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Phoenix Interface (PHX200 or PHX600)

The Phoenix Lab and Fume Hood Interface Module (PHX) is an input/out device that connects a Phoenix Controls Corporation Makeup Air Controller Interface (MIJ) to a Johnson Controls Metasys[®] Network or Companion[™] System. Cooperatively designed between Johnson Controls, Inc. and Phoenix Controls Corporation, the PHX provides complete point monitoring and control of laboratory airflow control applications.

The PHX is fully supported by Metasys Revision 5.0, Companion 4.0, HVAC PRO[™] 4.0 (or greater) configuration software, and the Zone Terminal. The PHX 200/600 also controls the temperature of the lab by anticipating changes in temperature caused by fume hood airflow variations.

The combined package controls laboratory airflow conditions and communicates to the Metasys Network, thus providing a constant and safe laboratory and fume hood environment.

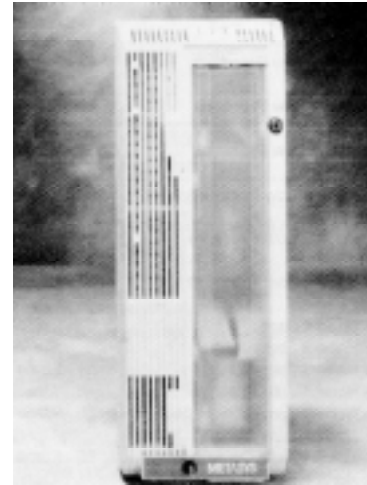


Figure 1: Phoenix Interface Module 200/600

Features and Benefits	
<input type="checkbox"/> N2 Bus Network Communications	Laboratory airflow and fume hood information is integrated into the Metasys Network at the Operator Workstation or Companion.
<input type="checkbox"/> System Synergy	More than 120 points can be monitored or controlled on up to six fume hoods and the laboratory.
<input type="checkbox"/> Local Zone Bus Communications	JCI Zone Terminal provides control and monitoring of points.
<input type="checkbox"/> Phoenix Controls Corporation Maintains Customer Expectations in Lab and Fume Hood Safety	Phoenix Controls Makeup Air Controller provides less than one second fume hood sash and lab pressurization response time.
<input type="checkbox"/> Johnson Controls, Inc. Maintains Customer Expectations in Total Facility Management	JCI temperature and humidity controls provide a stable facility and lab environment.

N₂ Communication Points for a Six Hood Laboratory

This list of points is the total number of points possible for N₂ Communication per a six hood laboratory.

1 - Fume Hood 1 Flow	42 - Actual Flow Offset	84 - Total Lab Exhaust Airflow
2 - Fume Hood 2 Flow	43 - Lab Offset Override	85 - Total Lab Exhaust Alarm
3 - Fume Hood 3 Flow	44 - Exhaust Flow Scale Factor	86 - Switched Supply Airflow
4 - Fume Hood 4 Flow	45 - Supply Flow Scale Factor	87 - Switched Exhaust Airflow
5 - Fume Hood 5 Flow	46 - Fume Hood 1 Min Sash Opening	88 - Constant Supply Airflow
6 - Fume Hood 6 Flow	47 - Fume Hood 1 Max Sash Opening	89 - Constant Exhaust Airflow
7 - Fume Hood 1 Low Pressure Alarm	48 - Fume Hood 2 Min Sash Opening	90 - Office Supply Airflow
8 - Fume Hood 2 Low Pressure Alarm	49 - Fume Hood 2 Max Sash Opening	91 - Office Supply Airflow Alarm
9 - Fume Hood 3 Low Pressure Alarm	50 - Fume Hood 3 Min Sash Opening	92 - Max Makeup Airflow
10 - Fume Hood 4 Low Pressure Alarm	51 - Fume Hood 3 Max Sash Opening	93 - Occupied Lab Temp Setpoint
11 - Fume Hood 5 Low Pressure Alarm	52 - Fume Hood 4 Min Sash Opening	94 - Unoccupied Lab Temp Setpoint
12 - Fume Hood 6 Low Pressure Alarm	53 - Fume Hood 4 Max Sash Opening	95 - Lab Remote Temp Setpoint
13 - Fume Hood 1 Jam Alarm	54 - Fume Hood 5 Min Sash Opening	96 - Supply Air Low Temp
14 - Fume Hood 2 Jam Alarm	55 - Fume Hood 5 Max Sash Opening	97 - Supply Air High Temp
15 - Fume Hood 3 Jam Alarm	56 - Fume Hood 6 Min Sash Opening	98 - Lab Temp
16 - Fume Hood 4 Jam Alarm	57 - Fume Hood 6 Max Sash Opening	99 - Lab Supply Air Temp
17 - Fume Hood 5 Jam Alarm	58 - Fume Hood 1 Velocity	100 - Adjacent Ambient Temp
18 - Fume Hood 6 Jam Alarm	59 - Fume Hood 2 Velocity	101 - Lab Supply Temp Setpoint (Calculated)
19 - Fume Hood 1 Flow Command	60 - Fume Hood 3 Velocity	102 - Lab Supply Air Cooling Prop Band
20 - Fume Hood 2 Flow Command	61 - Fume Hood 4 Velocity	103 - Lab Supply Air Cooling Integration
21 - Fume Hood 3 Flow Command	62 - Fume Hood 5 Velocity	104 - Cooling Command
22 - Fume Hood 4 Flow Command	63 - Fume Hood 6 Velocity	105 - Thermal Demand
23 - Fume Hood 5 Flow Command	64 - Fume Hood 1 Sash Position	106 - Space Heat Flow Rate
24 - Fume Hood 6 Flow Command	65 - Fume Hood 2 Sash Position	107 - Lab Supply Heating Prop Band
25 - Fume Hood 1 Emergency Override	66 - Fume Hood 3 Sash Position	108 - Lab Supply Heating Dead Band
26 - Fume Hood 2 Emergency Override	67 - Fume Hood 4 Sash Position	109 - Lab Supply Heating Integration
27 - Fume Hood 3 Emergency Override	68 - Fume Hood 5 Sash Position	110 - Heating Command
28 - Fume Hood 4 Emergency Override	69 - Fume Hood 6 Sash Position	111 - Hot Deck Airflow
29 - Fume Hood 5 Emergency Override	70 - Fume Hood 1 Local Occupied	112 - Hot Deck Airflow Alarm
30 - Fume Hood 6 Emergency Override	71 - Fume Hood 2 Local Occupied	113 - Vent Mode
31 - Makeup Airflow	72 - Fume Hood 3 Local Occupied	114 - Purge Mode
32 - Makeup Airflow Alarm	73 - Fume Hood 4 Local Occupied	115 - Vent Command
33 - Makeup VFD Flow	74 - Fume Hood 5 Local Occupied	116 - Purge Command
34 - Makeup VFD Flow Alarm	75 - Fume Hood 6 Local Occupied	117 - Vent Status
35 - General Exhaust Flow	76 - Occupied Status	118 - Purge Status
36 - General Exhaust Flow Alarm	77 - Shutdown Status	119 - Lab Humidity Sensor
37 - Return Airflow	78 - Bypass Valve Airflow	120 - Occupied Lab Humidity Setpoint
38 - Return Airflow Alarm	79 - Bypass Valve Airflow Alarm	121 - Unoccupied Lab Humidity Setpoint
39 - Lab Flow Offset Setpoint	80 - Building Exhaust Airflow	122 - Lab Humidity Prop Band
40 - Lab Flow Offset Default Setpoint	81 - Building Exhaust Airflow Alarm	123 - Lab Humidity Dead Band
41 - Lab Offset Polarity	82 - Ancillary Exhaust Airflow	124 - Lab Humidity Integration
	83 - Ancillary Exhaust Airflow Alarm	125 - Lab Humidity Offset
		126 - Lab Humidity Stroke Time
		127 - Lab Humidity Command
		128 - Occupied Minimum Ventilation
		129 - Unoccupied Minimum Ventilation

Monitor and Control Over 120 Different Points

The PHX200 is used in a lab with up to two fume hoods and the PHX600 is used in a lab with up to six fume hoods. All lab and control monitor points are on both models. You can easily configure the input and output points as well as software features using HVAC PRO Revision 4.0 or greater. The data base can be downloaded through a local Metastat™ (room temperature

sensor) or network-wide N2 Communication Bus. The PHX connects the Phoenix MIJ to the Metasys Network through a Network Control Unit (NCU) or Companion.

The table below specifically compares points for a two fume hood system to a six fume hood system.

Table 1: Point Counts for PHX Interface Module

Point Type	PHX200 (2 Fume Hoods)	PHX600 (6 Fume Hoods)
Analog Inputs	<p>22 Total</p> <p>(16) 0 to 10 VDC signals to the Makeup Air Controller (MIJ)</p> <p>AND</p> <p>(6) RTD temperature elements (1000 ohm nickel, 1000 ohm platinum, or silicon)</p> <p>OR</p> <p>2K ohm setpoint potentiometers</p> <p>OR</p> <p>0 to 10 VDC transducers</p>	<p>38 Total</p> <p>(32) 0 to 10 VDC signals to the Makeup Air Controller (MIJ)</p> <p>AND</p> <p>(6) RTD temperature elements (1000 ohm nickel, 1000 ohm platinum, or silicon)</p> <p>OR</p> <p>2K ohm setpoint potentiometers</p> <p>OR</p> <p>0 to 10 VDC transducers</p>
Binary Inputs	<p>20 Total</p> <p>(16) 0-12 VDC to the Makeup Air Controller board</p> <p>AND</p> <p>(4) 24 VAC only</p> <p>BI 4 may be used as an accumulator input for frequencies less than 2 Hz</p>	<p>36 Total</p> <p>(32) 0-12 VDC tied to the Makeup Air Controller</p> <p>AND</p> <p>(4) 24 VAC input only</p> <p>BI 4 may be used as an accumulator input for frequencies less than 2 Hz</p>
Analog Outputs	<p>5 Total</p> <p>0 to 10 VDC @ 10 mA (3 connected to Makeup Air Controller-MIJ)</p>	<p>5 Total</p> <p>0 to 10 VDC @ 10 mA (3 connected to Makeup Air Controller-MIJ)</p>
Binary Outputs	<p>6 Total</p> <p>(6) 24 VAC Triacs at 0.5 amp</p> <p>Low or High side common selectable</p>	<p>6 Total</p> <p>(6) 24 VAC Triacs at 0.5 amp</p> <p>Low or High side common selectable</p>
N2 Bus	Isolated	Isolated
Zone Bus	<p>8-pin phone jack on controller</p> <p>6-pin phone jack at zone sensor</p>	<p>8-pin phone jack on controller</p> <p>6-pin phone jack at zone sensor</p>

Connectivity

When connected to the Metasys Network, the PHX provides point and control information to the rest of the network. The device communicates through an N2 Bus. For a smaller facility, the PHX can function as a

standalone controller with a Zone Terminal (AS-ZTU100-1). The figure below illustrates the connectivity overview of the Metasys Network and the laboratory.

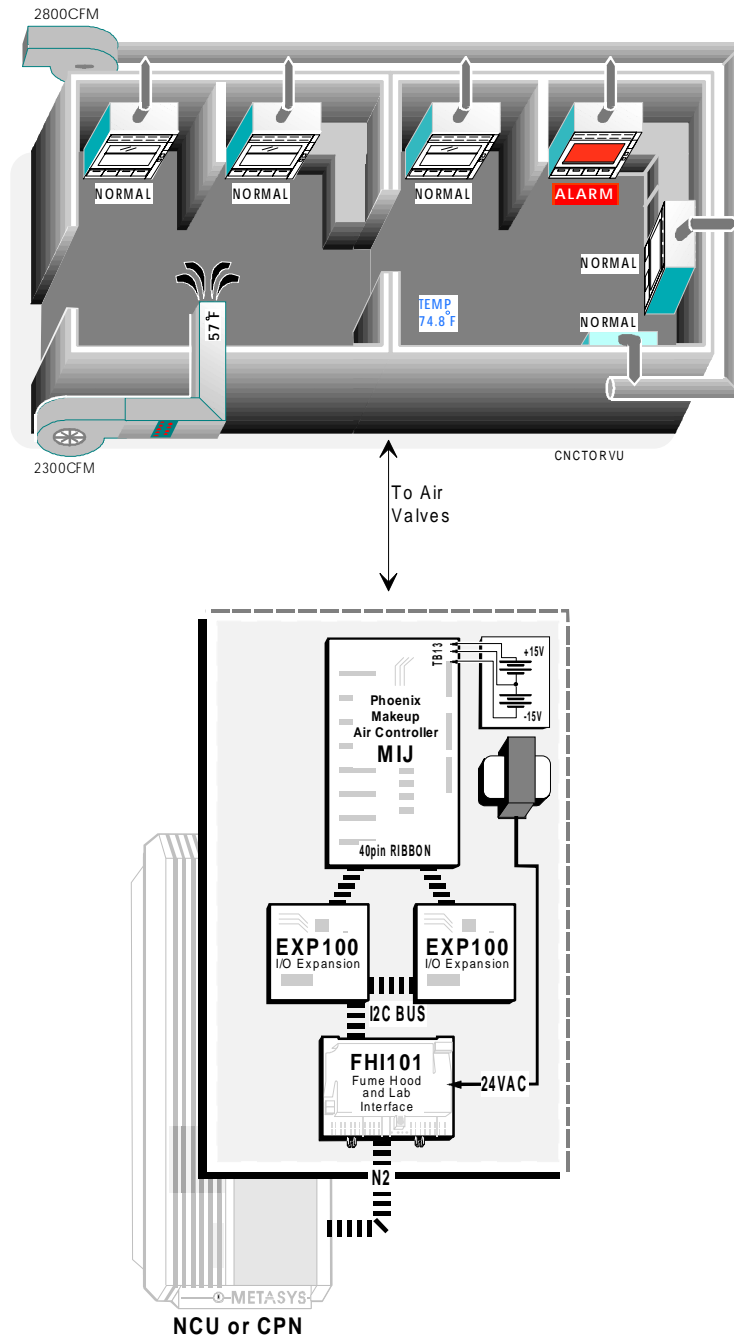


Figure 2: PHX Connectivity Overview

The Safe Total Building Solution

This mutually designed control system is setting new industry standards.

Accuracy

- modified venturi valve for high turn down of 10 to 1
- +/- 5 percent of reading, not of full scale, for low flow accuracy
- calibrated and traceable to the National Institute of Standards and Technology (NIST/NBS)
- local closed loop control using analog electronics
- energy savings through variable air volume and night setback of temperature/humidity
- certification training program insures experienced people are used on your project
- unique linear calibrated airflow controls

Speed

- less than one second system response time
- sash sensing provides immediate response
- safety verified through ASHRAE testing
- closed loop variable frequency drives
- fast responding pneumatic controls

Stability

- low overshoot eliminates fluctuations in hood face velocity
- lab pressurization polarity remains constant
- intersystem hunting is eliminated in manifolded system
- simple addition, subtraction, and high signal selection for control stability
- thermal anticipation provides more stable temperature control with extreme changes in fume hood flow (patent pending)

Data Logging

- totally integrated FMS with fire, smoke control, security, and HVAC
- document proper operation of lab and fume hood performance per OSHA 1910.1
- continually monitor hood, valve, and lab
- access to all vital lab environmental information—alarm monitoring, trending, historical data storage

Ordering Information

The following is a list of code numbers and descriptions for the PHX and accessory equipment.

Table 2: PHX Interface Modules

Code Number	Description
AS-PHX200-0 (2 fume hoods)	PHX connects to a Phoenix MIJ Controller (ordered from JCI) ¹
AS-PHX600-0 (6 fume hoods)	PHX connects to a Phoenix MIJ Controller (ordered from JCI) ¹
MIJ 500 (0 to 6 fume hoods)	Connects to PHX200 or PHX600. Order from: Phoenix Controls Corporation 55 Chapel Street Newton, MA 02158 Phone: 617/964-6670

Table 3: Sensors/Transmitters

Code Number	Description	Type
EP-8000-2	Electro-Pneumatic Transducer 0.5 to 19 PSIG	0 to 10 VDC, High Volume (relay)
HE-6300 Series	Wall Mount Humidity Transmitter	12-30 VDC Supply
HE-6310 Series	Duct Mount Humidity Transmitter	12-30 VDC Supply
HLC-1000 Series	High Limit Humidity Control	12-30 VDC Supply
TE-6100-961	Silicon Sensor	1035 ohms at 77°F (25°C)
TE-6100-11	Nickel Sensor without setpoint, phone cable connections	1000 ohms at 70°F (21°C)
TE-6100-12	Nickel Sensor with Warmer/Cooler Pot, phone cable connections	1000 ohms at 70°F (21°C)
TE-64X0X-X0X0 TE-64X1X-X0X0 TE-64X3X-X0X0 TE-64X5X-X0X0	Nickel or platinum sensor, with or without setpoint, wall or surface mounting, with phone jack or terminal blocks, with or without thermometer	Nickel-1000 ohms at 70°F (21°C) Platinum-1000 at 32°F (0°C) Setpoint: warmer/cooler or graduated scale 65°F to 85°F or 18°C to 30°C

¹Includes enclosure, power supply, transformer unit, expansion board(s)—MIJ ordered separately.

Table 4: Dampers and Valve Actuators for Heating

Code Number	Description	Type
AV-8020 Series	Valve Actuator Assemblies 1/2 in.	24 VAC Triac / Incremental
AV-8022 Series	Valve Actuator Assemblies 1/2 in.	0 - 10 VDC
AV-8050 Series	Valve Actuator Assemblies 1/2 in., 3/4 in., 1 in., and 1-1/2 in.	24 VAC Triac / Incremental
AV-8051 Series	Valve Actuator Assemblies 1/2 in., 3/4 in., 1 in., and 1-1/2 in.	24 VAC Triac / Incremental / with Feedback
AV-8052 Series	Valve Actuator Assemblies	0 - 10 VDC
EDA-2040-6X	Damper Actuator (6 min)	24 VAC Triac / Incremental
EDA-8x0x	Direct Mount Damper Actuator	24 VAC Triac / Incremental or Proportional 0-10 VDC
AV-8090	Valve Actuator Assemblies 1- 1/2 in. to 2 in.	24 VAC Triac / Incremental
AV-8091	Valve Actuator Assemblies 1-1/2 in. to 2 in.	24 VAC Triac / Incremental with Feedback
AV-8092	Valve Actuator Assemblies 1-1/2 in. to 2 in.	0 to 10 VDC
M100C Series	Zone Bus Damper Actuators	Zone Bus Addressable
M100G Series	Proportional Valve and Damper Actuators	0 to 10 VDC

Table 5: Accessories

Code Number	Description	Type
AS-CBLPRO-2 or -1	HVAC PRO Cable	N/A
WS-SWHPRO-004	HVAC PRO Software, Revision 4.0	N/A
WS-SWHPRO-604	HVAC PRO Software Upgrade, Revision 4.0	N/A
AS-CBLCON-0	Zone Terminal (ZT) Adapter	Optional
AS-ZTU100-1	New Zone Terminal (ZT)	Optional

Table 6: Repair Parts

Code Number	Description
AS-FHI101-700	Controller board
AS-EXP100-700	Expander board

Specifications

Product	N2 Interface for Laboratory Fume Hood Controls
Input Power Requirements	120 VAC (+/- 15%) at 60 Hz, 0.8 amps (96 VA)
Output Power Requirements	FHI101: 24 VAC, 50 VA; PHX200: +/- 15 VDC at 1.5 amp each; PHX600: +/- 15 VDC at 3 amps each; Regulation: +/- 0.05% load; +/- 0.05% line
Analog Input Accuracy	+/- 0.5% typical
Ambient Operating Conditions	32° to 125°F (0° to 52°C) Vertical Mount, 32° to 113°F (0° to 45°C) Horizontal Mount 10 to 90% noncondensing RH; 86°F (30°C) maximum dew point
Ambient Storage Conditions	-40° to 158°F (-40° to 70°C); 10 to 90% noncondensing RH; 86°F (30°C) maximum dew point
Dimensions (H x W x D)	28 in. x 10 in. x 8.5 in. (46 x 25 x 22 mm)
Shipping Weight	36 lbs (17 kg)
Agency Compliance	FCC Part 15, Subpart J-Class A CSA C22.2, No. 205 ISO9000 Certified Design Process UL-916 Energy Management* UL-864-Smoke Control*
Plastics Flammability	UL94 5V
Processors	(3) 80C652 at 11 MHz
Memory-FHI	64K bytes ROM, 32K bytes RAM, 8K bytes EEPROM
EXP	8K bytes ROM, 256 bytes RAM
Diagnostics	Powerup: RAM, EEPROM, ROM Checksum, Continuous RAM
Buses-N2	Serial Asynchronous 9600 Baud EIA RS-485
I²C	Serial Asynchronous 100,000 Baud Phillips Inter-integrated Circuit
Zone	Serial Asynchronous 1200 Baud EIA RS-422
Zone Terminal (optional)	7-day programmable for 3 modes, 10 holidays, floating holiday
Time Clock Accuracy	+/- 2 seconds per day unpowered
Battery	Lithium 5-year unpowered life at 25°C (77°F)

*pending

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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