1/6HP

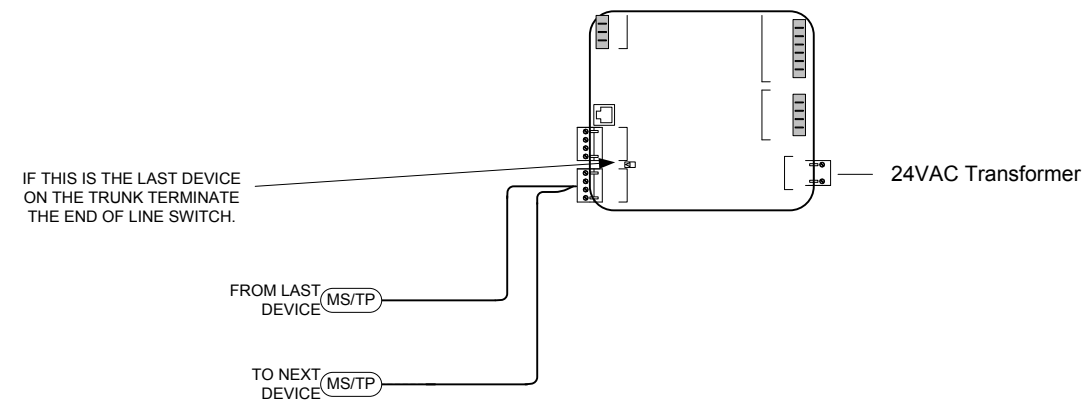
BILL OF MATERIALS

Designation	Qty	Part Number	Description
EF33-C/S	1	H120	CSR,N.O.,24V,FRAC HP,N.O.,SERIES
GHZN-H/T	1	HO30K-TT-3	KELE 3% OUTSIDE AIR RH XMTR W/TEMP (0-100F)
GHHTG-O	1		SEE VALVE SCHEDULE
GHDPR-C	1		SEE DAMPER SCHEDULE
TX-1	1	Y65T42-0	TRANSFORMER UR CLASS 2, 40VA
PANEL	1	MS-FEC1621-0	FEC1621-0 FINAL ASSEMBLY, 10POINT
	1	H141206HCLL-P	NEMA4 ENCLOSURE, CLEAR, 14X12X6

Sequence of Operation

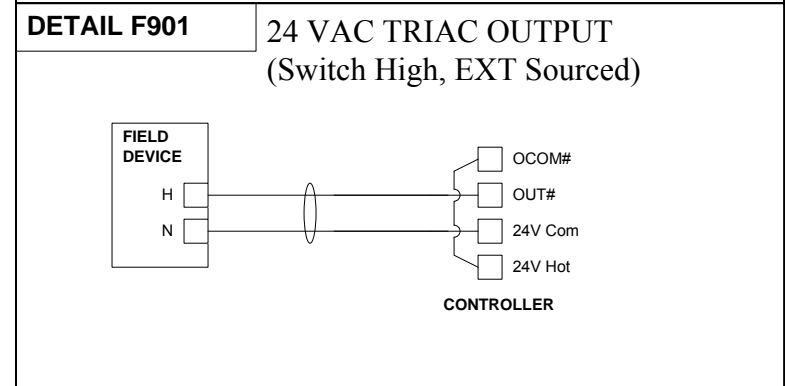
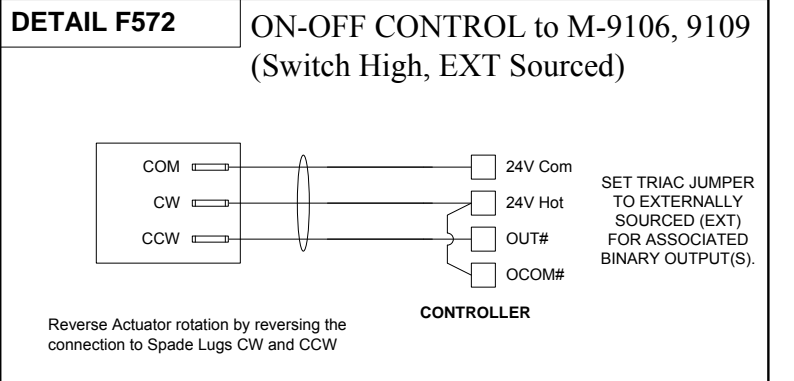
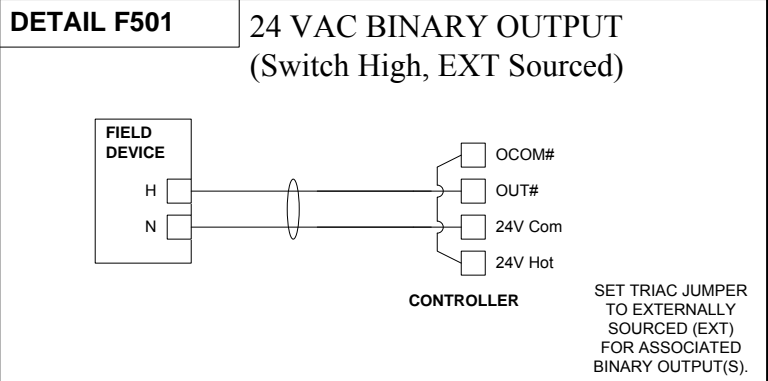
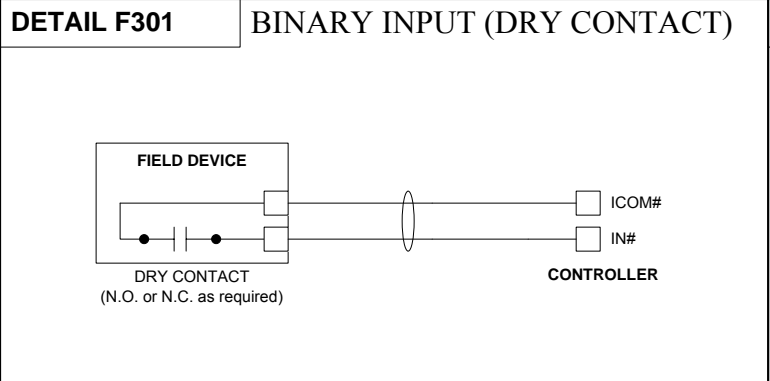
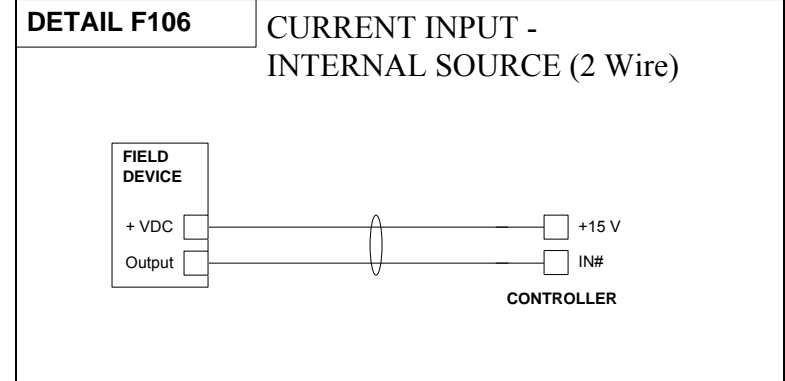
GREEN HOUSE CONTROL: ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE FIN TUBE HEATING WILL MODULATE TO CONTROL TO ZONE SETPOINT. ON A RISE IN ZONE TEMPERATURE ABOVE THE HEATING SETPOINT, THE FIN TUBE HEATING VALVE WILL BE OFF. ON A RISE IN HUMIDITY ABOVE THE HUMIDITY SETPOINT OR A RISE IN TEMPERATURE ABOVE THE HIGH TEMP SETPOINT, THE DAMPER SHALL BE OPEN AND THE EXHAUST FAN SHALL BE ON. ON A DROP IN HUMIDITY BELOW THE HUMIDITY SETPOINT OR A DROP IN TEMPERATURE BELOW THE HIGH TEMP SETPOINT, THE DAMPER SHALL BE CLOSED AND THE EXHAUST FAN SHALL BE OFF.

FOR BOX PARAMETERS AND SETTINGS SEE THE ROOM SCHEDULE



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	Greenhouse Flow Layout								
	Project Title	Kelly Walsh High School							
			Branch Information Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030		DRAWING NUMBER 10-1		

Electrician/Fitter Tag	Point Information			Controller Information							Panel Information				Intermediate Device				Field Device				Ref Detail Shape	Comment			
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Module Type	Termination Out	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Location	Wiring /Tubing			Termination In	Device	Location
		GREENHOUSE			FEC 16xx																					Power to Controller BacNet FC Bus	
UI IN-1	GREENHOUSE	GHZN-T	Greenhouse Zone Temperature		FEC 16xx	MS/TP	1	63		UI IN-1						0											
UI IN-2	GREENHOUSE	GHZN-H	Greenhouse Zone Humidity		FEC 16xx	MS/TP	1	63		UI IN-2						0											
BI IN-3	GREENHOUSE	EF33-S	EF33 Status		FEC 16xx	MS/TP	1	63		BI IN-3						0											
BO OUT-1	GREENHOUSE	GHHTG-O	Greenhouse Heating Output		FEC 16xx	MS/TP	1	63		BO OUT-1						0											
BO OUT-2	GREENHOUSE	GHHTG-O	Greenhouse Heating Output		FEC 16xx	MS/TP	1	63		BO OUT-2						0											
BO OUT-3	GREENHOUSE	GHHTG-O	Greenhouse Heating Output		FEC 16xx	MS/TP	1	63		BO OUT-3						0											
CO OUT-4	GREENHOUSE	EF33-C	EF33 Command		FEC 16xx	MS/TP	1	63		CO OUT-4						0											
CO OUT-5	GREENHOUSE				FEC 16xx	MS/TP	1	63		CO OUT-5						0											
CO OUT-6	GREENHOUSE				FEC 16xx	MS/TP	1	63		CO OUT-6						0											
CO OUT-7	GREENHOUSE				FEC 16xx	MS/TP	1	63		CO OUT-7						0											

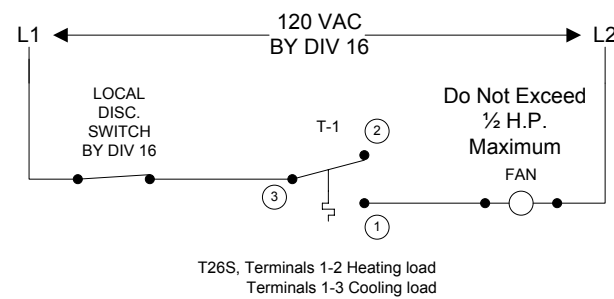
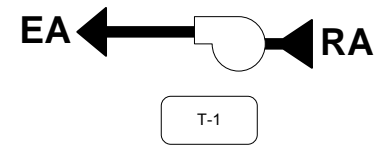


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Drawing Title		Greenhouse Wiring Details	
Project Title		Kelly Walsh High School	
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN
T Gunderson	Wayne Ramich	Chris Odell	
SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DATE
Branch Information		CONTRACT NUMBER	
		4216-0030	
Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		DRAWING NUMBER	
		10-2	

Cooling Exhaust Fan Flow Layout



EX FAN	POWER
EF-30	115V 1Φ 1/16HP
EF-31	115V 1Φ 1/16HP
EF-32	115V 1Φ 1/6HP

BILL OF MATERIALS

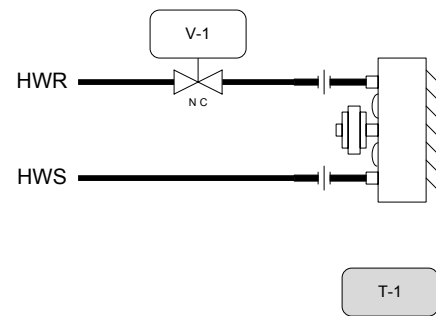
Designation	Qty	Part Number	Description
T-1	1	T26S-18C	SPC,BLB,SP=40-90 F (5-30 C),STG=1

Sequence of Operation

COOLING EXHAUST FAN: THE FAN WILL BE ENERGIZED AS NEEDED TO MAINTAIN ZONE COOLING TEMPERATURE SETPOINT.

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	Elev and Boiler EF Flow Layout Typical Of 3									
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER	
							4216-0030 DRAWING NUMBER 11-1			
				REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY		SALES ENGINEER PROJECT MANAGER APPLICATION ENGINEER DRAWN BY DATE		APPROVED BY DATE		
				T Gunderson Wayne Ramich Chris Odell						

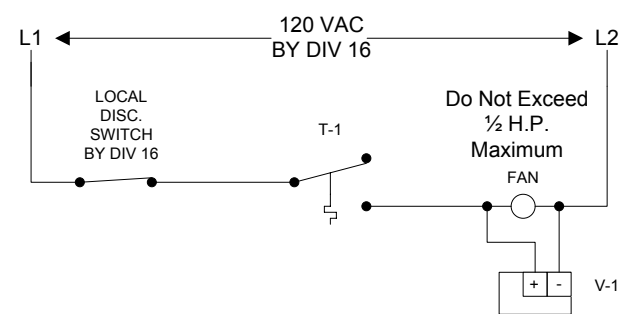
UH and CUH Flow Layout



DEVICE	POWER	QUANTITY
UH-1	115V 1Φ 1/10HP	6
UH-2	115V 1Φ 1/4HP	3
CH-1	115V 1Φ 1/10HP	21
CH-2	115V 1Φ 1/10HP	4
CH-3	115V 1Φ 1/10HP	5

BILL OF MATERIALS

Designation	Qty	Part Number	Description
T-1			FACTORY INSTALLED THERMOSTAT
V-1			SEE VALVE SCHEDULE



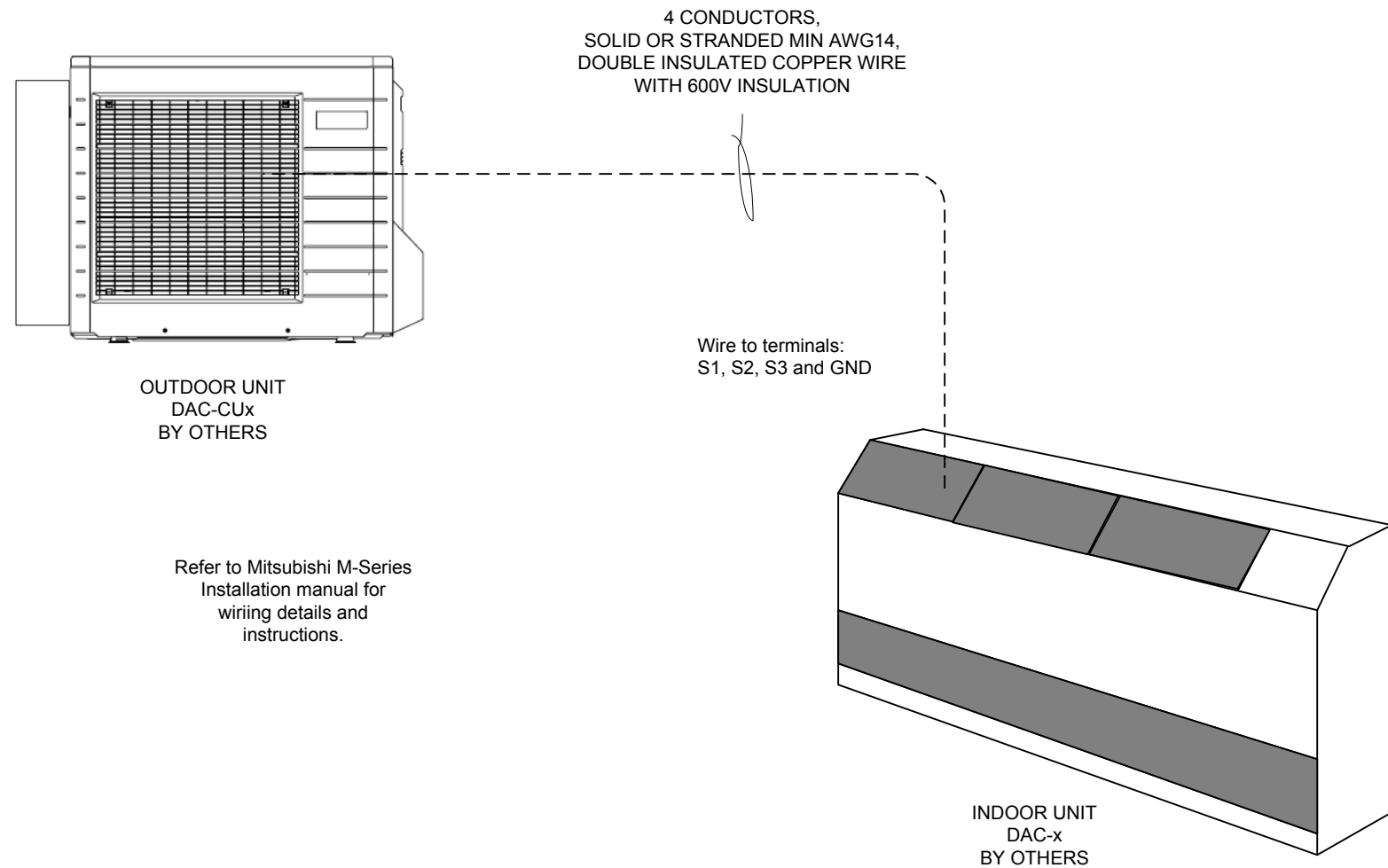
Sequence of Operation

HEATING: THE FAN AND THE HEATING COIL VALVE WILL BE ENERGIZED AS NEEDED TO MAINTAIN ZONE HEATING TEMPERATURE SETPOINT.

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	UH-CUH Flow Layout Typical Of 39										
	Project Title		Kelly Walsh High School		Branch Information		Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		CONTRACT NUMBER 4216-0030		
					DRAWING NUMBER 12-1						
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN		DATE		BY	
Sales Engineer		Project Manager		Application Engineer		DRAWN		APPROVED			
T Gunderson		Wayne Ramich		Chris Odell		BY		DATE		BY	

BILL OF MATERIALS

Designation	Qty	Part Number	Description
DAC			MITSUBISHI DATA ROOM AIR CONDITIONER BY OTHERS



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	DAC Flow Layout Typical of 9									
	Project Title		Project Manager		Application Engineer		DRAWN		APPROVED	
	Kelly Walsh High School		Wayne Ramich		Chris Odell		BY DATE		BY DATE	
		Branch Information		CONTRACT NUMBER						
				Johnson Controls, Inc. 5125 Carroll Ct. Suite 400 Evansville, WY 82636 Phone: 307-265-0771 Fax: 307-265-9501		4216-0030		DRAWING NUMBER		
								13-1		

Room Schedule

Location			Box Information															
Bldg./Flr.	Room	Name	System Name	Ref. dwg.	AHU	Box Type									Controller	NAE Address	Template	Comments
	No.					Box ID	Box Type	K Factor	Inlet Size (Inches)	Inlet Size (Area)	Clg Max Flow	Min Flow	Htg. Max Flow	Water Flow (GPM)				
C/Lower	C102	Men's Staff Lockers	VAV-01-01	6.M301aEA	AHU-1	SDV5	Price	2.21	9	0.44	730	245	500	2.50	MS-VMA1630-0	NAE2:T1:A58	VAV EFH	EF-14
C/Lower	C107	Men's PE Lockers	VAV-01-02	6.M301aEA	AHU-1	SDV5	Price	1.94	16	1.40	2185	730	1460	6.00	MS-VMA1615-0	NAE2:T1:A54	VAV Typ	
C/Lower	C108	Men's PE Office	VAV-01-03	6.M301aEA	AHU-1	SDV5	Price	2.24	8	0.35	400	135	200	1.50	MS-VMA1615-0	NAE2:T1:A55	VAV Typ	
C/Lower	C109	Conference	VAV-01-04	6.M301aEA	AHU-1	SDV5	Price	2.21	9	0.44	660	225	440	2.00	MS-VMA1615-0	NAE2:T1:A56	VAV Typ	
C/Lower	C110	Women's PE Office	VAV-01-05	6.M301aEA	AHU-1	SDV5	Price	2.80	6	0.20	375	125	190	1.50	MS-VMA1615-0	NAE2:T1:A52	VAV Typ	
C/Lower	C111	Women's PE Lockers	VAV-01-06	6.M301aEA	AHU-1	SDV5	Price	1.94	16	1.40	2185	730	1095	5.50	MS-VMA1615-0	NAE2:T1:A51	VAV Typ	
C/Lower	C113	Women's Athletic Lockers	VAV-01-07	6.M301aEA	AHU-1	SDV5	Price	1.94	16	1.40	2185	730	1095	5.50	MS-VMA1615-0	NAE2:T1:A49	VAV Typ	
C/Lower	C114	Women's Staff Lockers	VAV-01-08	6.M301aEA	AHU-1	SDV5	Price	2.24	8	0.35	540	175	265	1.50	MS-VMA1615-0	NAE2:T1:A50	VAV Typ	
C/Lower	C115	Training	VAV-01-09	6.M301aEA	AHU-1	SDV5	Price	1.96	10	0.55	825	275	420	2.50	MS-VMA1615-0	NAE2:T1:A48	VAV Typ	
A/Lower	A104	Health Classroom	VAV-01-10	6.M301aEA	AHU-1	SDV5	Price	1.97	14	1.07	1320	440	970	3.50	MS-VMA1630-0	NAE2:T1:A60	VAV EFH	EF-17
A/Lower	A105	Athletic Storage	VAV-01-11	6.M301aEA	AHU-1	SDV5	Price	1.94	16	1.40	2100	700	1420	5.00	MS-VMA1615-0	NAE2:T1:A61	VAV Typ	
C/Lower	C105	Men's Athletic Lockers	RHC-01-01	6.M301aEA	AHU-1			1.00	36x20	5.00	4000		7.70	MS-FEC1611-0	NAE2:T1:A57	RHC		
A/Lower	A102	Wrestling/Aerobics	RHC-01-02	6.M301aEA	AHU-1			1.00	28x20	3.89	4000		7.70	MS-FEC1611-0	NAE2:T1:A59	RHC		
D/Lower	C101a	Hall	VAV-02-01	6.M301dEA	AHU-2	SDV5	Price	2.24	8	0.35	550	180	265	1.50	MS-VMA1630-0	NAE2:T1:A39	VAV 2-1	EF-8, EF-19
D/Lower	D108	Agriculture Classroom	VAV-02-02	6.M301dEA	AHU-2	SDV5	Price	1.97	14	1.07	1480	495	740	3.50	MS-VMA1615-0	NAE2:T1:A41	VAV Typ	
D/Lower	D108a	Agriculture Studio	VAV-02-03	6.M301dEA	AHU-2	SDV5	Price	1.97	14	1.07	1480	495	740	3.50	MS-VMA1615-0	NAE2:T1:A42	VAV Typ	
D/Lower	D105	Teacher Planning	VAV-02-04	6.M301dEA	AHU-2	SDV5	Price	1.97	14	1.07	1400	465	940	3.00	MS-VMA1615-0	NAE2:T1:A40	VAV Typ	
D/Lower	D104	Teacher Planning	VAV-02-05	6.M301dEA	AHU-2	SDV5	Price	2.21	9	0.44	660	225	440	2.00	MS-VMA1615-0	NAE2:T1:A46	VAV Typ	
D/Basement	F002	Stair Lobby	VAV-02-06	6.M300dEA	AHU-2	SDV5	Price	1.97	14	1.07	1300	435	920	3.50	MS-VMA1615-0	NAE3:T1:A12	VAV HU	Humidity Sensor
D/Lower	D107	Metal/Welding Shop	RHC-02-01	6.M301dEA	AHU-2			1.00	24x20	3.33	3300		6.40	MS-FEC1611-0	NAE2:T1:A43	RHC		
D/Lower	D103	Wood Shop	RHC-02-02	6.M301dEA	AHU-2			1.00	30x20	4.17	4650		9.10	MS-FEC1611-0	NAE2:T1:A45	RHC		
D/Lower	D102	Automotive Shop	RHC-02-03	6.M301dEA	AHU-2			1.00	36x20	5.00	5450		10.40	MS-FEC1611-0	NAE2:T1:A47	RHC		
G/Main	G203	Principal	VAV-05-01	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	520	175	265	1.50	MS-VMA1630-0	NAE1:T1:A46	VAV FT	FT-2
G/Main	G201A	Hall	VAV-05-02	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A45	VAV Typ	
G/Main	G206	Assistant Principal	VAV-05-03	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A44	VAV Typ	
G/Main	G209	Accounting	VAV-05-04	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A43	VAV Typ	
G/Main	G212	Guidance Office	VAV-05-05	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A42	VAV Typ	
G/Main	G215	Registrar	VAV-05-06	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A41	VAV Typ	
G/Main	G218	Campus Supervisor	VAV-05-07	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	425	140	200	1.00	MS-VMA1615-0	NAE1:T1:A40	VAV Typ	
G/Main	G202	Attendance	VAV-05-08	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A26	VAV Typ	
G/Main	G201	Waiting Area	VAV-05-09	6.M302g	AHU-5	SDV5	Price	2.03	12	0.79	900	300	450	2.50	MS-VMA1615-0	NAE1:T1:A25	VAV Typ	
G/Main	G240	Athletic Director	VAV-05-10	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	640	215	320	1.00	MS-VMA1615-0	NAE1:T1:A28	VAV Typ	
G/Main	G266	Large Conference	VAV-05-11	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	330	2.00	MS-VMA1615-0	NAE1:T1:A29	VAV Typ	
G/Main	G237	Workroom	VAV-05-12	6.M302g	AHU-5	SDV5	Price	2.03	12	0.79	1100	365	550	2.50	MS-VMA1615-0	NAE1:T1:A30	VAV Typ	
G/Main	G238	Small Conference	VAV-05-13	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	600	200	300	1.00	MS-VMA1615-0	NAE1:T1:A27	VAV Typ	
G/Main	G235	Psychology	VAV-05-14	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	495	165	265	1.50	MS-VMA1615-0	NAE1:T1:A31	VAV Typ	
G/Main	G231	Social Worker	VAV-05-15	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	730	245	500	2.50	MS-VMA1615-0	NAE1:T1:A32	VAV Typ	
G/Main	G226	Student Records	VAV-05-16	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	330	1.00	MS-VMA1615-0	NAE1:T1:A33	VAV Typ	
G/Main	G225	Guidance Conference	VAV-05-17	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	400	135	200	1.00	MS-VMA1615-0	NAE1:T1:A34	VAV Typ	
G/Main	G224	Guidance Conference	VAV-05-18	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	400	135	200	1.00	MS-VMA1615-0	NAE1:T1:A35	VAV Typ	
G/Main	G222	Itinerant Office	VAV-05-19	6.M302g	AHU-5	SDV5	Price	2.24	8	0.35	430	145	200	1.00	MS-VMA1615-0	NAE1:T1:A36	VAV Typ	
G/Main	G221	Campus Supervisor	VAV-05-20	6.M302g	AHU-5	SDV5	Price	2.80	6	0.20	300	100	150	1.00	MS-VMA1615-0	NAE1:T1:A37	VAV Typ	
G/Main	G219	Clinic	VAV-05-21	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	660	220	440	2.00	MS-VMA1615-0	NAE1:T1:A39	VAV Typ	
G/Main	G220	Career Center	VAV-05-22	6.M302g	AHU-5	SDV5	Price	2.21	9	0.44	600	200	300	1.50	MS-VMA1615-0	NAE1:T1:A38	VAV Typ	
F/Main	F207	Staff Break/Locker	VAV-06-01	6.M302f	AHU-6	SDV5	Price	1.96	10	0.55	800	270	540	3.00	MS-VMA1630-0	NAE2:T1:A10	VAV EFH	EF-12
F/Main	F203D	Receiving Office	VAV-06-02	6.M302f	AHU-6	SDV5	Price	1.47	5	0.14	220	75	150	1.50	MS-VMA1615-0	NAE2:T1:A16	VAV Typ	
F/Main	F203	Main Repair/Receiving	VAV-06-03	6.M302f	AHU-6	SDV5	Price	1.97	14	1.07	1450	465	970	3.50	MS-VMA1630-0	NAE2:T1:A15	VAV EF	EF-18
F/Main	F202	Commercial Kitchen Simulators South	VAV-06-04	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2000	665	1340	5.50	MS-VMA1630-0	NAE2:T1:A17	VAV EFH	EF-15
F/Main	F202B	Teacher Planning	VAV-06-05	6.M302f	AHU-6	SDV5	Price	1.47	5	0.14	200	70	100	1.00	MS-VMA1615-0	NAE2:T1:A19	VAV Typ	
F/Main	F202A	Coffee Shop	VAV-06-06	6.M302f	AHU-6	SDV5	Price	1.47	5	0.14	200	70	100	1.00	MS-VMA1615-0	NAE2:T1:A21	VAV Typ	
F/Main	F203A	Tech Work Room	VAV-06-07	6.M302f	AHU-6	SDV5	Price	2.21	9	0.44	720	240	500	2.50	MS-VMA1630-0	NAE2:T1:A14	VAV EF	EF-9
F/Main	F201B	Commons 1	VAV-06-08	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2800	925	1870	6.50	MS-VMA1615-0	NAE2:T1:A22	VAV Typ	

Room Schedule

Location			Box Information																
Bldg./Flr.	Room	Name	System Name	Ref. dwg.	AHU	Box Type									Controller	NAE Address	Template	Comments	
	No.					Box ID	Box Type	K Factor	Inlet Size (Inches)	Inlet Size (Area)	Clg Max Flow	Min Flow	Htg. Max Flow	Water Flow (GPM)					
F/Main	F201B	Commons 2	VAV-06-09	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2400	800	1200	5.50	MS-VMA1615-0	NAE2:T1:A13	VAV Typ		
F/Main	F201B	Commercial Kitchen Simulators North	VAV-06-10	6.M302f	AHU-6	SDV5	Price	2.03	12	0.79	1000	335	500	2.50	MS-VMA1615-0	NAE2:T1:A20	VAV Typ		
F/Main	F206	Kitchen	VAV-06-11	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2400	800	1600	6.50	MS-VMA1615-0	NAE2:T1:A9	VAV Typ		
F/Main	F206F	Kitchen Office	VAV-06-12	6.M302f	AHU-6	SDV5	Price	1.47	5	0.14	200	65	100	1.00	MS-VMA1615-0	NAE2:T1:A5	VAV Typ		
F/Main	F206A	Ware Washing	VAV-06-13	6.M302f	AHU-6	SDV5	Price	1.96	10	0.55	800	265	400	2.00	MS-VMA1615-0	NAE2:T1:A6	VAV Typ		
F/Main	F201B	Commons 4	VAV-06-14	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2300	770	1150	5.00	MS-VMA1615-0	NAE2:T1:A7	VAV Typ		
F/Main	F205	Serving	VAV-06-15	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2200	740	1100	5.00	MS-VMA1615-0	NAE2:T1:A8	VAV Typ		
F/Main	F201B	Commons 3	VAV-06-16	6.M302f	AHU-6	SDV5	Price	1.94	16	1.40	2300	770	1150	5.00	MS-VMA1615-0	NAE2:T1:A12	VAV Typ		
F/Main	F204	Staff Dining	VAV-06-17	6.M302f	AHU-6	SDV5	Price	2.24	8	0.35	530	175	265	1.50	MS-VMA1615-0	NAE2:T1:A11	VAV Typ		
F/Main		Relief Exhaust Fan 6	RELF-6	6.M302f	AHU-6											NAE2:T1:A62		RELF-6	
E/Lower	F101B	Hall	VAV-06-18	6.M301f	AHU-6	SDV5	Price	1.94	16	1.40	2400	800	1200	5.50	MS-VMA1615-0	NAE3:T1:A14	VAV Typ		
G/Main	G244	Office	VAV-07-01	6.M302g	AHU-7	SDV5	Price	2.80	6	0.20	340	110	170	1.00	MS-VMA1615-0	NAE1:T1:A22	VAV Typ		
G/Main	G245	FLS	VAV-07-02	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	910	300	455	1.50	MS-VMA1615-0	NAE1:T1:A21	VAV Typ		
G/Main	G247	Conference	VAV-07-03	6.M302g	AHU-7	SDV5	Price	2.21	9	0.44	765	255	510	2.00	MS-VMA1615-0	NAE1:T1:A10	VAV Typ		
G/Main	G248	FLS	VAV-07-04	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	1050	350	700	2.50	MS-VMA1615-0	NAE1:T1:A9	VAV Typ		
G/Main	G240D	Student Commons	VAV-07-05	6.M302g	AHU-7	SDV5	Price	2.21	9	0.44	750	250	500	2.50	MS-VMA1630-0	NAE1:T1:A8	VAV FT	FT-3b	
G/Main	G240B	Hall	VAV-07-06	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	900	300	450	1.50	MS-VMA1615-0	NAE1:T1:A11	VAV Typ		
G/Main	G249	Classroom C	VAV-07-07	6.M302g	AHU-7	SDV5	Price	1.97	14	1.07	1400	465	940	3.00	MS-VMA1615-0	NAE1:T1:A7	VAV Typ		
G/Main	G262	Classroom B	VAV-07-08	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	860	285	430	1.50	MS-VMA1615-0	NAE1:T1:A12	VAV Typ		
G/Main	G263	Classroom B	VAV-07-09	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	940	310	470	1.50	MS-VMA1615-0	NAE1:T1:A20	VAV Typ		
G/Main	G264	Classroom (Network Wired)	VAV-07-10	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	1050	350	500	2.50	MS-VMA1615-0	NAE1:T1:A19	VAV Typ		
G/Main	G261	Classroom (Network Wired)	VAV-07-11	6.M302g	AHU-7	SDV5	Price	2.03	12	0.79	1140	380	560	2.00	MS-VMA1615-0	NAE1:T1:A13	VAV Typ		
G/Main	G251	Classroom C	VAV-07-12	6.M302g	AHU-7	SDV5	Price	1.97	14	1.07	1635	540	1090	4.00	MS-VMA1615-0	NAE1:T1:A6	VAV Typ		
G/Main	G252	Chemistry	VAV-07-14	6.M302g	AHU-7	SDV5	Price	1.94	16	1.40	2135	715	1420	5.00	MS-VMA1630-0	NAE1:T1:A5	VAV EFS	EF-24	
G/Main	G253	Chemistry	VAV-07-15	6.M302g	AHU-7	SDV5	Price	1.94	16	1.40	1935	640	1290	4.50	MS-VMA1630-0	NAE1:T1:A15	VAV EFS	EF-22	
G/Main	G259	Teacher Planning	VAV-07-16	6.M302g	AHU-7	SDV5	Price	1.97	14	1.07	1400	460	700	1.50	MS-VMA1615-0	NAE1:T1:A18	VAV Typ		
G/Main	G258	Small Group	VAV-07-18	6.M302g	AHU-7	SDV5	Price	2.21	9	0.44	720	240	500	2.50	MS-VMA1615-0	NAE1:T1:A14	VAV Typ		
G/Main	G253A	Science Prep	VAV-07-19	6.M302g	AHU-7	SDV5	Price	2.24	8	0.35	450	150	300	1.50	MS-VMA1630-0	NAE1:T1:A81	VAV SP	Science Prep Rm ACV-4	
G/Main	G254	Chemistry	VAV-07-20	6.M302g	AHU-7	SDV5	Price	1.94	16	1.40	1875	620	940	4.50	MS-VMA1630-0	NAE1:T1:A16	VAV EFS	EF-21	
G/Main	G240A	Hall 3	VAV-07-21	6.M302g	AHU-7	SDV5	Price	2.21	9	0.44	675	340	440	2.00	MS-VMA1615-0	NAE1:T1:A17	VAV Typ		
G/Main	G240A	Hall 2	VAV-07-22	6.M302g	AHU-7	SDV5	Price	2.21	9	0.44	675	340	440	2.00	MS-VMA1615-0	NAE1:T1:A23	VAV Typ		
G/Main	G240A	Hall 1	VAV-07-23	6.M302g	AHU-7	SDV5	Price	1.94	16	1.40	2000	665	1340	5.50	MS-VMA1615-0	NAE1:T1:A24	VAV Typ		
G/Upper	F201A	Commons	VAV-07-24	6.M303g	AHU-7	SDV5	Price	1.94	16	1.40	1800	600	1200	5.00	MS-VMA1615-0	NAE1:T1:A56	VAV Typ		
G/Upper	G309	Project Classroom	VAV-07-25	6.M303g	AHU-7	SDV5	Price	1.97	14	1.07	1370	460	700	1.50	MS-VMA1630-0	NAE1:T1:A55	VAV FT	FT-3f	
G/Upper	F201A	Commons	VAV-07-26	6.M303g	AHU-7	SDV5	Price	1.94	16	1.40	2120	700	1420	5.00	MS-VMA1615-0	NAE1:T1:A57	VAV Typ		
G/Upper	F201A	Commons	VAV-07-27	6.M303g	AHU-7	SDV5	Price	1.94	16	1.40	2800	925	1870	6.50	MS-VMA1630-0	NAE1:T1:A58	VAV FT	FT-3a	
G/Upper	G310	Classroom B	VAV-08-01	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1120	370	560	2.00	MS-VMA1615-0	NAE1:T1:A59	VAV Typ		
G/Upper	G311	Resource Classroom	VAV-08-02	6.M303g	AHU-8	SDV5	Price	1.96	10	0.55	840	280	420	1.00	MS-VMA1615-0	NAE1:T1:A60	VAV Typ		
G/Upper	G312	Classroom B	VAV-08-03	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1390	460	930	3.50	MS-VMA1615-0	NAE1:T1:A72	VAV Typ		
G/Upper	G314	Classroom B	VAV-08-04	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1200	400	800	3.00	MS-VMA1615-0	NAE1:T1:A73	VAV Typ		
G/Upper	G301C	Student Commons	VAV-08-05	6.M303g	AHU-8	SDV5	Price	1.96	10	0.55	940	315	480	2.00	MS-VMA1615-0	NAE1:T1:A74	VAV Typ		
G/Upper	G301B	Applied Learning	VAV-08-06	6.M303g	AHU-8	SDV5	Price	1.96	10	0.55	825	275	415	2.00	MS-VMA1615-0	NAE1:T1:A71	VAV Typ		
G/Upper	G330	Classroom C	VAV-08-07	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1380	455	920	3.00	MS-VMA1615-0	NAE1:T1:A75	VAV Typ		
G/Upper	G329	Classroom B	VAV-08-08	6.M303g	AHU-8	SDV5	Price	1.96	10	0.55	860	290	430	1.50	MS-VMA1615-0	NAE1:T1:A70	VAV Typ		
G/Upper	G320	Classroom B	VAV-08-09	6.M303g	AHU-8	SDV5	Price	1.96	10	0.55	860	290	480	2.00	MS-VMA1615-0	NAE1:T1:A61	VAV Typ		
G/Upper	G321	Classroom (Network Wired)	VAV-08-10	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1110	370	555	2.50	MS-VMA1615-0	NAE1:T1:A62	VAV Typ		
G/Upper	G328	Classroom (Network Wired)	VAV-08-11	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1145	380	690	2.50	MS-VMA1615-0	NAE1:T1:A69	VAV Typ		
G/Upper	G332	Classroom C	VAV-08-12	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1620	455	1080	3.00	MS-VMA1615-0	NAE1:T1:A76	VAV Typ		
G/Upper	G333	Physical Science	VAV-08-14	6.M303g	AHU-8	SDV5	Price	1.94	16	1.40	2125	710	1420	5.00	MS-VMA1630-0	NAE1:T1:A77	VAV EFS	EF-25	
G/Upper	G335	Physical Science	VAV-08-15	6.M303g	AHU-8	SDV5	Price	1.94	16	1.40	1960	650	1320	4.50	MS-VMA1630-0	NAE1:T1:A66	VAV EFS	EF-23	
G/Upper	G332	Teacher Planning	VAV-08-16	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1400	465	700	2.50	MS-VMA1615-0	NAE1:T1:A68	VAV Typ		
G/Upper	G335A	Science Prep	VAV-08-17	6.M303g	AHU-8	SDV5	Price	2.24	8	0.35	450	150	225	1.00	MS-VMA1630-0	NAE1:T1:A82	VAV SP LEF	Science Prep Rm ACV-5 LEF-1	

Room Schedule

Location			Box Information															
Bldg./Flr.	Room	Name	System Name	Ref. dwg.	AHU	Box Type								Controller	NAE Address	Template	Comments	
	No.					Box ID	Box Type	K Factor	Inlet Size (Inches)	Inlet Size (Area)	Cig Max Flow	Min Flow	Htg. Max Flow					Water Flow (GPM)
G/Upper	G326	Small Group	VAV-08-18	6.M303g	AHU-8	SDV5	Price	2.21	9	0.44	700	235	350	3.00	MS-VMA1630-0	NAE1:T1:A67	VAV 8-18	FT-3g, EF-10
G/Upper	G336	Physical Science	VAV-08-19	6.M303g	AHU-8	SDV5	Price	1.94	16	1.40	1960	650	980	3.50	MS-VMA1630-0	NAE1:T1:A65	VAV EFS	EF-20
G/Upper	G301	Hall East	VAV-08-20	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1500	495	750	2.50	MS-VMA1630-0	NAE1:T1:A64	VAV EF	EF-6
G/Upper	G301	Hall West	VAV-08-21	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1500	495	750	2.50	MS-VMA1615-0	NAE1:T1:A63	VAV Typ	
G/Upper	G302	Lecture	VAV-08-22	6.M303g	AHU-8	SDV5	Price	1.94	16	1.40	2100	700	1400	5.00	MS-VMA1630-0	NAE1:T1:A54	VAV EF	EF-7
G/Upper	G303	Lecture	VAV-08-23	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1320	440	880	3.00	MS-VMA1615-0	NAE1:T1:A53	VAV Typ	
G/Upper	G304	Classroom B	VAV-08-24	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1200	400	800	3.00	MS-VMA1630-0	NAE1:T1:A52	VAV EF	EF-5
G/Upper	G305	Credit Recovery	VAV-08-25	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1210	400	810	2.50	MS-VMA1615-0	NAE1:T1:A51	VAV Typ	
G/Upper	G306	Digital Arts	VAV-08-26	6.M303g	AHU-8	SDV5	Price	1.97	14	1.07	1715	570	1150	4.00	MS-VMA1615-0	NAE1:T1:A50	VAV Typ	
G/Upper	G307A	Control & Editing	VAV-08-27	6.M303g	AHU-8	SDV5	Price	2.21	9	0.44	825	275	550	1.50	MS-VMA1615-0	NAE1:T1:A49	VAV Typ	
G/Upper	G307B	A/V Studio	VAV-08-28	6.M303g	AHU-8	SDV5	Price	2.21	9	0.44	700	235	470	2.00	MS-VMA1615-0	NAE1:T1:A48	VAV Typ	
G/Upper	G307	A/V Classroom	VAV-08-29	6.M303g	AHU-8	SDV5	Price	2.03	12	0.79	1000	350	500	2.00	MS-VMA1630-0	NAE1:T1:A47	VAV EF	EF-4
H/Main	H200	Circulation	VAV-09-01	6.M302h	AHU-9	SDV5	Price	1.97	14	1.07	1600	535	1070	3.00	MS-VMA1630-0	NAE1:T2:A25	VAV FT	FT-3c
H/Upper	H302B	Seating	VAV-09-02	6.M303h	AHU-9	SDV5	Price	1.94	16	1.40	2400	800	1600	6.50	MS-VMA1615-0	NAE1:T1:A83	VAV Typ	
H/Upper	H202	Small Group	VAV-09-03	6.M303h	AHU-9	SDV5	Price	1.97	14	1.07	1500	495	750	2.50	MS-VMA1615-0	NAE1:T1:A84	VAV Typ	
H/Crawlspace	H210	Media Center	RHC-09-01	6.M301h	AHU-9			1.00	40x24	6.67	9000		17.40	MS-FEC1611-0	NAE3:T1:A85	RHC	6.M302h	
H/Main	H210E	Media Specialist Office	VAV-10-01	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	730	245	365	2.50	MS-VMA1615-0	NAE1:T2:A23	VAV Typ	
H/Main	H212	Resource Classroom	VAV-10-02	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	800	265	400	1.50	MS-VMA1615-0	NAE1:T2:A22	VAV Typ	
H/Main	H213	Classroom B	VAV-10-03	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1400	465	700	2.00	MS-VMA1615-0	NAE1:T2:A11	VAV Typ	
H/Main	H215	Classroom B	VAV-10-04	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	1200	400	600	2.00	MS-VMA1615-0	NAE1:T2:A10	VAV Typ	
H/Main	H201D	Student Commons	VAV-10-05	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	750	250	500	2.50	MS-VMA1630-0	NAE1:T2:A9	VAV FT	FT-3d
H/Main	H201C	Applied Learning	VAV-10-06	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	900	300	450	1.50	MS-VMA1615-0	NAE1:T2:A12	VAV Typ	
H/Main	H230	Classroom C	VAV-10-07	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1375	455	920	3.50	MS-VMA1615-0	NAE1:T2:A8	VAV Typ	
H/Main	H229	Classroom B	VAV-10-08	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	860	285	430	1.00	MS-VMA1615-0	NAE1:T2:A13	VAV Typ	
H/Main	H220	Classroom B	VAV-10-09	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	940	310	470	1.50	MS-VMA1615-0	NAE1:T2:A21	VAV Typ	
H/Main	H221	Classroom (Network Wired)	VAV-10-10	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	1050	350	690	2.50	MS-VMA1615-0	NAE1:T2:A20	VAV Typ	
H/Main	H228	Classroom (Network Wired)	VAV-10-11	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	1140	380	690	2.50	MS-VMA1615-0	NAE1:T2:A14	VAV Typ	
H/Main	H232	Classroom C	VAV-10-12	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1570	520	1050	3.50	MS-VMA1615-0	NAE1:T2:A7	VAV Typ	
H/Main	H233	Classroom B	VAV-10-13	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	1000	330	670	2.50	MS-VMA1615-0	NAE1:T2:A6	VAV Typ	
H/Main	H234	Classroom A	VAV-10-14	6.M302h	AHU-10	SDV5	Price	2.03	12	0.79	1125	370	750	2.50	MS-VMA1615-0	NAE1:T2:A5	VAV Typ	
H/Main	H222	Teacher Planning	VAV-10-15	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1400	465	700	2.00	MS-VMA1615-0	NAE1:T2:A19	VAV Typ	
H/Main	H235	Life Science	VAV-10-17	6.M302h	AHU-10	SDV5	Price	1.94	16	1.40	1920	635	1280	2.50	MS-VMA1630-0	NAE1:T2:A16	VAV EFS	EF-28
H/Main	H226	Small Group	VAV-10-18	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	700	235	470	2.00	MS-VMA1615-0	NAE1:T2:A15	VAV Typ	
H/Main	H235A	Science Prep	VAV-10-19	6.M302h	AHU-10	SDV5	Price	2.24	8	0.35	450	150	300	1.50	MS-VMA1630-0	NAE1:T2:A66	VAV SP	Science Prep Rm ACV-9
H/Main	H236	Life Science	VAV-10-20	6.M302h	AHU-10	SDV5	Price	1.94	16	1.40	1860	615	1240	5.50	MS-VMA1630-0	NAE1:T2:A17	VAV EFS	EF-27
H/Main	H201A	Student Lockers East	VAV-10-21	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	675	225	440	2.00	MS-VMA1615-0	NAE1:T2:A18	VAV Typ	
H/Main	H201A	Student Lockers West	VAV-10-22	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	675	225	440	2.00	MS-VMA1615-0	NAE1:T2:A24	VAV Typ	
H/Main	H203	Student Store	VAV-10-23	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	640	210	430	1.50	MS-VMA1615-0	NAE1:T2:A26	VAV Typ	
H/Main	H204	Marketing	VAV-10-24	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1350	450	900	3.00	MS-VMA1615-0	NAE1:T2:A27	VAV Typ	
H/Main	H205	Business Classroom	VAV-10-25	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1680	555	1120	4.00	MS-VMA1615-0	NAE1:T2:A28	VAV Typ	
H/Main	H205B	Teacher Planning	VAV-10-26	6.M302h	AHU-10	SDV5	Price	2.24	8	0.35	520	175	350	1.50	MS-VMA1615-0	NAE1:T2:A29	VAV Typ	
H/Main	H206	Business Classroom	VAV-10-27	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1620	535	1080	4.00	MS-VMA1615-0	NAE1:T2:A30	VAV Typ	
H/Main	H207	Design Studio	VAV-10-28	6.M302h	AHU-10	SDV5	Price	1.97	14	1.07	1680	555	1120	4.00	MS-VMA1615-0	NAE1:T2:A31	VAV Typ	
H/Main	H207B	Teacher Planning	VAV-10-29	6.M302h	AHU-10	SDV5	Price	2.21	9	0.44	755	250	505	1.50	MS-VMA1615-0	NAE1:T2:A32	VAV Typ	
H/Main	H208	3D Art	VAV-10-30	6.M302h	AHU-10	SDV5	Price	1.94	16	1.40	1890	624	1260	5.50	MS-VMA1615-0	NAE1:T2:A33	VAV Typ	
H/Upper	H311	Classroom B	VAV-11-01	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1120	370	560	2.00	MS-VMA1615-0	NAE1:T2:A43	VAV Typ	
H/Upper	H312	Resource Classroom	VAV-11-02	6.M303h	AHU-11	SDV5	Price	2.21	9	0.44	840	0	420	1.50	MS-VMA1615-0	NAE1:T2:A44	VAV Typ	
H/Upper	H313	Classroom B	VAV-11-03	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1390	460	695	2.00	MS-VMA1615-0	NAE1:T2:A56	VAV Typ	
H/Upper	H315	Classroom B	VAV-11-04	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1200	400	800	3.00	MS-VMA1615-0	NAE1:T2:A57	VAV Typ	
H/Upper	H301E	Student Commons	VAV-11-05	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	940	315	480	1.50	MS-VMA1615-0	NAE1:T2:A58	VAV Typ	
H/Upper	H301D	Applied Learning	VAV-11-06	6.M303h	AHU-11	SDV5	Price	2.21	9	0.44	825	275	415	1.50	MS-VMA1615-0	NAE1:T2:A55	VAV Typ	
H/Upper	H330	Classroom C	VAV-11-07	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1380	455	920	3.50	MS-VMA1615-0	NAE1:T2:A59	VAV Typ	

Room Schedule

Location			Box Information															
Bldg./Flr.	Room	Name	System Name	Ref. dwg.	AHU	Box Type								Controller	NAE Address	Template	Comments	
	No.					Box ID	Box Type	K Factor	Inlet Size (Inches)	Inlet Size (Area)	Clg Max Flow	Min Flow	Htg Max Flow					Water Flow (GPM)
H/Upper	H329	Classroom B	VAV-11-08	6.M303h	AHU-11	SDV5	Price	1.96	10	0.55	860	285	430	2.00	MS-VMA1615-0	NAE1:T2:A54	VAV Typ	
H/Upper	H320	Classroom B	VAV-11-09	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	960	320	480	1.50	MS-VMA1615-0	NAE1:T2:A45	VAV Typ	
H/Upper	H321	Classroom (Network Wired)	VAV-11-10	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1110	370	555	2.00	MS-VMA1615-0	NAE1:T2:A46	VAV Typ	
H/Upper	H328	Classroom (Network Wired)	VAV-11-11	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1145	385	750	2.50	MS-VMA1615-0	NAE1:T2:A53	VAV Typ	
H/Upper	H322	Classroom C	VAV-11-12	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1470	485	980	3.50	MS-VMA1615-0	NAE1:T2:A60	VAV Typ	
H/Upper	H333	Classroom B	VAV-11-13	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1030	340	690	2.50	MS-VMA1615-0	NAE1:T2:A61	VAV Typ	
H/Upper	H334	Classroom A	VAV-11-14	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	1125	370	750	2.50	MS-VMA1630-0	NAE1:T2:A62	VAV FT	FT-3e
H/Upper	H335	Life Science	VAV-11-15	6.M303h	AHU-11	SDV5	Price	1.94	16	1.40	1960	650	1310	4.50	MS-VMA1630-0	NAE1:T2:A50	VAV EFS	EF-29
H/Upper	H332	Teacher Planning	VAV-11-16	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1400	465	700	2.00	MS-VMA1615-0	NAE1:T2:A52	VAV Typ	
H/Upper	H335A	Science Prep	VAV-11-17	6.M303h	AHU-11	SDV5	Price	2.24	8	0.35	450	148	300	1.50	MS-VMA1630-0	NAE1:T2:A41	VAV SP LEF	Science Prep Rm ACV-8 LEF-2
H/Upper	H326	Small Group Collaboration	VAV-11-18	6.M303h	AHU-11	SDV5	Price	2.21	9	0.44	700	230	350	1.00	MS-VMA1630-0	NAE1:T2:A51	VAV EFH	EF-11
H/Upper	H336	Life Science	VAV-11-19	6.M303h	AHU-11	SDV5	Price	1.94	16	1.40	1960	650	1310	4.50	MS-VMA1630-0	NAE1:T2:A49	VAV EFS	EF-26
H/Upper	H301	Hall East	VAV-11-20	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1500	495	750	2.00	MS-VMA1630-0	NAE1:T2:A48	VAV EF	EF-2
H/Upper	H301	Hall West	VAV-11-21	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1500	495	750	2.00	MS-VMA1615-0	NAE1:T2:A47	VAV Typ	
H/Upper	H310	Bass	VAV-11-22	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	910	300	610	2.50	MS-VMA1615-0	NAE1:T2:A40	VAV Typ	
H/Upper	H308	Bass	VAV-11-23	6.M303h	AHU-11	SDV5	Price	2.03	12	0.79	845	280	565	2.00	MS-VMA1630-0	NAE1:T2:A39	VAV EF	EF-3
H/Upper	H303	CADD/Engineering	VAV-11-24	6.M303h	AHU-11	SDV5	Price	1.94	16	1.40	2060	680	1375	4.00	MS-VMA1615-0	NAE1:T2:A38	VAV Typ	
H/Upper	H304	Electronics	VAV-11-25	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1780	590	1190	4.00	MS-VMA1615-0	NAE1:T2:A37	VAV Typ	
H/Upper	H305	2D Art	VAV-11-26	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1560	515	1040	4.00	MS-VMA1615-0	NAE1:T2:A36	VAV Typ	
H/Upper	H305B	Art Office	VAV-11-27	6.M303h	AHU-11	SDV5	Price	2.21	9	0.44	750	250	500	1.00	MS-VMA1630-0	NAE1:T2:A35	VAV EF	EF-1
H/Upper	H306	2D Art	VAV-11-28	6.M303h	AHU-11	SDV5	Price	1.97	14	1.07	1750	580	1170	4.00	MS-VMA1615-0	NAE1:T2:A34	VAV Typ	
E/Main	E116	Hall	VAV-12-01	6.M302e	AHU-12	SDV5	Price	2.21	9	0.44	600	200	430	1.50	MS-VMA1615-0	NAE2:T1:A25	VAV Typ	
E/Main	E201	Theater Lobby	VAV-12-02	6.M302e	AHU-12	SDV5	Price	1.94	16	1.40	3000	1000	1870	6.50	MS-VMA1630-0	NAE2:T1:A23	VAV EF	EF-34
E/Main	E316	Theater Control Rm	VAV-12-03	6.M302e	AHU-12	SDV5	Price	2.24	8	0.35	450	148	300	1.50	MS-VMA1615-0	NAE2:T1:A27	VAV Typ	
E/Main	E214	Tickets/Concessions	VAV-12-04	6.M302e	AHU-12	SDV5	Price	2.21	9	0.44	600	200	430	1.50	MS-VMA1615-0	NAE2:T1:A28	VAV Typ	
E/Main	E203	Vocal Office	VAV-12-05	6.M302e	AHU-12	SDV5	Price	1.97	14	1.07	1680	555	1120	4.00	MS-VMA1630-0	NAE2:T1:A31	VAV FT	FT-3h
E/Main	E206	Practice	VAV-12-06	6.M302e	AHU-12	SDV5	Price	2.03	12	0.79	885	295	450	1.50	MS-VMA1630-0	NAE2:T1:A30	VAV EF	EF-37
E/Main	E207	Vocal	VAV-12-07	6.M302e	AHU-12	SDV5	Price	1.62	24x16	2.67	3525	1175	1870	6.50	MS-VMA1630-0	NAE2:T1:A32	VAV EFH	EF-16
E/Lower	E118	Driver's Ed Classroom	VAV-12-08	6.M301e	AHU-12	SDV5	Price	1.97	14	1.07	1500	495	750	2.00	MS-VMA1615-0	NAE2:T1:A38	VAV Typ	
E/Lower	E117	Drama Classroom/Green Room	VAV-12-09	6.M301e	AHU-12	SDV5	Price	1.94	16	1.40	1915	640	1310	4.50	MS-VMA1615-0	NAE2:T1:A37	VAV Typ	
E/Lower	E110	Scene Shop/Prop Storage	VAV-12-10	6.M301e	AHU-12	SDV5	Price	1.97	14	1.07	1500	495	750	2.00	MS-VMA1615-0	NAE2:T1:A36	VAV Typ	
E/Lower	E106	Dressing/Practice	VAV-12-11	6.M301e	AHU-12	SDV5	Price	1.94	16	1.40	1895	635	1310	4.50	MS-VMA1615-0	NAE2:T1:A35	VAV Typ	
E/Lower	E103	Band/Instrumental (Green Room)	VAV-12-12	6.M301e	AHU-12	SDV5	Price	1.62	24x16	2.67	3470	1160	1870	6.50	MS-VMA1615-0	NAE2:T1:A34	VAV HU	Humidity Sensor
E/Main	E111	Theater South	RHC-12-01	6.M302e	AHU-12			1.00	40x26	7.22	12000			23.20	MS-FEC1611-0	NAE2:T1:A24	RHC	
E/Main	E111	Theater North	RHC-12-02	6.M302e	AHU-12			1.00	40x24	6.67	8800			17.00	MS-FEC1611-0	NAE2:T1:A29	RHC	

Valve Schedule

Tag					Valve Information														Actuator Information		Comments	
Item	System	Service	Qty.	Ref. Dwg.	Code Number	Valve Family	Configuration	Fail Position	Inlet Pipe Size (in)	Valve Size (in)	Medium	Flow (gpm or lbs/hr)	Design Delta P (psi)	Valve Delta P (psi)	Design Coefficient (Cv)	Valve Coefficient (Cv)	Valve Close Off (psi)	Trim Material	Connection	Code Number		Actuator Control
241	CWS-ISO	MV-3	1	6.M713EA	VWN060LB2924AGC	Butterfly Valve	2-Way	Last Position	6	6	Water	433.0	3.0	0.2	250.0	1025.0	50.0	Ductile Iron coated with Nylon 1	Flanged	M9124-AGC-2	24VAC On/Off	Chiller Isolation
242	FT	FT-1	1	6.M711EA	VG1241EP+906IGA	Ball Valve	2-Way	Last Position	1-1/2	1-1/2	Water	8.0	3.0	0.2	4.6	18.7	200.0	Brass	Threaded	M9106-IGA-2	24VAC On/Off	VAV-02-03, Greenhouse
243	FT	FT-2	1	6.M712	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1	1	Water	2.0	3.0	0.1	1.2	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-05-01, Principal G203
244	FT	FT-3a	1	6.M711EA	VG1241EP+906AGA	Ball Valve	2-Way	Last Position	1-1/2	1-1/2	Water	12.0	3.0	0.4	6.9	18.7	200.0	Brass	Threaded	M9106-AGA-2	24VAC INC	VAV-07-27, Commons F201A
245	FT	FT-3b	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1	1	Water	4.0	3.0	0.3	2.3	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-07-05, Commons G240D
246	FT	FT-3c	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1	1	Water	6.0	3.0	0.7	3.5	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-09-01, Circulation H200
247	FT	FT-3d	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1	1	Water	4.0	3.0	0.3	2.3	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-10-05, Commons H201D
248	FT	FT-3e	1	6.M712	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	3/4	3/4	Water	2.0	3.0	0.2	1.2	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-11-14, Classroom
249	FT	FT-3f	1	6.M712	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1	1	Water	4.0	3.0	0.3	2.3	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-07-25, Classroom G309
250	FT	FT-3g	1	6.M712	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	3/4	3/4	Water	2.0	3.0	0.2	1.2	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-08-14, Physical Science G333
251	FT	FT-3h	1	6.M712	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	3/4	3/4	Water	2.0	3.0	0.2	1.2	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	VAV-12-05, Vocal Office E203
252	RHC	RHC-01-01	1	6.M711EA	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	1	3/4	Water	7.7	3.0	2.7	4.5	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
253	RHC	RHC-01-02	1	6.M711EA	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	3/4	Water	7.7	3.0	2.7	4.5	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
254	RHC	RHC-02-01	1	6.M711EA	VG1241BG+9T4AGA	Ball Valve	2-Way	Last Position	1	3/4	Water	6.4	3.0	1.9	3.7	4.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
255	RHC	RHC-02-02	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	1	Water	9.1	3.0	1.5	5.3	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
256	RHC	RHC-02-03	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	1	Water	10.4	3.0	2.0	6.0	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
257	RHC	RHC-09-01	1	6.M711EA	VG1241DN+906AGA	Ball Valve	2-Way	Last Position	1-1/2	1-1/4	Water	17.4	3.0	2.2	10.1	11.7	200.0	Brass	Threaded	M9106-AGA-2	24VAC INC	
258	RHC	RHC-12-01	1	6.M711EA	VG1241EP+906AGA	Ball Valve	2-Way	Last Position	2	1-1/2	Water	23.2	3.0	1.5	13.4	18.7	200.0	Brass	Threaded	M9106-AGA-2	24VAC INC	
259	RHC	RHC-12-02	1	6.M712	VG1241DN+906AGA	Ball Valve	2-Way	Last Position	2	1-1/4	Water	17.0	3.0	2.1	9.8	11.7	200.0	Brass	Threaded	M9106-AGA-2	24VAC INC	
260	SHX	SHX-1	1	6.M711EA	VG1241EP+906AGA	Ball Valve	2-Way	Last Position	2	1-1/2	Water	29.5	3.0	2.5	17.0	18.7	200.0	Brass	Threaded	M9106-AGA-2	24VAC INC	
261	SHX	SHX-2	1	6.M711EA	VG1241CN+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	1	Water	14.5	3.0	1.5	8.4	11.7	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
262	SHX	SHX-3	1	6.M712	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	1	Water	10.1	3.0	1.9	5.8	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
263	SHX	SHX-4	1	6.M711EA	VG1241CL+9T4AGA	Ball Valve	2-Way	Last Position	1-1/2	1	Water	9.3	3.0	1.6	5.4	7.4	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
264	SHX	SHX-5	1	6.M711EA	VG1241AD+9T4AGA	Ball Valve	2-Way	Last Position	3/4	1/2	Water	1.9	3.0	2.5	1.1	1.2	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
265	SHX	SHX-6	1	6.M711EA	VG1241AE+9T4AGA	Ball Valve	2-Way	Last Position	1	1/2	Water	3.2	3.0	2.8	1.9	1.9	200.0	Brass	Threaded	VA9104-AGA-3S	24VAC INC	
266	UH	UH-1	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
267	UH	UH-1	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
268	UH	UH-1	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
269	UH	UH-1	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
270	UH	UH-1	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
271	UH	UH-1	1	6.M712	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	5.0	3.0	0.5	2.9	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	
272	UH	UH-2	1	6.M711EA	VG1241EP+958BAA	Ball Valve	2-Way	Valve Closed	1-1/2	1-1/2	Water	13.0	3.0	0.5	7.5	18.7	200.0	Brass	Threaded	VA9208-BAA-3	120VAC On/Off	
273	UH	UH-2	1	6.M711EA	VG1241EP+958BAA	Ball Valve	2-Way	Valve Closed	1-1/2	1-1/2	Water	13.0	3.0	0.5	7.5	18.7	200.0	Brass	Threaded	VA9208-BAA-3	120VAC On/Off	
274	UH	UH-2	1	6.M711EA	VG1241CL+943BUA	Ball Valve	2-Way	Valve Closed	1	1	Water	7.7	3.0	1.1	4.5	7.4	200.0	Brass	Threaded	VA9203-BUA-2	120VAC On/Off	

Damper Schedule

Tag					Damper Information							Actuator Information				Comments	
Item	System	Service	Ref. Dwg.	Qty.	Code Number	Type	Shape/Blade	Fail Position	Damper Size			Qty.	Code No.	Actuator Control	Field Mtd Actuator		Mount Loc'n
									Diameter or W (in.)	H (in.)	Area (ft²)						
1	AHU	AHU1-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	36	33.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
2	AHU	AHU1-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	36	33.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
3	AHU	AHU2-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	112	26	20.22	1	M9220-GGA-3	0-10VDC PROP	Yes		
4	AHU	AHU2-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	112	26	20.22	1	M9220-GGA-3	0-10VDC PROP	Yes		
5	AHU	AHU3EA-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	112	24	18.67	1	M9220-GGA-3	0-10VDC PROP	Yes		
6	AHU	AHU3EA-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	112	24	18.67	1	M9220-GGA-3	0-10VDC PROP	Yes		
7	AHU	AHU4EA-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	36	33.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
8	AHU	AHU4EA-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	36	33.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
9	AHU	AHU5-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	96	20	13.33	1	M9220-GGA-3	0-10VDC PROP	Yes		
10	AHU	AHU5-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	96	20	13.33	1	M9220-GGA-3	0-10VDC PROP	Yes		
11	AHU	AHU6-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	30	27.50	1	M9220-GGA-3	0-10VDC PROP	Yes		
12	AHU	AHU6-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	132	30	27.50	1	M9220-GGA-3	0-10VDC PROP	Yes		
13	AHU	AHU7-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
14	AHU	AHU7-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
15	AHU	AHU8-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
16	AHU	AHU8-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
17	AHU	AHU9-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	96	22	14.67	1	M9220-GGA-3	0-10VDC PROP	Yes		
18	AHU	AHU9-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	96	22	14.67	1	M9220-GGA-3	0-10VDC PROP	Yes		
19	AHU	AHU10-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
20	AHU	AHU10-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
21	AHU	AHU11-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
22	AHU	AHU11-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	124	36	31.00	1	M9220-GGA-3	0-10VDC PROP	Yes		
23	AHU	AHU12-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	78	72	39.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
24	AHU	AHU12-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	106	84	61.83	2	M9220-GGA-3	0-10VDC PROP	Yes		
25	AHU	AHU12-EA		1		Damper By Others	Rectangular Parallel	Normally Closed	78	72	39.00	2	M9220-GGA-3	0-10VDC PROP	Yes		
26	AHU	AHU13-OA		1		Damper By Others	Rectangular Parallel	Normally Closed	116	28	22.56	1	M9220-GGA-3	0-10VDC PROP	Yes		
27	AHU	AHU13-RA		1		Damper By Others	Rectangular Parallel	Normally Closed	116	28	22.56	1	M9220-GGA-3	0-10VDC PROP	Yes		
28	RHC	RHC-01-01		1	VOPEN-036X020	Class II - Low Leakage	Rectangular Opposed	Last Position	36	20	5.00	1	M9108-AGA-2	24VAC/VDC INC	Yes		
29	RHC	RHC-01-02		1	VOPEN-028X020	Class II - Low Leakage	Rectangular Opposed	Last Position	28	20	3.89	1	M9108-AGA-2	24VAC/VDC INC	Yes		
30	RHC	RHC-02-01		1	VOPEN-024X020	Class II - Low Leakage	Rectangular Opposed	Last Position	24	20	3.33	1	M9108-AGA-2	24VAC/VDC INC	Yes		
31	RHC	RHC-02-02		1	VOPEN-030X020	Class II - Low Leakage	Rectangular Opposed	Last Position	30	20	4.17	1	M9108-AGA-2	24VAC/VDC INC	Yes		
32	RHC	RHC-02-03		1	VOPEN-036X020	Class II - Low Leakage	Rectangular Opposed	Last Position	36	20	5.00	1	M9108-AGA-2	24VAC/VDC INC	Yes		
33	RHC	RHC-09-01		1	VOPEN-040X024	Class II - Low Leakage	Rectangular Opposed	Last Position	40	24	6.67	1	M9108-AGA-2	24VAC/VDC INC	Yes		
34	RHC	RHC-12-01		1	VOPEN-040X024	Class II - Low Leakage	Rectangular Opposed	Last Position	40	24	6.67	1	M9108-AGA-2	24VAC/VDC INC	Yes		
35	RHC	RHC-12-02		1	VOPEN-040X024	Class II - Low Leakage	Rectangular Opposed	Last Position	40	24	6.67	1	M9108-AGA-2	24VAC/VDC INC	Yes		
36	LVR-15	ZN-02-03a		1	VPPEN-032X024	Class II - Low Leakage	Rectangular Parallel	Normally Closed	32	24	5.33	1	M9208-AGA-2	24VAC On/Off	Yes		
37	LEF	LEF-BD		1		Damper By Others	Rectangular Opposed	Normally Closed	32	32	7.11	1	M9208-GGA-3	0-10VDC PROP	Yes		