

20200529 – IN073 Science Building  
Replace AHU-1

November 12, 2021



Daniel J. Ulrich, PE, WELL AP

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This Addendum issued prior to bidding, alters, amends, corrects, or clarifies the Proposal Documents to the extent stated herein and does hereby become a part of the Proposal Documents, and will become a part of the Contract Documents of the successful bidder.

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**GENERAL**

**A. SPECIFICATIONS**

- a. Table of Contents
  - 1) Add item "Appendix – A"
    - a) Johnson Controls (PPE) IUPUI Science AHU-1 Design.....1-11
  
- b. Section 23 09 57 HVAC Instrumentation and Controls Installation.
  - 1) Delete items 1.1.D and 1.1.E.
  - 2) Add item 1.1.D as follows.
    - a) Section 23 05 93 Testing and Balancing
  - 3) Add item 1.1.E. as follows.
    - a) Appendix A – Johnson Controls (PPE) IUPUI Science AHU-1 Design

**B. DRAWINGS**

- a. None.

END OF ADDENDUM

# IUPUI Science AHU-1 Design

IU# 20200529 JCI# 2N20-0020 APPENDIX - A



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
- Building Operations Management
- Energy Conservation Control
- Training Programs
- Performance Contracting
- 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

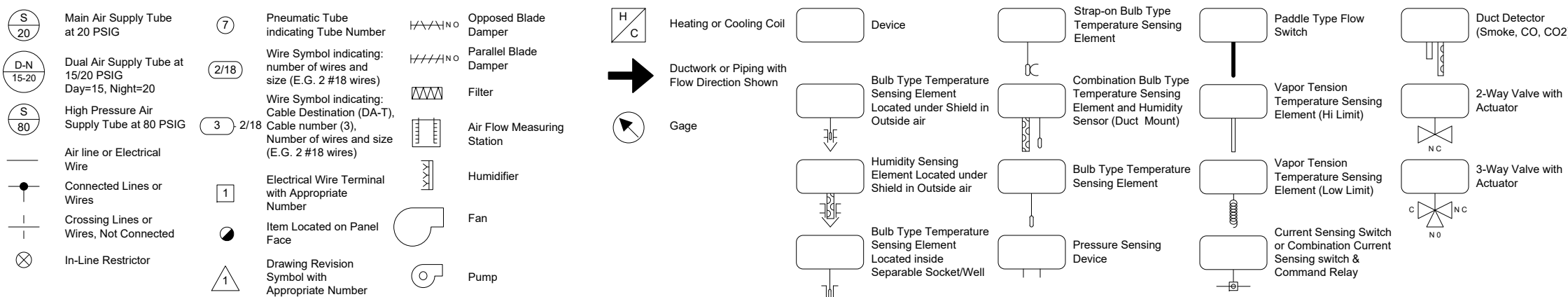
Page	Description
0.1	Communications Riser
0.2	MSTP Installation Details
1.1	AHU-1 – Flow Layout
1.2	AHU-1 – BOM & Sequence
1.3	AHU-1 – Point Schedule
1.4	AHU-1 – Wiring Diagram 1
1.5	AHU-1 – Wiring Diagram 2
1.6	AHU-1 – Wiring Diagram 3
1.7	AHU-1 – Wiring Diagram 4
2.1	Valve Schedule

PROJECT TITLE  
**IUPUI Science AHU-1 Design**  
**IU# 20200529**  
**Indianapolis, Indiana**

ARCHITECT	ENGINEER <b>R. E. Dimond</b> 732 N Capitol Avenue, Indianapolis, Indiana 46204 Phone: (317) 634-4672
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MECHANICAL CONTRACTOR	ELECTRICAL CONTRACTOR
Phone:	Phone:

## LEGEND



		REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY		
		Branch Information BSNA - INDIANAPOLIS, IN 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000		
SALES ENGINEER JG	PROJECT MANAGER WP	APPLICATION ENGINEER KS	DATE 2021-11-09	CONTRACT NUMBER 2N20-0020


# COMMUNICATION RISER

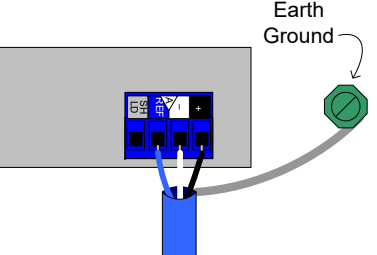


ADDRESSES TO BE  
FIELD VERIFIED

EXISTING MSTP TRUNK

DEVICE TAG	ADDRESS	TRUNK
AHU-1		

Drawing Title							
<b>Communication Riser</b>							
Project Title		Branch Information		CONTRACT NUMBER		DRAWING NUMBER	
<b>IUPUI Science AHU-1 Design IU# 20200529 Indianapolis, Indiana</b>		 <b>BSNA - INDIANAPOLIS, IN</b> 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000		<b>2N20-0020</b>		<b>0.1</b>	
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY	
Sales Engineer JG	Project Manager WP	Application Engineer KS	DRAWN	BY	DATE	APPROVED	DATE

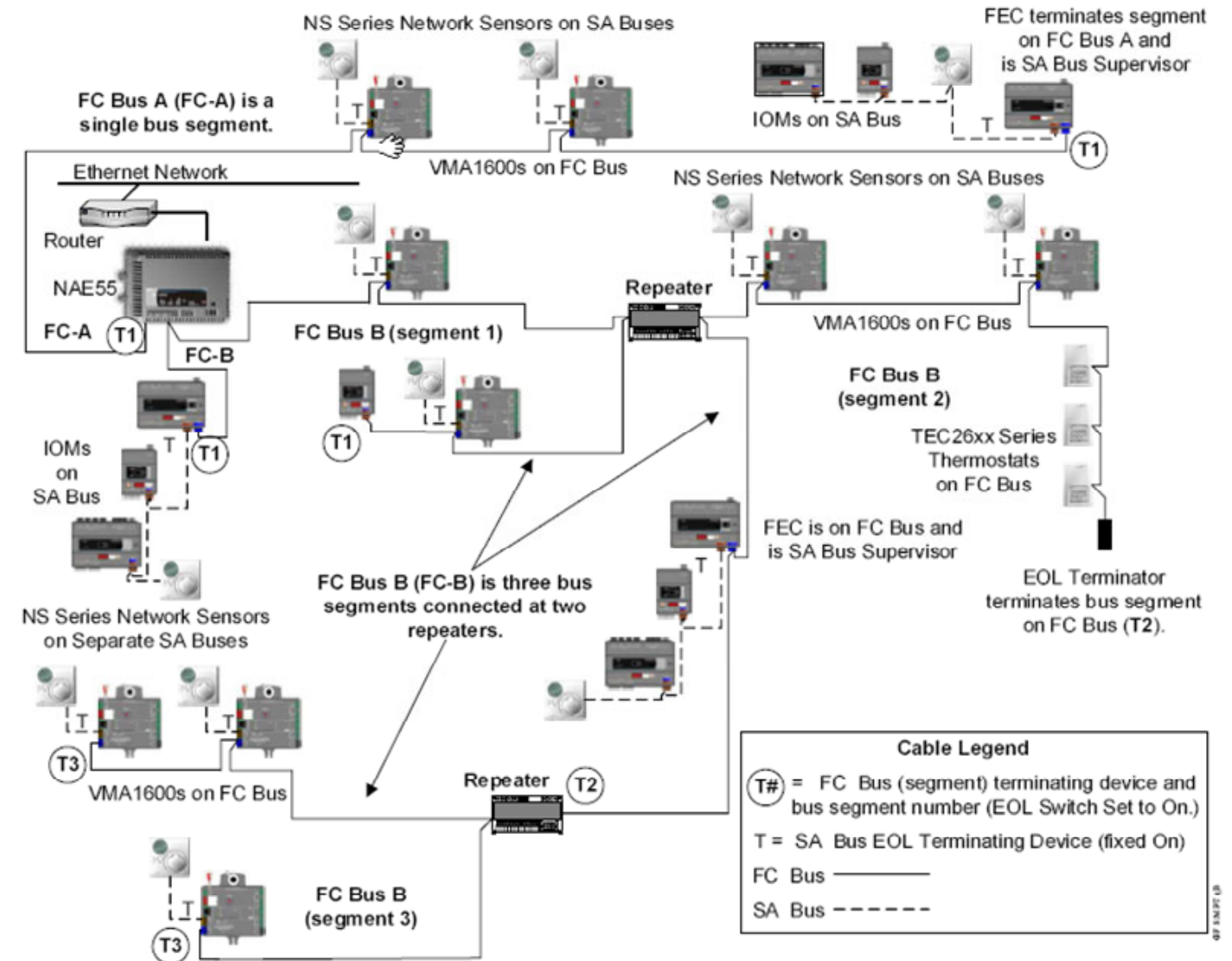
Category	Rules / Maximums Allowed
General	Typically daisy-chained; branch or star configuration acceptable when repeaters are used. See End of Line Switching and Repeater Guideline graphic.
Number of Devices	<p><b>When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the device and bus segment limits are:</b>            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><b>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:</b>            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><b>Note:</b> 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><b>When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the cable length limits are:</b>            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><b>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:</b>            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	<p>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.</p> <p><b>EOL Termination on NAEs</b>            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.</p> <p><b>EOL Termination on Switch-Terminating Devices</b>            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.</p> <p><b>EOL Termination on Devices Without EOL Provision</b>            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.</p> <p><b>EOL Termination Across the FC Bus</b>            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.</p> <p><b>EOL on FC Bus Repeater</b>            When using repeaters in the FC Bus, set the EOL jumpers based on the position of the repeater in the run.</p>
	<p><b>SHIELD GROUNDING</b></p>  <p>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.</p>

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

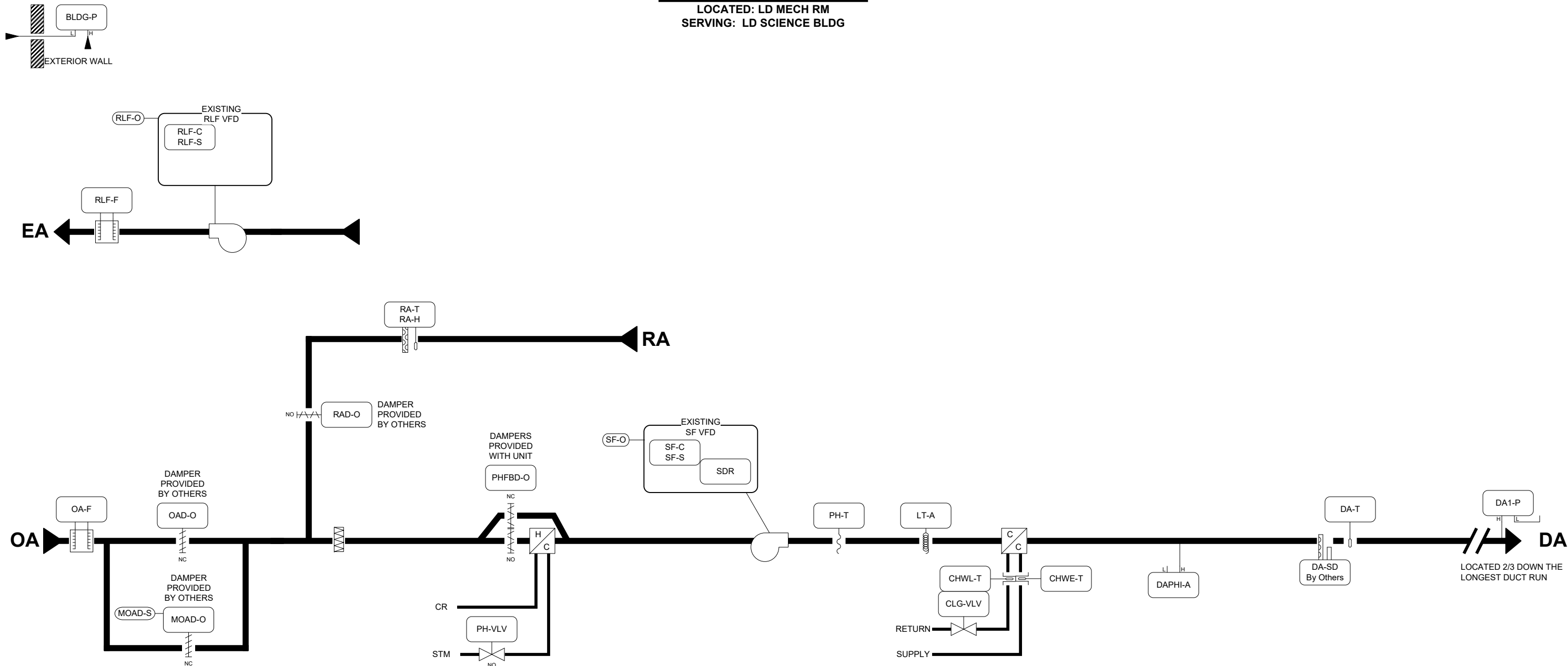


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Drawing Title									
MSTP Installation Details									
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY			
Sales Engineer JG	Project Manager WP	Application Engineer KS		BY	DATE	APPROVED			
Project Title		Branch Information		CONTRACT NUMBER		DRAWING NUMBER			
IUPUI Science AHU-1 Design IU# 20200529 Indianapolis, Indiana		BSNA - INDIANAPOLIS, IN 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000		2N20-0020		0.2			
Johnson Controls									

# AHU-1 FLOW LAYOUT

LOCATED: LD MECH RM  
SERVING: LD SCIENCE BLDG



<p>Copyright Johnson Controls, 2021. All rights reserved. Reuse, copying, modification or alteration of the drawings and other information contained herein is strictly prohibited.</p>	<p>Drawing Title <b>AHU-1 - Flow Layout</b></p>							
	<p>Project Title <b>IUPUI Science AHU-1 Design IU# 20200529 Indianapolis, Indiana</b></p>		<p>REFERENCE DRAWING NO. REVISION-LOCATION ECN DATE BY</p>		<p>SALES ENGINEER PROJECT MANAGER APPLICATION ENGINEER</p>		<p>BY DATE BY DATE</p>	
	<p>Johnson Controls</p>		<p>Branch Information <b>BSNA - INDIANAPOLIS, IN</b> 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000</p>		<p>CONTRACT NUMBER <b>2N20-0020</b></p>		<p>DRAWING NUMBER <b>1.1</b></p>	

SEQUENCE OF OPERATION

SUPPLY FAN CONTROL:

The variable speed supply fan (SF-C) will be started based on occupancy schedule (OCC-SCHEDULE). When the supply fan status (SF-S) indicates the fan started, the control sequence will be enabled. The supply fan (SF-O) will modulate to maintain the discharge static pressure (DA-P) at setpoint (DAP-SP). Upon a loss of airflow (SF-S), an alarm is issued at the operator workstation.

DISCHARGE PRESSURE RESET:

The discharge static pressure is decreased in 0.1" increments in 10 minute intervals until any one served VAV box is 100% open. When the VAV boxes can not be satisfied the discharge pressure is raised in the same sequence until all VAV boxes are satisfied, at which time the pressure will remain constant.

RELIEF FAN CONTROL:

When the building pressure exceeds 0.05" (adj), the relief fan is commanded on and will modulate (RLF-O) to maintain the building static pressure at setpoint (BLDGP-SP), initially set at 0.02" (adj). Upon a loss of airflow (RLF-S), an alarm is issued at the operator workstation.

ECONOMIZER CONTROL:

When enabled via the network command (ECON-ENA), the economizer will act as the initial stage of cooling, working in sequence with the cooling coil.

MINIMUM OA CONTROL:

The minimum OA damper (MOAD-O) will open to the preselected position when the unit is in occupied mode. 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).

TEMPERATURE CONTROL:

The unit will control to maintain a constant discharge air temperature (DA-T) of 55°F (adj), unless the return air humidity (RA-H) is over 60%. When the return air humidity (RA-H) is over 60% (adj), the discharge air temperature setpoint will be lowered to 53°F (adj).

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.

PREHEAT COIL:

The preheat face & bypass damper (PHFBD-O) will remain open to the face when the preheat valve (PH-VLV) is modulating. The preheat face & bypass damper (PHFBD-O) will be enabled if the outdoor air temperature (OA-T) falls below setpoint (OALT-SP), at which time the preheat valve (PH-VLV) will be commanded fully open, and the preheat face & bypass damper (PHFBD-O) will modulate to maintain the temperature setpoint. When the unit is shutdown, the preheat coil will be commanded to a preset position should the outdoor air temperature (OAT) fall below the low outdoor air temperature setpoint (OALT-SP). Upon a loss of airflow (SF-S), the preheat 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).

When the outside air temperature is above 50°F (adj), the preheat valve (PH-VLV) is commanded closed and the face & bypass damper is commanded to full bypass. When the outside air temperature is between 40°F (adj) and 50°F (adj), the preheat valve modulates to maintain the discharge air temperature setpoint. When the outside air temperature is below 40°F (adj), the preheat valve is commanded fully open and the face & bypass dampers modulate to maintain the discharge air temperature setpoint.

COOLING COIL:

The cooling coil (CLG-VLV) 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). Upon a loss of airflow (SF-S), the cooling coil will be 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.
- Discharge Air Smoke Detector (DA-SD) - Disables the fan(s) via a hard wired shutdown circuit.

ADDITIONAL POINTS MONITORED BY THE FMS:


- Outdoor Air Flow (OA-F)
- Minimum Outdoor Air Damper Status (MOAD-S)
- Chilled Water Entering Temperature (CHEW-T)
- Chilled Water Leaving Temperature (CHLW-T)
- Mixed Air Temperature (MA-T)
- Return Air Temperature (RA-T)
- Relief Air Flow (RLF-F)
- Discharge Air Smoke Alarm (DA-SD)

BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
CLG-VLV	1	VALVE	See Valve Schedule.
MOAD-O	1	M9220-GGC-3	20NM SR DPR ACT 0(2) T 10 VDC 24 VAC
OAD-O	1	M9220-GGA-3	20NM SR DPR ACT 0(2) T 10 VDC 24 VAC
OA-F	1	GTC116-P+	EBTRON GOLD TRANSMITTER W/2 PROBES
PHFBD-O	2	M9220-GGA-3	20NM SR DPR ACT 0(2) T 10 VDC 24 VAC
PH-VLV	1	VALVE	See Valve Schedule.
RAD-O	1	M9220-GGA-3	20NM SR DPR ACT 0(2) T 10 VDC 24 VAC
RLF-F	1	GTC116-P+	EBTRON GOLD TRANSMITTER W/1 PROBES
BLDG-P	1	A-306-K	OUTDOOR AIR STATIC
BLDG-P	1	RPS	PRESSURE SENSOR 1/4" BARB
BLDG-P	1	SD-01	SURGE DAMPENER
BLDG-P	1	DP140X25B21C	BIDIRECTIONAL + OR -0.25IN. W.C. 24 VDC / 4 TO 20 MA
CHWL-T, CHWE-T	2	DVUT35	WEISS SOLAR TEMP TRANSMITTER
DA1-P, DAPHI-A	2	FTG18A-600R	SENSING TUBE KIT FOR P32
DA1-P	1	DP140005U21C	UNIDIRECTIONAL 0 TO 5IN. W.C. 24 VDC / 4 TO 20 MA
DAPHI-A	1	AFS-460	ADJUSTABLE MANUAL RESET
DAPHI-A	1	RIB24P	DPDT,20A @ 300VAC,COIL=24 VAC/DC,WITH LED INDICATION,POWER COMSUMPTION=3VA
DA-T	1	TE-6351M-1	DUCT MOUNT SENSOR 1K OHM PLATINUM 8 IN. PROBE METAL ENCLOSURE
LT-A	2	A70HA-1C	15/55F, DIFF 5 FIXED,1NO/1NC MAIN OPEN LOW,1/8 X 20' BULB,
LT-A, PH-T	3	TE-6001-8	AVER ELEMENT HLDR QTY =10
PH-T	1	TE-6328P-1	20', W/TE-6001-8ELEMENTHOLDER
PANEL	1	P2DAY-BAHB1N01	PANEL, M4-CGM09090-0, M4-XPM09090-0, 24 X 36 X 6.5, REMOTE DISPLAY
RA-T,-H	1	HE-69530NP-0	DUCT PROBE, 3%RH, PT TEMP
SF-C, RLF-C	2	RIBU1C	UNIVERSAL
SDR	1	RIBMNLB-4	SAFETY BOARD 4 INPUTS

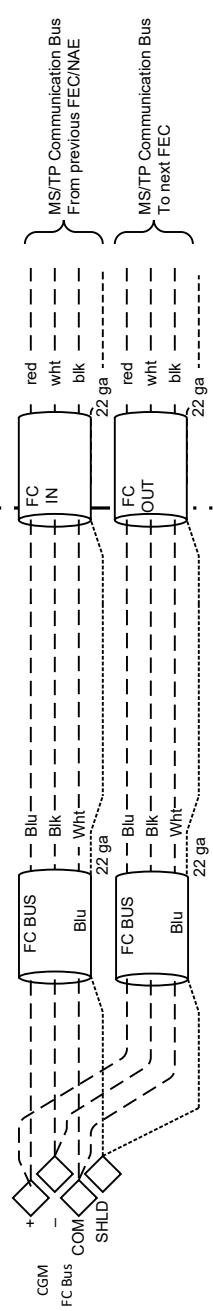
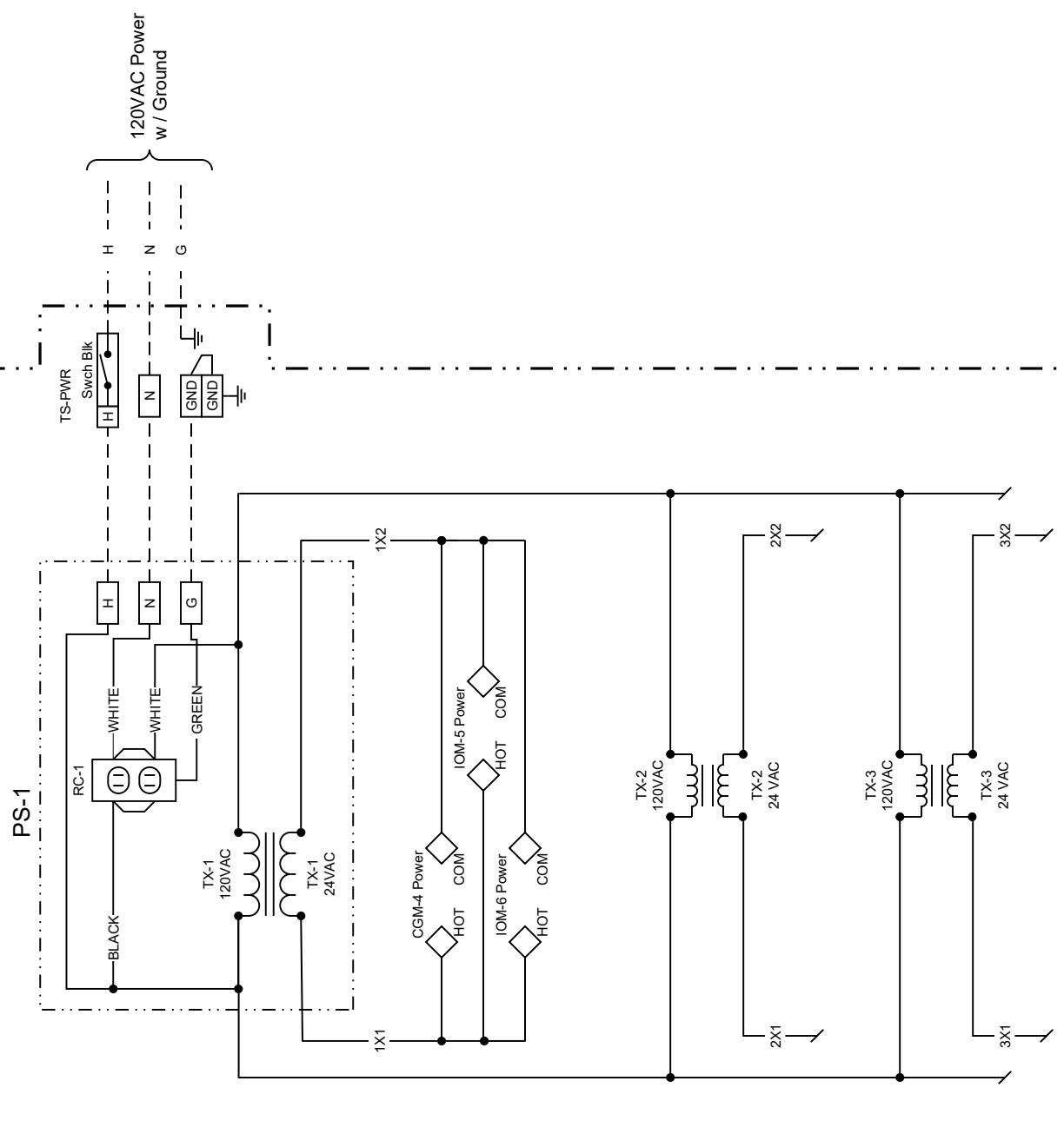
Copyright Johnson Controls, 2021. All rights reserved. Reuse, copying, modification or alteration of the drawings and other information contained herein is strictly prohibited.	Drawing Title							
	<b>AHU-1 - BOM &amp; Sequence</b>							
	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY		
	Sales Engineer JG	Project Manager WP	Application Engineer KS	BY	DATE	BY	DATE	APPROVED
Project Title				Branch Information BSNA - INDIANAPOLIS, IN 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000		CONTRACT NUMBER <b>2N20-0020</b>		
<b>IUPUI Science AHU-1 Design</b> <b>IU# 20200529</b> <b>Indianapolis, Indiana</b>						DRAWING NUMBER <b>1.2</b>		

Electrician/Fitter		Point Information			Controller Information					
Tag	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Termination Out
		AHU-1			CGM09090					
		AHU-1			CGM09090	MS/TP	1	4		
	UI IN-1	AHU-1	DA-T	Discharge Air Temperature	CGM09090	MS/TP	1	4	UI IN-1	IN#, ICOM#
	UI IN-2	AHU-1	RA-T	Return Air Temperature	CGM09090	MS/TP	1	4	UI IN-2	IN#, ICOM#
	UI IN-3	AHU-1			CGM09090	MS/TP	1	4	UI IN-3	
	UI IN-4	AHU-1	MOAD-S	Min Outdoor Air Damper Status	CGM09090	MS/TP	1	4	UI IN-4	IN#, ICOM#
	UI IN-5	AHU-1	CHWE-T	Chilled Water Entering Temperature	CGM09090	MS/TP	1	4	UI IN-5	IN5, +15V
	UI IN-6	AHU-1	OA-F	Outdoor Air Flow	CGM09090	MS/TP	1	4	UI IN-6	IN#, ICOM#
	UI IN-7	AHU-1	LT-A	Low Temperature Alarm	CGM09090	MS/TP	1	4	UI IN-7	IN#, ICOM#
	BI IN-1	AHU-1	SF-S	Supply Fan Status	CGM09090	MS/TP	1	4	BI IN-1	IN#, ICOM#
	BI IN-2	AHU-1	RLF-S	Relief Fan Status	CGM09090	MS/TP	1	4	BI IN-2	IN#, ICOM#
	BO OUT-1	AHU-1	SF-C	Supply Fan Command	CGM09090	MS/TP	1	4	BO OUT-1	OUT#, 24V COM
	BO OUT-2	AHU-1	RLF-C	Relief Fan Command	CGM09090	MS/TP	1	4	BO OUT-2	OUT#, 24V COM
	BO OUT-3	AHU-1			CGM09090	MS/TP	1	4	BO OUT-3	
	CO OUT-1	AHU-1	RAD-O	Return Air Damper Output	CGM09090	MS/TP	1	4	CO OUT-1	OUT#, OCOM#,24VAC, COM
	CO OUT-2	AHU-1	CLG-VLV	Cooling Output	CGM09090	MS/TP	1	4	CO OUT-2	OUT#, OCOM#,24VAC, COM
	CO OUT-3	AHU-1	PHFBD-O	Preheat Face & Bypass Damper Output	CGM09090	MS/TP	1	4	CO OUT-3	OUT#, OCOM#,24VAC, COM
	CO OUT-4	AHU-1	PH-VLV	Preheat Output	CGM09090	MS/TP	1	4	CO OUT-4	OUT#, OCOM#,24VAC, COM
	AO OUT-1	AHU-1	RLF-O	Relief Fan Output	CGM09090	MS/TP	1	4	AO OUT-1	OUT#, OCOM#
	AO OUT-2	AHU-1	OAD-O	Outdoor Air Damper Output	CGM09090	MS/TP	1	4	AO OUT-2	OUT#, OCOM#,24VAC, COM
		AHU-1			XPM09090					
		AHU-1			XPM09090	SA Bus	1	5		
	UI IN-1	AHU-1	DA1-P	Discharge Air Static Pressure 1	XPM09090	SA Bus	1	5	UI IN-1	IN#, +15V
	UI IN-2	AHU-1	RA-H	Return Air Humidity	XPM09090	SA Bus	1	5	UI IN-2	IN#, ICOM#, +15V
	UI IN-3	AHU-1	PH-T	Preheat Temperature	XPM09090	SA Bus	1	5	UI IN-3	IN#, ICOM#
	UI IN-4	AHU-1	BLDG-P	Building Static Pressure	XPM09090	SA Bus	1	5	UI IN-4	IN#, +15V
	UI IN-5	AHU-1	CHWL-T	Chilled Water Leaving Temperature	XPM09090	SA Bus	1	5	UI IN-5	IN5, +15V
	UI IN-6	AHU-1	RLF-F	Relief Air Flow	XPM09090	SA Bus	1	5	UI IN-6	IN#, ICOM#
	UI IN-7	AHU-1			XPM09090	SA Bus	1	5	UI IN-7	
	BI IN-1	AHU-1	DAPHI-A	Discharge Air High Duct Pressure	XPM09090	SA Bus	1	5	BI IN-1	IN#, ICOM#
	BI IN-2	AHU-1	DA-SD	Discharge Air Smoke Alarm	XPM09090	SA Bus	1	5	BI IN-2	IN#, ICOM#
	BO OUT-1	AHU-1			XPM09090	SA Bus	1	5	BO OUT-1	
	BO OUT-2	AHU-1			XPM09090	SA Bus	1	5	BO OUT-2	
	BO OUT-3	AHU-1			XPM09090	SA Bus	1	5	BO OUT-3	
	CO OUT-1	AHU-1			XPM09090	SA Bus	1	5	CO OUT-1	
	CO OUT-2	AHU-1			XPM09090	SA Bus	1	5	CO OUT-2	
	CO OUT-3	AHU-1			XPM09090	SA Bus	1	5	CO OUT-3	
	CO OUT-4	AHU-1			XPM09090	SA Bus	1	5	CO OUT-4	
	AO OUT-1	AHU-1	MOAD-O	Min Outdoor Air Damper Output	XPM09090	SA Bus	1	5	AO OUT-1	OUT#, OCOM#,24VAC, COM
	AO OUT-2	AHU-1	SF-O	Supply Fan Output	XPM09090	SA Bus	1	5	AO OUT-2	OUT#, OCOM#

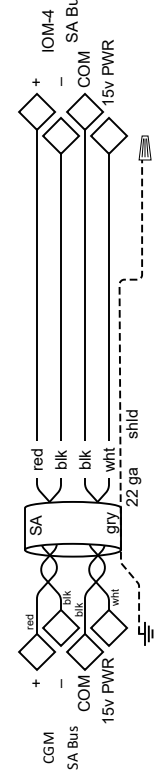
Drawing Title									
<b>AHU-1 - Point Schedule</b>									
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN		DATE	
Sales Engineer		Project Manager		Application Engineer		DRAWN		APPROVED	
JG		WP		KS		BY		DATE	
Project Title		Branch Information		CONTRACT NUMBER		DRAWING NUMBER			
<b>IUPUI Science AHU-1 Design</b> IU# 20200529 Indianapolis, Indiana		 BSNA - INDIANAPOLIS, IN 1255 N. Senate Ave., Indianapolis, Indiana 46202 Phone: (317) 917-5000		<b>2N20-0020</b>		<b>1.3</b>			

# WIRING DETAILS

← PANEL → FIELD →



**FC BUS CABLE IS:**  
 5501FE (NON-PLENUM)  
 6501FE (PLENUM)  
 22ga, stranded, 3-cond., twisted/shielded



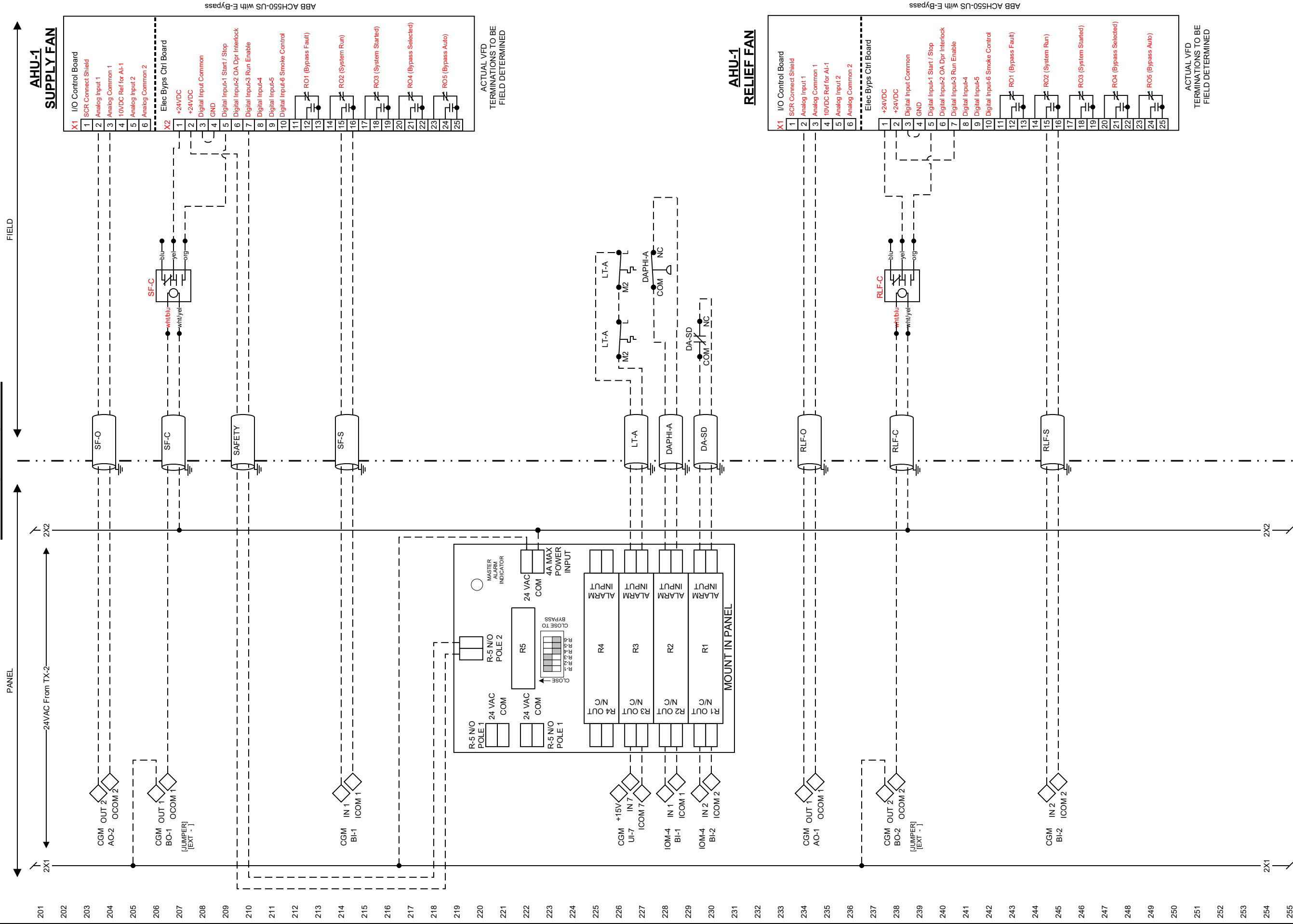
**SA BUS CABLE IS:**  
 5541FE (NON-PLENUM)  
 6541FE (PLENUM)  
 22ga, stranded, (2) twisted pairs, shielded

<b>Wiring Notes</b>											
<p>Terminal in DDC controller. nn indicates terminal number.</p> <p>Shielded cable. Terminate &amp; ground shield within 2 inches of entry into enclosure. Continue shield to last device and tape back both ends of cable.</p> <p>Cable-no shield. nn indicates cable number (labeled at both ends of cable).</p>	<p>Indicates field-installed wiring. nnn indicates wire number (labeled at both ends of wire).</p> <p>Indicates factory wiring. nnn indicates wire number (labeled at both ends of wire).</p> <p>Terminal in JCI panel. nnn indicates terminal number.</p>										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>REVISION/LOCATION</th> <th>ECN</th> <th>DATE</th> <th>BY</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	REVISION/LOCATION	ECN	DATE	BY					
NO.	REVISION/LOCATION	ECN	DATE	BY							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>FILE NAME 1.4 - AHU-1 - WIRING DETAILS 1.1 VSDX</td> <td>REVISION DATE/TIME 11/09/21 5:15 PM</td> <td>PROJECT MANAGER WP</td> <td>APPLICATION ENGINEER KS</td> <td>DATE 6/2/2021</td> </tr> </table>		FILE NAME 1.4 - AHU-1 - WIRING DETAILS 1.1 VSDX	REVISION DATE/TIME 11/09/21 5:15 PM	PROJECT MANAGER WP	APPLICATION ENGINEER KS	DATE 6/2/2021					
FILE NAME 1.4 - AHU-1 - WIRING DETAILS 1.1 VSDX	REVISION DATE/TIME 11/09/21 5:15 PM	PROJECT MANAGER WP	APPLICATION ENGINEER KS	DATE 6/2/2021							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PROJECT NAME IUPUI Science AHU-1 Design IU# 20200529 Indianapolis, Indiana</td> <td style="text-align: right;">                   BRANCH INFORMATION                  BSNA - INDIANAPOLIS, IN                  1255 N SENATE AVE                  INDIANAPOLIS, Indiana                  46202                  Phone: 3176387611             </td> </tr> </table>		PROJECT NAME IUPUI Science AHU-1 Design IU# 20200529 Indianapolis, Indiana	 BRANCH INFORMATION BSNA - INDIANAPOLIS, IN 1255 N SENATE AVE INDIANAPOLIS, Indiana 46202 Phone: 3176387611								
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DRAWING TITLE <b>AHU-1 - Wiring Diagram 1</b></td> </tr> <tr> <td>CONTRACT NUMBER <b>2N20-0020</b></td> </tr> <tr> <td>DRAWING NUMBER <b>1.4</b></td> </tr> </table>		DRAWING TITLE <b>AHU-1 - Wiring Diagram 1</b>	CONTRACT NUMBER <b>2N20-0020</b>	DRAWING NUMBER <b>1.4</b>							
DRAWING TITLE <b>AHU-1 - Wiring Diagram 1</b>											
CONTRACT NUMBER <b>2N20-0020</b>											
DRAWING NUMBER <b>1.4</b>											

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155



# WIRING DIAGRAM



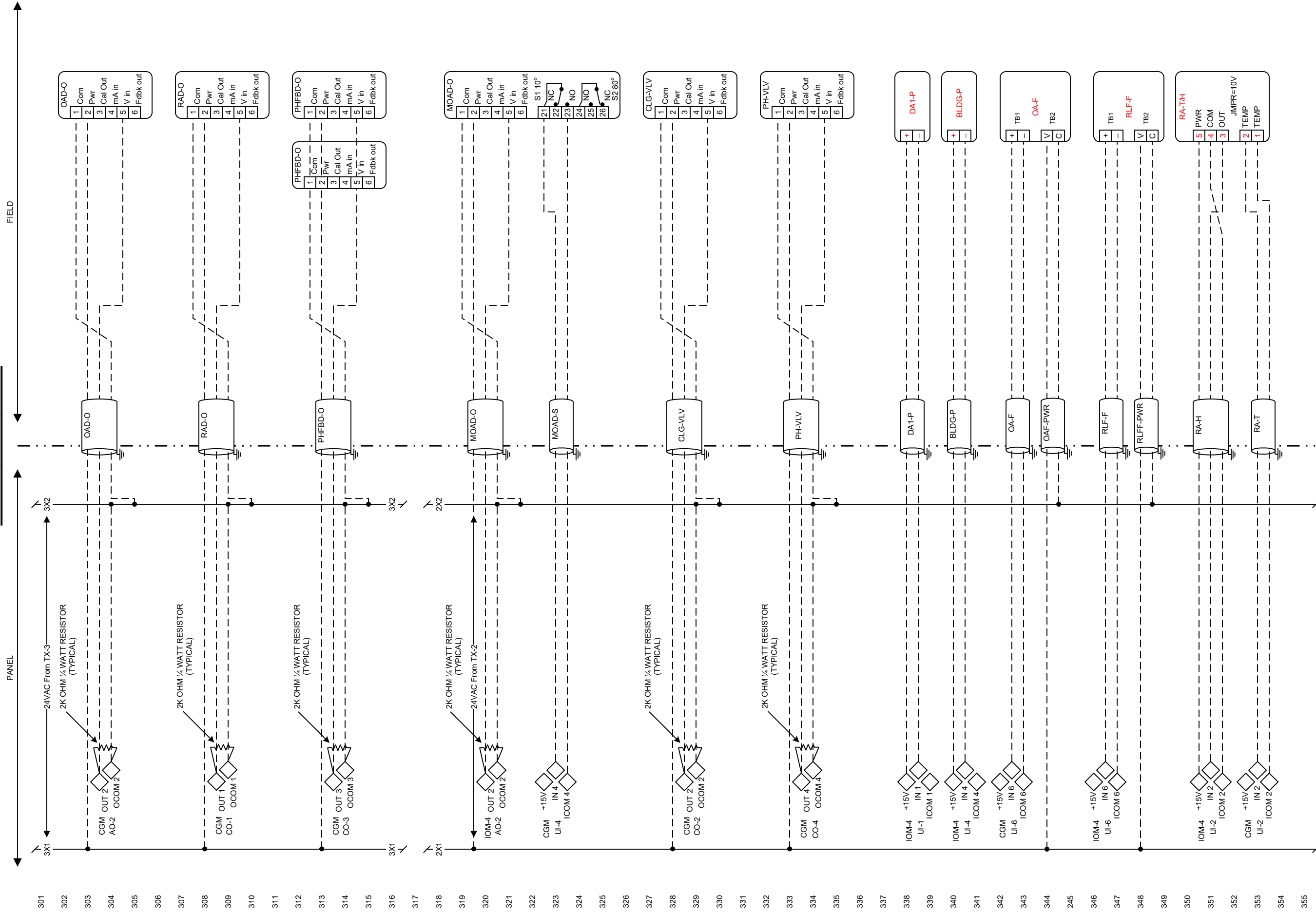
<b>DRAWING TITLE</b> <b>AHU-1 - Wiring Diagram 2</b>		<b>PROJECT NAME</b> <b>IUPUI Science AHU-1 Design</b> <b>IUH# 20200529</b> <b>Indianapolis, Indiana</b>	
APPROVED BY: _____ DATE: _____ CONTRACT NUMBER: <b>2N20-0020</b> DRAWING NUMBER: <b>1.5</b>	REVISION INFORMATION NO.   REVISION   LOCATION   PROJECT MANAGER   APPLICATION ENGINEER   ECN   DATE   BY 1   1.5 - AHU-1 - WIRING DETAILS   2-3/2020   JG   WP   KS   0000040   11/09/21   5:16 PM		
BRANCH INFORMATION BSNVA - INDIANAPOLIS, IN 1255 N. Senate Ave. Indianapolis, Indiana 46202 Phone: (317) 917-5000			

**Wiring Notes**

- Terminal in DDC controller.  
nn indicates terminal number.
- Shielded cable.  
Terminate & ground shield within 2 inches of entry into enclosure. Continue shield to last device and tape back.
- Terminal in JCI panel.  
nn indicates cable number (labeled at both ends of cable).
- Cable no. shield.  
nn indicates cable number (labeled at both ends of cable).

Indicates field-installed wiring.  
nnn indicates wire number (labeled at both ends of wire).  
Indicates factory wiring.  
nnn indicates wire number (labeled at both ends of wire).  
Terminal in JCI panel.  
nnn indicates terminal number.

# WIRING DIAGRAM



<b>DRAWING TITLE</b> <b>AHU-1 - Wiring Diagram 3</b>		<b>PROJECT NAME</b> <b>IUPUI Science AHU-1 Design</b> <b>IUH# 20200529</b> <b>Indianapolis, Indiana</b>	
APPROVED BY: _____ DATE: _____ I.G. - AHU-1 - WIRING DETAILS 3/3/2021	REVISION DATE/TIME: 11/11/21 5:25 PM REVISED BY: JG	PROJECT NUMBER: 0000040 APPLICATION ENGINEER: KS PROJECT MANAGER: WP REVISION LOCATION: _____ NO.: _____	BRANCH INFORMATION: BSNVA - INDIANAPOLIS, IN 1255 N. Senate Ave. Indianapolis, Indiana 46202 Phone: (317) 917-5000
CONTRACT NUMBER <b>2N20-0020</b>		DRAWING NUMBER <b>1.6</b>	

**Wiring Notes**

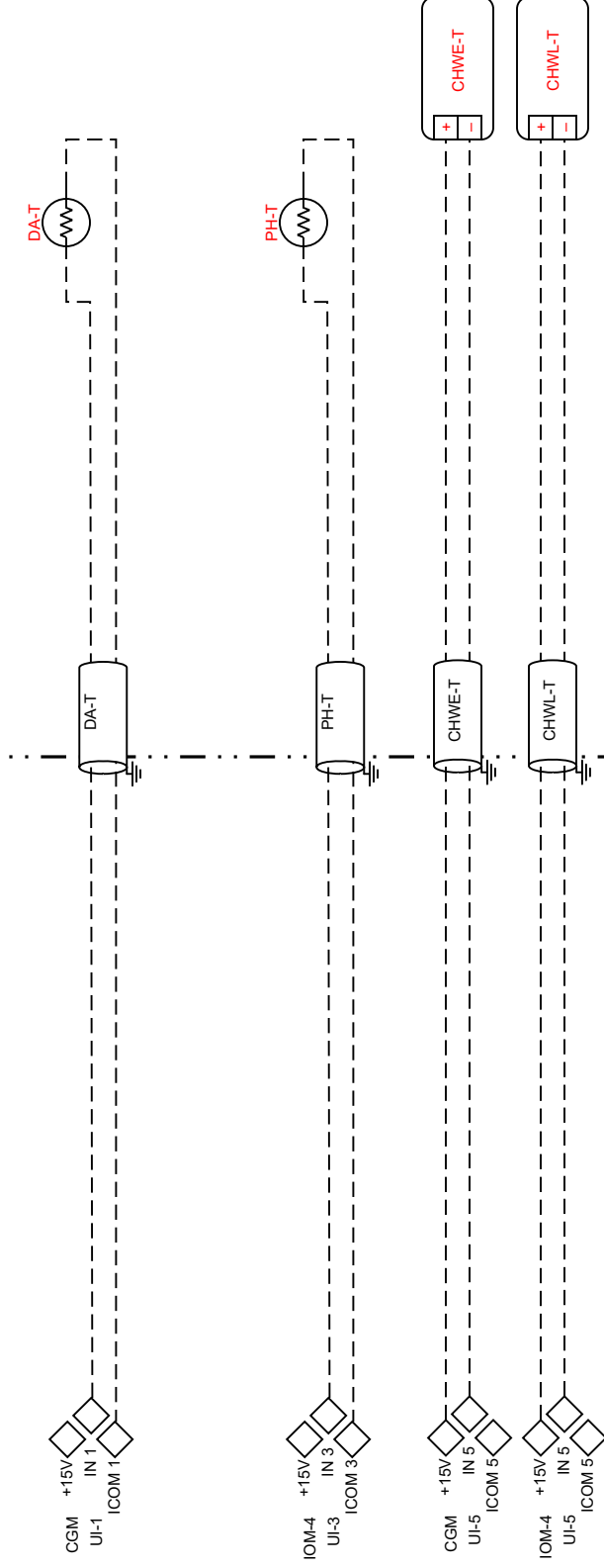
- Terminal in DDC controller.
- nm indicates terminal number.
- Shielded cable.
- Terminate & ground shield within 2 inches of entry into enclosure. Continue shield to last device and tape back.
- nm indicates cable number (labeled at both ends of cable).
- Cable-no. shield.
- nm indicates cable number (labeled at both ends of cable).

Indicates field-installed wiring.  
 nm indicates wire number (labeled at both ends of wire).  
 Indicates factory wiring.  
 nm indicates wire number (labeled at both ends of wire).  
 Terminal in JCI panel.  
 nm indicates terminal number.

# WIRING DIAGRAM

PANEL

FIELD



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<b>DRAWING TITLE</b> <b>AHU-1 - Wiring Diagram 4</b>		<b>PROJECT NAME</b> <b>IUPUI Science AHU-1 Design</b> <b>IUH# 20200529</b> <b>Indianapolis, Indiana</b>	
APPROVED BY	DATE	REVISION NO.	DATE
BY	DATE	BY	DATE
CONTRACT NUMBER	<b>2N20-0020</b>		
DRAWING NUMBER	<b>1.7</b>		
FILE NAME: 1.7_AHU-1_WIRING DETAILS 4.3.352A		REVISION DATE/TIME: 11/11/21 5:26 PM REVISED BY: JG	PROJECT LOCATION: WP PROJECT MANAGER: WP APPLICATION ENGINEER: KS ECN: KS DATE: 6/2/2021 DRAWN BY: KLS
BRANCH INFORMATION BSWA - INDIANAPOLIS, IN 1255 N. Senate Ave. Indianapolis, Indiana 46202 Phone: (317) 917-5000			
Terminal in DDC controller. nn indicates terminal number.		Terminal in JCI panel. nnn indicates terminal number.	
Shielded cable. Terminate & ground shield within 2 inches of entry into enclosure. Continue shield to last device and tape back both ends of cable.		Cable-no shield. nn indicates cable number (labeled at both ends of cable).	
Indicates field-installed wiring. ---nnn --- both ends of wire).		Indicates factory wiring. ---nnn both ends of wire).	

## VALVE SCHEDULE

Tag					Valve Information														Actuator Information		Piping Detail	Comments		
Item	System	Service	Qty	Ref. Dwg.	Code Number	Valve Family	Configuration	Fail Position	Inlet Pipe Size	Valve Size	Medium	Flow (lb/hr)	Design Delta P (psig)	Valve Delta P (psig)	Design Coefficient (Cv)	Valve Coefficient (Cv)	Design Close Off (psig)	Valve Close Off (psig)	Trim Material	Connection			Code Number	Actuator Control
	AHU-1	CLG-VLV	1		VFC030HB+94NGGA	Butterfly Valve	2-Way	Valve Closed	4	3	Water	163.00	5.00	1.12	72.90	154.00	0.00	175.00	Nylon 11	Flanged	M9220-GGA-3	0-10VDC PROP		
	AHU-1	PH-VLV	1		VG1245FRH928GGA	Ball Valve	2-Way	Valve Open		2	Steam	738.00	13.36	2.52	14.10	29.20	15.00	200.00	Stainless Steel	Threaded	VA9208-GGA-2	0-10VDC PROP		

Drawing Title															
<b>Valve Schedule</b>															
REFERENCE DRAWING		NO.		REVISION-LOCATION		ECN		DATE		BY					
Sales Engineer	Project Manager	Application Engineer		DRAWN		APPROVED									
JG	WP	KS		BY		DATE		BY		DATE					
Project Title		Branch Information		CONTRACT NUMBER											
<b>IUPUI Science AHU-1 Design</b>		BSNA - INDIANAPOLIS, IN		<b>2N20-0020</b>											
<b>IU# 20200529</b>		1255 N. Senate Ave., Indianapolis, Indiana		DRAWING NUMBER											
<b>Indianapolis, Indiana</b>		46202		<b>2.1</b>											
		Phone: (317) 917-5000													

