Forge Construction LLC
1307 Union Ave
Kansas City, Missouri 64101
P: (816) 608-1800

Project: 25-004 Platte City ASC
1101 Kentucky Avenue
Platte City, Missouri 64079

Submittal #90.1 - REV1 Critical Air Valves

Revision	1	**Submittal Manager**	Alex O'Laughlin (Forge Construction LLC)
Status	In Review	**Date Created**	Jun 6, 2025
Issue Date	Jun 11, 2025	**Spec Section**	
Responsible Contractor	Temp-Con, Inc.	**Received From**	Phillip Garcia (Temp-Con, Inc.)
Received Date	Jun 11, 2025	**Submit By**	
Final Due Date	Jun 18, 2025	**Lead Time**	
		Cost Code	
Location		**Type**	

Submittal Package

Approvers Rebecca Eubanks (Smith & Boucher), Jared Langenfield (Smith & Boucher)

Ball in Court Rebecca Eubanks (Smith & Boucher), Jared Langenfield (Smith & Boucher)

Distribution

Description REV1 schedule, product data, and wiring info for CAV's

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					23-03 - Critical Air Valves REV1.pdf
Rebecca Eubanks	Jun 11, 2025	Jun 18, 2025		Pending	
Jared Langenfield	Jun 11, 2025	Jun 18, 2025		Pending	

CONTRACTOR REVIEW ONLY
FORGE CONSTRUCTION

Contractor's review is for general compliance with the information provided in the Contract Documents and for general conformance with the design concept of the project. Any action noted herein is subject to the requirements set forth in the Contract Documents. Subcontractor and/or Supplier shall be responsible for all dimensions and techniques of construction; the coordination of Subcontractor's work with that of all other trades; and the performance of Subcontractor's work in accordance with Contract Documents.

PROJECT #: 25-004

SUBMITTAL #: 23-09 Rev 1

BY: MICHAEL DAVIDSON

DATE: 06.11.2025

FORGE NOTES:
- Mechanical engineers please review.

smith & boucher engineers

- [x] Reviewed no exceptions.
- [ ] Make corrections noted; resubmittal not required.
- [ ] Make corrections noted; revise and resubmit indicated items only.
- [ ] Revise and resubmit entire submittal.
- [ ] Reviewed for coordination/information only; refer to comments if any.

Review of this submittal is only for general conformance with the design concept of the project and-for general compliance with those portions of the Contract Documents prepared by Smith & Boucher. Notes, corrections or comments made on the submittals during this review do not relieve the Contractor from responsibility for: Compliance with the requirements of the plans and specifications; Dimensions to be confirmed and correlated at the jobsite: Information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; Coordination of the Work with that of all other trades; Assemblies of which a specific reviewed item is a component; and performance of all work in a safe and satisfactory manner.

Received: 06/11/2025 2:42:30 PM

Returned: 06.19.2025 By: Jared Langenfeld, PE

TEMP-CON
A TRIPLEPOINT COMPANY

15670 S. Keeler
Olathe KS 66062
(913) 768-4888

Submittal

Submittal#: 23.36.00 Rev1

Submittal Date: 05/22/2025

To: FORGE CONSTRUCTION
1307 Union Avenue
Kansas City, MO 64101

Project: 250017
Platte City ASC - NueHealth
1101 Kentucky Avenue
Platte City, Missouri 64079

Prepared By: Phillip Garcia

Item	Description	Action Required	Date Required
001	Critical Air Valves	For Approval	05/30/2025

Please sign and date this form as proof that you are in receipt of the above listed items.
Return form to Temp-Con, LLC

Signed: _____ Date: _____

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th, Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: ryanm@aap-kc.com

EQUIPMENT SUBMITTAL

By Associated Air Products, Inc. (AAP) – Ryan Mustain

***PROJECT*:**
Platte City ASC – NueHealth

CONTRACTOR/SUPPLIER:
TEMPCON

REPRESENTED BY:
Associated Air Products
Ryan Mustain

MANUFACTURER / PRODUCTS:
Phoenix Controls

SUBMITTAL DATE:
REV.1 06.09.25

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th, Suite A - Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: ryanm@aap-kc.com

Platte City ASC – NueHealth

- **Tab 1** Room Schedule Sheet
- **Tab 2** Product Data Sheets
- **Tab 3** Wiring Diagrams

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th Street- Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: ryanm@aap-kc.com

Platte City ASC – NueHealth

Tab 1

Room Schedule Sheet

Phoenix Controls

Room Schedule Sheet
Version 1.0

WebPro Job ID: 69396
Job Name: PLATTE CITY ASC - NUEHEALTH
Validation: Passed

End User: aap
Unit of Measure: CFM
Altitude Correction Factor: 1

Printed On: 5/19/25
Rep PO: xx

Device Parameters											Zone Parameters									
Room	Tag	Desc	Function	Catalog Number	Model Code	Linked Set	Scale Factor	Min CFM	Max CFM	Serial Number	Offset	Occ Min Vent	Unocc Min Vent	TStat Min/Max	Ovr Min	Ovr Max	Switched	Constant	CVSE Fan	Production Notes
		SENSOR		PVC400-HW																
		SENSOR		PVC400-HW																
		SENSOR		PVC400-HW																
		SENSOR		PVC400-HW																
		INTEGR		PCI8025-LNNN-USA-OPL																
169	SAV2-04	VALVE		MAVA112M-ALEHZ	LF			1250	1250											
169	RAV2-04	VALVE		EXVA112M-ALEHZ	GM			1075	1075											
169	SAV2-04	SENSOR		PTS102-D-04																
169	SAV2-04	SENSOR		PCS410-R-DHOP																SELECTED with humidity capabilities. Spec only calls for temp
169	SAV2-04	DISP		RPI500-A010																
170	SAV2-02	VALVE		MAVA112M-ALEHZ	LF			1250	1250											
170	RAV2-02	VALVE		EXVA112M-ALEHZ	GM			1075	1075											
170	SAV2-02	SENSOR		PTS102-D-04																
170	SAV2-02	SENSOR		PCS410-R-DHOP																SELECTED with humidity capabilities. Spec only calls for temp
170	SAV2-02	DISP		RPI500-A010																
173	SAV2-03	VALVE		MAVA112M-ALEHZ	LF			1250	1250											
173	RAV2-03	VALVE		EXVA112M-ALEHZ	GM			1075	1075											
173	SAV2-03	SENSOR		PTS102-D-04																
173	SAV2-03	SENSOR		PCS410-R-DHOP																SELECTED with humidity capabilities. Spec only calls for temp
173	SAV2-03	DISP		RPI500-A010																
176	SAV2-01	VALVE		MAVA112M-ALEHZ	LF			1250	1250											
176	RAV2-01	VALVE		EXVA112M-ALEHZ	GM			1075	1075											
176	SAV2-01	SENSOR		PTS102-D-04																
176	SAV2-01	SENSOR		PCS410-R-DHOP																SELECTED with humidity capabilities. Spec only calls for temp
176	SAV2-01	DISP		RPI500-A010																

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th Street - Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: ryanm@aap=kc.com

Platte City ASC – NueHealth

TAB # 2

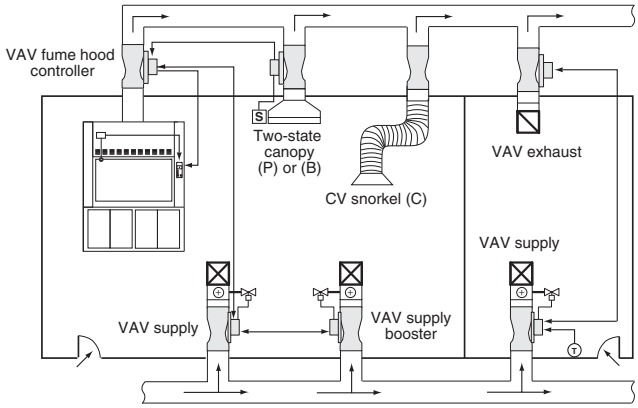
Product Data Sheets

(Includes troubleshooting information)

MEDIUM-PRESSURE CELERIS® CONTROLLERS

Variable air volume (VAV) control schemes are commonly used for fume hoods, general exhaust, and room supply air. For typical fume hood applications, high-speed (< 1 second speed of response) actuation is required. The Celeris® valve controller interfaces with our current fume hood monitors for control and monitoring. Celeris controllers also provide room-level control functions in either standalone or integrated systems.

For Tracking Pair control (non-VAV applications where make-up air control and an interface with the fume hood monitors are not required) Celeris controllers with low-speed electric actuation offers an economical solution for room-level ventilation, pressurization, temperature and humidity control in either standalone or integrated systems.



FEATURES

FEATURE/OPTION	VAV (EXV/MAV)		
Control type	L	N	M
Actuator type	Low-speed electric	Pneumatic*	High-speed electric
Flow feedback signal	✔	✔	✔
Failsafe	Last Position	NO/NC	NO/NC/Last Position
Factory-insulated valve body (supply)	✔	✔	✔
Field-adjustable flow	✔	✔	✔
Flow alarm via feedback circuit	✔	✔	✔
Flow alarm via pressure switch	Option	Option	✔
Low noise diffuser construction†	✔	✔	✔

All valves include a pressure-independent assembly and factory-calibrated position controller.
†Accel II valves are designed to reduce sound over all frequencies, but significantly target the lower bands (125-500 Hz) to help eliminate the need for silencers.
*The pneumatic actuator is not available for the 14-inch valve at this time.

OSHPD Certified
This device is certified for OSHPD Seismic Certification Preapproval per 2013 CBC, 2012 IBC, ASCE 7-10, and IEC-ES-AC-156. OSHPD Special Certification number OSP-0290-10.

NVLAP Accreditation
All venturi valves are characterized on NVLAP Accredited Airstations, Lab Code 200992-0. NVLAP is administered by the National Institute of Standards and Technology (NIST).

ISO
Phoenix Controls Designs, Develops, Manufactures, and sells products , systems, and service to control the environment and airflow of critical spaces. Phoenix Controls is registered to ISO 9001:2008.

Warranty
Phoenix Controls Warrants all venturi valves against defects in material and workmanship for a period of 5 years. In addition, all other equipment manufactured by Phoenix Controls, such as sash sensors, fume hood monitors, and equipment supplied but not manufacturered by Phoenix Controls is covered by a 3 year warranty.

TABLE OF CONTENTS

75 Discovery Way ▪ Acton, MA 01720 USA ▪ Tel (978) 795-1285 ▪ Fax (978) 795-1111 ▪ www.phoenixcontrols.com

Phoenix Controls

SPECIFICATIONS

Construction
- 16 ga. spun aluminum valve body with continuous welded seam
- Valve bodies available as uncoated aluminum (Class A) with corrosion-resistant baked phenolic (Class B and C) or with PVDF coatings for more chemical intense applications (Class D)
- Composite Teflon® shaft bearings
- Spring grade stainless steel spring and polyester or PPS slider assembly
- Supply valves* insulated with 3/8" (9.5 mm) flexible closed-cell polymer-based foam. Flame/smoke rating 25/50. Density is 1.5 lb/ft^3 (24.0 kg/m^3)

Operating Range
- 32-122 °F (0-50 °C) ambient
- 10-90% non-condensing RH

Performance
- Pressure independent over 0.6"-3.0" WC (150-750 Pa) drop across valve
- Volume control accurate to ±5% of airflow command signal
- No additional straight duct runs needed before or after valve
- Available in flows from 35-10,000 CFM (60-16,990 m^3/hr)
- Response time to change in command signal:
  - <1 second (control type M and N)
  - <1 minute (control type L)
- Response time to change in duct static pressure: <1 second

Pneumatic Actuation
(Not available with the 14-inch valve)
- 20 psi (-0/+2 psi) with a 20 micron filter main air required
- Compressor sizing: Accel II Valves are not continuous air-consuming devices. For compressor sizing, use:
  - single and dual valves: 10 scim
  - triple and quad valves: 20 scim

Sound
Designed for low sound power levels to meet or exceed ASHRAE noise guidelines.

Power
24 Vac (±15%) @ 50/60 Hz

Power Consumption
Singles/Duals *per valve*
- Low-speed Electric: 10 VA
- High-speed Electric: 70 VA
- Pneumatic: 10 VA

Notes:
1. All power consumption VA ratings listed here are based on fully-loaded I/O.

I/O
Available for connecting field devices:
- 3 universal inputs. Accepts volt, mA, ohms or NTC 2 or 3 thermistor signals.
- 1 digital input
- 2 analog outputs. Provides volt or mA signals.
- 1 digital output (Type C, 1 amp @ 24 Vac/Vdc)
- Input accuracy: Voltage, current, resistance: ±1% full scale
- Output accuracy
  - 0 to 10 Vdc: ±1% full scale into 10 kΩ minimum
  - 4 to 20 mA: ±1% full scale into 500 Ω +0/-50 Ω

Room-level Communications
FTT-10, 78 KB, bus topology, LonTalk™ network

Building-level Communications
TP-1250, 1.2 MB, bus topology, LonTalk™ network

Regulatory Compliance
- RoHS
- FCC

  This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
  1. This device may not cause harmful interference.
  2. This device must accept any interference received, including interference that may cause undesired operation.
- EU Contact Address:
  Honeywell GmbH
  Boeblinger Str. 17
  71101 Schoenaich
  Germany

* Not applicable to CVV series.
Teflon is a registered trademark of DuPont Company.

LonWorks is a registered trademark of Echelon Corporation.

ORDERING GUIDE

MAV A 1 12 M - A ME H O - SFB REI

VALVE FAMILY
EXV = Celeris exhaust valve
MAV = Celeris supply valve (comes standard with insulation)

VALVE CONSTRUCTION
A = Body and cone uncoated aluminum; uncoated 316 stainless steel shaft
B = Body and cone with baked-on phenolic coating; PFA-coated 316 stainless steel shaft
C = Body and cone with baked-on phenolic coating; hardware with titanium or baked-on epoxy phenolic coating; PFA-coated 316 stainless steel shaft
D = Body and cone with PVDF coating; hardware with PVDF or baked-on epoxy phenolic coating; PFA-coated 316 stainless steel shaft; *see Note 1*

NUMBER OF VALVE BODIES
F = Single valve body with welded circular flange
1 = One valve body no flange
2 = Two valve bodies as one unit (dual); *10", 12", and 14" valves only*

VALVE SIZE
08 = 8" valve (7.88"/200 mm actual diameter),
10 = 10" valve (9.67"/246 mm actual diameter)
12 = 12" valve (11.84"/301 mm actual diameter)
14 = 14" valve (13.88"/353mm actual diameter)

FLOW/PRESSURE OPERATING RANGE
See *Flow/Pressure Operating Range* table below.
M = Medium pressure operation; pressure independent over a range of 0.6 to 3.0" WC (150 to 750 Pa), associated pressure switch trips at 0.3" WC

VALVE DESIGN
A = Conical-shaped diffuser (Accel II)

VALVE OPTIONS
EVI = Exhaust valve with insulation blocks and insulation
IBO = Insulation blocks only, no insulation
PSL = Pressure switch, low limit
REI = Remote electronics - indoor applications only; *see Note 3*
REO= Remote electronics - outdoor applications, for pneumatic actuation only; *see Note 4*
WRE= Weather resistant electronics - outdoor applications, for electric actuation only; *see Note 5*
SFB = Square flanges on both ends of single-body valves; *see Note 1*
SFX = Single square flange mounted on either the exhaust inlet or supply discharge; *see Note 1*

FAIL-SAFE POSITION
C = Normally closed
O = Normally opened
Z = Fails to last position

VALVE ORIENTATION
H = Horizontal
U = Vertical upflow
D = Vertical downflow

VALVE CONTROLLER DESIGNATION
E = Electronic controller
H = Hood exhaust valve with pressure switch; *see Note 2*

CONTROL TYPE
I = IP54 low-speed electric; *only available on single-body valves in sizes 08, 10, 12*
L = Low-speed electric
M = High-speed electric
N = Pneumatic

FLOW/PRESSURE OPERATING RANGE FOR STANDARD VALVE DESIGNS

Designation	Size	Operating Range in CFM (m3/hr) Single	Operating Range in CFM (m3/hr) Dual	Pressure Drop Across Valve
M = Medium Pressure	**08"**	35-700 (60-1185)	—	0.6-3.0" WC (150-750 Pa)
	10"	50-1000 (85-1695)	100-2000 (170-3390)	
	12"	90-1500 (155-2545)	180-3000 (310-5090)	
	14"	200-2500 (340-4245)	400-5000 (680-8490)	

NOTES:
1. Construction D is ONLY available in single-body valves (Number of Bodies = F or 1) WITHOUT square flanges (Options SFB or SFX). Rectangular plates can be purchased as special products to field assemble two, three or four single-body round-flanged valves into multi-body configurations. For sizes 08, 10, and 12 only.
2. Celeris Hood valves cannot have Low Speed actuators (Control Type = L or I).
3. Option REI: Remote Electronics, Indoor installations ONLY. The distance to the valve controller is limited to:
- 75 feet (22.8 meters) of pneumatic tubing for pneumatic actuators (Control Type = N).
- 40 inches (1 meter) of 18 gauge cable for high-speed electric actuators (Control Type = M).
- 150 feet (45.7 meters) of 22 gauge cable for low-speed electric actuators (Control Type = L or I).

4. Option REO: Remote Electronics, Outdoor installations ONLY. Limited to PNEUMATICALLY actuated valves ONLY (Control Type = N). HORIZONTAL orientation ONLY.
- Includes sealed Vpot, small weather-resistant NEMA 3R box mounted on base channel for others to connect Vpot cables, and a valve controller in an enclosure that has been disconnected from the base channel and shipped in the same box as the valve.
- Maximum distance between remote mounted enclosure and valve is 75 feet (22.8 meters) (maximum allowable length of pneumatic tubing).
- REQUIRES use of a dog house enclosure, provided by others, to protect valve from the elements and maintain temperature and humidity conditions within Phoenix specifications.

5. Option WRE: Weather Resistant Electronics, outdoor installations. Applies to ELECTRICALLY actuated valves with sufficient IP ratings only: Control = I or M for single-body valves; Control = L or M for multi-body valves. HORIZONTAL orientation ONLY.
- Includes: sealed Vpot and large weather-resistant IP65 box mounted on base channel that houses the controller and all electric connections to/from it.
- When used in Low-Speed Electric applications for 08-, 10-, and 12-inch single-body valves, WRE must ALSO be ordered with Control Type I in place of the standard Control Type L.
- When used in High-Speed Electric applications, standard actuators are sufficient (Control Type = M) since they are IP56 actuators.
- REQUIRES use of a dog house enclosure, provided by others, to protect valve from the elements and maintain temperature and humidity conditions within Phoenix's specifications.

VALVE CONTROLLERS AND OPTIONS

Valve Controller Designation

Controller Type E—Suitable for supply, make-up air and general exhaust valve applications.

Controller Type H—Suitable for fume hood applications and includes a pressure switch for alarming.

Valve Options *(components added to enhance a valve's functions)*

Single square flange (SFX)—Provides a single connection from a round single body valve to a square duct (on the inlet of single body exhaust valves; discharge of single body supply valves). Typically used in Neutralizer™ applications.

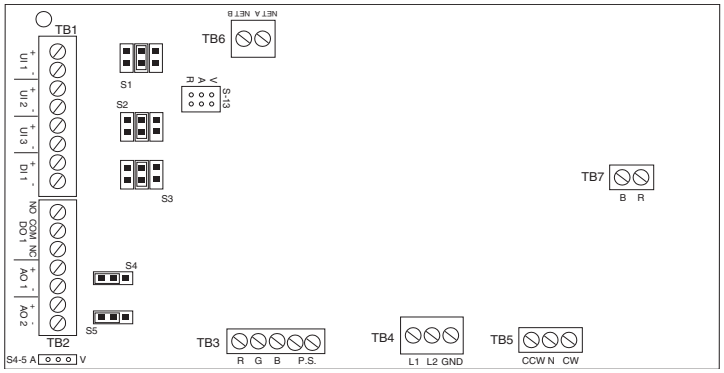
Two square flanges (SFB)—Transitions each end of a single body valve from a round to square duct.

Pressure switch (PSL)—Detects low static pressure across the valve. Installed on non-hood exhaust valves to provide low static pressure alarm monitoring.

POINTS AND WIRING

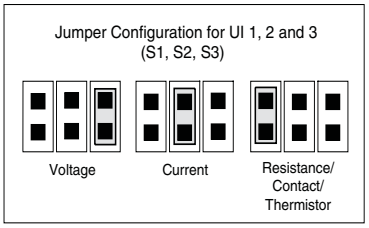
Celeris Valve Controller

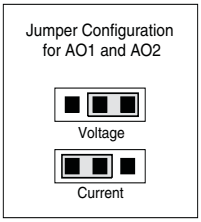
NOTE: See submittal wiring diagram for project-specific details.



NOTES:

1. Power–14 AWG (Controller Type M).
   High-speed electric valves must be connected in a star configuration.
2. Power–18 AWG (Controller Type L).
3. Control signal—22 AWG multi conductor, twisted pair
4. Communication—22 AWG level 4; 16 AWG Belden 8471 (or equivalent)
5. Each termination block (except TB3, 5 and 7) uses a depluggable connector with screw-down terminations for ease of installation.



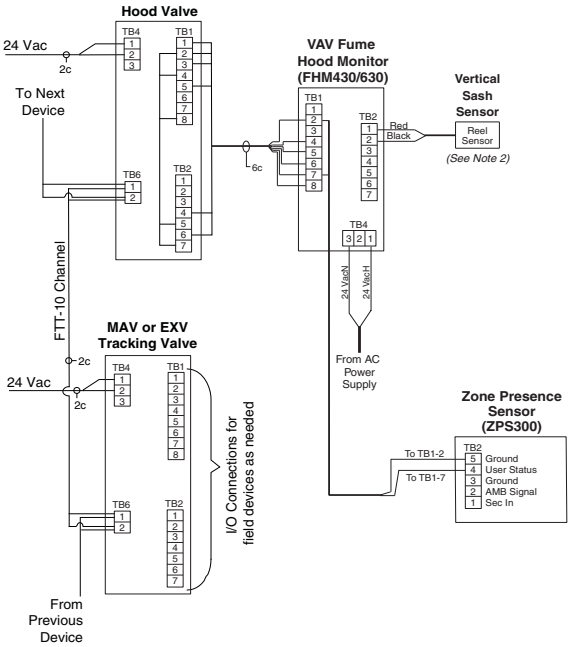


TERMINAL BLOCKS—CELERIS VALVE CONTROLLERS

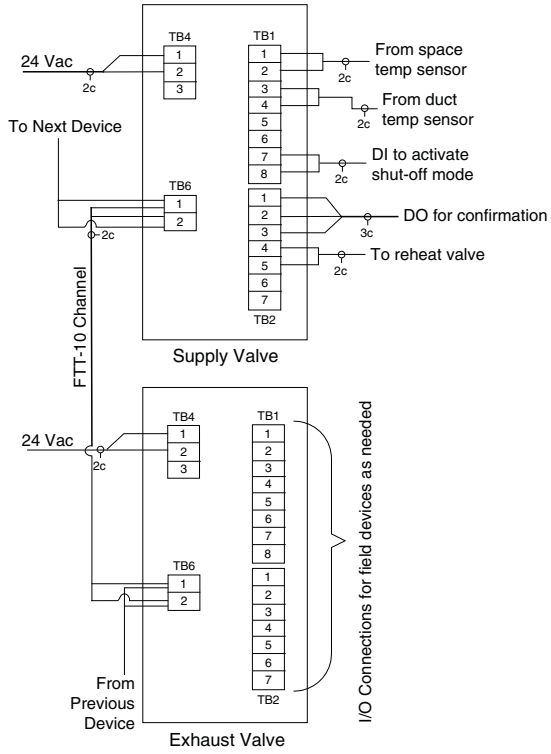
Terminal Block	Typical Function	Number of Terminations
TB1	Input connections	8
TB2	Output connections	7
TB3	vPot and pressure switch	5
TB4	Power (24 Vac input)	2
TB5	Actuator (control type L only)	2
TB6	Communication (FTT-10)	2
TB7	Actuator (control type M only)	2

Typical Wiring Diagrams

Hood Applications



Tracking Pair Applications



NOTES:

1.Eight-conductor wire is Belden 9421 (22 AWG) or equivalent. (Tape back unused conductors.)

2.Sash sensor is provided with two-conductor cable. See combination sash sensors for exception.

Network Wiring

Room-Level Network

Echelon Corporation has tested and approved 5 cables types for use with the FTT10 communications transceiver. Based on availability, cost and maximum distance limitations, we have focused our recommendation to two cable types:

- Generic NEMA level 4 cable, 22 AWG (0.65 mm)*
- Belden 8471, 16 AWG (1.3 mm) cable (or equivalent)

NOTE: Level 4 cable specified by Echelon as originally defined by the NEMA differs from the Category 4 specification proposed by the Electronic Industries Association/Telecommunication Industry Association (EIA/TIA).

The cables Phoenix Controls recommends are stranded, two-conductor, twisted-pair (TP) without a shield. A shield, or drain wire, is not required for Celeris controller communications wiring and should not be used. Both of these cables are available from multiple sources either solid or stranded, in plenum and non-plenum rated versions.

- If two conductors are to be placed in a terminal opening, twist the bare conductors prior to inserting these in the terminal opening.
- If a wall-mounted sensor with a communications jack is used, the connections to the jack must be treated as either a bus connection or an EOL connection.
- While the room-level communications wiring is not polarity sensitive, it is recommended that a consistent color-coding and polarity convention be followed.
- Each terminal on the terminal block will accommodate up to two 16 AWG (1.3 mm) stranded conductors.
- Communications connections are to be made following a bus or daisy chain topology.
- Two end-of-line (EOL) terminators must be installed, one at each end of the room-level network.

Maximum Cable Lengths

- When using Level 4 cable operating in a bus topology, the maximum cable length is 4500 feet (1370 meters).
- When using 16 AWG cable operating in a bus topology, the maximum cable length is 8800 feet (2680 meters).

Phoenix Controls Wiring Recommendations

- Use cables recommended by Phoenix Controls.
- Stranded wire is strongly recommended for ease of installation.
- Follow good wiring practices:
  - Do not run the communications cable in the same conduit or wire way as the power cables.
  - If the communications cables must cross power cables, it is best to do so at a 90-degree angle.
  - Shield or drain wires, if present, should be wrapped with insulating tape to prevent contact with exposed conductors or contacts.
  - Maintain a consistent color code or polarity all the way through the wiring system.
  - All connections must meet the requirements of an NEC Class 2 circuit.
- Local and national electrical codes take precedence.
- **Consult the project specific wiring diagrams for exact details.**

TRANSFORMERS

The Celeris valve controller requires the use of a step-down transformer (either 120/24 volt or 240/24 volt). Any transformer used to power Celeris valve controllers must meet the requirements of an NEC Class 2 circuit.

- The secondary transformer must be limited to a maximum of 30 Vac.
- Secondary power shall be current limited with either internal circuit breaker protection or with a four-amps slow-blow fuse, in accordance with NEC Class 2 power requirements.

Phoenix Controls offers the following recommendations; however, designers, installers and owners should always consult their national and local electrical codes before selecting transformers for their systems.

- Transformers should not exceed 100 VA. Use multiple transformers, rather than larger transformers, when more than 100 VA is required.
- Each pressurization zone should have either a dedicated single-phase primary circuit or a secondary circuit disconnect.
- If an earth ground is provided, it should not be connected to the Celeris valve controller, even though there is a three-terminal connector on the controller board.

NOTE: AC line voltage polarity must be maintained on all Celeris valve controllers and AC powered ancillary devices.

Transformer Sizing

To size a transformer, all of the VA loads for the circuit must be totaled. This table outlines the power ratings of Celeris controllers with Accel® II valves, and related third-party purchased equipment. Use these values to size the power transformers.

Celeris Valve Controller		
Control type L (low-speed electric)	Single/dual valve body	10 VA
Control type M (high-speed electric)	Single/dual valve body	70 VA
Control type N (pneumatic)	Single/dual valve body	10 VA
External Devices		
Router/repeater modules		2 VA
Sensor	Approved thermistor	0 VA
Heating valve	Belimo LM24 (2-state)	3 VA
Heating valve	Belimo LM24SR (propor)	4 VA
Each 4-20 mA device	Example: transducers	0.5 VA

Phoenix Controls

PCS Combination Sensor with Display

Phoenix Controls temperature sensors provide a stable and secure environment for those facilities that need it the most, such as hospitals, cleanrooms, and laboratory animal facilities. The sensors also simplify room balancing by eliminating the need for a certified person to accompany the balancer during the commissioning process.

The PCS4xx/5xx/6xx series, microprocessor-based sensor, provides a choice of three temperature sensor output signal signals and three humidity sensor output signals. The five pushbuttons allow easy adjustment of set points, occupancy override, and access to the setup menu. The large backlit LCD display allows simultaneous display of two values (temperature, temperature set point, humidity, or humidity set point) and occupancy status.

PCS Combination Sensor

Features

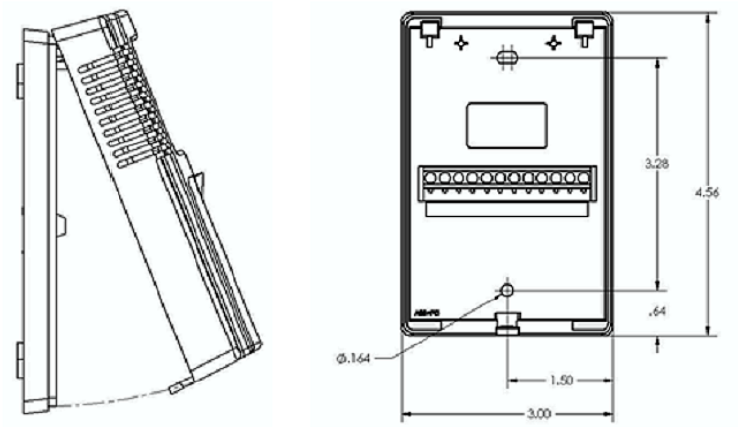
- Test and Balance in the setup menu for heating, cooling, and normal operation
- Fully configurable set point range, relative or absolute
- Large Backlit LCD Display with readings within a tenth of a degree
- Simultaneous display of temperature, humidity, and occupancy status
- 3.5 mm communications jack (standard)
- Foam backing for drywall or 2" x 4" single gang junction box mounting (standard)
- Optional 3 Point NIST Calibration Certificates

SPECIFICATIONS

Specification	Temperature			Humidity
	4xx Series	**5xx Series**	**6xx Series**	**x05/x10/x20 Series**
Sensor Output Range (Span)	32-122 °F (0-50 °C)	40-104 °F (5-40 °C)	32-122 °F (0-50 °C)	0-100%
Sensing Element	Thermistor (NTC)	Platinum RTD (PTC)	Thermistor (NTC)	Impedance Type Humidity Sensor
Signal, Sensor Output (Common Ground)	10 K Type 2 thermistor	0-10 Vdc	20K NTC	0 to 5 Vdc, or 0 to 10 Vdc, or 4 to 20 mA
Keypad Configuration	5 Pushbuttons (Setup, Up and Down Arrows, O/R (Occupancy Override), and Select)			
Signal, Set Point Output (Common Ground)	0-20K ohms	0-10 Vdc	9.5-1K ohms	0 to 5 Vdc, or 0 to 10 Vdc, or 4 to 20 mA
Local Occupancy Control	Contact closure to common ground			
Display	Blue backlight LCD, 2.27"x 1.7", 3 LED, programming option for 0 or 1 decimal point			
Display Unit of Measure	Push Button Programming (°F (standard) or °C)			
Setpoint Display and Range (Push Button Control & Programming)	Fully configurable via pushbutton menu: - Setpoint range: 55 to 89 °F (15 to 31 °C) - Setpoint Adjust: adjustable up to -20 to +20 °F or °C of setpoint (1 °F or 0.5 °C increments) - Setpoint Limits: 40 to 104 °F (4.5 to 40 °C) - Relative range: up to -20 to 20 ° F or °C (1 °F or 0.5 °C increments)			Fully configurable via pushbutton menu: - Setpoint range: 33 to 67% - Setpoint Adjust: adjustable up to -20% to +20% of setpoint (1% increments) - Setpoint Limits: 13% to 87%
Occupancy Display	Remote contact closure to common ground indicates *Occupied* on display			
Housing Material/ Color	ABS/PC (White); UL 94-5VB			

Specification	Temperature			Humidity
	4xx Series	**5xx Series**	**6xx Series**	**x05/x10/x20 Series**
Test & Balance Settings (Push Button Control)	40 °F (4.4 °C), 72 °F (22.2 °C), and 104 °F (40 °C)			0%, 50%, and 100%
Communication Jack	3.5 mm Stereo Jack (Ring, Tip, Shield)			
Operating Range	35-122 °F (1.5-50 °C), 0-95% Relative Humidity Non-Condensing			
Storage Range	-4-131 °F (-20-60 °C), 0-95% Relative Humidity Non-Condensing			
Reference Resistance	10K ohm @ 77 °F (25 °C)	1K ohm @ 32 °F (0 °C)	20K ohm @ 77 °F (25 °C)	N/A
Accuracy	Sensor Output Accuracy: +/- 1.0 °F (+/- 0.56 °C): LCD Display Accuracy +/- 1.5 °F due to Rounding			2% from 10 to 95% RH @ 77 °F (25 °C)
Dissipation Constant	N/A			
Response Time	10 seconds nominal for a 63% step increase (room-hot water) 11 seconds nominal for a 63% step decrease (room-ice water)			20 seconds for a step of 46%-96% 45 seconds for a step of 98%-47%
Stability	< 1% after 1000 hours at 212 °F (100 °C)	N/A	< 1% after 1000 hours at 212 °F (100 °C)	< 2% over 5 years
Supply Voltage	+18 to 40 Vdc (NOTE: Use of PVC400-HW is required for LON applications)			
Power Consumption	< 0.65 VA (x05 and x10 Series), < 4 VA (x20 Series)			
Product Dimensions (L x W x D)	4.56" (115.82 mm) x 3.0" (76.2 mm) x 1.45" (36.75 mm)			
Product Weight	0.35 lbs (0.162 kg)			
NIST Certification (6 Points)	61 °F (16 °C), 72 °F (22.5 °C), and 82 °F (28 °C)			20%, 50%, and 80% @ 72 °F (22 °C)
Regulatory Compliance	**WEEE Directive 2012/19/EC** **Waste Electrical and Electronic Equipment directive** At the end of the product life dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse. Do not burn the product.			

DIMENSIONS



ORDERING GUIDE

PCS 405 - R - D H O P - 06

PRODUCT FAMILY
PCS = Phoenix Combination Sensor, temperature and humidity
NOTE: All humidity sensors are +/- 2% accurate from 10 to 95% RH at 77 °F (25 °C).

SENSOR TYPE
405 = Temperature Output: 10K ohm NTC Type 2; RH Output: 0 - 5 Vdc
410 = Temperature Output: 10K ohm NTC Type 2; RH Output: 0 - 10 Vdc
420 = Temperature Output: 10K ohm NTC Type 2; RH Output: 4 - 20 mA
505 = Temperature Output: 0 - 10 Vdc; RH Output: 0 - 5 Vdc
510 = Temperature Output: 0 - 10 Vdc; RH Output: 0 - 10 Vdc
520 = Temperature Output: 0 - 10 Vdc; RH Output: 4 - 20 mA
605 = Temperature Output: 0 - 20K ohm; RH Output: 0 - 5 Vdc
610 = Temperature Output: 0 - 20K ohm; RH Output: 0-10 Vdc
620 = Temperature Output: 0 - 20K ohm; RH Output: 4-20 mA

SENSOR LOCATION
R = Room

ADDITIONAL FEATURES
As required; list alphabetically and NOT separated by dashes when multiple:
D = Display
H = Humidity Pushbutton Set Point
O = Override
P = Temperature Pushbutton Set Point

OPTIONS
06= 6 certified points (3 temperature and 3 humidity). Calibration Certificates are tested at the following points:
Temperature - 61, 72, and 82 °F at 50% RH
Humidity - 20, 50, and 80% RH at 77 °F

Valid Catalog Numbers

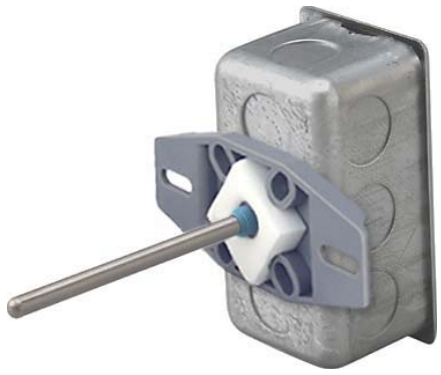
PHX-COMBINATION-SENSOR (10K-2 Temperature Output)		PHX-COMBINATION-SENSOR (0-10VDC Temperature Output)		PHX-COMBINATION-SENSOR (20K Temperature Output)	
Catalog Number without Calibration Certificate	Catalog Number with 6 Point Calibration Certificate	Catalog Number without Calibration Certificate	Catalog Number with 6 Point Calibration Certificate	Catalog Number without Calibration Certificate	Catalog Number with 6 Point Calibration Certificate
PCS405-R-DOP	PCS405-R-DOP-06	PCS505-R-DOP	PCS505-R-DOP-06	PCS605-R-DOP	PCS605-R-DOP-06
PCS405-R-DHOP	PCS405-R-DHOP-06	PCS505-R-DHOP	PCS505-R-DHOP-06	PCS605-R-DHOP	PCS605-R-DHOP-06
PCS410-R-DOP	PCS410-R-DOP-06	PCS510-R-DOP	PCS510-R-DOP-06	PCS610-R-DOP	PCS610-R-DOP-06
PCS410-R-DHOP	PCS410-R-DHOP-06	PCS510-R-DHOP	PCS510-R-DHOP-06	PCS610-R-DHOP	PCS610-R-DHOP-06
PCS420-R-DOP	PCS420-R-DOP-06	PCS520-R-DOP	PCS520-R-DOP-06	PCS620-R-DOP	PCS620-R-DOP-06
PCS420-R-DHOP	PCS420-R-DHOP-06	PCS520-R-DHOP	PCS520-R-DHOP-06	PCS620-R-DHOP	PCS620-R-DHOP-06

OUTPUT FORMULAS AND TABLES

For output formulas and complete sensor output tables, see *MKT-0474 Sensor Outputs and Tables*.

PTS102 TEMPERATURE SENSOR (DUCTS)

The **Phoenix Controls PTS102 Duct Mounted Temperature Sensors** provide a standard 10K-2 thermistor output or, with the TV option, a scaled temperature 0-10 Vdc analog output. The PTS102 features medical-grade closed cell foam to seal the probe insertion hole and to absorb vibration. Mounting tabs allow for easy installation directly to the wall of the duct. The PTS102 has etched Teflon® leadwires and double encapsulated sensors to create a watertight package that can withstand high humidity and condensation and perform under a wide range of environmental conditions. The PTS102 have probe lengths from 4" to 18" to accommodate most duct shapes and sizes.



PTS102 Duct Mounted Temperature Sensor with junction box.

SPECIFICATION

Feature	TV Output Option	Standard Option
Power Supply:	13 to 35 Vdc	—
Temperature Transmitter:		
• Output	0 to 10 Vdc, 10KΩ minimum	—
• Range	35 °F To 180 °F (scalable)	—
• Accuracy	± 1.83 °F (1.015 °C)	—
• Linearity	± .117 °F (0.065 °C)	—
Sensor:	Thermistor, two-wire resistive	Thermistor, two-wire resistive
• Ro trim	10 KΩ @25°C, NTC	—
• Accuracy	± 0.36 °F (±0.2 °C/year)	±0.2 °C (0 to 70 °C)
• Stability	<0.036 °F/year (<0.02 °C/year)	<0.02 °C/year
• Drift	<0.02 °C/year	<0.02 °C/year
• Dissipation	2.7 mW/°C	2.7 mW/°C
• Range	-67 °F to 221 °F (-55 °C to 105 °C)	-67 °F to 302 °F (-55 °C to 150 °C)
Response:	10 seconds at the 63% step	—
Probe:	0.25" stainless steel	0.25" stainless steel
Lead wire:	5 wires, 6" long	As Ordered
Insulation:	22 AWG Etched teflon (plenum rated)	—
Duct Mounting:	Handy box with tab bracket	As Ordered
Enclosure Types:	Electrical 2" x 4" handy box	As Ordered
Enclosure Ratings:	NEMA 1, UL94H-B	As Ordered
Enclosure Material:	Galvanized steel	As Ordered
Ambient:	0 to 95% RH, Non-condensing -40 °F to 185 °F (-40°C to 85 °C)	0 to 100% RH, Non-condensing -40 °F to 212 °F (-40°C to 100 °C)
Agency:	RoHS, NEMA 1	As Ordered

FEATURES

- Mounting tabs for easy installation
- Probe lengths: 4" to 18"
- Series 304 stainless steel probes
- Double encapsulated sensors
- Medical-grade foam padding
- Etched Teflon® leadwires
- Range:
  35 °F To 180 °F (scalable) - TV option only
  -40 °F to 221 °F - Standard

ORDERING GUIDE

PTS 102 - D - 04 - N10

PRODUCT FAMILY
PTS = Phoenix Temperature Sensor

SENSOR TYPE
102 = 10,000 ohm thermistor, Type 2

SENSOR LOCATION
D = Duct

PROBE LENGTH
04 = 4 inch
08 = 8 inch
12 = 12 inch (*not available with TV option*)
18 = 18 inch (*not available with TV option*)

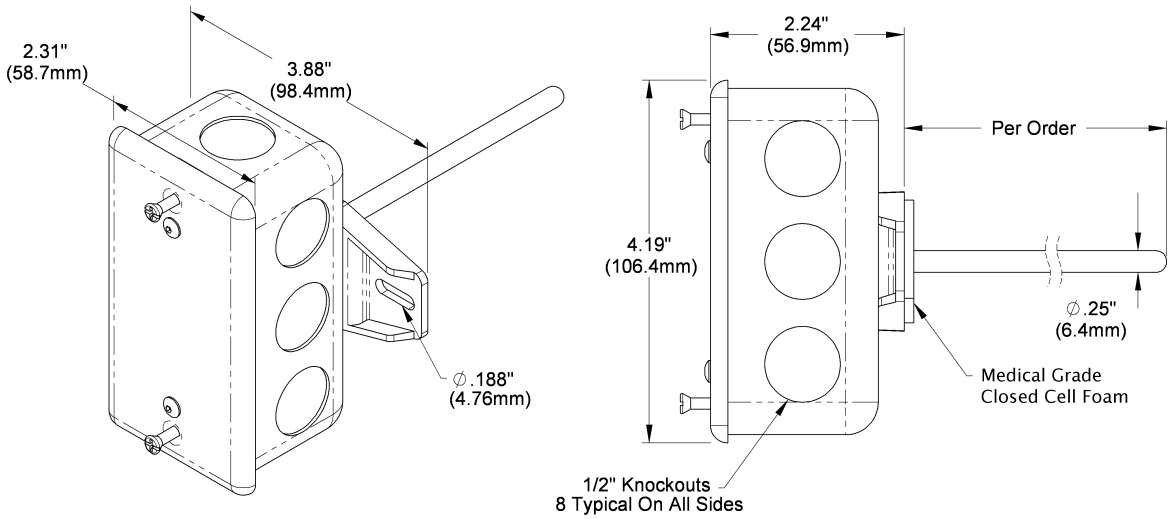
MOUNTING/OUTPUT OPTION:
N18 = No junction box, 18" lead of 22 AWG twisted pair
N05 = No junction box, 5' lead of 22 AWG twisted pair
N10 = No junction box, 10' lead of 22 AWG twisted pair
N15 = No junction box, 15' lead of 22 AWG twisted pair
TB = Junction box with Test and Balance switch
TV = Junction box, Test and Balance, 0-10 Vdc output

TABLE OF CONTENTS

75 Discovery Way • Acton, MA 01720 • Tel (978) 795-1285 • Fax (978) 795-1111 • www.phoenixcontrols.com

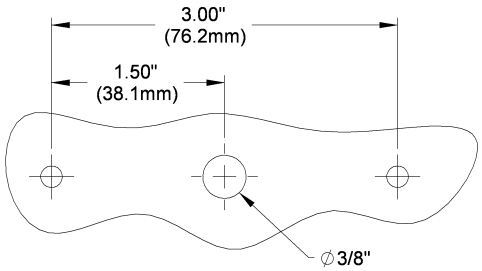
DIMENSIONS

NOTE: Junction boxe provided only with TB and TV options.

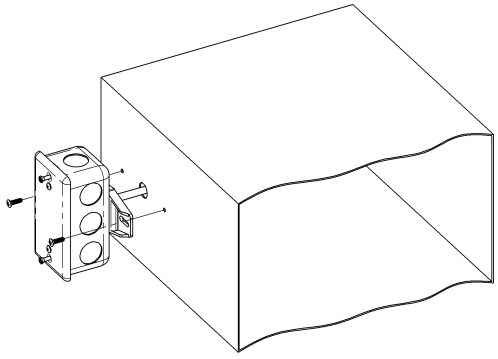


INSTALLATION (ALL MODELS)

1. Place the sensor in the middle of the duct away from temperature stratified air, coils or humidifiers to achieve the best temperature reading.



2. Drill the probe hole as depicted below for the enclosure being used. Insert the probe into the duct.

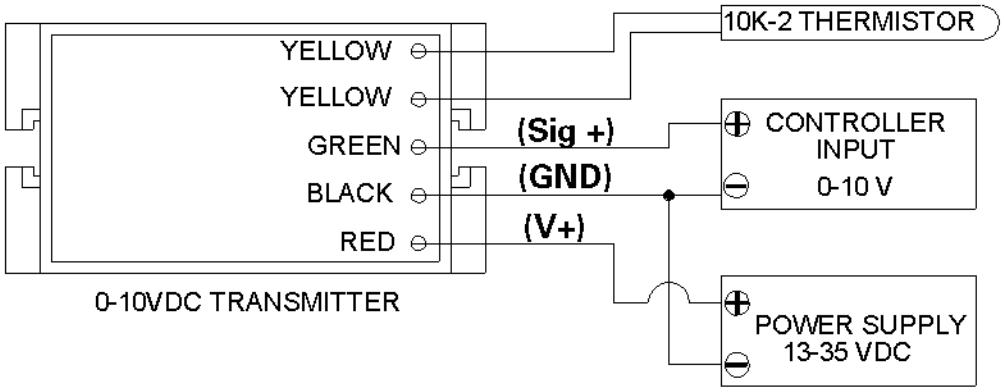


3. Mount the enclosure to the duct using #8 screws through a minimum of two opposing mounting tabs provided. A 1/8 inch pilot screw hole in the duct makes mounting easier through the mounting tabs. Use the enclosure tabs to mark the pilot hole locations.

4. Snug up the sensors so that the foam backing is depressed to prevent air leakage but do not over-tighten or strip the screw threads.

WIRING AND TERMINATION (TV OUTPUT OPTION ONLY)

Phoenix Controls recommends using twisted pair of at least 22 AWG and sealant filled crimp type connectors for all wire connections and sealant filled crimp twist-on wire nuts. We also recommend that wiring **NOT** be run in the same conduit as the line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.



TROUBLESHOOTING (TV OUTPUT OPTION ONLY)

$$\frac{(\text{Sig+}) \times (\text{Tspan})}{10} + T_{Low} = T$$

Sig+ = Voltmeter reading in volts

T_{Span} = # of Degrees in Temp Span (for example, 180 - 35 = 145)

T_{Low} = Low end to the Temp Span (for example, 35)

T = Temperature at the sensor

1. Measure the voltage by placing a voltmeter (V) across the transmitter's (+) and (-) terminals. This voltage should be between 13 to 35 Vdc.
2. Measure the voltage by placing a voltmeter across the sig(+) and (-) terminal. The voltage should read according to the equation above to get the temperature.
3. The temperature surrounding the transmitter must be between -40 and 185 °F (-40 and 85 °C) for the standard ruggedized configurations.

NOTE: The temperature at the temperature sensor's location using an accurate temperature standard. Disconnect the temperature sensor wires and measure the temperature sensor's resistance with an ohmmeter. Compare the temperature sensor's resistance to an appropriate sensor table. If the measured resistance is different from the temperature table by more than 5%, call Phoenix Controls for technical support.

Room Pressure Indicator (RPI)

The Room pressure indicator (RPI) provides a bright and easy-to-read screen accurately displaying the differential pressure between two spaces. The graphic display is an unmistakable indication of the room condition for all pressurized spaces, indicating whether a space is operating within pressure requirements for Negative, Neutral, or Positive pressures.

The RPI features a 4" diagonal multi color screen visible from a distance to quickly recognize room pressure conditions. A real-time digital read of the pressure value combined with an indication of pressure polarity provide actionable information for space occupants, maintenance staff, and compliance officers. On-screen icons for door open and alarms can also sound an audible tone to provide further indication for potentially unsafe conditions in the space. BACnet MS/TP communication provides information to the BMS for trending and management. The numeric PIN protected menu reduces unwanted access to configuration and alarm parameters.

Room Pressure Indicator (RPI)

Transducer and Pressure Port

FEATURES

- Single room pressure indication for all pressurized spaces.
- Modern and elegant 4" diagonal touch screen.
- Vibrant background colors easily delineate between normal, alarm, warning, and standby conditions.
- Supports multiple pressure ranges.
- On-screen programming reduces start up time.
- Audible alarming quickly alerts users of pressurization issues.
- BACnet Communication allows BMS to monitor conditions.
- Analog output for use with Phoenix Controls valves for Progressive Offset Control (POC).
- Dry contact output for door open status or remote alarm annunciator.
- Door open status can delay alarm to reduce nuisance alarming.

APPLICATIONS

- Healthcare:
  - Patient and Isolation rooms
  - Operating suite
  - Compounding Pharmacy (USP 797/800)
  - Ante Room
- Wet Chemistry and BSL Labs
- Animal Holding Areas
- Endoscopy and Bronchoscopy Rooms

75 Discovery Way • Acton, MA 01720 USA • Tel (978) 795-1285 • Fax (978) 795-1111 • www.phoenixcontrols.com

SPECIFICATIONS

Power
24vac (+/- 10%), 50/60Hz, Class 2 Transformer ONLY
360mA Max (8.68 VA) @24vac
- Display Power: 355mA Max (8.5VA) @ 24 Vac
- Transducer Power: 5mA Max (.18VA)

Communications
- MS/TP BAUD Rates: 9,600 19,200 38,400 76,800 115,000

Monitor Operating Temperature
32 to 122 deg f (0 to 50 deg c)

Monitor Storage Temperature
-40 to 150 deg f (-40 to 65.5 deg c)

Monitor Operating Humidity
10% to 90% relative humidity (Non-condensing)

Monitor Display
24 BPP TFT display with CTP, 480x480 pixel, 4" diagonal viewing area, Dimmable LCD. IP54 rated.

Monitor I/Os
UI1 and UI2
- Voltage Input (SELV)
  - 0-10V, ±5% of full scale
- Digital Input
  - Dry contact closure
  - Open circuit (≥100K ohms)
  - Closed circuit (≤100 ohms)

DO Switch
- Relay Output, 1 Amp Max. @ 24Vac

Transducer Pressure Range
- +/- 0.10 in wc 0.50% Accuracy
- +/- 0.25 in wc 0.50% or 0.25% Accuracy
- +/- 0.50 in wc 0.50% or 0.25% Accuracy
- +/- 1.0 in wc 0.50% or 0.25% Accuracy

Transducer NIST Calibration Options
- 3 point NIST calibration: 10%, 50%, and 90% of FSO
- 5 point NIST calibration: 10%, 30%, 50%, 70%, and 90% of FSO

Transducer Sensor Compensated Temperature Range
32 to 122°F (0-50°C)

Transducer Operating Temperature
32 to 185ºF (0 to 85ºC)

Transducer Operating Humidity
10 to 95% RH, non-condensing

Transducer Storage Temperature
-40 to 176ºF (-40 to 80ºC)

Transducer Storage Humidity
10 to 95% RH, non-condensing

Transducer Thermal Effects
+/- 0.056% FSO/°F (+/-0.10% FSO/°C)
NOTE: Shift is relative to 77°F (25°C).

Transducer Warm Up Time
15 Minutes

Transducer Response Time (T95)
800 ms

Transducer Output Update Rate
500 ms

Transducer Zero Function (Pushbutton)
Recommended after 15 minute warm up period.

Transducer Proof Pressure/Burst Pressure
Ranges </= 1" wc (248.84 pa)
- Proof: 270" wc (67.2 kPa)
- Burst: 415" wc (103.3 kPa)

Transducer Enclosure
Intended for use with non-corrosive, non-ionic gases, such as air and other dry gases.
- Material : Polycarbonate
- Flammability Rating: UL 94 V-0
- Enclosure Temperature Range: -40 to 248ºF (-40 to 120ºC)
- DIN Rail Mounting: 35mm (U.S. Patent no. 7,416,421)

Pressure Port Tubing Connection
Barbed fitting accepts 1/8”ID or 3/16”ID flexible control tubing

Pressure Port Maximum Operating Pressure
- Filter: 150 PSI (10.3 bar)
- Tubing: 100’ length: 65 psi maximum at 73°F (23°C)

Pressure Port Operating Temperature Range
-40 to 150°F (-40° to 66°C)

Pressure Port Storage Temperature Range
-40 to 160°F (-40° to 71°C)

Pressure Port Wall Plate
- Material: 302 Series Stainless Steel
- Foam Material: Cross-Linked Polyethylene
- Flammability Rating: FMUSS-302
- Filter Material: Nickel Brass Plated

Pressure Port Weight
0.16 lbs (0.073 kg)

Retrofit Plates
- Stainless: Plates are made from 304 Stainless Steel
- White: Plates are made from 304 Stainless Steel and powder coated white

Washdown and Chemical Resistance
- Monitor: IP54 rated against dust and liquid penetration
- Adapter Plate: Minimum IP54 rated against dust and liquid penetration (when sealed to the wall with silicone or similar sealant)

Compliance

WEEE Directive 2012/19/EC
Waste Electrical and Electronic Equipment directive
At the end of the product life dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse. Do not burn the product.

- RoHS3
- EU Contact Address:
  Pittway Tecnologica Srl
  Via Caboto 19/3
  34147 Trieste TS
  Italy

ORDERING GUIDE

RPI 500 - A 010 - 3PC

PRODUCT FAMILY
RPI = Room Pressure Indicator

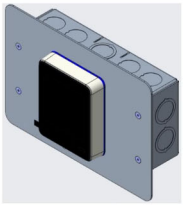
SERIES
500 = Standard (two pressure pick-up ports)

ACCURACY
A = +/- 0.50% accuracy
B = +/- 0.25% accuracy
N = No transducer

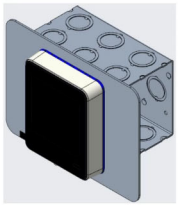
TRANSDUCER RANGE
000 = No transducer
010 = 010 (+/- 0.10" WC / 24.90 Pa); *only available in Accuracy A*
025 = 025 (+/- 0.25" WC / 62.27 Pa)
050 = 050 (+/- 0.50" WC / 124.54 Pa)
100 = 100 (+/- 1.00" WC / 249.08 Pa)

OPTIONS
3PC = 3 point NIST calibration
5PC = 5 point NIST calibration
RSA = Retrofit kit, stainless steel: from APM1xx to single RPI500
RSB = Retrofit kit, stainless steel: from APM2xx to single RPI500
RSC = Retrofit kit, stainless steel: from APM2xx to dual RPI500s
RSD = Retrofit kit, stainless steel: from standard double gang electrical box to single RPI500
RWA = Retrofit kit, white: from APM1xx to single RPI500
RWB = Retrofit kit, white: from APM2xx to single RPI500
RWC = Retrofit kit, white: from APM2xx to dual RPI500s
RWD = Retrofit kit, white: from standard double gang electrical box to single RPI500

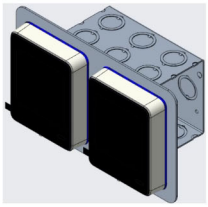
Retrofit Kit Examples



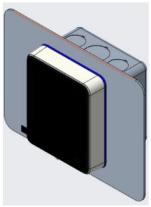
RSA/RWA
APM1xx to Single RPI



RSB/RWB
APM2xx to Single RPI



RSC/RWC
APM2xx to Dual RPI



RSD/RWD
Single RPI, Double gang box

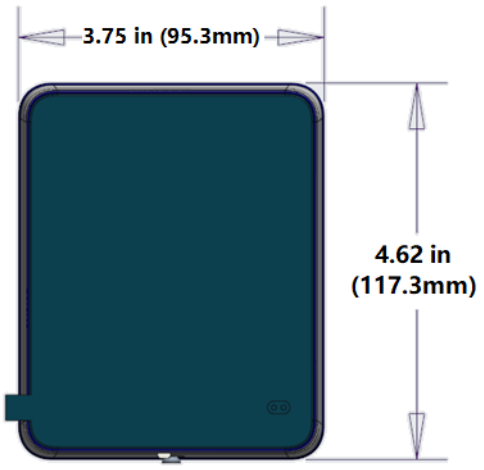
Spare Parts

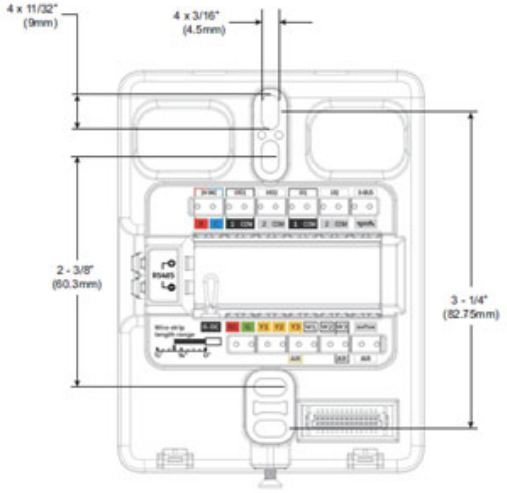
Catalog Number	Description
RPI500-N000	RPI500 Monitor only
PRT-260-200-053	KIT RETRO SS APM1 TO SNGL RPI
PRT-260-200-054	KIT RETRO SS APM2 TO SNGL RPI
PRT-260-200-055	KIT RETRO SS APM2 TO DUAL RPI
PRT-260-200-056	KIT RETRO SS STD DBL GANG TO SNGL RPI
PRT-260-200-057	KIT RETRO WHT APM1 TO SNGL RPI
PRT-260-200-058	KIT RETRO WHT APM2 TO SNGL RPI
PRT-260-200-059	KIT RETRO WHT APM2 TO DUAL RPI
PRT-260-200-060	KIT RETRO WHT STD DBL GANG TO SNGL RPI
PRT-373-022-001LF	PRESS TRANS 0.25% 0.25IN NO-CAL
PRT-373-022-301LF	PRESS TRANS 0.25% 0.25IN 3P-CAL
PRT-373-022-501LF	PRESS TRANS 0.25% 0.25IN 5P-CAL
PRT-373-023-001LF	PRESS TRANS 0.25% 0.50IN NO-CAL
PRT-373-023-301LF	PRESS TRANS 0.25% 0.50IN 3P-CAL
PRT-373-023-501LF	PRESS TRANS 0.25% 0.50IN 5P-CAL
PRT-373-024-001LF	PRESS TRANS 0.25% 1.00IN NO-CAL

Catalog Number	Description
PRT-373-024-301LF	PRESS TRANS 0.25% 1.00IN 3P-CAL
PRT-373-024-501LF	PRESS TRANS 0.25% 1.00IN 5P-CAL
PRT-373-051-001LF	PRESS TRANS 0.50% 0.10IN NO-CAL
PRT-373-051-301LF	PRESS TRANS 0.50% 0.10IN 3P-CAL
PRT-373-051-501LF	PRESS TRANS 0.50% 0.10IN 5P-CAL
PRT-373-052-001LF	PRESS TRANS 0.50% 0.25IN NO-CAL
PRT-373-052-301LF	PRESS TRANS 0.50% 0.25IN 3P-CAL
PRT-373-052-501LF	PRESS TRANS 0.50% 0.25IN 5P-CAL
PRT-373-053-001LF	PRESS TRANS 0.50% 0.50IN NO-CAL
PRT-373-053-301LF	PRESS TRANS 0.50% 0.50IN 3P-CAL
PRT-373-053-501LF	PRESS TRANS 0.50% 0.50IN 5P-CAL
PRT-373-054-001LF	PRESS TRANS 0.50% 1.00IN NO-CAL
PRT-373-054-301LF	PRESS TRANS 0.50% 1.00IN 3P-CAL
PRT-373-054-501LF	PRESS TRANS 0.50% 1.00IN 5P-CAL
PRT-510-200-001	PLATE PRESS PICK-UP SS
PRT-630-200-002	TUBING PVC .125 X .250 X 100

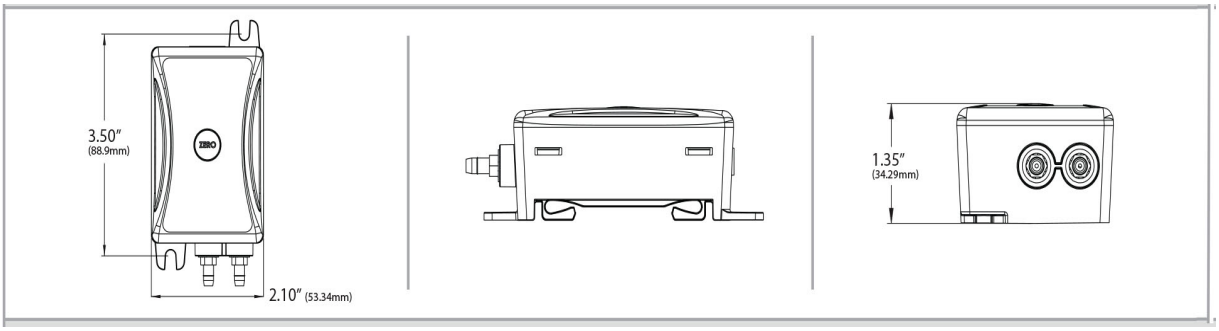
DIMENSIONS

Monitor



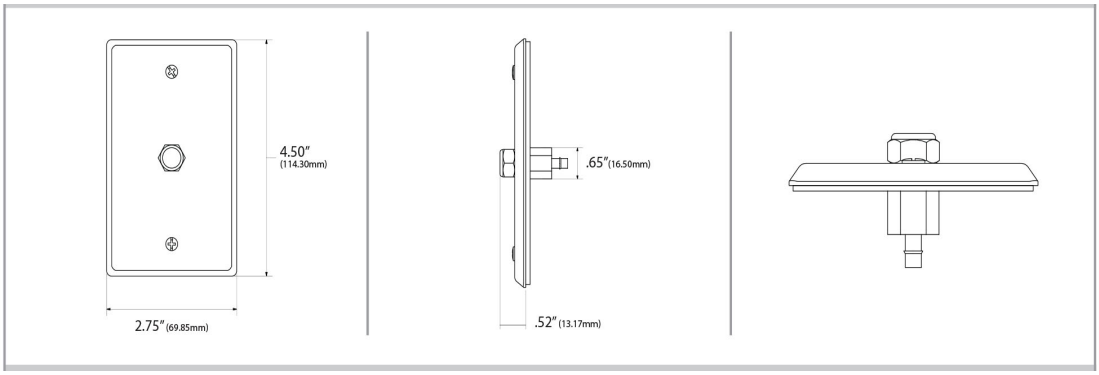


Pressure Transducer



Front **Right** **Bottom**

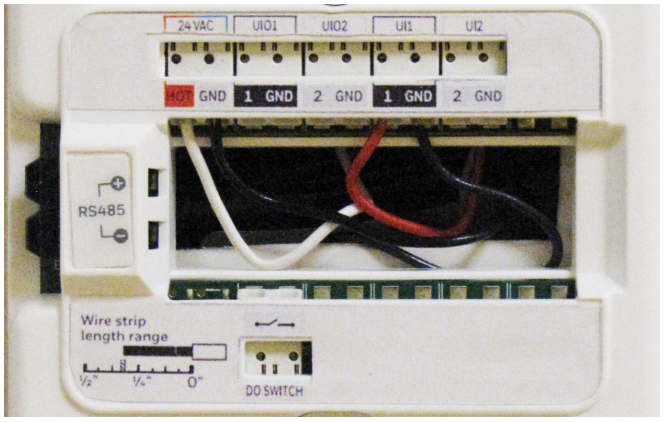
Pressure Pickup Port



Front **Right** **Bottom**

INPUTS/OUTPUTS

Monitor



Terminal	Description	Board Identification	
24 Vac	Power Terminal	Hot	GND
UIO1	Pressure Transducer Analog Output	1	GND
UIO2	Not Used	2	GND
UI1	Pressure Transducer Input	3	GND
UI2	Door Switch Input	4	GND
DO Switch	Digital output for Door Open Alarm or Pressure Alarm	DO Switch	
RS485+	BACnet MS/TP Communication Positive	BACnet Communications	
RS485-	BACnet MS/TP Communication Negative		

Transducer

Pressure Transducer Terminal Layout		
VIN	Power Voltage Input	24VAC (+/- 10%) 50/60 Hz
GND	Ground	Ground
OUT	Output to RPI500 UI1	0 - 10VDC (Max output limited to 10.25 VDC)
HIGH	High Pressure control tubing input (typically Room pressure)	Brass Pressure Fitting for 1/8" ID, 1/4" OD flexible control tubing
LOW	Low Pressure control tubing input (typically Reference Pressure)	Brass Pressure Fitting for 1/8" ID, 1/4" OD flexible control tubing

WIRING

Wiring for the RPI 500 monitor and Pressure transducer should be done with 18 - 22 gauge AWG (0.5 - 0.75mm) wire, solid core is preferred. For wiring details see RPI Installation Guide (651-000-013).

INSTALLATION

The RPI500 Monitor requires a standard US single gang box with 3-1/4" (82.75mm) mounting hole spacing or standard European single gang box with 2-3/8" (60.3mm) mounting hole spacing. Suitable US model electrical boxes are Raco 8670, Raco 8650, Raco 8663, or equivalent. For further details see the RPI Installation Guide (651-000-013).

The RPI500 pressure transducer can either be mounted remotely on a section of Din rail in a suitable location or using a standard US triple wide, single depth electrical gang box. Suitable US model electrical boxes are Raco 686, Steel City 3G4DV12-10R, or equivalent. To securely mount the transducer in the electrical box, two self tapping #8 x 1/2" screws can be used. Make sure the pressure tubing does not become kinked or pinched during installation. For further details see the RPI Installation Guide (651-000-013).

The RPI500 pressure pickup ports require a standard US single gang box with 3-1/4" (82.75mm) mounting hole spacing. Suitable US model electrical boxes are Raco 8670, Raco 8650, Raco 8663, or equivalent. Make sure the pressure tubing does not become kinked or pinched during installation. For further details see the RPI Installation Guide (651-000-013).

RECOMMENDED CABLES

Cable Type	Plenum Rated	Function	Wire Gauge (AWG)	Vendor and Part Number		Color Code	Notes
				Primary	Alternative		
2C Round (Non-Shielded)	No	24 Vac Power (110 ft Max)	14	Belden 9411		1: Red 2: Black	Must Be Stranded
			18	Belden 9409			
2C Round (Non-Shielded)	Yes	24 Vac Power (110 ft Max)	14	Windy City 007960BR		1: Red 2: Black	Must Be Stranded
			18	Belden 82740	Windy City 002360BR		
8C Round (Non-Shielded)	No	Control	22	Belden 9421	Windy City 425501 Smart-Wire.com	1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No Substitutes
8C Round (Non-Shielded)	Yes	Control	22	Windy City 004392 Smart-Wire.com		1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No Substitutes
MS/TP (3C Shielded)	No	BACnet MS/TP Communication	22	Belden 3106A (120 ohm)		1. White w/ Orange Stripe 2. Orange w/ White Stripe 3. Blue w/White Stripe	Shielded w/ Drain
MS/TP (3C Shielded)	Yes	BACnet MS/TP Communication (4,000 ft Max)	22	Connect Air W223C-2060YPC		1. Black 2. White 3. Red	Shielded w/ Drain

Phoenix Controls PCI8000 is a multi-purpose solution seamlessly integrating critical airflow control devices to building automation networks while providing a platform for custom control logic. It performs:

- Protocol translation and data integration between the company's environmental control systems to BACnet®-capable Building Automation Systems (BAS).
- Bidirectional translation between room-level devices using LonWorks® technology and the BAS utilizing either BACnet over IP or MS/TP to manage read requests and write commands.

The PCI8000 offers a graphical programming environment and configurable inputs and outputs to extend control functions provided by on-site valve controllers. Using optional I/O modules, it can also be used to provide local control for hard-wired third party devices - typically room-level lighting control, advanced temperature control sequences, or integrating air quality sensors to the building's front-end visualization system.

A web server is included with functions for troubleshooting and commissioning devices available through web pages. Diagnostic displays can be used to assess problems on the room devices, room network, or device itself. If remote access is provided, many troubleshooting tasks can be performed off-site, saving the time and expense of travel to fix a potentially minor issue.

The Lab Verification feature is a set of web pages that field technicians use to perform field acceptance testing for one pressurization zone at a time. It temporarily overrides the airflow to min and max settings as well as occupied/unoccupied set points, then captures the readings for reporting and archiving.

The Test and Balance (TAB) feature is also a set of web pages that is used by third party verification experts to measure all airflows to ensure valves are flowing as intended. The TAB function can place several spaces in full heating or cooling so the balancer can check out the hot water and air handling systems. Balancers can enter the measured field data for adjustments and save the data in a .csv format for use in their own reporting tool.

PCI8000 with I/O Module

FEATURES

- Support for Niagara 4 with Phoenix Controls Workbench 3.0 or later.
- Support for Niagara AX: Phoenix Controls Workbench 2.5 or later.
- Web User interface for device, network, and platform diagnostics.
- Supports up to 4 optional communications modules.
- Includes 2 on-board RS-485 BACnet® MS/TP ports.
- Up to 20 high-speed Celeris® devices and 10 LON devices (FHD, PTC, LDU) per network channel; up to 4 LON network channels per PCI.
- Data Recovery Services prevents data loss during power interruptions.
- Lab Verification function for field acceptance testing via password protected web pages.
- Test and Balance function for third party balancers to verify valves work as intended via password protected web pages.
- Support for remote I/O modules.

TABLE OF CONTENTS

 MKT-0430 MPC-2352

Phoenix Controls

SPECIFICATIONS

Platform
- ARM® Cortex™-A8 1Ghz processor
- 1GB DDR3 SDRAM
- 2Mb (megabit) Serial FRAM
- Up to 4GB microSD Flash memory
- Removable micro-SD card with 4GBflash total storage; 2GB user storage
- Real-time clock

Operating System
Niagara 4.4 or later
Niagara 3.8 (Optional)

Communications
- Two 10/100Mbit Ethernet ports
- Two electrically isolated RS485 ports with selectable bias and termination.
- USB Type A connector (backup and restore support)
- Wi-Fi (Client or WAP)
  - IEEE802.11a/b/g/n, IEEE802.11n HT20 @ 2.4 GHz, IEEE802.11n HT20/HT40 @ 5 GHz
  - Configurable radio (Off, WAP, or Client), WPAPSK/WPA2PSK supported

Integration Points
25 points per device (e.g; 20 devices = 500 points)

Power
- 24 VAC Input @ 24 VA minimum
- Dedicated UL listed Class 2 transformer, 50/60 Hz

Optional Expansion Modules
- LON Expansion Module: one LON network channel per module
- ANSI 709.1 LonTalk protocol

Optional I/O Modules
- 16-point Module
  - Maximum 16 modules
  - 8 Universal Inputs: Type 3 (10K) Thermistors, 0-100K ohm, 0-10 vdc, 0-20 mA external resistor
  - 4 Relay Outputs (Form A contacts, 24VAC @ 0.5 amp rated)
  - 4 Analog Outputs (0-10 vdc)
  - Powered by 34 Point Module (up to 4 modules) or IO 16 Power Supply Module
- 34-point Module
  - Maximum of 16 Modules
  - 16 Universal Inputs: Type 3 (10K) Thermistors, 0-100K ohm, 0-10 vdc, 0-20 mA external resistor
  - 10 Relay Outputs (Form A contacts, 24VAC @ .5 amp rated)
  - 8 Analog Outputs (0-10 vdc)
  - 24VAC Input @ *nn*VA Minimum

Dimensions
- PCI8000: 6.38" (162 mm) L x 4.33" (110 mm) W x 2.4" (61 mm) H
- IO 16 Module: 3.25" (82.5 mm) L x 4.5" (116 mm) W x 2.4" (61 mm) H
- IO 34 Module: 6.38" (162 mm) L x 4.5" (116 mm) W x 2.4" (61 mm) H
- LON Module: 2.07" (52.5 mm) L x 4.33" (110 mm) W x 2.4" (61 mm) H
- IO 16 Power Supply: 3.25" (82.5 mm) L x 4.5" (116 mm) W x 2.4" (61 mm) H

Approximate Weight
PCI8000: 13.2 oz (.37kg)
I/O 16 Module: 4.8 oz (.14 kg)
I/O 34 Module: 10.4 oz (.29 kg)
LON Expansion Module: 4.4 oz (.12 kg)
Power Supply: 4.8 oz (.14 kg)

Storage Temperature Range

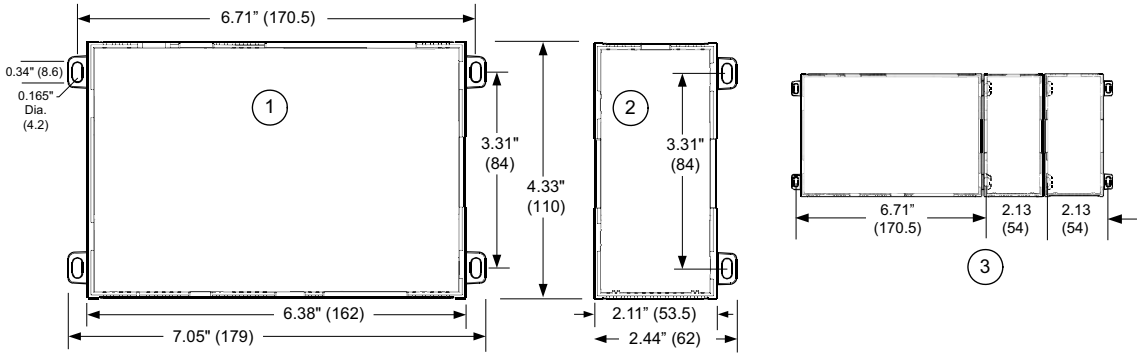
-40 - 185 °F (-40 - 85 °C)

Operating Temperature Range
-4 - 140 °F (-20 - 60 °C)

Operating Humidity Range
5 - 95% RH, non-condensing

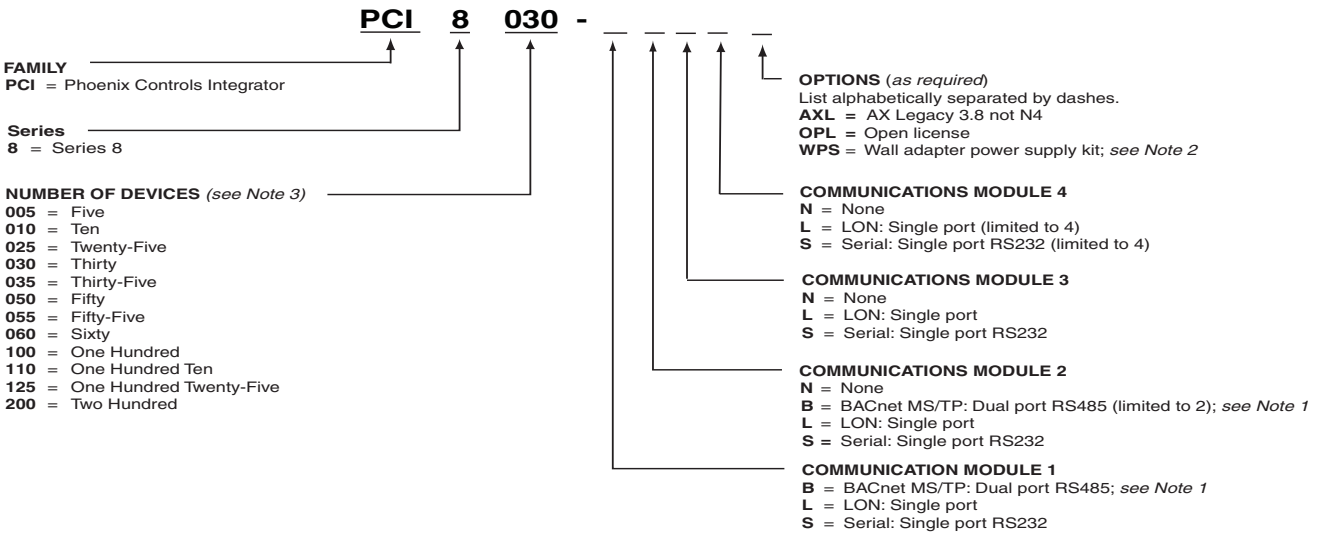
Agency Listings:
- UL 916
- CE EN 61326-1
- FCC Part 15 Subpart B, Class B
- FCC Part 15 Subpart C
- C-UL listed to Canadian Standards Association (CSA) C22.2 No. 205-M1983 Signal Equipment"
- 1999/5/EC R&TTE Directive
- CCC
- SRRC
- RSS
- ROHS
- ICES-003, Class B - Industry Canada Interference-Causing Equipment Standard
- CE Declaration of Conformity (Council Directive 004-108-EC)

Dimensions of PCI8000 and Optional Expansion Modules



1 PCI8000 with no option modules. Allow 1.5" (38 mm) clearance on all sides.
2. Option module, up to 4 can be used.
3. Center tab distances between units.

ORDERING GUIDE



NOTES:
1. Communication Slots terminate BACnet MSTP room networks. When building level network is BACnet MSTP use the on-board RS-485 connection.
2. 100-240 Vac, 50/60 Hz Wall Adapter – Connects to the 2.5 mm barrel plug 24 V input on the PCI8000 and includes US, EU, UK, and AU style plugs.
3. PCI8000 Device Count = Total LON Devices + Total BACnet Devices

Option Module and Capacity Considerations

The controller supports a maximum total of four option (expansion) modules in certain combinations. If you use two RS485 option modules, you are limited to one additional non-RS485 module (LON or 232) for a total of three. The following are some example combinations.

		232 or LON	232 or LON	EXPANSION 4
	232 or LON	232 or LON	232 or LON	EXPANSION 3
485 485	485 485	232 or LON	232 or LON	EXPANSION 2
485 485	485 485	485 485	232 or LON	EXPANSION 1
Baseboard:			485 485	

Separate maximum limits may be defined in the controller's license, such as total number of networks, devices, and integration points (capacity licensing). Maximum wired field bus integrations:.

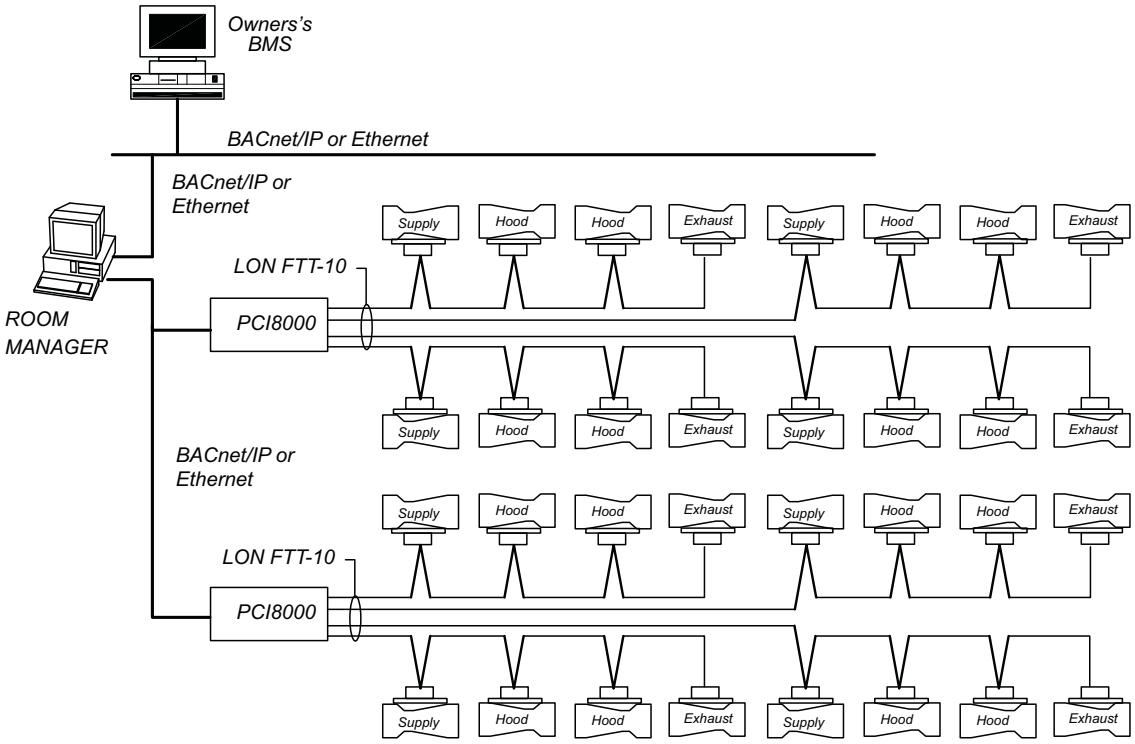
Protocol	Max Integrations	Option Module Description
RS485	7	Two via onboard RS485, four via two Dual RS485 option modules (2 ports each), plus one via LON or RS232.
Lonworks FTT-10	4	Four LON option modules (1 port each module)
RS232	4	Four RS232 option modules (1 port each module)

Note that maximums in this table do not reflect combinations of wired field bus integrations. Two examples:

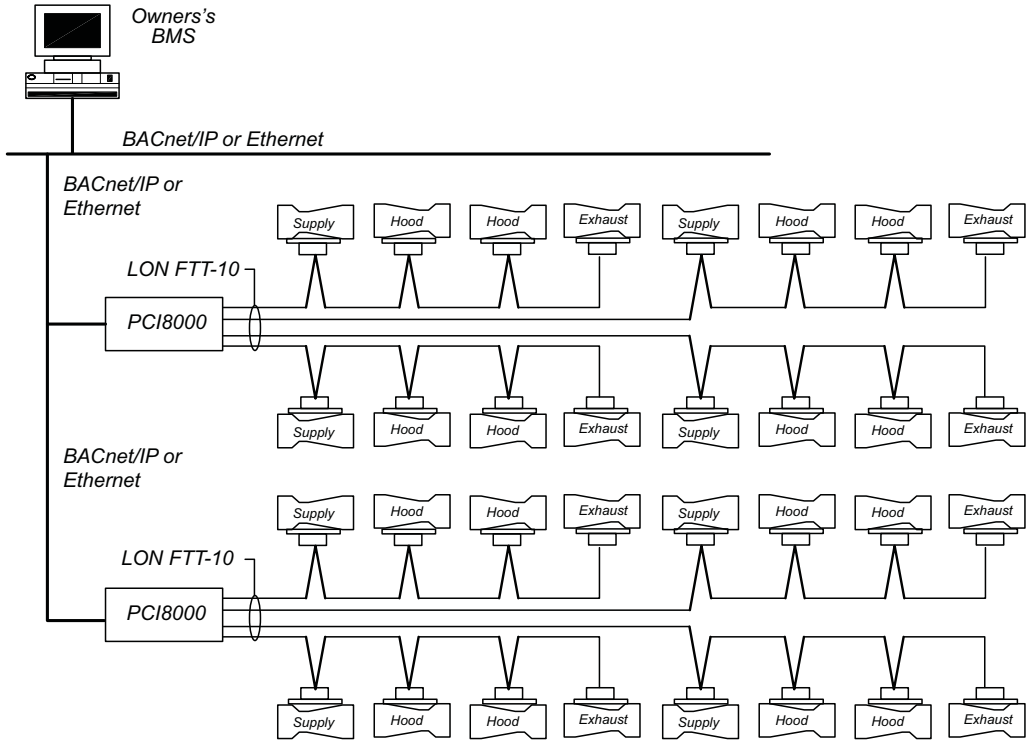
- Two RS485 (via onboard RS485), two Lonworks FTT-10 (2 LON modules), two RS232 (2 RS232 modules). Maximum number of option modules (4) are installed.
- Four RS485 (2 via onboard RS485, 2 from a single Dual RS485 module), two Lonworks FTT-10 (2 LON modules). In this case, three (3) option modules are installed.

APPLICATIONS

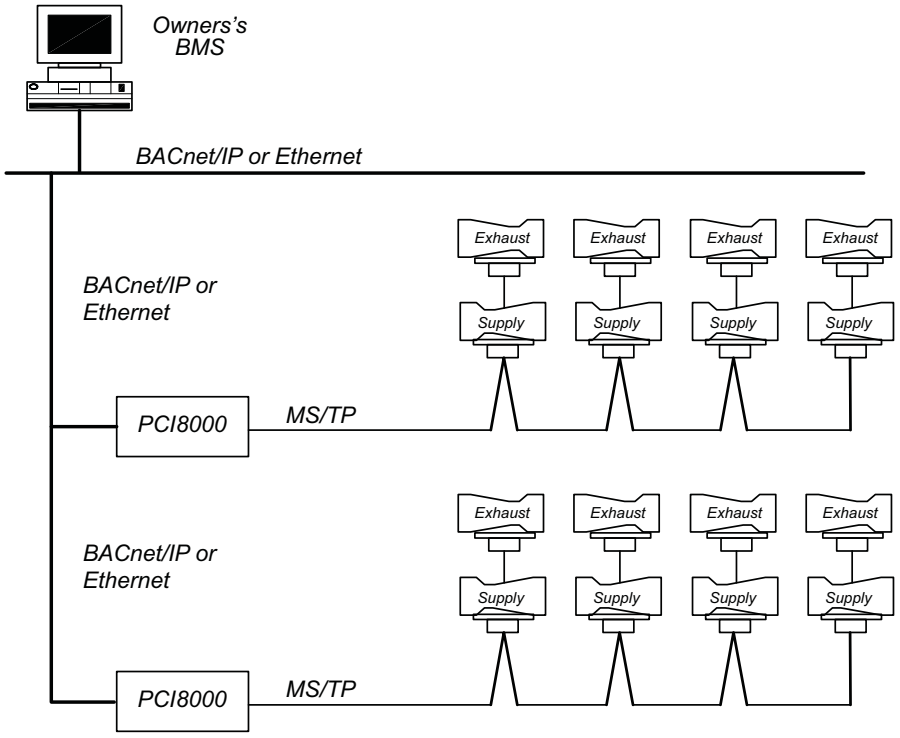
Single IP Connection (LON FTT-10 to BACnet IP)



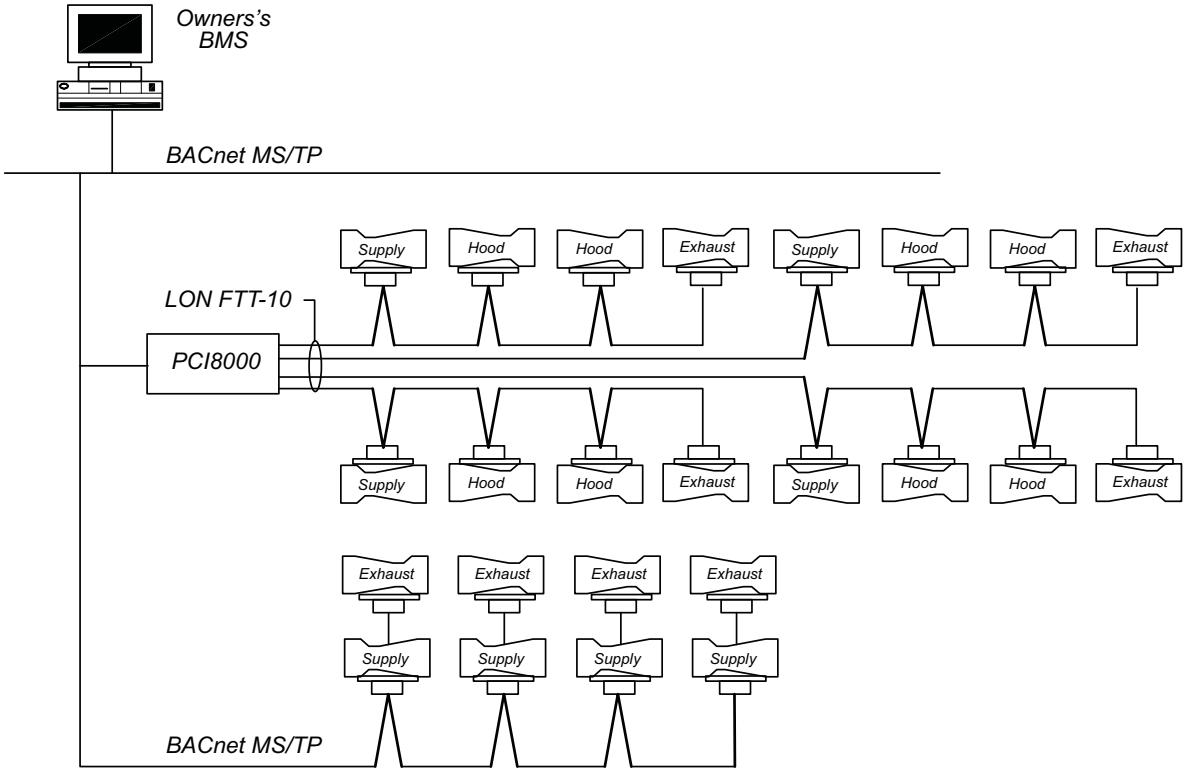
Multiple IP Connections (LON FTT-10 to BACnet IP)



Multiple IP Connections (MS/TP to BACnet IP)



Multiple IP Connections (LON FTT-10 MS/TP to MS/TP)



INSTALLATION

- **Remove all power to the PCI8000 before attaching (plug in) or detaching (unplug) any option module.**
- **Removal of the PCI8000 cover is not required.** All items are accessible as switches and connectors on the unit's top, bottom, and side, or behind the unit's front access door or microSD card shutter.
- **Discharge static electricity by touching a known, securely grounded object.** The microprocessors and associated circuitry within the controller are sensitive to static discharge.

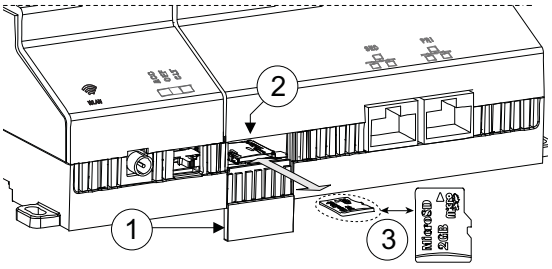
PHOENIX CONTROLS WIRING RECOMMENDATIONS

- Use cables recommended by Phoenix Controls.
- Follow good wiring practices:
  - Do not run the signal cable in the same conduit or wireway as the power cables.
  - If the signal cable must cross power cables, it is best to do so at a 90-degree angle.
  - Shield or drain wires, if required, should be wrapped with insulating tape to prevent contact with exposed conductors or contacts.
  - Prior to connecting cables, provide strain relief for them to prevent damage to the controller.
  - Maintain a consistent color code or polarity all the way through the wiring system.
- Local and national electrical codes take precedence.
- Consult the project-specific wiring diagrams for exact details.

INSTALLING THE PCI8000

Inserting the MicroSD Card

Before mounting a new controller, you must insert the included microSD flash memory card. Note the card has the unique, factory-set Niagara identity (host ID) for the unit.



1. MicroSD access shutter.
2. Card tray.
3. MicroSD card.

1 Carefully slide the plastic microSD card shutter open.
2. The shutter should remain captive in the base, revealing the microSD card socket.
3. To insert the microSD card, slide it into card carrier, label side up, until the spring catch engages.
4. If properly inserted, the card is behind the shutter track.
5. To remove the microSD card, push it in, until the spring release pushes it partially out of the card carrier. Grasp the card, pull it completely out of the unit and store it in a static free protective case.
6. Carefully slide the card shutter back over the card carrier opening, until it clicks in place. When properly closed, the shutter should not protrude behind the mounting base.

NOTE: Data on the microSD card is encrypted. If you swap in a card from a previously configured unit, you must change the JACE-8000 system passphrase on the platform to match the passphrase on the new microSD card.

Mount in the Proper Location

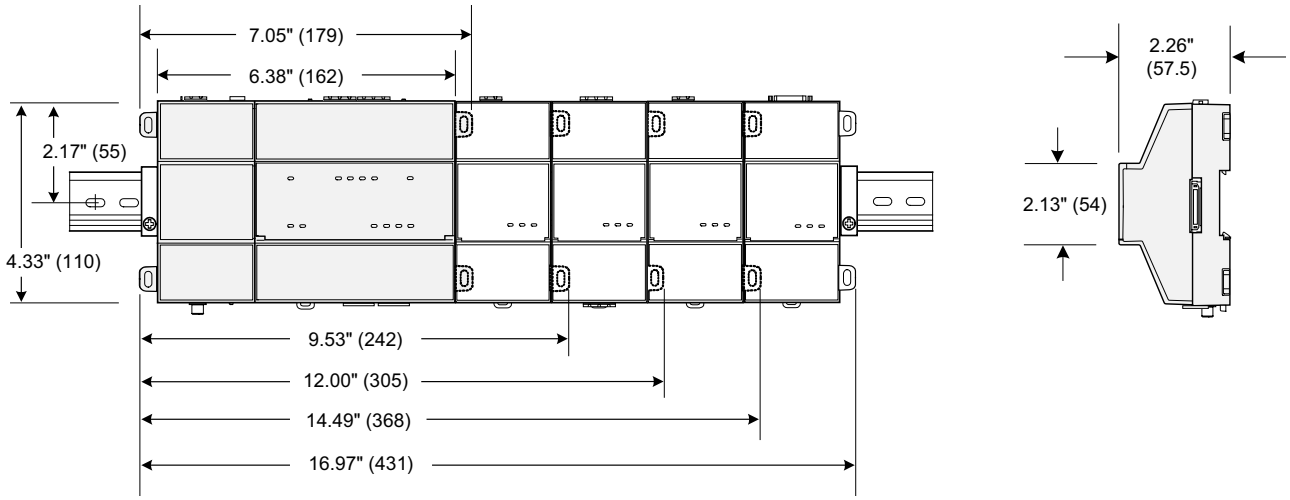
- Mount the controller in a location that allows clearance for wiring, servicing, and module removal.
- Avoid areas with excessive moisture, fumes, or explosive vapors; or with excessive moisture, corrosive fumes, or explosive vapors; where vibration or shock is likely to occur; or a location subject to electrical noise.
- For a unit mounted inside an enclosure, ensure that the enclosure is designed to keep the unit within its required operating temperature range (considering a 24-watt dissipation by the controller); especially when the controller is mounted inside an enclosure with other heat-producing equipment.

Mounting on a DIN Rail

- Horizontal mounting is strongly recommended, to achieve maximum heat dissipation and meet the operating tem-

perature upper limit. Any other mounting orientation reduces this upper limit.

- Mounting on a 35mm wide DIN rail is recommended. The unit base has a molded DIN rail slot and locking clip, as do option modules. DIN rail mounting ensures alignment of the connectors between all devices.
- Tabs on the unit base can be used for panel mounting as an alternate to DIN rail mounting.
- Up to four (4) option modules are supported.

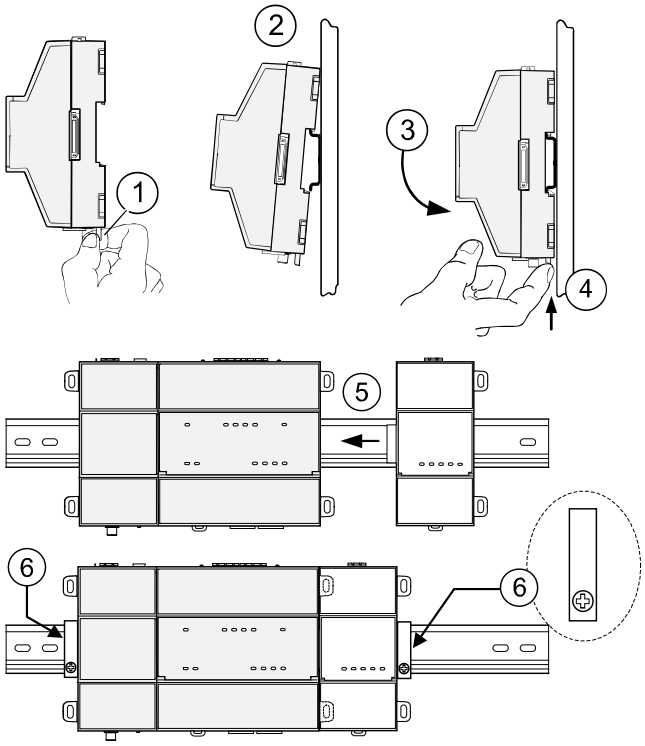


- The 35mm DIN rail should be securely mounted, with at least two screws near the rail ends.
- The microSD card must be installed in the controller.

Complete the following steps for installation:

1. Pull the controller's locking clip down.
2. Tilt the controller to hook over the DIN rail.
3. Push down and in on the unit, fastening to the rail.
4. Push the locking clip up to secure.
5. Mount any option module onto the DIN rail in the same way. Slide the module firmly into the controller's connector to seat. Repeat for other modules as needed (4 maximum).
6. Carefully secure both ends of the final assembly with DIN rail end-clips provided by the DIN rail vendor.

NOTE: To remove a unit from the DIN rail, pull down its locking clip. Then swing the bottom out and lift the unit away from the DIN rail.

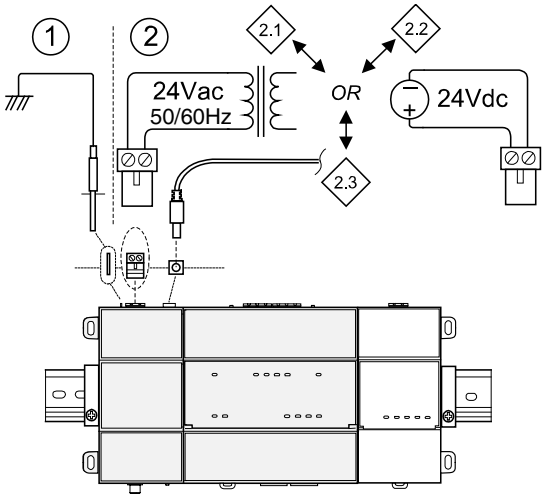


PCI8000 WIRING

Earth Ground and Power

CAUTION: *Earth grounding provides protection from electrostatic discharge or other forms of EMI. Before making power terminations, de-energize the 24V power source. Do not restore power until completing all other mounting and wiring.*

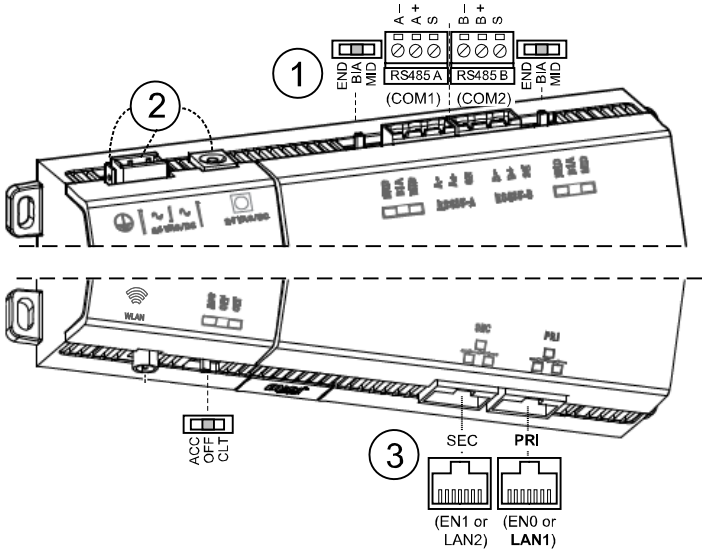
1 Install the included earth ground wire to the controller's earth ground spade lug, and terminate the other end to a nearby earth ground.
2. Unplug the controller's 2-position power connector plug and terminate the 24V supply source (AC or DC) to the connector. Leave connector unplugged for now.
3. Depending on power source used, refer to diagram as follows:
   2.1 (AC): Dedicated 24V transformer required, with neither side of the transformer secondary tied to ground.
   2.2 (DC): Polarity is unimportant (uses onboard diode bridge), with neither leg tied to ground.
   2.3 (Wall-mount AC adapter, WPM-8000) instead of wiring 24V to 2-position connector.



Communications Wiring

Ports for field communications shown in this drawing are

1. RS485 ports and bias switches.
2. Earth ground and 24V power input.
3. Ethernet ports, 10/100-Mbit, RJ-45.



LON

Single LON ports may be ordered with optional communications modules (1 - 4). The 78 kbps FTT-10 network uses 22 AWG wire in a bus topology and is limited to 4500 feet (1400 meters). For recommended room-level wiring, refer to Phoenix Tools > Phoenix Vantage Specifications.

RS485 Wiring (MS/TP)

On the controller's top side, two RS485 ports operate as COM1 and COM2. Each port is capable of up to 115,200 baud, and uses a 3-position, screw terminal connector. Up to four additional RS485 ports may be ordered as part of communications modules 1 and 2.

- Use shielded, twisted-pair (3-conductor minimum), 18-22 AWG cabling to wire in a continuous multidrop fashion to other RS485 devices: minus-to- minus, plus-to-plus, and shield-to-shield.
- Connect the shield wire to earth ground at one end only, for example at the controller. See following wiring examples.

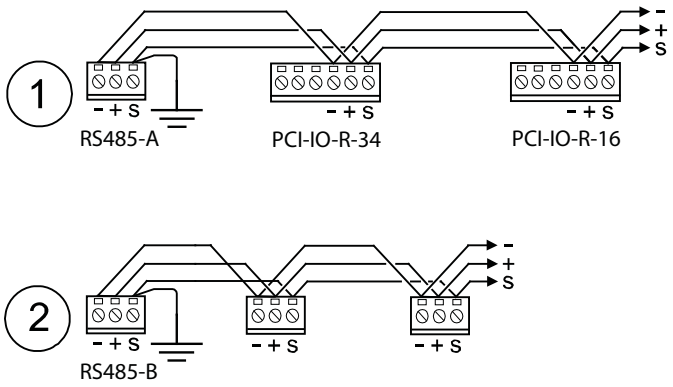
RS485 Wiring Examples

In the figure to the right:

Example 1: RS485 port A (COM1) is often used to support a trunk of PCI-IO-R-16 or PCI-IO-R-34 modules.

NOTE: Do not mix IO modules with other types of RS485 devices on the same RS485 trunk. A maximum of 16 PCI-IO-R-16 modules or 8 PCI-IO-R-34 modules can be connected. See the PCI8000 I/O Module product data sheet for more details.

Example 2: RS485 port B (COM2) supporting a network of other field devices using RS485 communications.



RS485 devices on the same network should use the same protocol and baud rate. Depending on device specifications, the smaller of either 32 unit loads or 50 devices can be supported on each network.

RS485 Bias Switches

Each RS485 port has an adjacent 3-position biasing switch, with these settings:

BIA - (Default, middle) RS485 biasing and termination: 2.7K Ohm bias resistors with no termination resistor.

END - RS485 biasing and a termination: 562 Ohm bias resistors and 150 Ohm termination resistor.

MID - RS485 biasing or termination: 47.5K bias resistors with no termination resistor.

Often, adding RS-485 biasing can improve communications by eliminating indeterminate idle states.

BIA - (Default, middle) Often best if the RS485 trunk needs biasing, but when the controller is not installed at the end of the trunk.

END - Often best if the controller is installed at the end of an RS485 trunk of devices that is not already biased.

MID - Often best if the controller is put in the middle of an already-biased RS485 trunk.

If desired, you can change the position of an RS485 port's bias switch while the controller is running.

Ethernet Wiring

CAUTION: *The PCI8000 is not compatible with a Power-Over-Ethernet (POE) network. Connecting the PCI8000 on a network segment which carries power may cause the unit to fail. In that event, you must disconnect it from the POE network segment and power-cycle the unit.*

Two RJ-45 10/100-Mbit Ethernet connectors are labeled PRI (LAN1) for primary, and SEC (LAN2) for secondary. Use a standard Ethernet patch cable to an Ethernet switch. Often, you only use PRI (LAN1 primary), unless you have a specific application for the other port. For example, isolating a driver's network traffic, using SEC (LAN2). Do not use SEC as the primary port. If enabling SEC, keep in mind that PRI and SEC must be connected to different IP subnets. Further, a JACE controller does not provide IP routing or bridging operation between the two Ethernet ports.

The factory-default IP address for PRI is 192.168.1.140. The subnet mask is 255.255.255.0. By default, the SEC (LAN2) port is disabled.

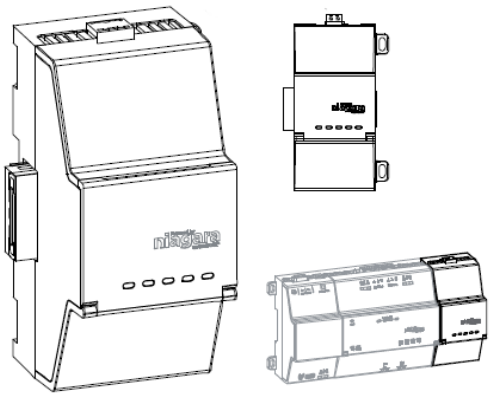
Refer to the *JACE-8000 Niagara 4 Install and Startup Guide* for details about the software configuration of the Ethernet ports.

INSTALLING THE LON OPTION MODULE

The Option Module is a polarity insensitive FTT-10A LON (LonWorks) adapter with a 2-position removable screw-terminal connector plug.

The PCI8000 supports a maximum total of four Option Modules across all option types. If two Dual RS485 modules are used, only one additional non-RS485 module may be added for a maximum total of three modules.

DIN-rail mounting the PCI8000 and all its Option Modules is recommended. Tabs on the controller or module can be used for panel mounting as an alternative.



COM Port Assignments

If only one LON option is used, it operates as LON1, regardless of its position. If multiple LON option modules are used, the module closest to the controller base operates as LON1, the next closest as LON2, and so on. So, if 4 LON options are installed, the module furthest from the controller base operates as LON4.

In the Niagara 4 station hosted by the controller, use a separate LonNetwork for each installed LON option. Specify LON port on a network's property sheet (Lon Comm Config, Device Name = LONn).

Mounting on a DIN Rail

To mount on a DIN rail, complete the following procedure:

1 Pull the option module's locking clip down.
2. Tilt the module to hook over the DIN rail.
3. Push down and in on the unit, fastening to the rail.
4. Slide the module firmly into the controller's connector (or existing option module) to seat. Repeat for other modules as needed (4 maximum).
5. Push up the locking clip on all modules.
6. Carefully secure both ends of the final assembly with DIN rail end-clips provided by the DIN rail vendor.

To remove a unit from the DIN rail, pull down its locking clip. Slide the unit away from other devices, then swing the bottom out and lift away from the rail.

Option Module Wiring

Connect LonWorks FTT-10A communications wiring to the 2-position connector of the LON option module. Polarity is not a factor in FTT-10A wiring. The connector accepts wire sizes from 26-12AWG.

Refer to the LonWorks *FTT-10A Free Topology Transceiver User's Guide (078-0156-01F)* for technical guidelines associated with free topology restrictions, and the Junction Box and Wiring Guidelines for Twisted Pair LonWorks Networks (005-0023-01) for more detailed information on wiring.

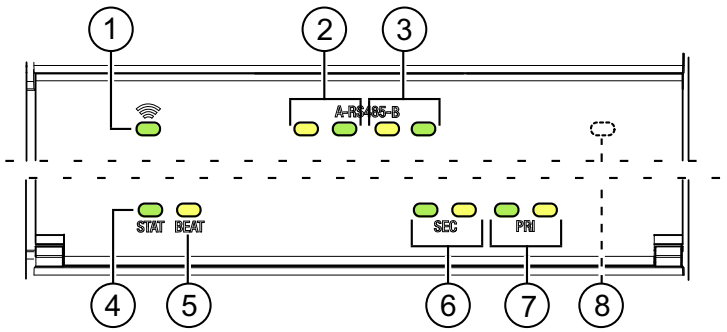
POWER UP/INITIAL CHECKOUT/STATUS LEDs

PCI8000

- Once the power and ground wiring to the PCI8000 is properly connected, to apply power either insert the 2-position 24V power connector plug; or insert the barrel plug of the wall-mount AC adapter (WPM-8000).
- Check the STAT (Status) and BEAT (Heartbeat) LEDs.
  When power is applied, after 3-10 sec, the green STAT LED illuminates, indicating that the system is OK, with power applied. During bootup, the BEAT LED may blink at 1 Hz with a 90%/10% on/off duty cycle, or in some other irregular pattern. When bootup completes, the normal 1 Hz BEAT LED flash at 50%/50% on/off duty cycle returns. If, after applying power, the STAT LED goes out or if the BEAT LED comes on (steady) and stays lit over 2 minutes, contact Phoenix Controls Product Support for technical assistance. See the following Status LEDs section for more information.

Status LEDs

The controller provides a number of status LEDs with all but one visible with the front access door closed as shown in this figure.



LED	Description
1	WiFi (Green) - Lit whenever WiFi config switch is not Off.
2	RS485 A (COM1): Transmit (TX, Yellow) and Receive (RX, Green). See RS485 LEDs in this section.
3	RS485 B (COM2): Transmit (TX) and Receive (RX).
4	STAT (Green) - Remains lit. See STAT (Status) LED.
5	BEAT (Yellow) - Heartbeat LED that blinks at 1Hz during normal operation. See BEAT (Heartbeat) LED in this section.
6	Secondary Ethernet, SEC (LAN2) Link (Green) and Activity (Yellow).
7	Primary Ethernet SEC (LAN1) Link (Green), Activity (Yellow). See PRI, SEC (Ethernet) LEDs in this section.
8	Behind Door) BACKUP - Green, typically Off unless a USB drive is inserted, or a backup, restore, or factory recovery image install is in progress. See BACKUP LED in this section.

RS485 LEDs

RS485 port A (COM1) and RS485 port B (COM2) each have two LEDs reflecting port activity as follows:

- Yellow (TX): indicates the controller is transmitting data on the RS485 port.
- Green (RX): indicates the controller is receiving data from an RS485 device connected to this port.

These LEDs use a *fixed on time* when a message is detected on the port. If a receive LED is on constantly, this can indicate a wiring problem, such as a shorted wire or reversed wiring.

STAT (Status) LED

The green STAT LED provides a CPU machine status check, and should remain lit whenever the controller is powered. If the status LED does not light while power is applied, contact System Engineering for technical support.

BEAT (Heartbeat) LED

In normal operation, the yellow heartbeat BEAT LED blinks at 1 Hz, at 50%/50% on/off duty cycle.

During controller bootup, this LED may blink at 1 Hz with a 90%/10% on/off duty cycle, or in some other irregular pattern. When bootup completes, the platform daemon is started, and the normal 1 Hz flash at 50%/50% on/off duty cycle returns.

If the BEAT LED stays on constantly, does not light, or blinks very fast, contact System Engineering<**IBID**?>.

CAUTION: *The 1Hz, 90%/10% on/off BEAT flash at bootup also occurs during other critical operations, such as a firmware upgrade to the controller and/or any attached modules. To be safe, do not remove power from the controller while its BEAT LED flashes with a 90%/10% on/off duty cycle. Wait for the normal (50%/50%) flash to return before removing power.*

PRI, SEC (Ethernet) LEDs

Two LEDs for each of the two LAN ports indicate as follows:

- Green (left-side) Link LED

  Off: No Ethernet link is made.

  On: Ethernet link is made.

- Yellow (right-side) Activity LED

  Off: No Ethernet activity.

  On: Blinking indicates activity (typical if Link is On).

BACKUP LED

A green BACKUP LED is behind the front access door, and is visible only if the door is open (see previous Status LED figure). Typically, this LED remains Off.

WARNING: *Do not remove power while a recovery image install or backup restore is in progress, meaning the BACKUP LED is flashing in Working Mode pattern (1s On/1s Off, or slow blink). Otherwise, the controller will be inoperable (bricked), and must be returned to a service center for repair.*

Possible BACKUP LED states are:

- On solid: USB backup media detected. Occurs when you insert a USB flash drive, to signal a backup is possible.
- Alert mode: 100ms On/100ms Off repeating (fast blink).
- Occurs for several seconds in the following scenarios:
  - When USB media was detected, after the controller's BACKUP button is pressed (backup mode).
  - When the controller is power cycled while holding in the BACKUP button (recovery/restore mode)
- Working mode: 1s On/1s Off repeating (slow blink). Never remove power in this mode; see the Warning on page 7.
- Error mode: Two quick 200ms flashes On, 3 seconds Off, repeating.

Some scenarios where the BACKUP LED is used include:

USB drive inserted - A USB flash drive is inserted in the USB 2.0 port, to either backup a commissioned unit to the USB drive, or to restore an existing backup from the drive. The BACKUP LED lights when the USB drive is mounted.

Backup - A backup is initiated by pressing the BACKUP button from 1 to 5 seconds before releasing, where the LED starts blinking in Alert Mode for 5 seconds. Another button press in this period starts the backup, where the LED blinks in the working mode pattern. When the backup completes, the LED turns Off, and the USB drive can be removed.

Boot to recover or restore image - The unit is powered up while holding in the BACKUP button, for either:

- (No USB media detected) A factory defaults recovery from an onboard partition with default image.
- (If USB media is detected) For the restore of a backup image on the USB flash drive. Note this also requires a serial shell connection to the controller's Debug port.

In either case, the BACKUP LED starts blinking in Alert Mode pattern. If you release the BACKUP button during this period (within 5 seconds), initiation begins for either:

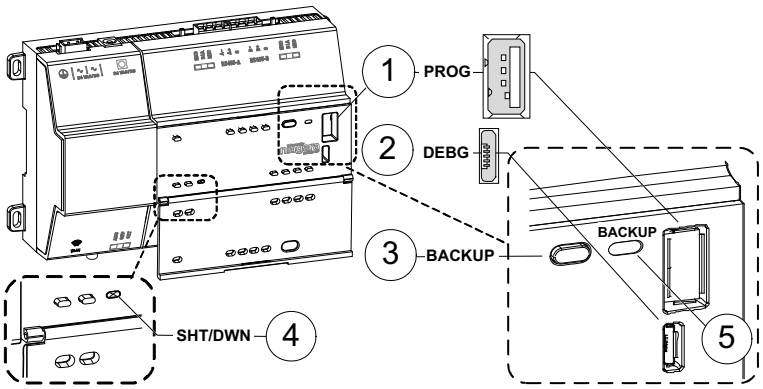
- If no USB media is detected, the factory defaults recovery image installation.
- If USB media is detected, the system enters restore mode. In this mode, after login with serial shell, a menu lists the available backup images on the USB flash drive. You can select one (and enter the unique security key to initiate its installation), or alternatively select to install the factory defaults recovery image.

During a recovery or restore image installation, the LED blinks in the working mode pattern. When the image installation completes, the BACKUP LED turns Off. A controller reboot is then required.

See the JACE-8000 Backup and Restore Guide document for complete details on JACE-8000 controller backups, restores, and recoveries.

USB PORTS AND PUSHBUTTON SWITCHES

Behind the controller's front access door are two USB ports, two pushbutton switches, and an associated LED as shown below.



Ports/ Switches	Description
1	PROG - USB 2.0 for usage with USB flash (thumb) drive.
2	DEBUG - Micro-A USB for serial debug communications.
3	BACKUP - Pushbutton switch to start a USB backup, or if held in during power up/boot up, a factory recovery image.
4	SHT/DWN - Recessed switch for controlled shutdown.
5	BACKUP - LED to indicate USB media present, or a backup, restore, or factory recovery image in progress. See *Backup* in previous section for more information.

DEBUG

This is a standard Micro-A type USB port for serial debug communications to the controller. You can use a serial terminal program (for example: PuTTY) to access the controller system shell menu. Login requires admin-level platform credentials. The menu provides access to a few basic platform settings: baud rate, data bits, parity, stop bits. Defaults for these settings are 115200, 8, N, and 1, respectively. For more details see the Tridium document *JACE Niagara 4 Install and Startup Guide*.

SHT/DWN

Use this pushbutton to initiate a controlled shutdown of the controller, ensuring that all station data is preserved. While connected online with controller, the pushbutton provides an alternative to the platform Stop Station command.

Initiating a Controller Shutdown

When locally servicing an installed and configured (commissioned) unit, use this feature before removing power. The unit is considered commissioned only after Niagara 4 is installed, the platform configured, a station installed, and the unit is running the station.

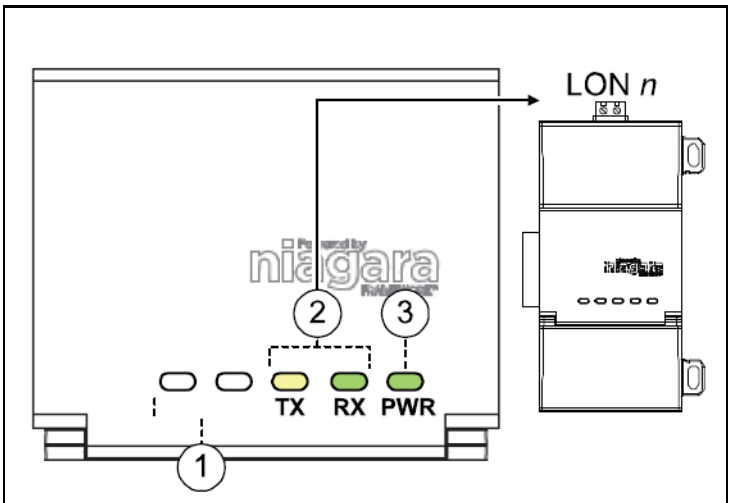
Do not initiate a shutdown or remove power if the BACKUP LED is blinking in Working Mode, or the BEAT LED is flashing at a 90%/10% on/off rate. Instead, wait for the BACKUP LED to be in another state (typically Off), and the BEAT LED to be flashing at the normal 50%/50% on/off duty cycle rate before initiating a shutdown. In the case where the system cannot be put into a safe state, the BACKUP LED blinks in Error Mode: two quick 200ms flashes On, 3 seconds Off, repeating.

To initiate a PCI800 shutdown, complete these steps:

1 Press and hold the recessed SHT/DOWN button just until the BACKUP LED begins flashing in the Alert Mode pattern: 100ms On/100ms Off repeating (fast blink).
2. Release the SHT/DOWN button during this Alert Mode.
3. This starts the shutdown process, where the station and software is put into a safe state. During this shutdown, the BACKUP LED blinks in working mode.
4. When shutdown is done, the BACKUP LED turns Off. You can safely remove 24V power from the unit.

OPTION MODULE LEDs

Three LEDs are visible on the front of the LON option module.



LED	Description
1	Unused.
2	TX (Transmit) and RX (Receive).
3	PWR — Green, remains lit while controller is powered.

The LED pair RX and TX operate as follows

- TX (yellow) — Transmit, flashing indicates that the controller is transmitting a message on the LON trunk.
- RX (green) — Receive, flashing indicates that another LonWorks device is transmitting a message.

TYPICAL POINTS AVAILABLE FOR INTEGRATION

NOTE: This is a minimum suggested integration list. This is not a comprehensive lift of integration points. Additional points may be necessary to integrate.

Point Name	Description	Data Type	Read/Write
Alarm Points (available on any digital valve controller)			
JAM_ALARM	The valve is unable to reach the commanded set point	Binary	Read Only
FLOW_ALARM	The pressure switch detected low static pressure	Binary	Read Only
Flow Points (available on any digital valve controller)			
EFF_VLV_CMD	Valve flow set point	Analog	Read Only
EFF_VLV_FLOW_FDBK	Valve flow feedback	Analog	Read Only
Points Associated with a Hood Valve Controller			
BROKEN_SASH_CABLE	Alarm indicating sash sensor cable or bar is broken	Binary	Read Only
SASH_HEIGHT_ALARM	Alarm indicating sash input signal exceeds maximum sash height set point	Binary	Read Only
HOOD_OVERRIDE	Alarm indicating emergency override function on the fume hood monitor is active	Binary	Read Only
EFF_VLV_FLOW_CMD	Valve flow set point	Analog	Read Only
VLV_FLOW_FDBK	Valve flow feedback	Analog	Read Only
SASH_OPEN_PERCENT	Calculated Sash Opening (0-100%)	Analog	Read Only
SASH_SWITCH_STATE (for 2 state applications)	Sash switch status (hood open or closed)	Binary	Read Only
FACE_VELOCITY	Calculated face velocity	Analog	Read Only
FACE_VELOCITY_SETPT	Calculated face velocity set point	Analog	Read Only
USER_STATUS	Zone Presence Sensor status- Hood Occupied (normal) or Unoccupied (setback) mode	Binary	Read Only
Points Associated with Occupancy Control			
OCCUPANCY_CMD	Commanded room occupancy state (occupied/unoccupied/standby)	Multi-State	Read/Write
EFF_OCC_MODE	Current room occupancy status (occupied/unoccupied/standby/bypass)	Multi-State	Read Only
Points Associated with Emergency Mode Control			
EFF_EMER_MODE	Present emergency mode status (none, 1, 2, 3, or 4 active)	Multi-State	Read Only
EMER_MODE_CMD	Commanded emergency mode state (1, 2, 3, or 4)	Multi-State	Read/Write
Points Associated with Humidity Control			
HUMIDITY_SETPT	Writable relative humidity set point	Analog	Read/Write
HUMIDITY_DEMAND	Relative humidity demand	Analog	Read Only
SPACE_HUMIDITY	Relative humidity present value	Analog	Read Only
Points Associated with Temperature Control (may vary with application)			
OCC_COOL_SETPT	Cooling set point in the occupied mode	Analog	Read/Write
OCC_HEAT_SETPT	Heating set point in the occupied mode	Analog	Read/Write
UNOCC_COOL_SETPT	Cooling set point in the unoccupied mode	Analog	Read/Write
UNOCC_HEAT_SETPT	Heating set point in the unoccupied mode	Analog	Read/Write
EFF_TEMP_SETPT	Average of the cooling and heating set points	Analog	Read Only
OCC_TEMP_SETPT	Occupied temperature set point	Analog	Read/Write
AVG_SPACE_TEMP	Average of temperature sensor inputs used for control	Analog	Read Only
OFFSET_LVR_ENABLE	Enables or disables temperature offset lever	Binary	Read/Write
COOLING_DEMAND	Cooling demand output (-100% = cooling)	Analog	Read Only

Point Name	Description	Data Type	Read/Write
HEATING_DEMAND	Heating demand output (+100% = heating)	Analog	Read Only
DSCHRG_AIR_TEMP	Present value of discharge air temperature sensor	Analog	Read Only
DSCHRG_TEMP_SETPT	Discharge air temperature set point (used with Advanced Temperature Control function)	Analog	Read Only
TEMP_CTRL_MODE	Reports current temperature control state	Multi-State	Read Only
HVAC_MODE_OVERRIDE	Allows BMS to override temperature control to one of eight states (not available on all applications)	Multi-State	Read/Write
Points Associated with Zone Balance			
EFF_OFFSET_SETPT	Zone offset set point	Analog	Read/Write
OFFSET	Calculated zone offset	Analog	Read Only
OCC_MIN_SETPT	Occupied minimum ventilation flow set point	Analog	Read/Write
UNOCC_MIN_SETPT	Unoccupied minimum ventilation flow set point	Analog	Read/Write
TOTAL_ZONE_SUPPLY	Total of all networked and non-networked supply devices	Analog	Read Only
TOTAL_ZONE_EXHAUST	Total of all networked and non-networked exhaust devices	Analog	Read Only
TOTAL_CNST_VOL_EXH_FLOW (where applicable)	Entered value of constant volume exhaust devices	Analog	Read Only
TOTAL_CNST_VOL_SUP_FLOW (where applicable)	Entered value of constant volume supply devices	Analog	Read Only
TOTAL_ADD_EXH_FLOW (where applicable)	Total of all hard-wired (non-networked) exhaust devices	Analog	Read Only
TOTAL_ADD_SUP_FLOW (where applicable)	Total of all hard-wired (non-networked) supply devices	Analog	Read Only
Points Associated with Pressure Control			
PRESSURE_ALARM	Alarm indicating over or under pressure alarm condition	Binary	Read Only
EFF_PRES_SETPT	The set point to which the pressure control system will control	Analog	Read Only
PRES_SETPT	Writable differential pressure set point	Analog	Read/Write
ZONE_DIFF_PRESSURE	Present value of the measured zone differential pressure	Analog	Read Only
PRES_PID_CMD	Progressive Offset Control's current PID value	Analog	Read Only
PRES_ALRM_SETPT	Set point value for the over pressure alarm function	Analog	Read/Write
FRZ_MODE_STATE	PID control Freeze Mode status	Binary	Read Only
FRZ_MODE_OFFSET_SETPT	Set point for an alternate offset when the Freeze Mode is active	Analog	Read/Write

RELATED DOCUMENTS

For additional information, see these Tridium documents available on www.tridium.com.

JACE-8000 Install and Startup Guide

Dual RS485 Option Module (12979) Install Sheet

LON Option Module (12978) Install Sheet

RS232 Option Module (12980) Install Sheet

JACE-8000 Backup and Restore Guide

JACE-8000 WiFi Guide

Data Recovery Service G

SPARE PARTS

Part Number	Description
DRV-DEVICE-UP-10	10 device upgrade
DRV-DEVICE-UP-25	25 device upgrade
DRV-DEVICE-UP-50	50 device upgrade
DRV-JACE-8000-AX	Enables PCI8000 to run Niagara AX
PRT-NPB-8000-232	Replacement RS-232 module
PRT-NPB-8000-2X-485	Replacement MS/TP module
PRT-NPB-8000-LON	Replacement LON module
PRT-NPB-8000-OPT-KIT	PCI8000 spare connectors: (2) RS-485 and (1) LON FTT10
PRT-PCI-IO-R-16	16 point I/O module (powered from PRT-PCI-IO-R-34)
PRT-PCI-IO-R-34	34 point I/O module (powered from 24 Vac)
PRT-WPM-8000	Replacement 100-240 Vac, 50/60 Hz Wall Adapter
PRT-800-250-005LF	FTT10 End-of-Line (two required per LON segment)

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th Street - Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: ryanm@aap-kc.com

Platte City ASC – NueHealth

Tab 3

Wiring Diagrams

DRAWINGS / REVISIONS		
DRAWING NAME	**REVISION**	**DATE**
COVER		
WIRE		
CABLE-1		
CABLE-2		
TEMP		
RPI		
BACNET MSTP		
BACNET IP		
LON - PCI		
ROOM - 169		
ROOM - 170		
ROOM - 173		
ROOM - 176		

JOB NAME: NUEHEALTH
ASC (PLATTE CITY, MO)

PHOENIX JOB: 69396

DATE: 05-21-2025

DRAWING TITLE: COVER PAGE

TOTAL PAGES: 12 (NOT INCLUDING COVER PAGE)

ACKNOWLEDGMENTS		
REV	**DATE**	**DRAWN BY**
		DAVID HOPKIN
		DATE
		5/21/2025

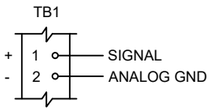
Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

NUEHEALTH - PLATTE CITY ASC

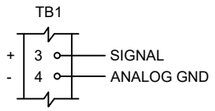
COVER

LON VALVE

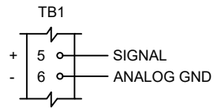
INPUTS



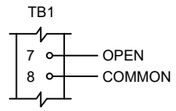
UI1 — SUPPLY: SPACE TEMP SENSOR
RETURN: PRESSURE SIGNAL



UI2 — SUPPLY: TEMP SETPOINT ADJUST
RETURN: HUMIDITY

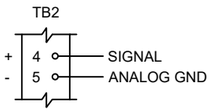


UI3 — SUPPLY: DUCT TEMP SENSOR
RETURN: HUMIDITY SETPOINT

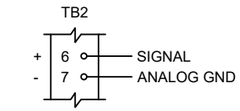


DI1 — SUPPLY: OCCUPANCY CONTACT
RETURN: DOOR SWITCH

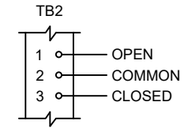
OUTPUTS



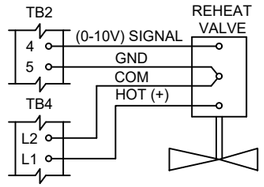
AO1 — SUPPLY: REHEAT SIGNAL
RETURN: AVAILABLE



AO2 — SUPPLY: AVAILABLE
RETURN: AVAILABLE

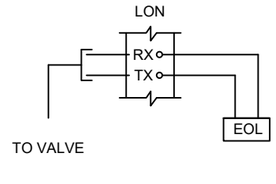


DO1 — SUPPLY: OVERRIDE DISPLAY
RETURN: AVAILABLE

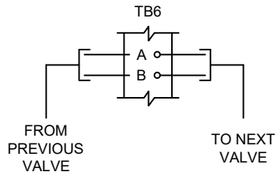


RH1 — REHEAT VALVE:
PROPORTIONAL CONTROL

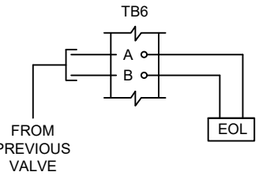
NETWORK



CH1-4 — PCI8000: FTT-10 CHANNEL
ROOM LEVEL

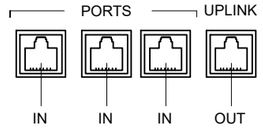


LON1 — "ROOM" LEVEL DEVICE TO
DEVICE

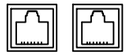


LON2 — END OF LINE "ROOM" LEVEL
DEVICE

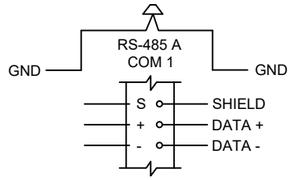
LAN 1 — PCI8000: IP OR ETHERNET



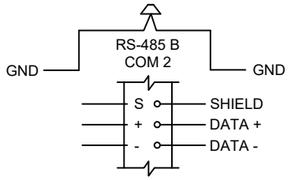
SW=IN
UP=OUT — SWITCH



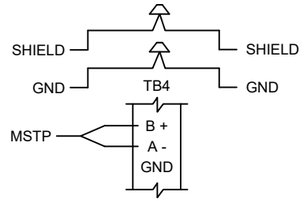
RJ45 — RMM/SUP: IP OR ETHERNET



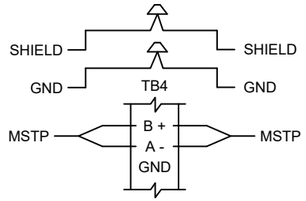
RS485A — PCI8000: ON BOARD
(ISOLATED) SEE NOTES 2 & 3



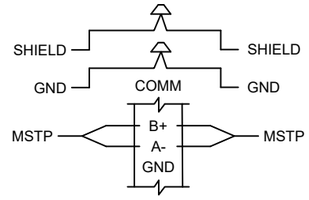
RS485B — PCI8000: ON BOARD
(ISOLATED) SEE NOTES 2 & 3



MSTP1 — TDU: NON ISOLATED
SEE NOTES 2 & 4

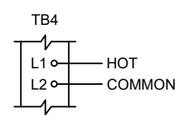


MSTP2 — TDU: NON ISOLATED
SEE NOTES 2 & 4

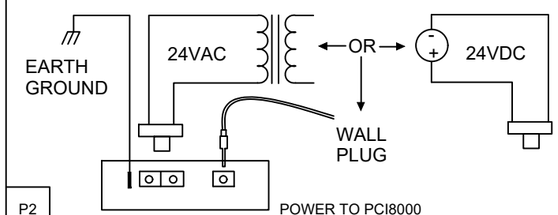


MSTP3 — RPI - "ROOM" LEVEL DEVICE
TO DEVICE

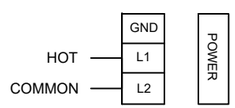
POWER



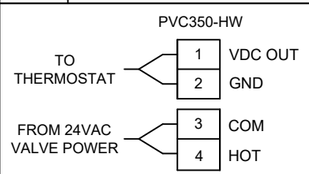
P1 — VALVE 24 VAC



P2 — POWER TO PCI8000



P3 — POWER TO RPI 24 VAC



P4 — DC POWER SUPPLY
(INSTALL IN VALVE ENCLOSURE)

NOTES:

1. HUMIDITY CONTROL ONLY AVAILABLE WITH CELERIS MODEL CODES: MT, ZV, & BT AND THERIS/TRACCEL: TX, TX-EXH, & TX-RTN PRODUCT MODELS.
2. SEE DRAWING "BACNET MS/TP WIRING" FOR BUS CONNECTIONS AND RULES
3. SET RS-485 BIAS SWITCHES FOR END OF TRUNK OR MIDDLE OF TRUNK AS REQUIRED.
4. WHEN TDU IS FIRST OR LAST DEVICE, INSTALL JUMPER "J2" (INTERNAL TERMINATING RESISTOR).

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

LON WIRE DETAILS

WIRE

TABLE 1: CABLE SPECIFICATIONS & ALTERNATES

CABLE TYPE	PLENUM RATED	FUNCTION	WIRE GAUGE (AWG)	VENDOR & PART NUMBER		COLOR CODE (N = CONDUCTOR / PAIR #)	NOTES
				PRIMARY	ALTERNATE		
2C ROUND (NON-SHIELDED)	NO	24 VAC POWER (110 FT MAX)	14[A]	BELDEN 9411		1. RED 2. BLACK	MUST BE STRANDED
			18[B]	BELDEN 9409			
2C ROUND (NON-SHIELDED)	YES	24 VAC POWER (110 FT MAX)	14[A]	WINDY CITY NP007960		1. RED 2. BLACK	MUST BE STRANDED
			18[B]	BELDEN 82740	WINDY CITY NP002360		
3C ROUND (NON-SHIELDED)	NO	CONTROL	22	BELDEN 8443		1. RED 3. GREEN 2. BLACK	MUST BE STRANDED
3C ROUND (NON-SHIELDED)	YES	CONTROL	22	BELDEN 88444	WINDY CITY 004380	1. RED 3. GREEN 2. BLACK	MUST BE STRANDED
4C ROUND (NON-SHIELDED)	NO	CONTROL	22	BELDEN 8444	MANHATTAN MI3304	1. WHITE 3. BLACK 2. GREEN 4. RED	MUST BE STRANDED
5C ROUND (NON-SHIELDED)	NO	CONTROL	22	BELDEN 8445	MANHATTAN MI3305	1. WHITE 3. RED 2. BROWN 4. GREEN 3. BLACK	MUST BE STRANDED
8C ROUND (NON-SHIELDED)	NO	CONTROL	22	BELDEN 9421	MANHATTAN MI3308	1. WHITE 5. GREEN 2. ORANGE 6. YELLOW 3. BLACK 7. BLUE 4. RED 8. BROWN	NO SUBSTITUTES
8C ROUND (NON-SHIELDED)	YES	CONTROL	22	COMTRAN 4956		1. WHITE 5. GREEN 2. ORANGE 6. YELLOW 3. BLACK 7. BLUE 4. RED 8. BROWN	NO SUBSTITUTES
CAT 5/5E/6/6A (8C IP NON-SHIELDED TYPICAL, OR SHIELDED)	YES/NO	BACNET IP / ETHERNET (328 FT MAX)	23[C]	SEE CAT 5, 5E, 6, OR 6A CABLE REQUIREMENTS (ANSI/TIA-586-C)		PAIR 1: GREEN WHITE/GREEN PAIR 2: ORANGE WHITE/ORANGE PAIR 3: BLUE WHITE/BLUE PAIR 4: BROWN WHITE/BROWN	THE USE OF NON-PLENUM RATED CABLE MAY REQUIRE CONDUIT. CONSULT LOCAL CODES
MS/TP (3C SHIELDED)	NO	BACNET MS/TP COMMUNICATION (4,000 FT MAX)	22[D]	BELDEN 3106A (120 OHM)	SEE FOOTNOTE D	1. WHITE W/ ORANGE STRIPE 2. ORANGE W/ WHITE STRIPE 3. BLUE W/ WHITE STRIPE	SHIELDED W/ DRAIN
MS/TP (3C SHIELDED)	YES	BACNET MS/TP COMMUNICATION (4,000 FT MAX)	22[D]	CONNECT AIR W223C-2060YPC	SEE FOOTNOTE D	1. BLACK 3. RED 2. WHITE	FOIL SHIELD WITH DRAIN
TP (NON-SHIELDED)	NO	FTT-10 (4,500 FT MAX)	22	WINDY CITY 107500 SMARTWIRE.COM		1. WHITE W/ BLUE STRIPE 2. BLUE W/ WHITE STRIPE	FOR ALTERNATES SEE: WWW.ECHELON.COM
		FTT-10 (8,800 FT MAX)	16	WINDY CITY 109600 SMARTWIRE.COM			
TP (NON-SHIELDED)	YES	FTT-10 (4,500 FT MAX)	22	WINDY CITY 105500-S= SPOOL OR B= BOX	CONNECT AIR W221P-2001B	1. WHITE W/ BLUE STRIPE 2. BLUE W/ WHITE STRIPE	
		FTT-10 (8,800 FT MAX)	16	WINDY CITY 109500 SMARTWIRE.COM			

[A] HIGH-SPEED ELECTRIC VALVE POWER:
(1) MUST BE WIRED IN A HOME-RUN CONFIGURATION
(2) FOR LOADS UP TO 96 VA USE A DEDICATED 14 AWG CABLE WITH A MAXIMUM LENGTH OF 110 FT BETWEEN THE TRANSFORMER AND THE VALVE
(3) NO OTHER VALVES CAN BE DAISY-CHAINED FROM THIS POWER; BUS CONFIGURATIONS ARE NOT ALLOWED BETWEEN HIGH-SPEED VALVES

[B] LOW-SPEED ELECTRIC & PNEUMATIC VALVE POWER AND ALL OTHER PHOENIX CONTROLS 24 VAC DEVICE POWER:
(1) CAN BE WIRED IN A BUS CONFIGURATION, EXCEPT FOR DEVICES THAT REQUIRE A DEDICATED TRANSFORMER (SEE TABLE 2)
(2) FOR LOADS UP TO 96 VA USE 18 AWG CABLE WITH A MAXIMUM LENGTH OF 110 FT (33m) BETWEEN THE TRANSFORMER AND THE LAST DAISY-CHAINED DEVICE

[C] CAT 5/5E/6:
(1) CABLES CAN BE ORDERED BY SPECIFIC LENGTH COMPLETE WITH THE RJ45 CONNECTOR ALREADY INSTALLED
(2) CABLES CAN ALSO BE PURCHASED ON A ROLL; FIELD INSTALLATION OF THE RJ45 CONNECTOR IS THEN REQUIRED

[D] MS/TP BACNET CABLE SPECIFICATIONS FOR ALTERNATE SOLUTIONS:
(1) AN MS/TP EIA-485 NETWORK SHALL USE SHIELDED, 3 CONDUCTOR CABLE WITH CHARACTERISTIC IMPEDENCE BETWEEN 100 AND 130 OHMS
(2) DISTRIBUTED CAPACITANCE BETWEEN CONDUCTORS SHALL BE LESS THAN 100pF PER METER (30pF PER FOOT)
(3) DISTRIBUTED CAPACITANCE BETWEEN CONDUCTORS AND SHIELD SHALL BE LESS THAN 200pF PER METER (60pF PER FOOT)
(4) FOIL OR BRAIDED SHIELDS ARE ACCEPTABLE. THE MAXIMUM RECOMMENDED LENGTH OF AN MS/TP SEGMENT IS 4000 FT (1200 M) WITH AWG 18 CABLE
(5) THE USE OF GREATER DISTANCES AND/OR DIFFERENT WIRE GAUGES SHALL COMPLY WITH THE ELECTRICAL SPECIFICATIONS OF EIA-485 MS/TP CABLE REQUIREMENTS

24VAC POWER RULES

1. SIZE THE TRANSFORMER FOR THE NUMBER AND TYPE OF EQUIPMENT IT WILL SERVE BASED ON VA RATINGS IN TABLE 2
2. PRIMARY POWER WIRING TO BE PERFORMED BY LOCAL ELECTRICIAN AND MEET LOCAL ELECTRICAL CODES
3. DEDICATED PRIMARY CIRCUIT OR SECONDARY CIRCUIT DISCONNECT REQUIRED FOR:
   * EACH HIGH-SPEED (ELECTRIC/PNEUMATIC) PRESSURIZATION ZONE
   * MULTIPLE LOW-SPEED (ELECTRIC) PRESSURIZATION ZONES
4. SECONDARY POWER SHALL BE INTERNALLY THERMAL PROTECTED OR EXTERNALLY FUSED WITH A 4A SLOW BLOW FUSE IN ACCORDANCE WITH NEC CLASS 2 POWER REQUIREMENTS (SEE FIGURES 1 & 2)
5. GROUNDING:
   * SEE "TRANSFORMER SECONDARY" COLUMN IN TABLE 2
   * FOR BACNET VALVES AND PCM5XX: EARTH GROUND SECONDARY OF TRANSFORMER
   * FOR ALL OTHER PHOENIX DEVICES: DO NOT EARTH GROUND SECONDARY OF TRANSFORMER
6. MAXIMUM CABLE LENGTH FOR 96 VA LOAD = 110 FT (33M):
   * HIGH-SPEED VALVES: USE 14 AWG CABLE
   * PNEUMATIC AND LOW-SPEED ELECTRIC VALVES: USE 18 AWG CABLE MINIMUM
   * ALL OTHER PHOENIX CONTROLS DEVICES: USE 18 AWG CABLE MINIMUM
7. IF POWERING OTHER DEVICES OFF SAME TRANSFORMER SERVING THE VALVE CONTROLLER, POLARITY MUST BE OBSERVED
8. ADDITIONAL REQUIREMENTS FOR PHOENIX PRODUCTS THAT REQUIRE DEDICATED TRANSFORMERS:
   * SEE "DEDICATED TRANSFORMER" COLUMN IN TABLE 2
9. ADDITIONAL BACNET MS/TP REQUIREMENTS:
   * FULL WAVE DEVICES CANNOT BE MIXED ON SAME TRANSFORMER AS THE HALF WAVE BACNET VALVE CONTROLLERS (BVC)
   * SEE TABLE 2 ON VANTAGE SPECS SHEET 2 OF 2 FOR A LIST OF HALF WAVE (HW) AND FULL WAVE (FW) DEVICES

FOLLOW GOOD WIRING PRACTICES:

10. DO NOT RUN SIGNAL OR COMMUNICATIONS CABLE IN THE SAME CONDUIT OR WIREWAY AS POWER CABLES
11. IF SIGNAL CABLES MUST CROSS POWER CABLES, IT IS BEST TO DO SO AT A 90 DEGREE ANGLE

96 VA MAX PER TRANSFORMER

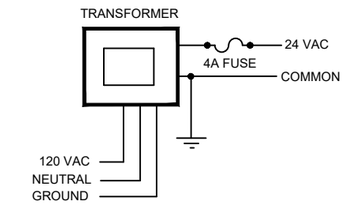


FIGURE 1: BACNET VALVES AND PCM5XX

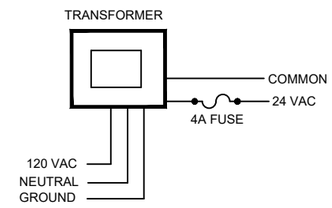


FIGURE 2: ALL OTHER PHOENIX DEVICES

ACKNOWLEDGMENTS		
REV	**DATE**	**DRAWN BY**
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

TABLE 2: POWER REQUIREMENTS, BACNET RATINGS AND LON NODES

CATALOG NUMBER	DESCRIPTION	AC POWER RATING (VA)	DEDICATED TRANSFORMER	TRANSFORMER SECONDARY	DC POWER RATING (WATTS)	BACNET POWER TYPE [A]	BACNET COMMUNICATION [F]	BACNET UNIT LOAD	COUNTS AS LON DEVICE (50 MAX PER CHANNEL)
APM2XX-ENG-ANU	ANALOG: ADVANCED PRESSURE MONITOR	9.60		DO NOT GROUND [2E]					
APM2XX-ENG-BAC	BACNET: ADVANCED PRESSURE MONITOR	9.60		DO NOT GROUND [2E]		FW	ISOLATED	0.25	
APM2CD	ANALOG OR BACNET: CENTRAL DISPLAY	9.60		DO NOT GROUND [2E]		FW	ISOLATED	1.00	
BxV FEEDBACK CARD (FLO)	DUAL VOLTAGE FEEDBACK CARD	1.5		DO NOT GROUND [2E]					
BxV SINGLE WITH CONTROL TYPE: I & L	BASE UPGRADEABLE CONTROL	4.00 / 6.00		DO NOT GROUND [2E]					
BxV SINGLE WITH CONTROL TYPE: Q, R, & S with FLO	TIERED CONTROL	25.00							
BxV SINGLE OR DUAL WITH CONTROL TYPE: Z	BASE UPGRADEABLE CONTROL	7.00							
BxV DUAL WITH CONTROL TYPE: Q, R, & S with FLO	TIERED CONTROL	28.00							
DHV	DIGITAL H/V SASH SENSOR INTERFACE	6.00		DO NOT GROUND [2E]					
EXV WITH CONTROL TYPE: I / L	LON LVC: C2 LOW-SPEED ELECTRIC	10.00		DO NOT GROUND [2E]					YES [M]
EXV WITH CONTROL TYPE: M	LON LVC: C2 HIGH-SPEED ELECTRIC	70.00	TO EACH VALVE CONTROLLER [G]	DO NOT GROUND [2E]					YES [M]
EXV WITH CONTROL TYPE: N	LON LVC: C2 PNEUMATIC	10.00		DO NOT GROUND [2E]					YES [M]
FHD1xx	LON: FUME HOOD DISPLAY	10.00		DO NOT GROUND [2E]					YES
FHMX3X	ANALOG: FUME HOOD MONITOR	10.00		DO NOT GROUND [2E]					
FSR100	ANALOG: FAN STATIC RESET	0.12		[K]		HW			
HXV WITH VALVE CONTROLLER DESIGNATION: A / B	BACNET: TP / TX	12.00 [B2] & [C]		DO NOT GROUND [2E]		HW	NON-ISOLATED	0.25	
HXV WITH VALVE CONTROLLER DESIGNATION: C / D	BACNET: SO / EO	10.00 [B2] * [C]		DO NOT GROUND [2E]		HW	NON-ISOLATED	0.25	
HXV WITH VALVE CONTROLLER DESIGNATION: E / X	LON LVC: TP / TX	12.00 [B2]		GROUND [1E]					YES
HXV WITH VALVE CONTROLLER DESIGNATION: O	LON LVC: SO	10.00 [B2]		GROUND [1E]					YES
HXV WITH VALVE CONTROLLER DESIGNATION: Y / Z	BACNET: TX-EXH / TX-RTN	15.00 [B2] & [C]		DO NOT GROUND [2E]		HW	NON-ISOLATED	0.25	
LDU200	LON: LOCAL DISPLAY UNIT	8.00		DO NOT GROUND [2E]					YES
LRC100	LON LRC: LONWORKS BASED ROOM CONTROLLER	1.20 [B1]		GROUND [1E]					YES
MAV WITH CONTROL TYPE: I / L	LON LVC: C2 LOW-SPEED ELECTRIC	10.00		DO NOT GROUND [2E]					YES
MAV WITH CONTROL TYPE: M	LON LVC: C2 HIGH-SPEED ELECTRIC	70.00	TO EACH VALVE CONTROLLER [G]	DO NOT GROUND [2E]					YES
MAV WITH CONTROL TYPE: N	LON LVC: C2 PNEUMATIC	10.00		DO NOT GROUND [2E]					YES
PCI8XXX-XXXX-XXX	BACNET: PCI ON-BOARD BACNET RS-485	24.00	TO EACH PCI	DO NOT GROUND [2E]		FW	ISOLATED	0.13	
PCI8XXX-BXXX-XXX	BACNET: PCI BACNET OPTION CARD(S)	24.00	TO EACH PCI	DO NOT GROUND [2E]		FW	ISOLATED	0.13	
PCI8XXX-LXXX-XXX	LON: PCI WITH LON OPTION CARD(S)	24.00	TO EACH PCI	DO NOT GROUND [2E]					YES [I]
PCM210, PCM211, PCM212, PCM213	LON PCM: PROGRAMMABLE CONTROL MODULE	85, 23, 33, 60	RECOMMENDED [H]	DO NOT GROUND [2E]					YES
PCM501, PCM502, PCM503	BACNET: PROGRAMMABLE CONTROL MODULE	23, 33, 60	RECOMMENDED [H]	GROUND [1E]		HW	NON-ISOLATED	0.13	
PCS220-X/PCS3XX-X	ANALOG: COMBINATION TEMP/HUMIDITY SENSOR	1.30		[K]					
PHS220-X/PHS300-X	ANALOG: HUMIDITY SENSOR	1.10		[K]					
PRT-PCI-IO-R-16	16 POINT IO MODULE FOR PCI8XXX	-			2.00			0.25	
PRT-PCI-IO-R-34	34 POINT IO MODULE FOR PCI8XXX	28.00	[J]	DO NOT GROUND [2E]		FW	ISOLATED	0.25	
PTC101-Bxx	BACNET: TEMPERATURE CONTROLLER	2.00 [B1&2]		[K]		HW	NON-ISOLATED	0.50	
PTC101-Lxx	LON: TEMPERATURE CONTROLLER	2.00 [B1&2]		[K]					YES
PTL700-UFXN-B	BACNET: PORTAL USING BACNET OPTION CARD(S)	N/A				FW	ISOLATED	1.00	
PTL700-UNNN-B	BACNET: PORTAL USING ON-BOARD BACNET RS-485	N/A				FW	ISOLATED	1.00	
PTS102-D-0X-TV	ANALOG: DUCT TEMP SENSOR	-		[K]					
PTS102-X-D / PTS300-X-D	ANALOG: ROOM TEMP SENSOR WITH DISPLAY	0.20		[K]	0.14				
PUB1012S, 4024S, 6438S, 6438SR	BACNET: PROGRAMMABLE SPYDER CONTROLLER	20, 20, 20, 20 Typ. (100 Max)	RECOMMENDED [L]	GROUND [1E]	0.25	HW	NON-ISOLATED		YES
PUL1012S, 4024S, 6438S, 6438SR	LON: PROGRAMMABLE SPYDER CONTROLLER	10, 10, 20, 20 Typ. (100 Max)	RECOMMENDED [L]	DO NOT GROUND [2E]					YES
TDU007-ENG-BAC	BACNET: VIEW TOUCH-DISPLAY-UNIT	10.00		DO NOT GROUND [2E]		FW	NON-ISOLATED	1.00	
TXV WITH VALVE CONTROLLER DESIGNATION: A / B	BACNET: TP / TX	12.00 [B2] & [C]		GROUND [1E]		HW	NON-ISOLATED	0.25	
TXV WITH VALVE CONTROLLER DESIGNATION: C / D	BACNET: SO / EO	10.00 [B2] & [C]		GROUND [1E]		HW	NON-ISOLATED	0.25	
TXV WITH VALVE CONTROLLER DESIGNATION: E / X	LON LVC: TP / TX	12.00 [B2]		DO NOT GROUND [2E]					YES
TXV WITH VALVE CONTROLLER DESIGNATION: O	LON LVC: SO	10.00 [B2]		DO NOT GROUND [2E]					YES
TXV WITH VALVE CONTROLLER DESIGNATION: Y / Z	BACNET: TX-EXH / TX-RTN	15.00 [B2] & [C]		GROUND [1E]		HW	NON-ISOLATED	0.25	
ZPS310	ANALOG: ZONE PRESENCE SENSOR	7.00		DO NOT GROUND [2E]					
ZPS320	ANALOG: ZONE PRESENCE SENSOR	14.00		DO NOT GROUND [2E]					
ZPS330	ANALOG: ZONE PRESENCE SENSOR	21.00		DO NOT GROUND [2E]					
ZPS340	ANALOG: ZONE PRESENCE SENSOR	28.00		DO NOT GROUND [2E]					

NOTES:

[A] FW = FULL WAVE AND HW = HALF WAVE (NOTE: FW DEVICES CANNOT BE MIXED ON SAME TRANSFORMERS AS HW DEVICES)
[B] VA RATINGS OF NON-PHOENIX PRODUCT (PROVIDED BY OTHERS) CONTROLLED BY OUR OUTPUTS MUST BE FACTORED IN SEPARATELY; SOME EXAMPLES ARE:
(1) PROPORTIONAL REHEAT ACTUATORS USED IN LON & BACNET SYSTEMS
(2) FLOATING POINT REHEAT ACTUATORS USED IN TRACCEL AND THERIS (LON & BACNET) SYSTEMS
[C] VA RATINGS FOR EXTERNAL DC LOADS MUST BE FACTORED IN SEPARATELY
[D] 90-263 VAC INPUT TO PORTAL'S POWER MODULE
[E] IN 24VAC POWER RULES SECTION ON VANTAGE SPECS - 1 OF 2
[F] REFER TO DRAWING "BACNET MS/TP WIRING"
[G] AND ITS ANCILLARY DEVICES (NOT TO EXCEED 96 VA)
[H] MAY SERVE MULTIPLE IF (TOTAL VA OF PCMS & EXTERNAL LOADS) X 1.3 IS LESS THAN 100 VA
[I] COUNTS AS A DEVICE ON PCI8XXX BUT NOT ON LON CHANNELS
[J] CAN ONLY SHARE WITH PCI8XXX OR OTHER PCI-IO-R-34 MODULES
[K] IN BACNET SYSTEMS: GROUND / IN LON SYSTEMS: DO NOT GROUND
[L] MAY SERVE MULTIPLE IF TOTAL VA OF PUB/PUL DEVICES & EXTERNAL LOADS IS < 96 VA
[M] MAXIMUM OF 20 FUME HOOD VALVES PER LON CHANNEL

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

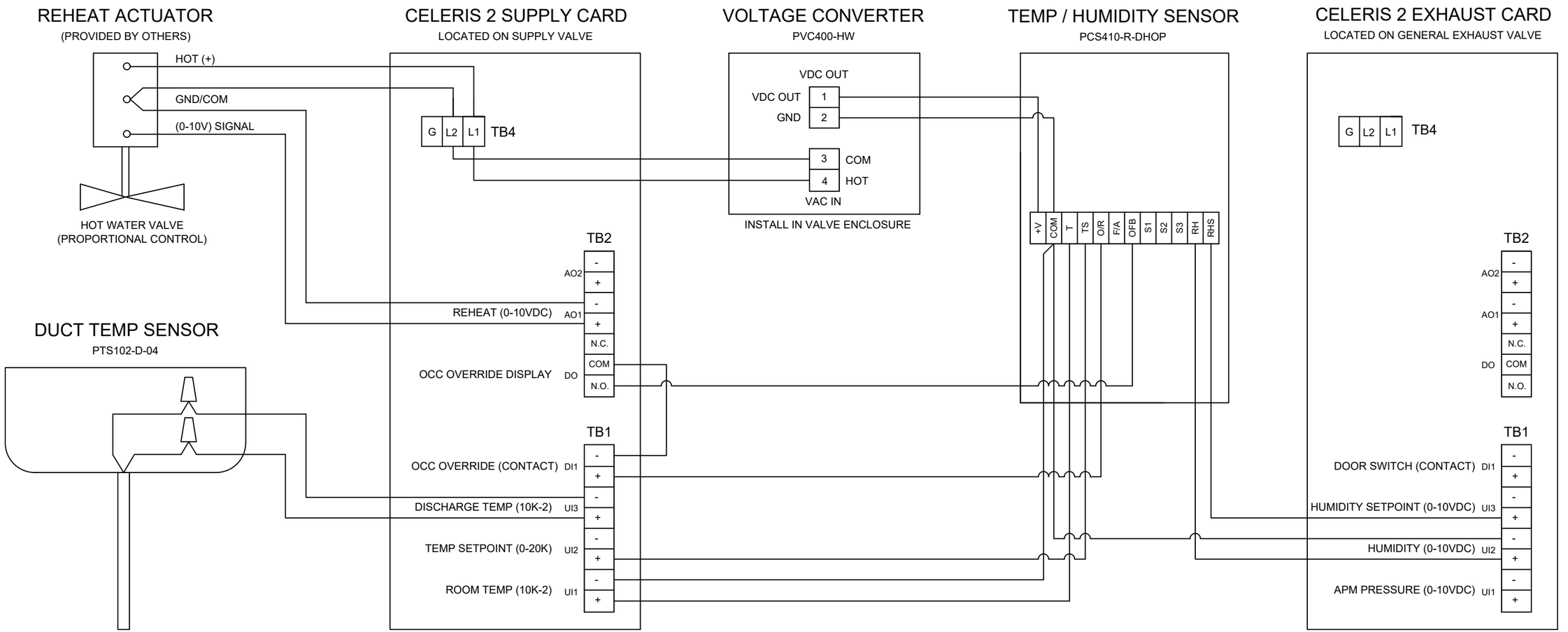
Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

VANTAGE SPECS - 2 OF 2: POWER (BACNET & LON)

CABLE-2

TEMPERATURE & HUMIDITY CONTROL TERMINATION DETAILS

- WALL THERMOSTAT / DUCT TEMP SENSOR / REHEAT CONTROL



NOTES:

1. PHOENIX CONTROLS DOES NOT RECOMMEND WIRING THE SENSOR WITH POWER APPLIED AS ACCIDENTAL ARCHING MAY DAMAGE THE PRODUCT AND WILL VOID THE WARRANTY

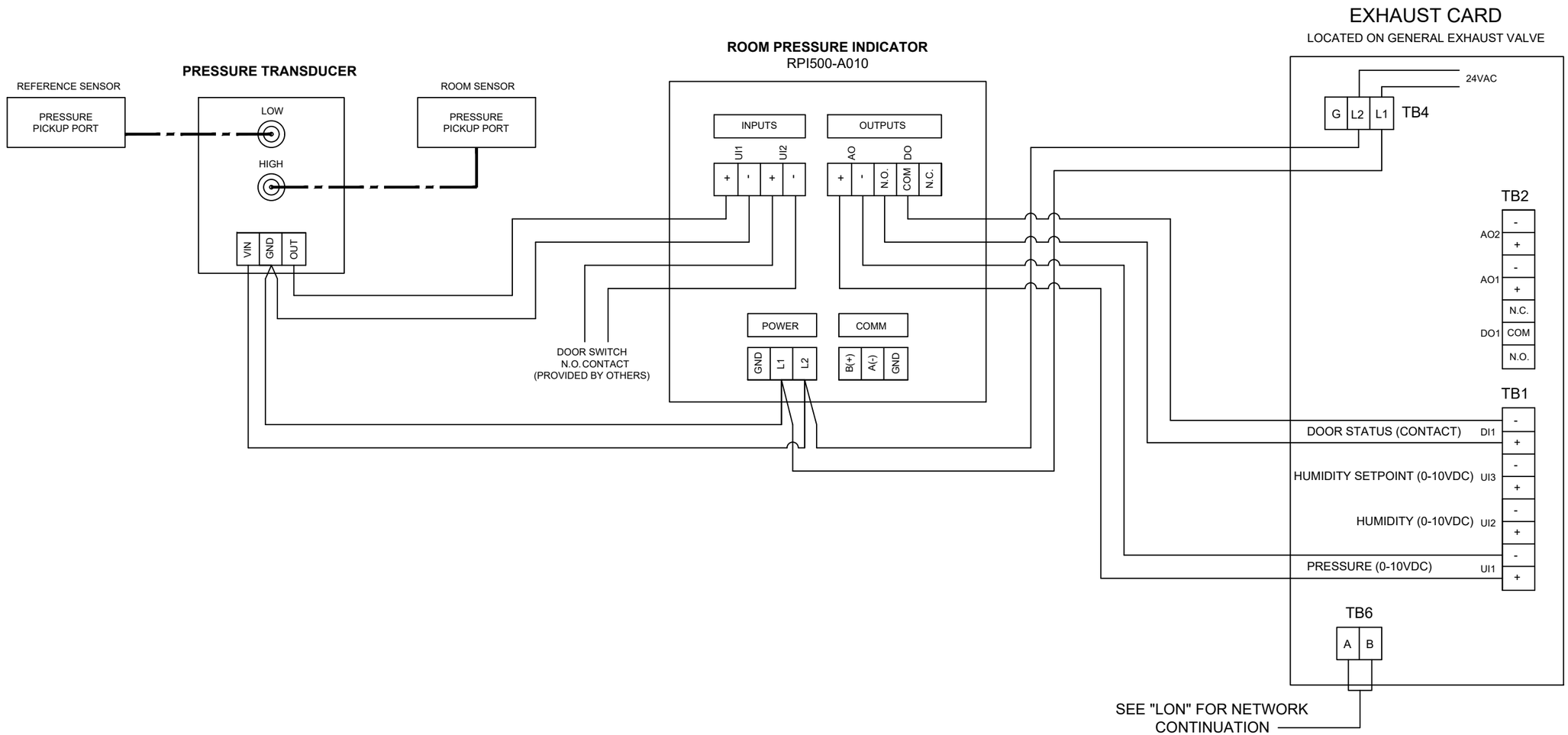
ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

TEMPERATURE CONTROL DRAWING | TEMP

BACNET ROOM PRESSURE INDICATOR



NOTES:

PNEUMATIC TUBING (BY OTHERS)

ACKNOWLEDGMENTS

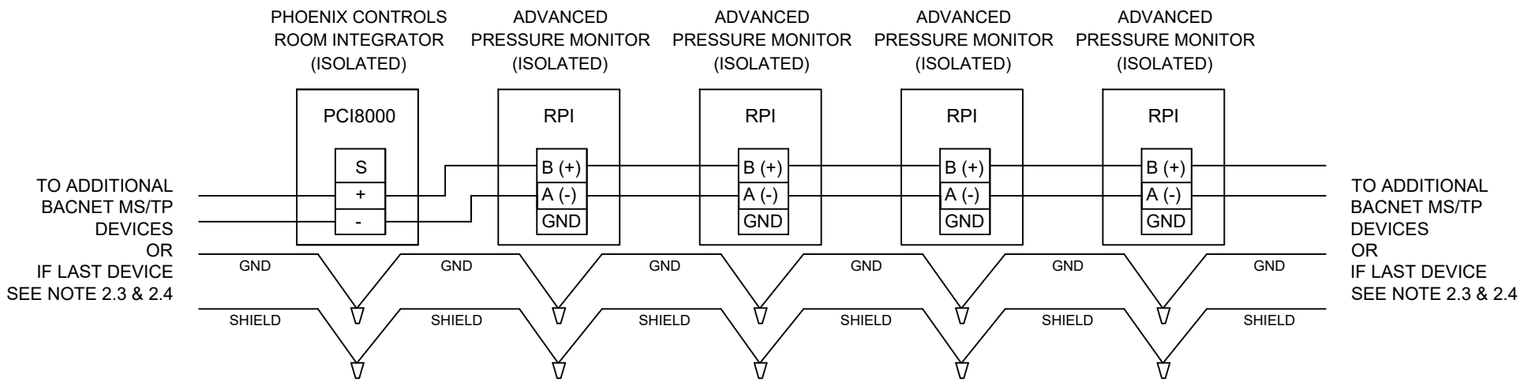
REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

ROOM PRESSURE INDICATOR WIRING

RPI

BACNET MS/TP WIRING WITH SHIELD GROUNDED AT LAST DEVICE (TYPICAL)



BACNET MS/TP WIRING RULES:

1. BACNET MS/TP CABLING:
   - 1.1. 3-CONDUCTOR, SHIELDED CABLE WITH CHARACTERISTIC IMPEDANCE BETWEEN 100 AND 130 OHMS
     - 1.1.1. ALLOW FOR MIX OF ISOLATED AND NON-ISOLATED DEVICES
     - 1.1.2. 22 AWG LIMITED TO 4,000 FT WITHOUT REPEATERS
     - 1.1.3. REFER TO ANTAGE SPECS: TABLE 1
   - 1.2. SEGMENT LENGTH CAN BE EXTENDED BY USE OF REPEATERS (NON-PHOENIX PRODUCT, PROVIDED BY OTHERS)
     - 1.2.1. THREE REPEATERS MAXIMUM BETWEEN ANY TWO BACNET MS/TP DEVICES
2. WIRING SPECIFICATIONS:
   - 2.1. NETWORK POLARITY MUST BE MAINTAINED ON ALL DEVICES: 'PLUS TO PLUS', 'MINUS TO MINUS', 'GROUND TO GROUND', AND 'SHIELD TO SHIELD'
   - 2.2. BUS CONNECT ALL UNUSED CABLE SHIELDS AND GROUND WIRES (NON-ISOLATED & JACE-BASED DEVICES) WITH DEDICATED WIRE NUTS AT EACH DEVICE, THEN CONNECT MS/TP SHIELD AND GROUND WIRE TOGETHER TO EARTH GROUND AT A SINGLE POINT ONLY, TYPICALLY END OF LINE
   - 2.3. TERMINATING RESISTOR THAT MATCHES CABLE IMPEDANCE IS REQUIRED (NON-PHOENIX PRODUCT, PROVIDED BY OTHERS)
   - 2.4. WHEN TDU IS FIRST OR LAST DEVICE INSTALL JUMPER J2 (INTERNAL TERMINATING RESISTOR)
3. ADDING PHOENIX CONTROLS DEVICES TO EXISTING MS/TP NETWORKS:
   - 3.1. THE EXISTING CABLE INSTALLED AS THE MS/TP NETWORK MUST BE VERIFIED FOR COMPATIBILITY WITH MS/TP BACNET CABLE SPECIFICATIONS
   - 3.2. BACNET VALVE CONTROLLERS AND OTHER NON-ISOLATED & JACE-BASED PHOENIX DEVICES MAY BE ADDED TO AN EXISTING 2 CONDUCTOR MS/TP NETWORK. HOWEVER, THE FOLLOWING ISOLATED DEVICE CAN NEVER BE ADDED TO 2 CONDUCTOR (I.E., SHIELDED, TWISTED PAIR) MS/TP NETWORK

ACKNOWLEDGMENTS

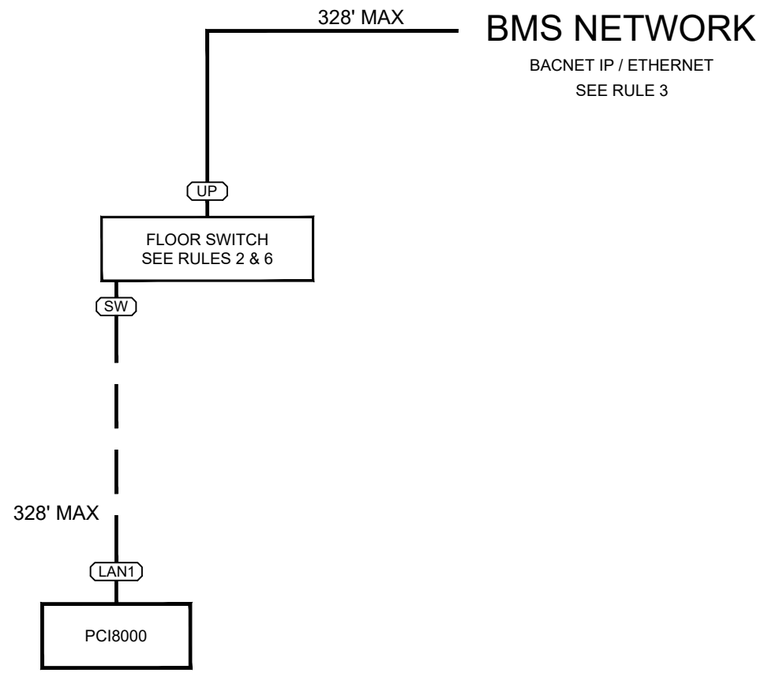
REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

BACNET MS/TP WIRING

BACNET MS/TP

BACNET IP WIRING (TYPICAL)



UPPER LEVEL NETWORK RULES

1. PRIVATE, SINGLE IP, BACNET ETHERNET NETWORK UNDER VANTAGE ROOM MANAGER (RMM) OR SUPERVISOR (SUP)
   * RMM OR SUP REQUIRED WHEN MORE THAN ONE PCI IS USED
2. CONNECTION TO PRIVATE BACNET ETHERNET VIA SWITCHES
   * NON-PHOENIX PRODUCT, TYPICALLY PROVIDED BY PHOENIX REP
   * SELECTION MUST BE APPROVED BY LOCAL IT DEPARTMENT
3. CONNECTION TO BMS NETWORK VIA STANDARD NETWORK INTERFACES (SWITCHES, HUBS, ROUTERS)
   *NON-PHOENIX PRODUCT, TYPICALLY PROVIDED BY BMS
4. DEVICE LIMITS:
   * UP TO 100 TOTAL PHOENIX CONTROLS INTEGRATOR (PCI)
5. CABLING:
   * CAT 5/5E/6/6A CABLE
   * LIMITED TO 328 FT (100 M) PER SEGMENT
6. TOPOLOGY:
   * HOME RUNS REQUIRED FROM:
     - EACH PCI TO THE SWITCH
     - THE SWITCH TO THE RMM/SUP
     - THE RMM/SUP TO THE BMS INTERFACE
   * MAXIMUM OF TWO SWITCHES ALLOWED BETWEEN EACH PCI AND THE RMM/SUP
   * MAXIMUM DISTANCE FROM RMM/SUP TO FARTHEST PCI IS 984 FT (300 M)

PCI RULES

7. UPPER LEVEL CHANNEL: BACNET ETHERNET ONLY
8. LOWER LEVEL CHANNEL LIMITS:
   * PER PCI: 2 ON-BOARD RS-485 BACNET MS/TP PORTS
   * PER PCI: UP TO 4 OPTIONAL COMMUNICATION MODULES
9. POWER: DEDICATED UL LISTED 24 VAC CLASS 2 TRANSFORMER PER PCI TO REDUCE NOISE

LOWER LEVEL "ROOM" NETWORK RULES

10. LON NODE LIMITS:
    * UP TO 49 LON DEVICES WITH 20 FUME HOODS MAXIMUM PER CHANNEL. 197 DEVICES MAXIMUM
      - FIRST LON MODULE SUPPORTS 50 DEVICES
11. LON CABLING:
    * FTT-10 CABLE (22AWG) LIMITED TO 4,500 FT (1,370 M) WITH NO REPEATERS IN BUS TOPOLOGY
    * REFER TO VANTAGE SPECS: TABLE 1
12. BACNET MS/TP LIMITS:
    * SMALLER OF 32 UNIT LOADS OR 50 DEVICES PER NETWORK SEGMENT
    * REFER TO VANTAGE SPECS: TABLE 2
13. BACNET MS/TP CABLING:
    * 3-CONDUCTOR, SHIELDED 22 AWG CABLE LIMITED TO 4,000 FT (1,219 M) WITHOUT REPEATERS IN BUS TOPOLOGY
    * REFER TO VANTAGE SPECS: TABLE 1 AND BACNET MS/TP WIRING

CABLE LEGEND:

- BMS BACNET IP/ETHERNET NETWORK: CAT 5/5E/6/6A
- PRIVATE BACNET ETHERNET NETWORK: CAT 5/5E/6/6A
- VAC — POWER (2 CONDUCTOR)
- ROOM LEVEL - LON: TP (FTTP-10)
- ROOM LEVEL - BACNET MS/TP (3 CONDUCTOR)

ACKNOWLEDGMENTS

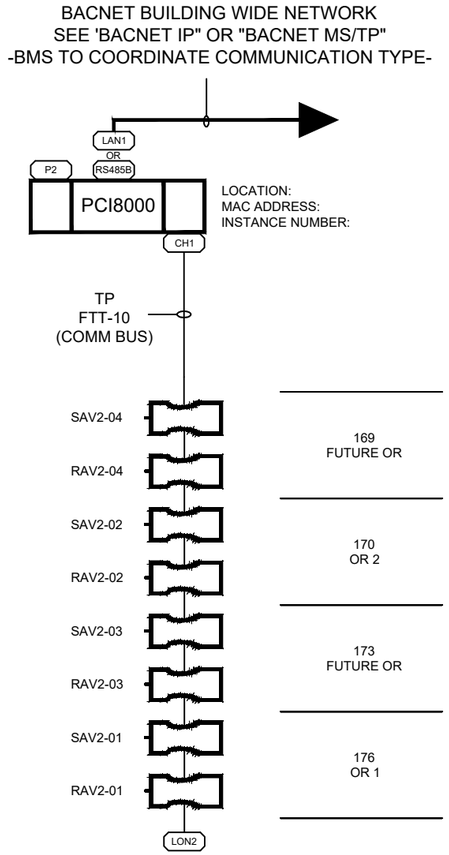
REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

LON TO SINGLE IP - SINGLE SWITCH

BACNET IP

LON NETWORK TOPOLOGY



LON NETWORK WIRING RULES:

1. FTT10 TERMINATION SEQUENCE SHOWN FOR DIAGRAMMATICAL PURPOSES ONLY
2. NETWORK TOPOLOGY ONLY REFERENCES DIGITAL PRODUCTS, FOR ADDITIONAL WIRING SPECIFICATIONS REFER TO INDIVIDUAL ROOM DRAWINGS
3. REFERENCE "VANTAGE SPECS" FOR APPROVED MANUFACTURERS AND CABLE SPECIFICATIONS
4. REFERENCE "LON WIRE DETAILS" SHEET FOR CABLE TERMINATIONS REPRESENTED BY THE SYMBOL: (XX)
5. SEE SPECIFIC ROOM DRAWINGS FOR NETWORK VALVE TERMINATIONS

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

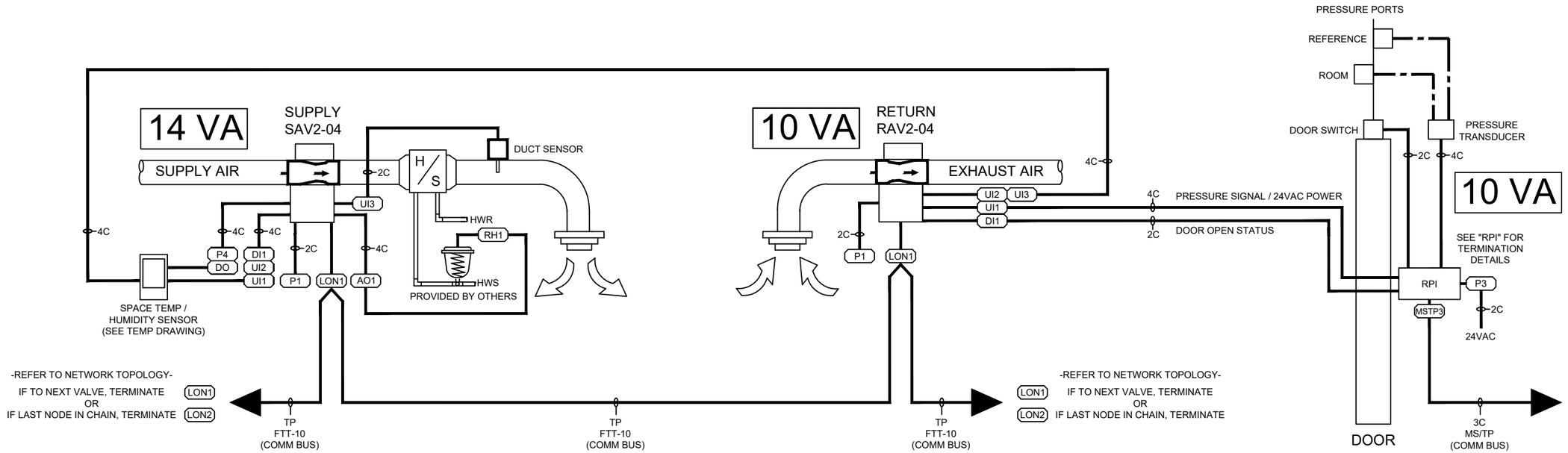
Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

LON TOPOLOGY

LON - PCI

169 - FUTURE OR

- "CELERIS 2" LOW SPEED SUPPLY AND RETURN AIR VALVES
- BACNET ROOM PRESSURE INDICATOR "RPI"



NOTES:

1. REFER TO ROOM SCHEDULE SHEET (RSS)
2. VALVES ARE SHOWN HORIZONTALLY FOR DIAGRAMMATICAL PURPOSES ONLY, ACTUAL VALVE ORIENTATIONS SPECIFIED ON THE RSS
3. REFERENCE "VANTAGE SPECS" FOR SPECIFICATIONS AND ALTERNATIVES (INCLUDING ALTERNATE WIRE COLOR CODES)
4. REFERENCE "LON WIRE DETAILS" FOR CABLE TERMINATIONS REPRESENTED BY THE FOLLOWING SYMBOL:

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

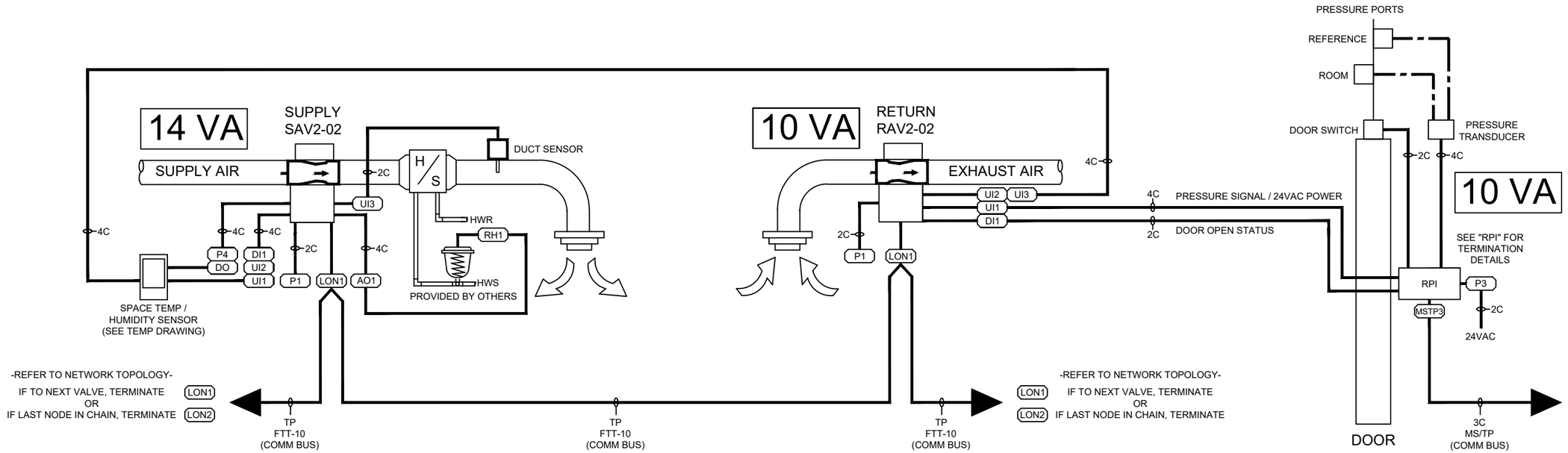
SYMBOL KEY — 2xC = CABLE PROVIDED BY FACTORY — 2xC = CABLE PROVIDED BY OTHERS x = # OF CONDUCTORS — (P) VALVE MOUNTED PRESSURE SWITCH

NUEHEALTH - PLATTE CITY ASC

ROOM - 169

170 - OR 2

- "CELERIS 2" LOW SPEED SUPPLY AND RETURN AIR VALVES
- BACNET ROOM PRESSURE INDICATOR "RPI"



NOTES:

1. REFER TO ROOM SCHEDULE SHEET (RSS)
2. VALVES ARE SHOWN HORIZONTALLY FOR DIAGRAMMATICAL PURPOSES ONLY, ACTUAL VALVE ORIENTATIONS SPECIFIED ON THE RSS
3. REFERENCE "VANTAGE SPECS" FOR SPECIFICATIONS AND ALTERNATIVES (INCLUDING ALTERNATE WIRE COLOR CODES)
4. REFERENCE "LON WIRE DETAILS" FOR CABLE TERMINATIONS REPRESENTED BY THE FOLLOWING SYMBOL:

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

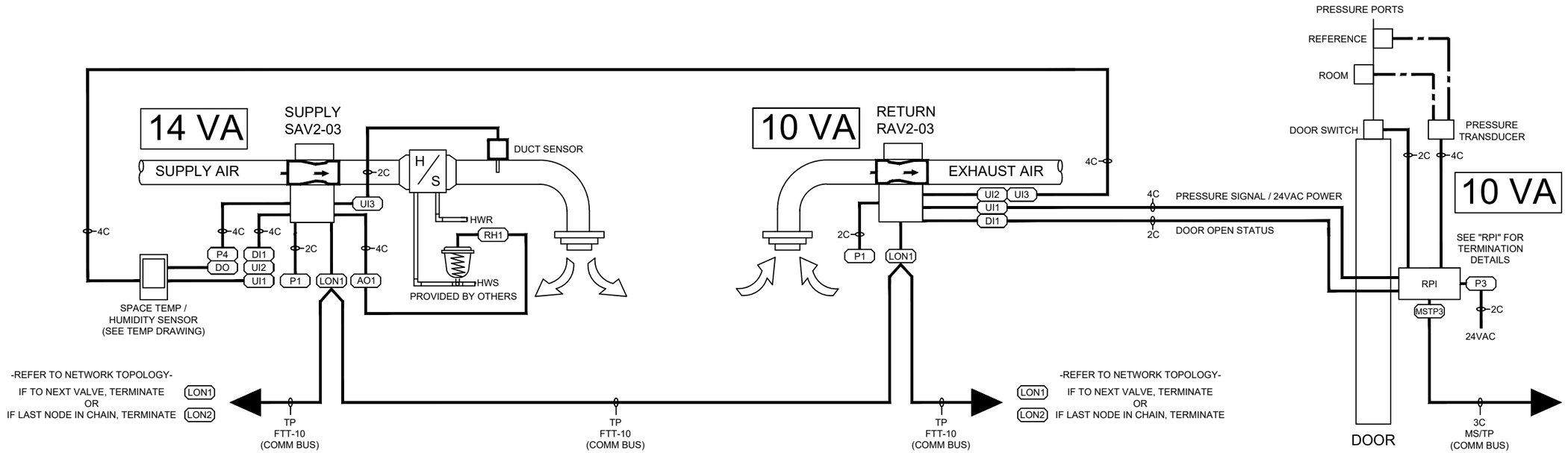
SYMBOL KEY — 2xC = CABLE PROVIDED BY FACTORY — 2xC = CABLE PROVIDED BY OTHERS x = # OF CONDUCTORS — (P) VALVE MOUNTED PRESSURE SWITCH

NUEHEALTH - PLATTE CITY ASC

ROOM - 170

173 - FUTURE OR

- "CELERIS 2" LOW SPEED SUPPLY AND RETURN AIR VALVES
- BACNET ROOM PRESSURE INDICATOR "RPI"



NOTES:

1. REFER TO ROOM SCHEDULE SHEET (RSS)
2. VALVES ARE SHOWN HORIZONTALLY FOR DIAGRAMMATICAL PURPOSES ONLY, ACTUAL VALVE ORIENTATIONS SPECIFIED ON THE RSS
3. REFERENCE "VANTAGE SPECS" FOR SPECIFICATIONS AND ALTERNATIVES (INCLUDING ALTERNATE WIRE COLOR CODES)
4. REFERENCE "LON WIRE DETAILS" FOR CABLE TERMINATIONS REPRESENTED BY THE FOLLOWING SYMBOL:

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

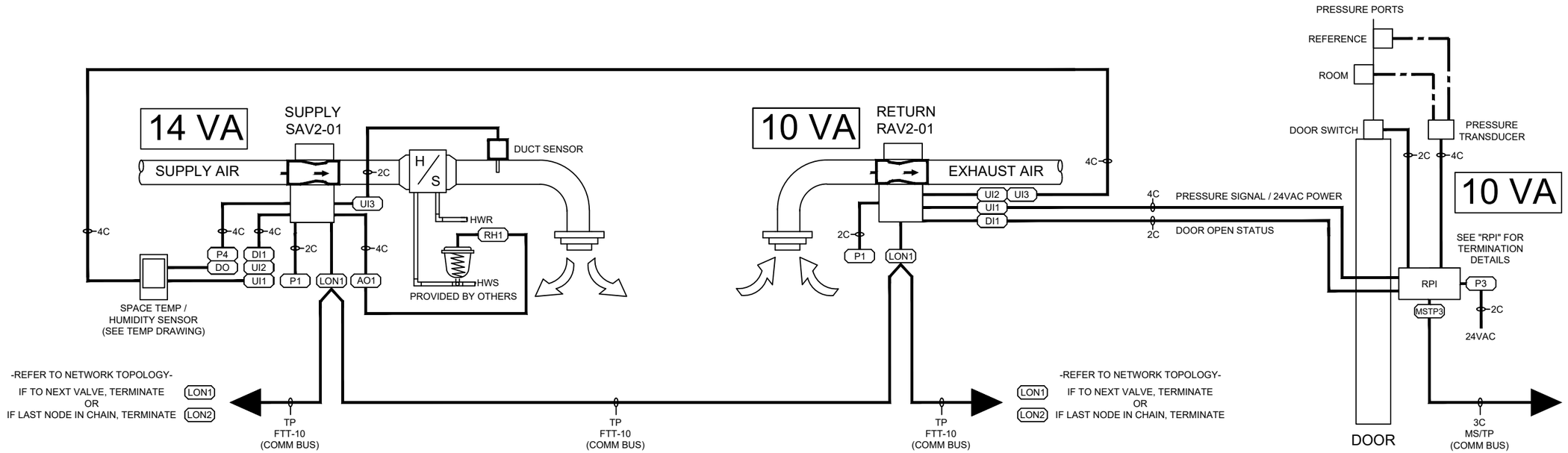
SYMBOL KEY — 2C = CABLE PROVIDED BY FACTORY — 2C = CABLE PROVIDED BY OTHERS x = # OF CONDUCTORS — (P) VALVE MOUNTED PRESSURE SWITCH

NUEHEALTH - PLATTE CITY ASC

ROOM - 173

176 - OR 1

- "CELERIS 2" LOW SPEED SUPPLY AND RETURN AIR VALVES
- BACNET ROOM PRESSURE INDICATOR "RPI"



NOTES:

1. REFER TO ROOM SCHEDULE SHEET (RSS)
2. VALVES ARE SHOWN HORIZONTALLY FOR DIAGRAMMATICAL PURPOSES ONLY, ACTUAL VALVE ORIENTATIONS SPECIFIED ON THE RSS
3. REFERENCE "VANTAGE SPECS" FOR SPECIFICATIONS AND ALTERNATIVES (INCLUDING ALTERNATE WIRE COLOR CODES)
4. REFERENCE "LON WIRE DETAILS" FOR CABLE TERMINATIONS REPRESENTED BY THE FOLLOWING SYMBOL:

ACKNOWLEDGMENTS

REV	DATE	DRAWN BY
		DAVID HOPKIN
		DATE
		5/21/2025

Phoenix Controls
Associated Air Products
14900 West 107th St
Lenexa, KS 66215
Tel 913-894-5600
David Hopkin
Cell 314-603-5568
Office 636-489-1885

SYMBOL KEY — 2xC = CABLE PROVIDED BY FACTORY — 2xC = CABLE PROVIDED BY OTHERS x = # OF CONDUCTORS — (P) VALVE MOUNTED PRESSURE SWITCH

NUEHEALTH - PLATTE CITY ASC

ROOM - 176

A S S O C I A T E D A I R P R O D U C T S
14900 West 107th Street - Lenexa, KS 66215
Phone: (913) 894-5600 - Fax: (913) 894-0648 – **Email**: rmustain@aap-kc.com

Platte City ASC –NueHealth

Tab 4

Coils Ratings Sheet

Rating Sheet

Associated Air Products

14900 West 107TH Street / Lenexa KS 662150000
Phone # - 9138945600 / Fax # - 9138940648
Rex H Mustain

Customer: Sell To Customer Company Name **Job: Platte City ASC - NueHealth**
Quote #: 1000031 **Item #: 5**

P#217/58B-15X30-10-2WHR-B

RHC-1

No. Coils:	1	Coil Type:	Water - Heating
Fin Height (In.):	15	Fin Mat./Thickness/Type:	Aluminum/ 0.008/ Waffle
Fin Length (In.):	30	Tube Mat./Wall/OD:	Copper/ 0.020/ 5/8 Inch
Air Flow/Coil (ACFM/SCFM)	1250 / 1270 (A)	Tube Spacing:	1.5 x 1.299
ACFM/SCFM Velocity (fpm):	400 / 406.5	Tube Surface:	Smooth
EDB (°F):	43	Casing Material:	Galv
EWT (°F):	150	Altitude (Feet):	1000
GPM (Fluid Flow/Coil):	2.4	Fluid Type:	Water
Rows/FPI:	2/10	FF Inside*:	0
Circuiting:	0	FF Outside*:	0

	Per Coil	Total All Coils
LDB (°F):	77.4	
Total Heat (BTUH):	47,278	47,278
Sensible. Heat (BTUH):	47,278	47,278
LWT (°F):	110.0	
Fluid Flow (GPM):	2.4	2.4
Fluid Press. Drop (Feet):	0.13	
Tube Velocity (fps):	0.53	
Reynolds number:	4,817.86	
Air Pressure Drop (in W.G.):	0.12	
Connection Size (In.):	1	
Approximate Fluid Volume (Gal) :	1.0	1.0

Uncrated, Dry Coil Weight: 38.7

Coil is NOT certified by AHRI. Coil is outside the scope of the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program.
All ratings assume a standard coil orientation with horizontal tubes and a vertical coil face with horizontal airflow.

Printed on 6/9/2025 using Total Package II; program version 3.28.2024.4 - DLL/Data 1.0.5.100/

* (Hr*ft^2*°F/Btu) Fouling Factor Units

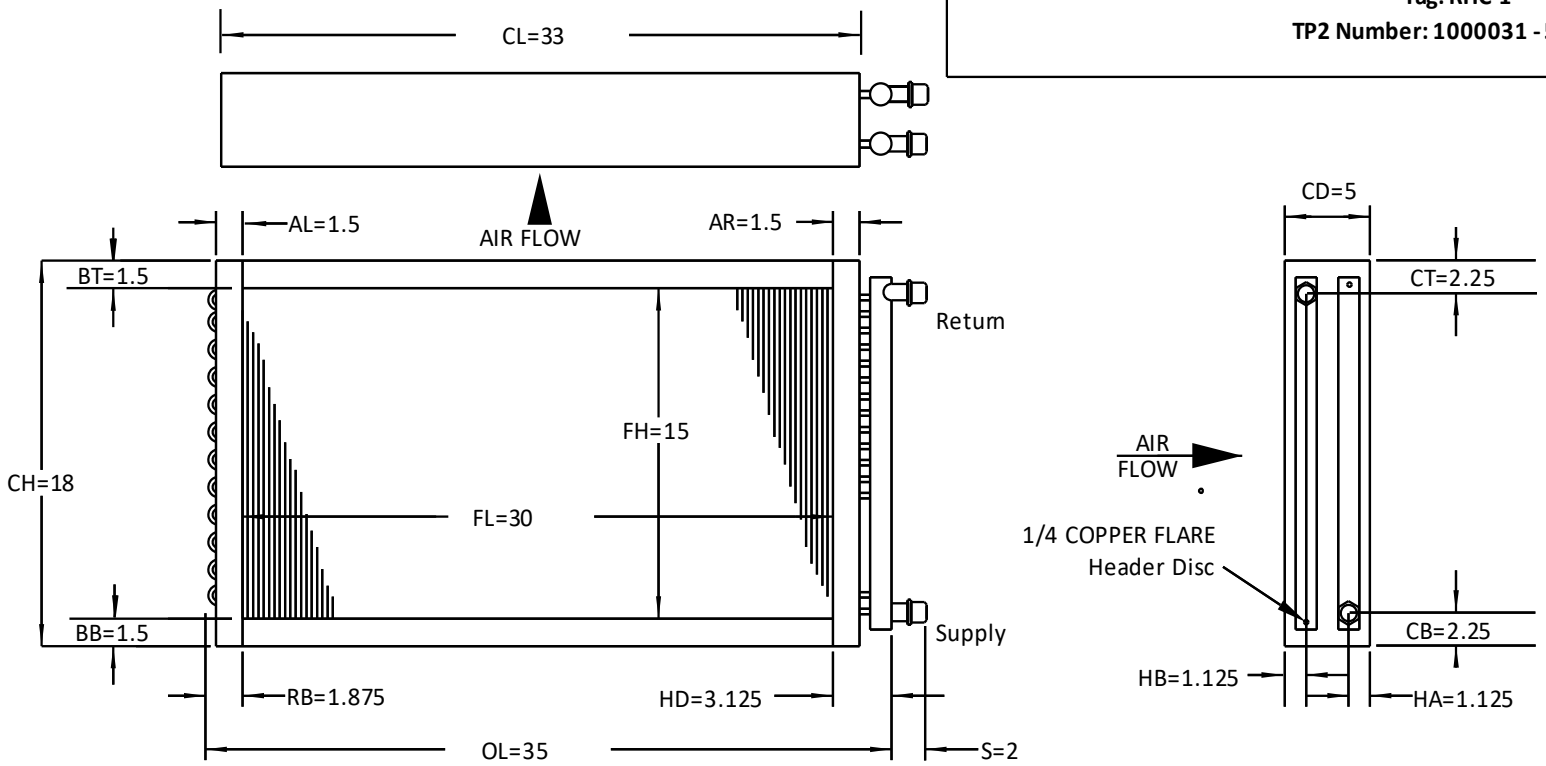
Sell To Customer Company Name

P#217/58B-15X30-10-2WHR-B

Project: Platte City ASC - NueHealth

Tag: RHC-1

TP2 Number: 1000031 - 5 Qty(1)



Fin Type:	**Waffle**
Fin Material:	**Aluminum**
Fin Thickness:	**0.008**
Rows/FPI:	**2/10**
Circuiting:	**0**
Tube Type:	**5/8 Inch / Copper / Smooth**
Tube Thickness:	**0.020**
Casing: Galv Gages: TS=16/ SP=16	

Connection Material:	**Copper**
Supply Connection Size:	**1**
Return Connection Size:	**1**
Connection Type:	**MPT**
App. weight (Uncrated each) :	**38.7**

Approximate Fluid Volume (Gal) : 0.9
Tube Sheet Flange Standard
Side Plate Flange: Standard

Date: 6/9/2025 10:27:36 AM **Program Version: 3.28.2024.4** **Sales Person: Rex H Mustain**

RAE Corporation
4492 Hunt St Pryor, OK 74361 Phone 918.825.7222 Fax 1.800.264.5329

Rating Sheet

Associated Air Products

14900 West 107TH Street / Lenexa KS 662150000
Phone # - 9138945600 / Fax # - 9138940648
Rex H Mustain

Customer: Sell To Customer Company Name **Job: Platte City ASC - NueHealth**
Quote #: 1000031 **Item #: 6**

P#217/58B-15X30-10-2WHR-B

RHC-2

No. Coils:	1	Coil Type:	Water - Heating
Fin Height (In.):	15	Fin Mat./Thickness/Type:	Aluminum/ 0.008/ Waffle
Fin Length (In.):	30	Tube Mat./Wall/OD:	Copper/ 0.020/ 5/8 Inch
Air Flow/Coil (ACFM/SCFM)	1250 / 1270 (A)	Tube Spacing:	1.5 x 1.299
ACFM/SCFM Velocity (fpm):	400 / 406.5	Tube Surface:	Smooth
EDB (°F):	43	Casing Material:	Galv
EWT (°F):	150	Altitude (Feet):	1000
GPM (Fluid Flow/Coil):	2.4	Fluid Type:	Water
Rows/FPI:	2/10	FF Inside*:	0
Circuiting:	0	FF Outside*:	0

	Per Coil	Total All Coils
LDB (°F):	77.4	
Total Heat (BTUH):	47,278	47,278
Sensible. Heat (BTUH):	47,278	47,278
LWT (°F):	110.0	
Fluid Flow (GPM):	2.4	2.4
Fluid Press. Drop (Feet):	0.13	
Tube Velocity (fps):	0.53	
Reynolds number:	4,817.86	
Air Pressure Drop (in W.G.):	0.12	
Connection Size (In.):	1	
Approximate Fluid Volume (Gal) :	1.0	1.0

Uncrated, Dry Coil Weight: 38.7

Coil is NOT certified by AHRI. Coil is outside the scope of the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program.
All ratings assume a standard coil orientation with horizontal tubes and a vertical coil face with horizontal airflow.

Printed on 6/9/2025 using Total Package II; program version 3.28.2024.4 - DLL/Data 1.0.5.100/

* (Hr*ft^2*°F/Btu) Fouling Factor Units

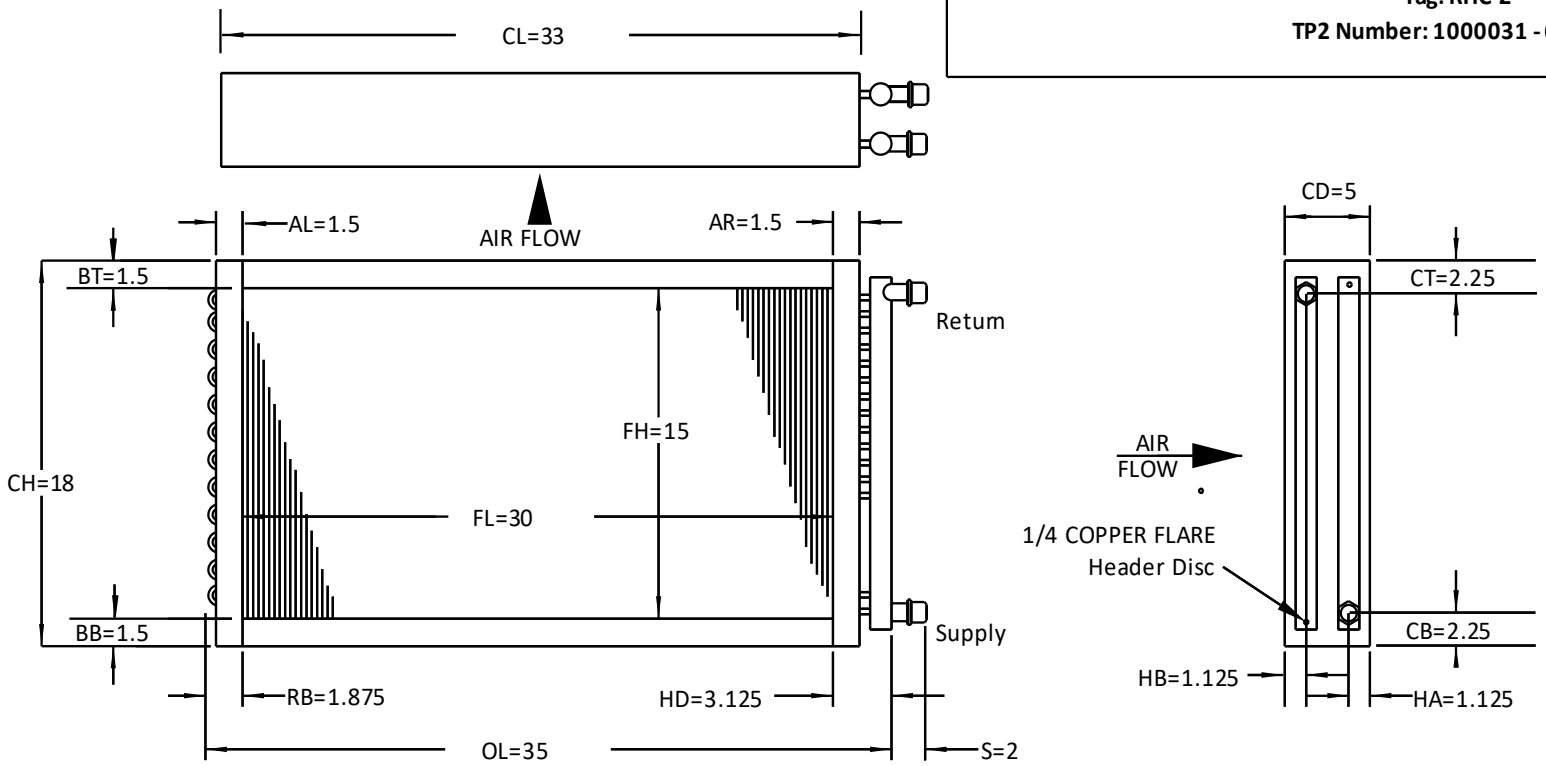
Sell To Customer Company Name

P#217/58B-15X30-10-2WHR-B

Project: Platte City ASC - NueHealth

Tag: RHC-2

TP2 Number: 1000031 - 6 Qty(1)



Fin Type:	**Waffle**
Fin Material:	**Aluminum**
Fin Thickness:	**0.008**
Rows/FPI:	**2/10**
Circuiting:	**0**
Tube Type:	**5/8 Inch / Copper / Smooth**
Tube Thickness:	**0.020**
Casing: Galv Gages: TS=16/ SP=16	

Connection Material:	**Copper**
Supply Connection Size:	**1**
Return Connection Size:	**1**
Connection Type:	**MPT**
App. weight (Uncrated each) :	**38.7**

Approximate Fluid Volume (Gal) : 0.9
Tube Sheet Flange Standard
Side Plate Flange: Standard

Date: 6/9/2025 10:27:58 AM **Program Version: 3.28.2024.4** **Sales Person: Rex H Mustain**

RAE Corporation
4492 Hunt St Pryor, OK 74361 Phone 918.825.7222 Fax 1.800.264.5329

Rating Sheet

Associated Air Products

14900 West 107TH Street / Lenexa KS 662150000
Phone # - 9138945600 / Fax # - 9138940648
Rex H Mustain

Customer: Sell To Customer Company Name **Job: Platte City ASC - NueHealth**
Quote #: 1000031 **Item #: 7**

P#213/58B-12X30-10-2WHR-A

RHC-3

No. Coils:	1	Coil Type:	Water - Heating
Fin Height (In.):	12	Fin Mat./Thickness/Type:	Aluminum/ 0.008/ Waffle
Fin Length (In.):	30	Tube Mat./Wall/OD:	Copper/ 0.020/ 5/8 Inch
Air Flow/Coil (ACFM/SCFM)	1250 / 1270 (A)	Tube Spacing:	1.5 x 1.299
ACFM/SCFM Velocity (fpm):	500 / 508.1	Tube Surface:	Smooth
EDB (°F):	43	Casing Material:	Galv
EWT (°F):	150	Altitude (Feet):	1000
GPM (Fluid Flow/Coil):	2.4	Fluid Type:	Water
Rows/FPI:	2/10	FF Inside*:	0
Circuiting:	0	FF Outside*:	0

	Per Coil	Total All Coils
LDB (°F):	76.0	
Total Heat (BTUH):	45,361	45,361
Sensible. Heat (BTUH):	45,361	45,361
LWT (°F):	111.7	
Fluid Flow (GPM):	2.4	2.4
Fluid Press. Drop (Feet):	0.29	
Tube Velocity (fps):	0.66	
Reynolds number:	6,064.36	
Air Pressure Drop (in W.G.):	0.17	
Connection Size (In.):	0.75	
Approximate Fluid Volume (Gal) :	0.8	0.8

Uncrated, Dry Coil Weight: 33.3

Coil is NOT certified by AHRI. Coil is outside the scope of the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program.
All ratings assume a standard coil orientation with horizontal tubes and a vertical coil face with horizontal airflow.

Printed on 6/9/2025 using Total Package II; program version 3.28.2024.4 - DLL/Data 1.0.5.100/

* (Hr*ft^2*°F/Btu) Fouling Factor Units

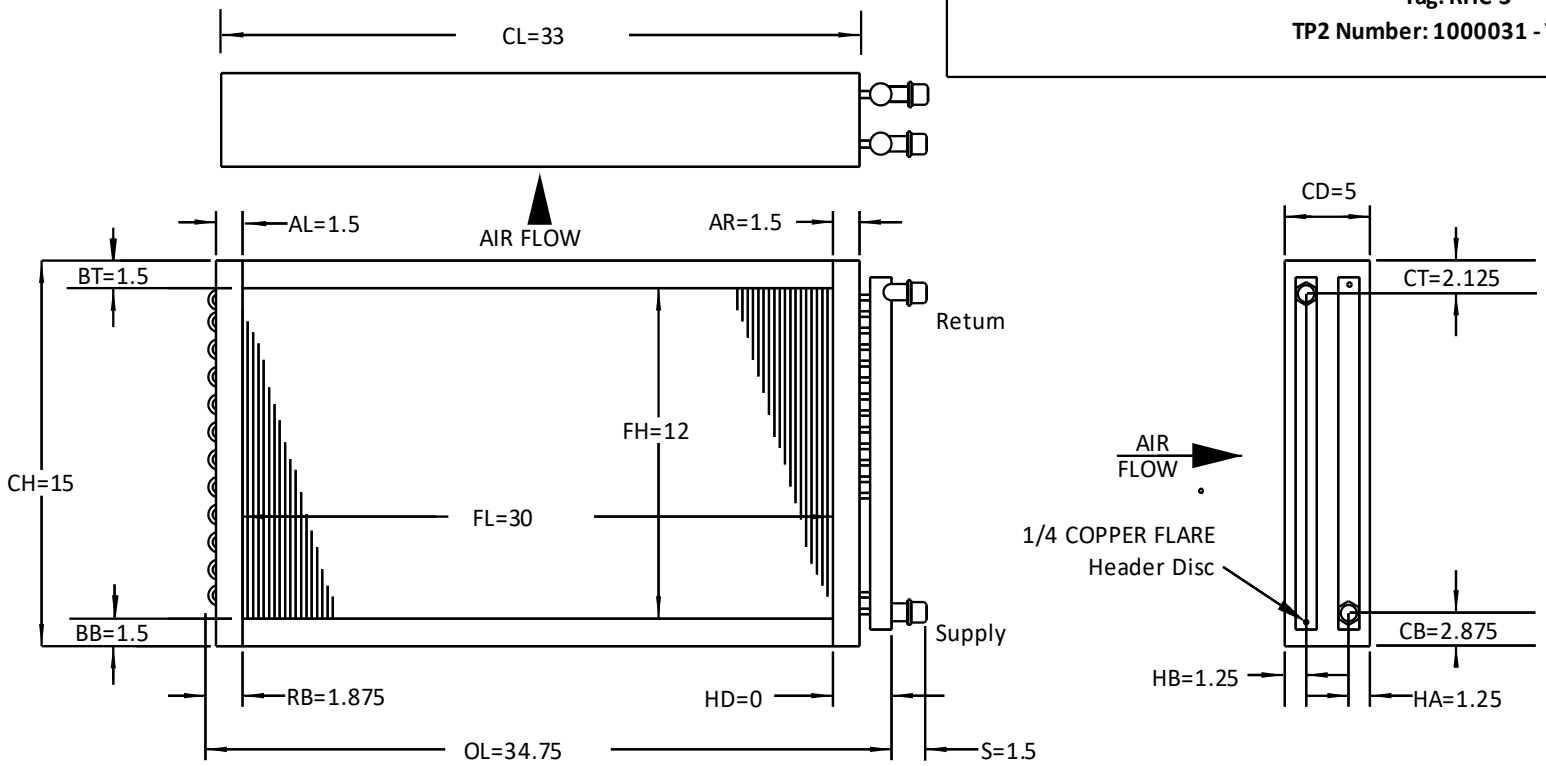
Sell To Customer Company Name

P#213/58B-12X30-10-2WHR-A

Project: Platte City ASC - NueHealth

Tag: RHC-3

TP2 Number: 1000031 - 7 Qty(1)



Fin Type:	**Waffle**
Fin Material:	**Aluminum**
Fin Thickness:	**0.008**
Rows/FPI:	**2/10**
Circuiting:	**0**
Tube Type:	**5/8 Inch / Copper / Smooth**
Tube Thickness:	**0.020**
Casing: Galv Gages: TS=16/ SP=16	

Connection Material:	**Copper**
Supply Connection Size:	**0.75**
Return Connection Size:	**0.75**
Connection Type:	**MPT**
App. weight (Uncrated each) :	**33.3**

Approximate Fluid Volume (Gal) : 0.8
Tube Sheet Flange Standard
Side Plate Flange: Standard

Date: 6/9/2025 10:28:43 AM **Program Version: 3.28.2024.4** **Sales Person: Rex H Mustain**

RAE Corporation
4492 Hunt St Pryor, OK 74361 Phone 918.825.7222 Fax 1.800.264.5329

Rating Sheet

Associated Air Products

14900 West 107TH Street / Lenexa KS 662150000
Phone # - 9138945600 / Fax # - 9138940648
Rex H Mustain

Customer: Sell To Customer Company Name **Job: Platte City ASC - NueHealth**
Quote #: 1000031 **Item #: 8**

P#213/58B-12X30-10-2WHR-A

RHC-4

No. Coils:	1	Coil Type:	Water - Heating
Fin Height (In.):	12	Fin Mat./Thickness/Type:	Aluminum/ 0.008/ Waffle
Fin Length (In.):	30	Tube Mat./Wall/OD:	Copper/ 0.020/ 5/8 Inch
Air Flow/Coil (ACFM/SCFM)	1250 / 1270 (A)	Tube Spacing:	1.5 x 1.299
ACFM/SCFM Velocity (fpm):	500 / 508.1	Tube Surface:	Smooth
EDB (°F):	43	Casing Material:	Galv
EWT (°F):	150	Altitude (Feet):	1000
GPM (Fluid Flow/Coil):	2.4	Fluid Type:	Water
Rows/FPI:	2/10	FF Inside*:	0
Circuiting:	0	FF Outside*:	0

	Per Coil	Total All Coils
LDB (°F):	76.0	
Total Heat (BTUH):	45,361	45,361
Sensible. Heat (BTUH):	45,361	45,361
LWT (°F):	111.7	
Fluid Flow (GPM):	2.4	2.4
Fluid Press. Drop (Feet):	0.29	
Tube Velocity (fps):	0.66	
Reynolds number:	6,064.36	
Air Pressure Drop (in W.G.):	0.17	
Connection Size (In.):	0.75	
Approximate Fluid Volume (Gal) :	0.8	0.8

Uncrated, Dry Coil Weight: 33.3

Coil is NOT certified by AHRI. Coil is outside the scope of the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program.
All ratings assume a standard coil orientation with horizontal tubes and a vertical coil face with horizontal airflow.

Printed on 6/9/2025 using Total Package II; program version 3.28.2024.4 - DLL/Data 1.0.5.100/

* (Hr*ft^2*°F/Btu) Fouling Factor Units

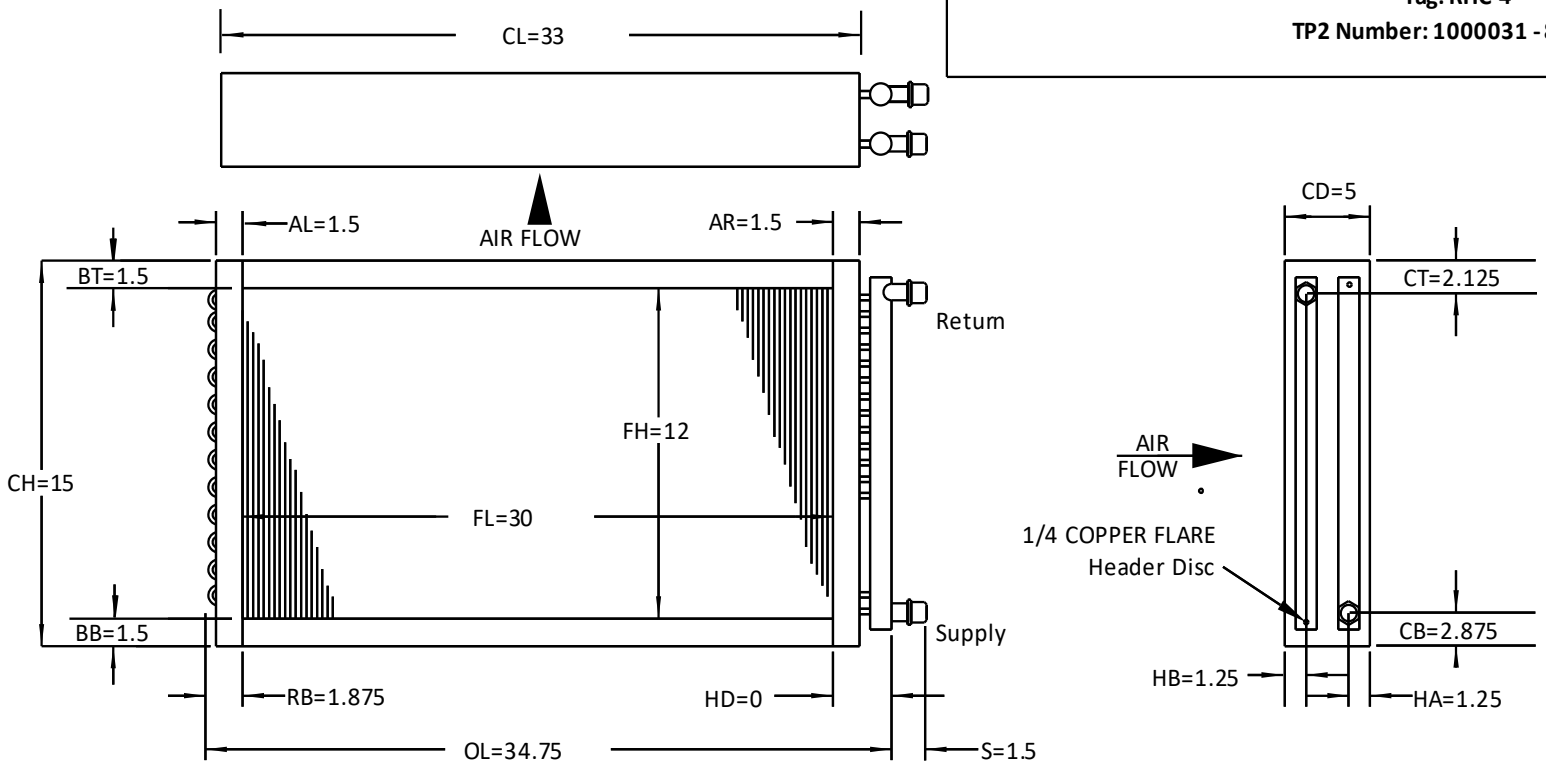
Sell To Customer Company Name

P#213/58B-12X30-10-2WHR-A

Project: Platte City ASC - NueHealth

Tag: RHC-4

TP2 Number: 1000031 - 8 Qty(1)



Fin Type: Waffle
Fin Material: Aluminum
Fin Thickness: 0.008
Rows/FPI: 2/10
Circuiting: 0
Tube Type: 5/8 Inch / Copper / Smooth
Tube Thickness: 0.020
Casing: Galv Gages: TS=16/ SP=16

Connection Material: Copper
Supply Connection Size: 0.75
Return Connection Size: 0.75
Connection Type: MPT
App. weight (Uncrated each) : 33.3

Approximate Fluid Volume (Gal) : 0.8
Tube Sheet Flange Standard
Side Plate Flange: Standard

Date: 6/9/2025 10:29:05 AM **Program Version: 3.28.2024.4** **Sales Person: Rex H Mustain**

RAE Corporation
4492 Hunt St Pryor, OK 74361 Phone 918.825.7222 Fax 1.800.264.5329