

PBx Power Blocks

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Limited warranty

This warranty applies only to the Phason PBx-10 and PBx-11 Power Blocks (PBx). If you need warranty service, return the product and original proof of purchase to your dealer.

Phason Inc. (Phason) warrants the PBx subject to the following terms and conditions.

This warranty is valid only to the original purchaser of the product, for two years from the manufacturing date. The manufacturing date is stated in the first eight digits of the serial number in the form year-month-day.

Phason hereby warrants that should the PBx fail because of improper workmanship, Phason will repair the unit, effecting all necessary parts replacements without charge for either parts or labor.

Conditions

- ◆ Installation must be done according to our enclosed installation instructions.
- ◆ The product must not have been previously altered, modified, or repaired by anyone other than Phason.
- ◆ The product must not have been involved in an accident, misused, abused, or operated or installed contrary to the instructions in our user and/or installation manuals. Phason's opinion about these items is final.
- ◆ The person requesting warranty service must be the original purchaser of the unit, and provide proof of purchase upon request.
- ◆ All transportation charges for products submitted for warranty must be paid by the purchaser.

Except to the extent prohibited by applicable law, no other warranties, whether expressed or implied, including warranties of merchantability and fitness for a particular purpose, shall apply to the PBx. Any implied warranties are excluded.

Phason is not liable for consequential damages caused by the PBx.

Phason does not assume or authorize any representatives, or other people, to assume any obligations or liabilities, other than those specifically stated in this warranty.

Phason reserves the right to improve or alter the PBx without notice.

Service and technical support

Phason will be happy to answer all technical questions that will help you use the PBx Power Block. Before contacting Phason, check the following:

- ◆ Read this manual for information about the feature with which you are having trouble.
- ◆ If you see an alarm message and are not sure what it means, look it up in the **Alarm and error messages** table on page 40 and then follow the instructions for resolving the alarm condition.
- ◆ If you are having a problem using the PBx, look in the **Troubleshooting** table on page 41 and then follow the directions for correcting the problem.
- ◆ If you still have a problem with the PBx, collect the following information:
 - ◆ The serial number
 - ◆ Any messages displayed by the PBx
 - ◆ A description of the problem
 - ◆ A description of what you were doing before the problem occurred

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Phason controls are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100 percent free of defects. Even reliable products can experience occasional failures and the user should recognize this possibility.

If Phason products are used in a life-support ventilation system where failure could result in loss or injury, the user should provide adequate back up ventilation, supplementary natural ventilation, or an independent failure-alarm system. The user's lack of such precautions acknowledges their willingness to accept the risk of such loss or injury.

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Chapter 1: Introducing the PBx Power Blocks

- ◆ **Introducing the PBx Power Blocks** below
- ◆ **Becoming familiar with the PBx** below

Introducing the PBx Power Blocks

PBx Power Blocks are designed to control ventilation equipment for a single room. Power Blocks work with the **Select Ventilation™** module of **OMNI Select** to control equipment according to your programmed settings. There are two models of PBx Power Blocks, PBx-10 and PBx-11.

Features	PBx-10	PBx-11	Notes
Variable AC stages	2	2	<i>Heat or cool</i>
Variable DC stages	2	2*	<i>Heat or cool</i>
General-purpose relays	6	9	<i>Heat, cool, duty cycle, curtain, timed event, or actuator</i>
Alarm relay	✓	✓	-
Automatic 4-probe temperature averaging	✓	-	<i>Requires additional probes</i>
Functions available at the control	✓	✓	<i>Group set point, test, override, and actuator calibration</i>
Power-failure memory protection	✓	✓	-
Four-character display and status LEDs	✓	✓	-
30-foot temperature probe	✓	✓	<i>Extendable to 500 feet</i>
Rugged enclosure	✓	✓	<i>Corrosion resistant, water resistant, and fire retardant</i>
CSA approval	✓	✓	-
Two-year limited warranty	✓	✓	-

* *The DC stages on the PBx-11 are not independent; they follow the settings of the AC stages.*

Becoming familiar with the PBx Power Block

Power Blocks work with the **OMNI Select** software to control equipment according to your programmed settings. Configuration and programming must be done in the **Select Ventilation** software, but there are some functions available at the control.

The PBx Power Block has a 4-character LED display, 16 status LEDs, and 8 buttons for operating the control.

Main display

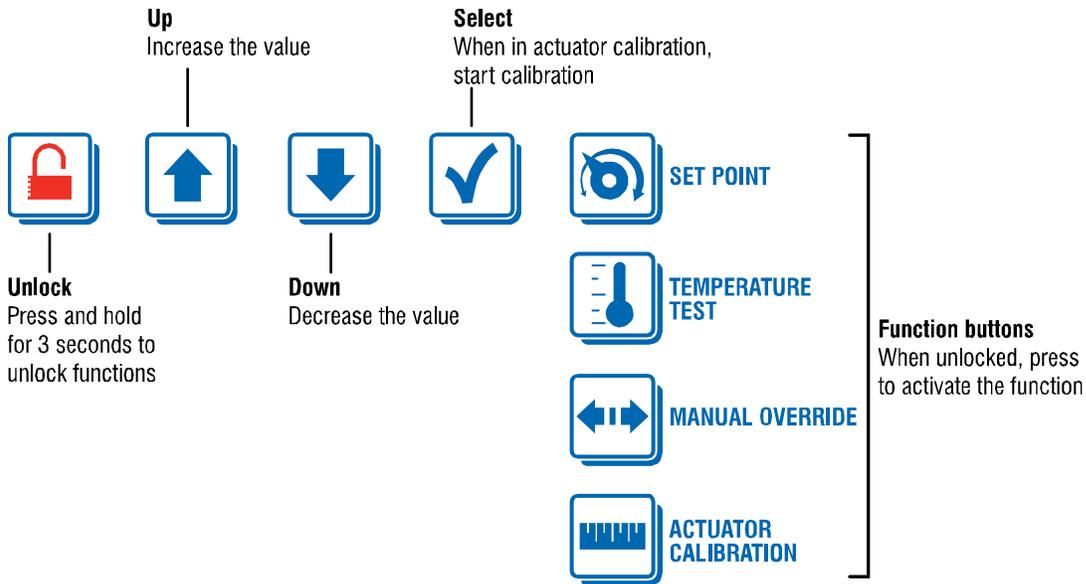
The four-character, seven-segment LED display shows ambient temperatures, alarm messages, and programming information.

Unlock indicator
When the dot is visible, the function buttons are unlocked

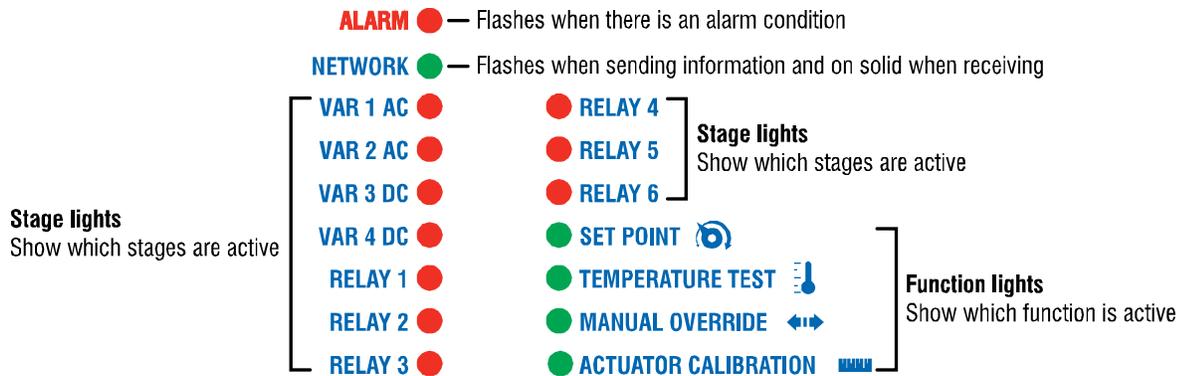


- ◇ If you leave the PBx in test or override mode, it stays there until you manually exit.
- ◇ If you leave the PBx in any other mode or function, the control returns to the main display and locks after five minutes without any key presses.

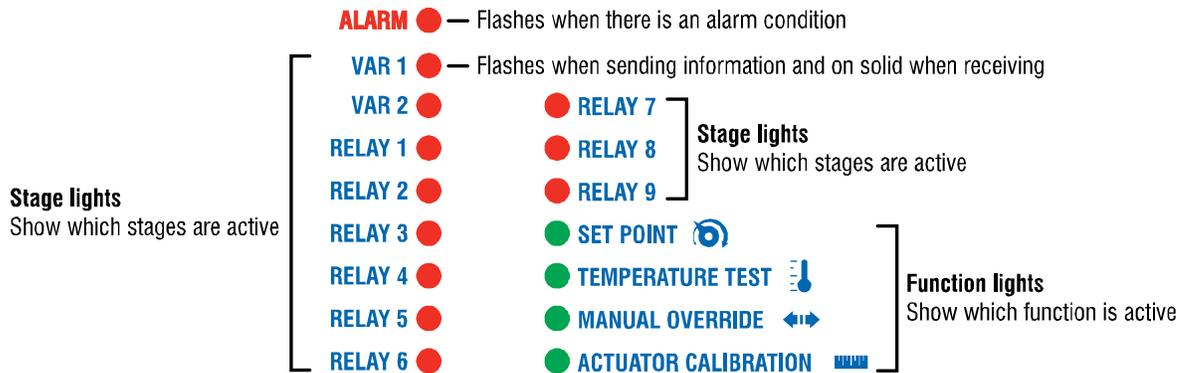
Buttons



PBx-10 status LEDs



PBx-11 status LEDs



Available accessories and kits

Several optional, convenient accessories are available to enhance and extend the PBx Power Blocks. For more information about any of these accessories, contact your dealer or visit www.phason.ca.

Power contactors

Phason’s 240-volt power contactors are heavy-duty relays that allow you to increase the load handling capability of control relays. Power contactors are ideal for secondary ventilation fans and electric heaters.

- ◆ **Power contactor relay (PC-240):** includes power contactor relay and mounting hardware for easy mounting in an enclosure.
- ◆ **Power contactor kit (122-1):** includes power contactor relay, on-off-auto switch and label, snubber filter (reduces electrical noise), and mounting hardware for easy mounting in an enclosure.
- ◆ **Power contactor unit (129-0):** includes two power contactor relays, two on-off-auto switches, and two snubber filters, mounted in a large enclosure. The enclosure has room for two additional contactor relays or kits.

Phason’s power contactor relays have the following electrical ratings.

- ◆ **Coil** 10.2 mA at 240 VAC
- ◆ **Contact** 25 A at 240 VAC; resistive
2 HP at 240 VAC, 1 HP at 120 VAC;
motor, power factor 0.4
1300 W at 120 VAC; tungsten



PBx Updater

The PBx Updater is an innovative and easy-to-use product that allows you to upgrade the PBx's firmware.

Phason constantly improves and adds new features to products. With the PBx Updater, you can upgrade the firmware in your PBx Power Blocks as new features become available. It takes only seconds to use and can upgrade all PBx controls (of the same model) at your site.

PBx Updater features

- ◆ Quick and easy to use
- ◆ Versions available for each model of PBx Power Block
- ◆ Compact design that fits in a pocket
- ◆ 90-day limited warranty



Multipoint wireless system

Phason's line of wireless adapters are for customers who want to avoid running communication cable between buildings, or to remote, hard-to-get-to devices or locations.

The multipoint wireless system (PWA-MULTI) consists of a Multipoint Coordinator, two Slave Units, and a power supply. You can purchase additional Slave Units and power supplies to expand your communication network to 32 Slave Units.

The Coordinator connects to one of the communication channels, after the RS485 Converter. The Coordinator communicates with the Slave Units. The Slave Units send information from the OMNI Select devices to the Coordinator. The RS485 Converter receives information from the Coordinator and sends it to the OMNI Select software.



Wireless range

Phason Wireless Adapters have a line-of-sight range of 1 mile, and an indoor range of up to 300 feet. The indoor range can vary depending on the building structure and interference from other electrical devices.

Features

- ◆ One Multipoint Coordinator (PWA-ECM)
- ◆ Two Slave Units (PWA-ES)
- ◆ One 12 VDC power supply (PA12-800)
- ◆ Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- ◆ Indoor range of up to 300 feet
- ◆ Outdoor, line-of-sight range of up to 1 mile
- ◆ Quick and easy installation
- ◆ Limited warranty (90 days)

eXtend Zone wireless temperature system

The eXtend Zone RF Temperature system allows you to share zone temperatures between multiple PBx Power Blocks. An eXtend Zone system consists of one remote unit and one or more control units.

- ◆ The eXtend Zone **remote unit** (model XZ-R) has connections for up to four temperature probes. It averages the temperature readings from all connected probes and then transmits them to the control unit. The remote unit comes with one six-foot temperature probe.
- ◆ The eXtend Zone **control unit** (model XZ-C) has a single cable that connects to any PBx Power Block.
- ◆ The eXtend Zone **package** (model XZ-P) consists of one of each unit.

Features

- ◆ Temperature averaging for up to four temperature probes
 - ◆ Remote unit comes with a six-foot temperature probe
- ◆ Indoor range of up to 300 feet
- ◆ DC powered
 - ◆ Remote unit requires a 9 to 14 VDC power supply; Can be powered by another Phason DC-powered device, RPS, PA12-800, or similar power supply
 - ◆ Control unit is powered by the Power Block
- ◆ Easy installation and configuration
- ◆ Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- ◆ Limited warranty (90 days)



Temperature probes and extension cable

The PBx Power Block comes with a 30-foot temperature probe that is extendable to 500 feet. Automatic four-zone temperature averaging is available with additional temperature probes.

Temperature probes monitor temperatures ranging from -49 to 122°F (-45 to 50°C). The probes are available in 1, 6, 30, 75, or 150-foot cable lengths and can be extended up to 500 feet using extension cable. Extension cable is available in 500-foot lengths.

Temperature probe features

- ◆ Easy installation
- ◆ Rugged and durable design
- ◆ Weather and UV-resistant cable
- ◆ 90-day limited warranty



Repair kits

Repair kits are available for all circuit boards and displays. If you need more information about repair kits, contact your dealer, or visit www.phason.ca.

PBx-10

- ◆ Display kit: K329003
- ◆ Control board kit: K329001

PBx-11

- ◆ Display kit: K329013
- ◆ Control board (bottom board) kit: K329011
- ◆ Relay board kit: K15220

Chapter 2: Installing the PBx Power Block

- ◆ What you need to know before installing below
- ◆ Connecting equipment to the PBx on page 20
- ◆ Finishing the installation on page 29

What you need to know before installing

Before installing the PBx, you need to do some initial preparation:

1. Read **Understanding power surges and surge suppression** below.



- ◇ If you do not install external surge suppression devices, you risk damage to the electronics inside the PBx, which may cause the PBx to fail.
- ◇ Because it is not possible to *completely* protect this product internally from the effects of power surges and other transients, we *highly recommend* that you install external surge suppression devices. For specific recommendations, see your electrical contractor.
- ◇ If you do not take these precautions, you acknowledge your willingness to accept the risk of loss or injury.

2. Using the **Installation worksheets** on page 45, list all the equipment you want to control using this PBx. Install the equipment and make your electrical connections according to the sheet.

Understanding power surges and surge suppression

Power surges can be caused by external influences (outside the barn – for example, lightning or utility distribution problems) or they can be caused internally (inside the barn – for example, starting and stopping inductive loads such as motors).

One of the most common causes of power surges is lightning. When lightning strikes the ground, it produces an enormously powerful electromagnetic field. This field affects nearby power lines, which transmit a surge to any device connected to it, such as lights, computers, or environmental controls like the PBx. Lightning does not have to actually strike a power line to transmit a surge.

Surge suppression devices offer some protection from power surges. Because it is not possible to internally protect this product completely from the effects of power surges and other transients, Phason *highly recommends* that you install external surge suppression devices. For specific recommendations, see your electrical contractor. If you do not take these precautions, you acknowledge your willingness to accept the risk of loss or injury.

Reducing electrical noise using filters

Electrical noise is caused by high voltage transients created when inductive loads, such as power contactors, are switched on or off. The strength of the transients can be over 1000 volts and can vary with the type of equipment and wiring, as well as several other factors.

“Visible” symptoms of electrical noise include erratic control operation, cycling inlets, communication problems, and more. However, the effects of electrical noise are not always visible. Over time, electrical noise can cause electronic circuits, relay contacts, and power contactors to deteriorate.

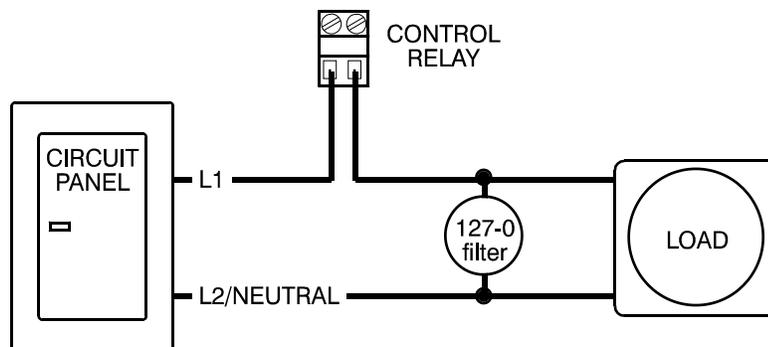
Phason highly recommends installing filters on all inductive loads.

Installing filters helps extend the life of equipment

Filters help prevent electrical noise problems by absorbing the transient energy. Even if you do not have *visible* symptoms of electrical noise, filters help keep controls operating reliably and can extend the life of the controls and equipment connected to them.

Phason’s snubber filters (part number 127-0) are intended for use with solenoids, timer relays, DC motors, furnaces, and other equipment connected to the control’s relays. You can also use the filters with loads connected to power contactors.

Install a filter in parallel with the load, as shown in the following example.



- ◇ Some power contactors include snubber filters. For more information, read **Using power contactors to increase the capacity of relays** on page 15.
- ◇ For more information about snubber filters or other Phason accessories, see your dealer or visit www.phason.ca.

Using power contactors to increase the capacity of relays

Phason's 240-volt power contactors are heavy-duty relays that allow you to increase the load handling capability of control relays. Power contactors are ideal for secondary ventilation fans and electric heaters.

Phason's power contactor relays have the following electrical ratings.

- ◆ **Coil** 10.2 mA at 240 VAC
- ◆ **Contact** 25 A at 240 VAC; resistive
 2 HP at 240 VAC, 1 HP at 120 VAC; motor, power factor 0.4
 1300 W at 120 VAC; tungsten

For more information about power contactors, read **Available accessories** and kits on page 9.

Electrical ratings

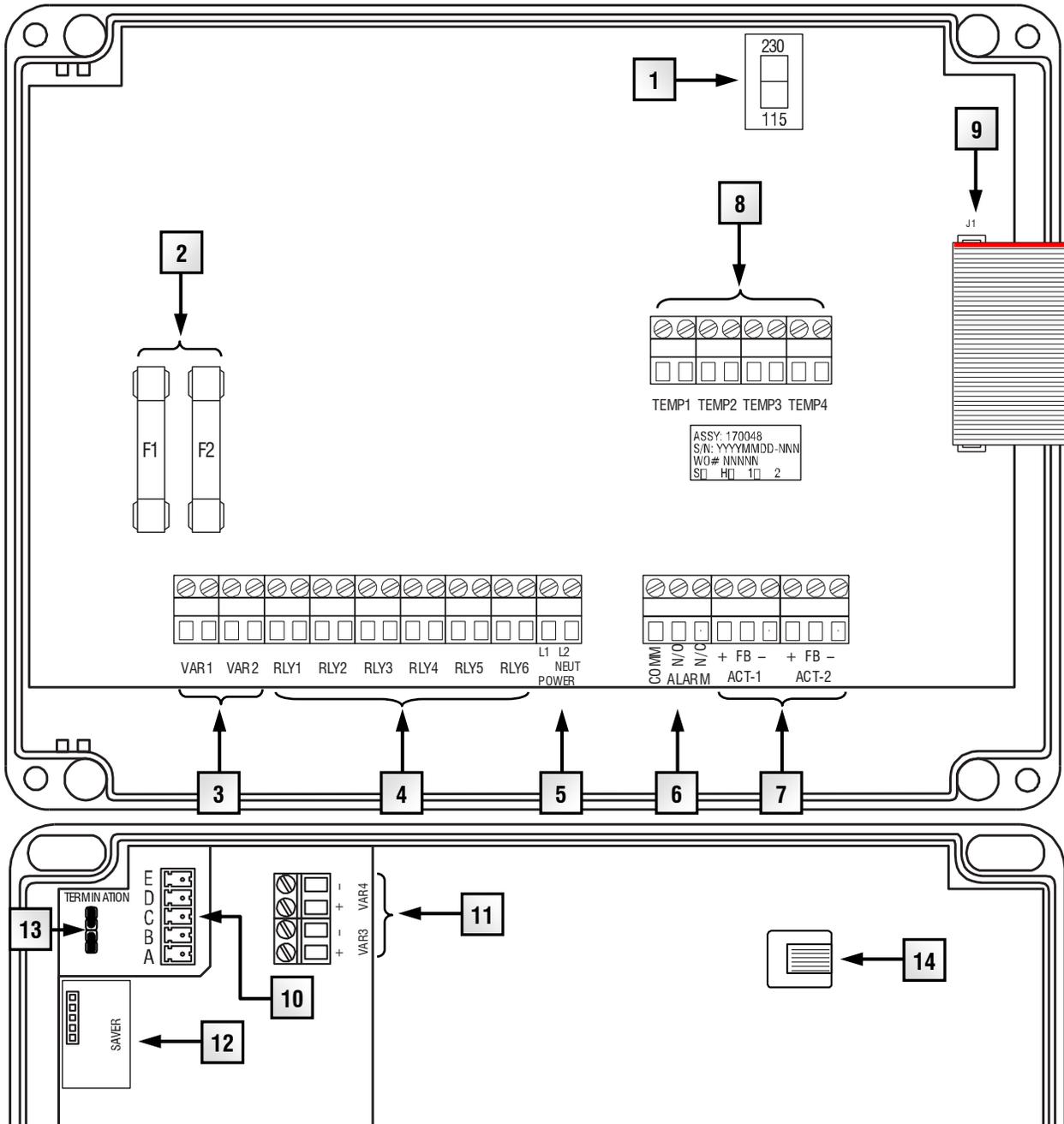
	PBx-10 terminal	PBx-11 terminal	Notes
Input power	POWER	POWER	120/230 VAC, 50/60 Hz
Variable AC stages	VAR1, VAR2	VARI-1, VARI-2	10 A at 120/230 VAC, general-purpose (resistive) 7 FLA at 120/230 VAC, PSC motor 1/2 HP at 120 VAC, 1 HP at 230 VAC, PSC motor
Variable AC stage fuses	F1, F2	F1, F2	15 A, 250 VAC ABC-type ceramic
Variable DC stages	VAR3, VAR4	V1, V2	0 to 10 VDC, 2K Ω load
General-purpose relays	RLY1 to RLY6	RLY1 to RLY9	10 A at 120/230 VAC, general-purpose (resistive) 1/3 HP at 120 VAC, 1/2 HP at 230 VAC 360 W tungsten at 120 VAC
Alarm relay	ALARM	ALARM	0.4 A at 125 VAC; 2 A at 30 VDC, resistive load 0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

You can connect more than one piece of equipment to a variable stage or relay as long as they are the same type (for example, two fans) and the total current draw does not exceed the stage's limit.



The FLA (full load ampere) rating accounts for the increase in motor current draw when the motor operates at less than full speed. Make sure the motor/equipment connected to the variable stage does not draw more than 7 FLA.

PBx-10 layout

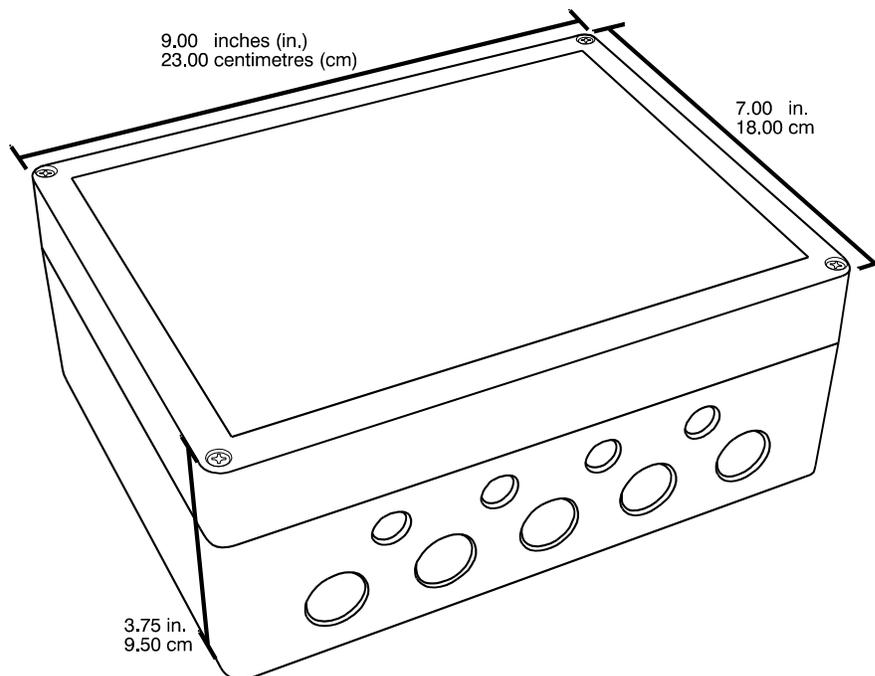


- 1 Voltage selection switch:** set this switch to the correct voltage before installing the PBx-10.
- 2 AC variable stage fuses (F1, F2):** 15 A, 250 VAC ABC-type ceramic; F1 variable stage 1, F2 for stage 2.
- 3 AC variable stage terminals (VAR1, VAR2):** connect variable speed fans to these terminals.
- 4 General-purpose relay terminals (RLY1 to RLY6):** connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, curtain, or actuator control.
- 5 Incoming power terminal:** connect the incoming power (120/230 VAC, 50/60 Hz) to this terminal.

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|----|--|
| 6 | Alarm relay terminal: connect an external alarm system or alarm siren to this terminal. |
| 7 | Actuator feedback terminals (ACT-1 and ACT-2): connect the feedback from the actuators to these terminals. |
| 8 | Temperature probe terminals (TEMP1 to TEMP4): connect the temperature probes to these terminals. |
| 9 | Display cable: make sure the ribbon cable from the display is properly connected to the socket. |
| 10 | Communication connector: connect the communication wiring to this socket. |
| 11 | DC variable stage terminals (VAR3, VAR4): connect variable frequency drives or other equipment that requires a 0 to 10 VDC input signal. |
| 12 | Saver connector: connect the optional PBx Updater when updating firmware. |
| 13 | Termination jumpers: If this is the last device on the communication channel, remove both of the shunts from the jumper pins. If this is not the last device, leave the shunts on the pins. For more information, read Connecting the communication wiring on page 28. |
| 14 | eXtend Zone connector: if you are using the eXtend Zone temperature system, connect the control unit here. |
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|-----------|--|
| 6 | Temperature probe terminal (TEMP): connect the temperature probe to this terminal. |
| 7 | Actuator feedback terminals (ACT-1-FB, ACT-2-FB): connect the feedback from the actuators to these terminals. |
| 8 | Alarm relay terminal: connect an external alarm system or alarm siren to this terminal. |
| 9 | Display cable: make sure the ribbon cable from the display is properly connected to the socket. |
| 10 | Pulse counter terminal: do not use this terminal. |
| 11 | Communication connector: connect the communication wiring to this socket. |
| 12 | DC variable stage terminals (V1, V2): connect variable frequency drives or other equipment that requires a 0 to 10 VDC input signal. |
| 13 | Saver connector: connect the optional PBx Updater when updating firmware. |
| 14 | Termination jumpers: If this is the last device on the communication channel, remove both of the shunts from the jumper pins. If this is not the last device, leave the shunts on the pins. For more information, read Connecting the communication wiring on page 28. |
| 15 | eXtend Zone connector: if you are using the eXtend Zone temperature system, connect the control unit here. |

Enclosure dimensions



Mounting the PBx

- ◆ Mount the control on a sheltered, vertical surface.
- ◆ Mount the control with the electrical knockouts facing down.
- ◆ Mount the control away from sources of moisture and heat.

To mount the PBx

1. Select a location for the control. Make sure you have enough cable and wire to reach all the equipment (fans, heaters, misters, curtains, etc.) that you want to control.
2. Remove the screws from the front cover and then gently lift it off.
3. Mount the enclosure to a wall using the four screws provided with the control. Insert the screws into the large holes in each corner of the box and tighten.

Connecting equipment to the PBx

Follow these instructions when installing the PBx and connecting equipment to it.



Use the electrical knockouts for bringing wires or cables into or out of the PBx enclosure. Do not make additional holes in the enclosure; this can damage the watertight seal or control components and void the warranty.



The PBx's manual override is useful for testing your equipment after you have installed it. For more information, read **Using manual override** on page 33.

Connecting actuators

You can connect two actuators to a PBx. Actuators are used for control elements that are not OFF or ON. Instead, they vary by a percentage. For example, inlets can be opened various distances from 0 percent to 100 percent.

Typically, linear actuators are connected directly to the inlets, or by cables and pulleys. Inlets are generally located in the ceiling or walls. Inlet systems are usually spring loaded to aid in closing the inlet, or counter weighted to aid in opening the inlets.

Feedback potentiometers

Each actuator you connect must have a feedback potentiometer. The feedback potentiometer, which you connect to one of the PBx's two corresponding feedback terminals, lets the control know how far the actuator's arm is extended.

Most linear actuators are available with potentiometer feedback and internal adjustable limit switches. A 10,000 ohm, 10-turn feedback potentiometer is preferred, but the internal feedback potentiometer can range between 1000 and 20,000 ohms. Potentiometers outside of this range will affect the precision to which the PBx can control the actuator.

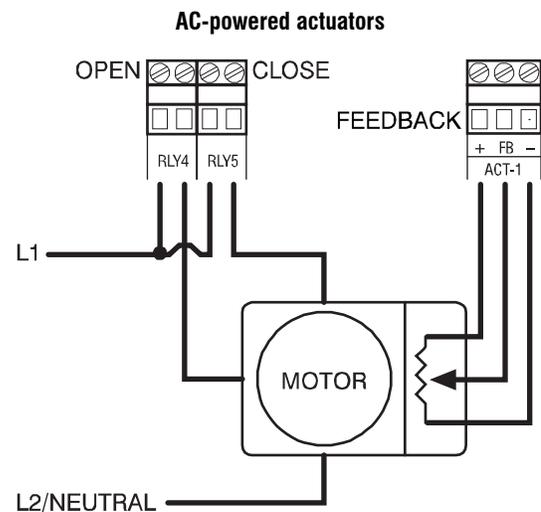
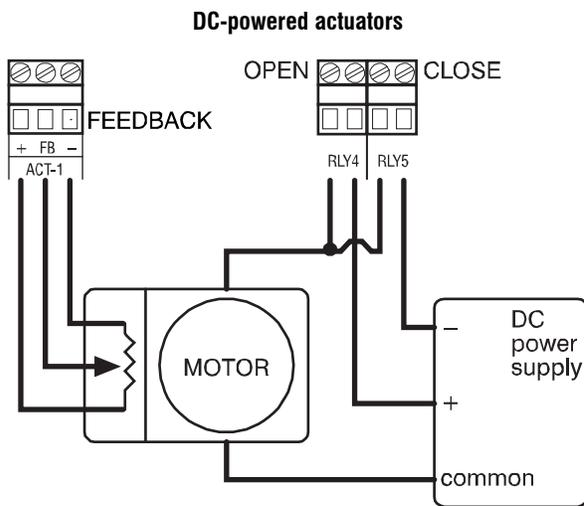
- ◇ A system operates more precisely when using the largest amount of stroke that is feasible with the actuator. The stroke is the distance the actuator arm extends or retracts.
- ◇ Refer to **Appendix C: Installation worksheets** on page 44 when connecting actuators.

The ratings of the actuator must not exceed the ratings of the PBx's relays.

PBx relay ratings: 10 A at 120/230 VAC, general-purpose (resistive)
 1/3 HP at 120 VAC, 1/2 HP at 230 VAC
 360 W tungsten at 120 VAC

To connect actuators

Connect actuators to the PBx-10 as shown below. Refer to your actuator's installation guide for information about its power supply requirements.





- ◇ If you are unsure of the potentiometer wiring for your actuator, read **Determining correct actuator feedback wiring** on page 43.
- ◇ When routing the actuator feedback wires, do not run them in or along the same conduit as AC-power lines.
- ◇ If you are measuring AC power with a digital multimeter (DMM), note that if a limit switch opens the circuit, the DMM measures voltage after the relay switch even if the relay is open.

Connecting single-stage heating or cooling elements

Heating or cooling elements include equipment such as electric heaters, furnaces, single-speed fans, and curtains.



The ratings of the equipment must not exceed the ratings of the PBx's relays.

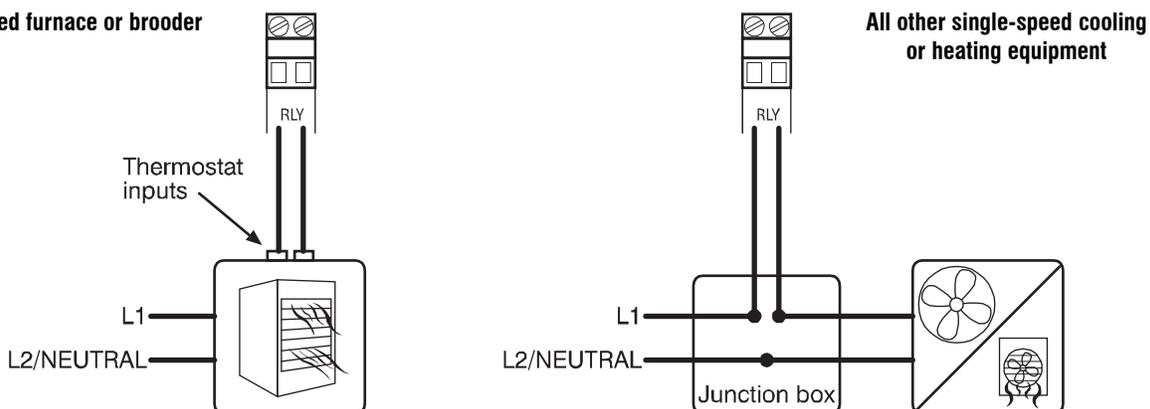
PBx relay ratings: 10 A at 120/230 VAC, general-purpose (resistive)
 1/3 HP at 120 VAC, 1/2 HP at 230 VAC
 360 W tungsten at 120 VAC



Refer to **Appendix C: Installation worksheets** on page 44 when connecting single-stage heating or cooling elements.

To connect single-stage heating or cooling elements

Connect single-speed heating or cooling elements to the PBx as shown below.



Gas furnaces using hot-surface ignition or glow plug can draw more current than indicated on their nameplate and require power contactors. For more information, contact your furnace dealer.

Connecting curtain machines

Curtains are usually controlled by equipment called curtain machines (sometimes referred to as winches). Curtains are opened and closed to let in more air or less air, the idea being more air cools the building.

You can connect three curtain machines to a PBx-10, four to a PBx-11. Each curtain machine you connect requires two relays: one for opening the curtain, and one for closing the curtain.



The ratings of the equipment must not exceed the ratings of the PBx's relays.

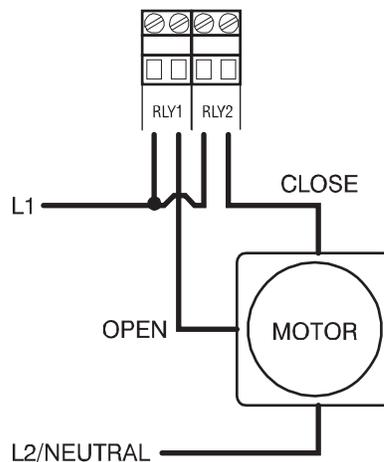
PBx relay ratings: 10 A at 120/230 VAC, general-purpose (resistive)
 1/3 HP at 120 VAC, 1/2 HP at 230 VAC
 360 W tungsten at 120 VAC



Refer to **Appendix C: Installation worksheets** on page 44 when connecting curtain machines.

To connect curtain machines

Connect curtain machines to the PBx as shown below.



Connecting equipment to the AC variable stages

Variable cooling elements include equipment such as variable-speed fans. Variable heating elements include equipment such as heat mats and heat lamps.

- ◇ **Only permanent split capacitor motors appropriate for variable speed control, or shaded pole motors, can be used on the variable AC stages.**
- ◇ If you are using three-phase power, connect the PBx and the variable cooling equipment to the same phase. For more information, read **Using three-phase power** on page 25.



- ◇ The ratings of the equipment must not exceed the ratings of the PBx's variable stages.

Variable AC stage ratings: 10 A at 120/230 VAC, general-purpose (resistive)
 7 FLA at 120/230 VAC, PSC motor
 1/2 HP at 120 VAC, 1 HP at 230 VAC, PSC motor

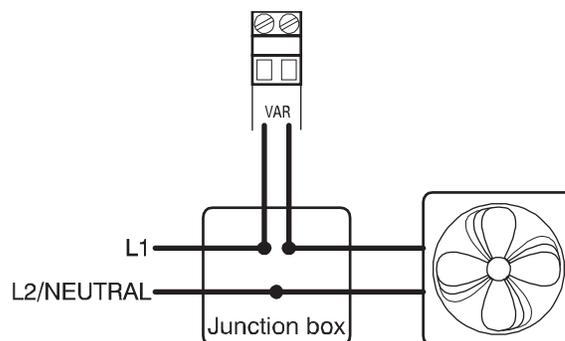
Variable AC stage fuses: 15 A, 250 VAC ABC-type ceramic



Refer to **Appendix C: Installation worksheets** on page 44 when connecting equipment to the variable stages.

To connect variable heating or cooling elements

Connect variable heating or cooling elements to the PBx as shown below.



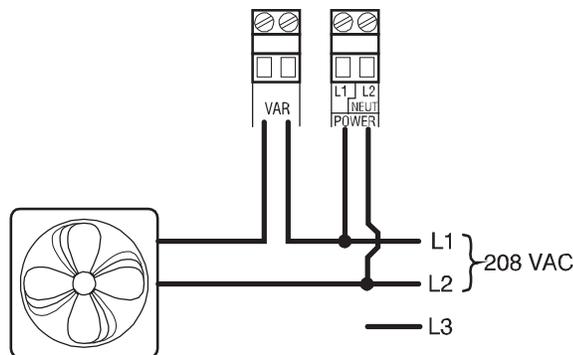
You can choose one of several motor curves for PBx Power Blocks. Use the curve recommended for your fan model. For more information, read the Configuration section of the **Select Ventilation user manual**.

Using three-phase power

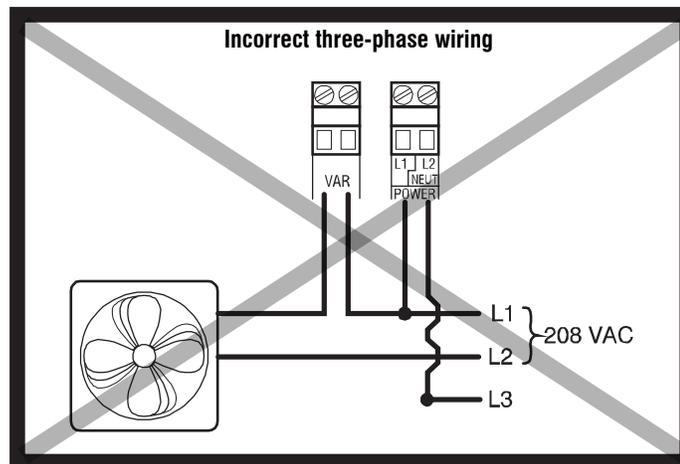
If you are connecting the PBx to a three-phase system, make sure to connect the control power and the variable cooling equipment to the same phase.

The PBx must be powered from the same phases that supply the equipment. If the PBx power and the variable stages are wired to different phases, the equipment will operate erratically.

Correct three-phase wiring



Incorrect three-phase wiring



Connecting variable frequency drives to DC variable stages

The **PBx-10** has two 0 to 10 VDC signal outputs for controlling variable frequency drives, and relays you can use as disconnects. The variable DC stages function independently from the AC stages, meaning they can have different settings.

The **PBx-11** has two 0 to 10 VDC signal outputs. The variable DC stages are dependent on the AC stages, meaning they follow the same settings as AC stages.



Refer to **Appendix C: Installation worksheets** on page 44 when connecting equipment to the variable stages.

The ratings of the equipment must not exceed the ratings of the control.

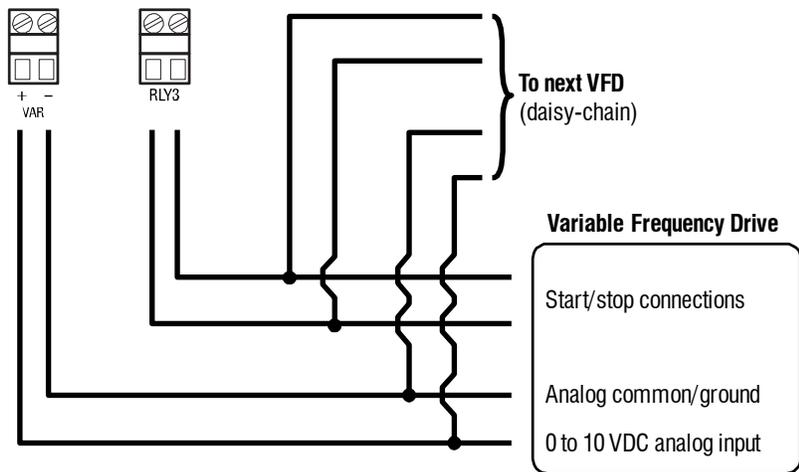
DC signal outputs: 0 to 10 VDC, 2K Ω load

Relay ratings: 6 A at 120/230 VAC, general-purpose (resistive)
 1/3 HP at 120 VAC, 1/2 HP at 230 VAC
 360 W tungsten at 120 VAC

Relay fuses: 12 A, 250 VAC ABC-type ceramic

To connect variable frequency drives

Connect variable frequency drives to the PBx as shown in the following diagram. The example uses stage 3 as a disconnect relay.



Connecting an alarm system

You can connect an alarm system to the PBx’s alarm terminal. An alarm system can be a siren, alarm panel, or auto-dialer. Read your system’s installation guide for installation instructions and information about the type of system: *normally open* or *normally closed*. Below are the descriptions for the alarm terminal.

- ◆ **COMM:** common connection
- ◆ **N/O:** normally open; closes during alarm conditions
- ◆ **N/C:** normally closed; opens during alarm conditions

For the alarm system to sound (or dial out) during an alarm condition, you must enable the alarms. For more information, read the *Programming alarms* section in the **Select Ventilation user manual**.

The ratings of the siren or alarm system must not exceed the ratings of the PBx’s alarm relay.

Alarm relay ratings: 0.4 A at 125 VAC; 2 A at 30 VDC, resistive load
 0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

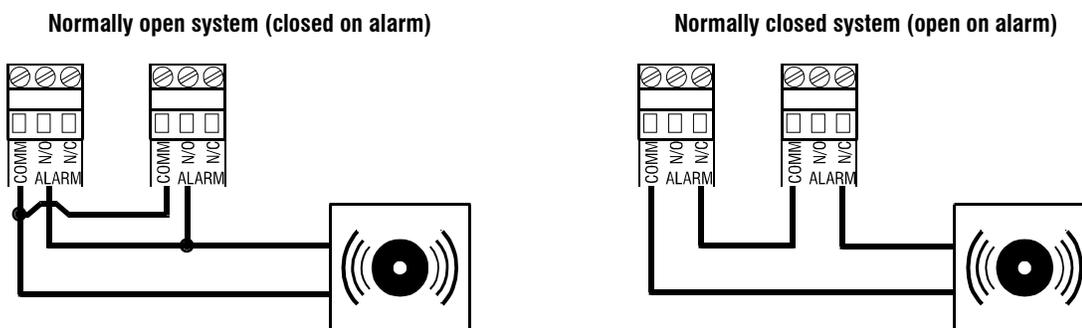
To connect an alarm system

- ◆ If you are connecting the alarm system to a network of PBx controls and your system uses a *normally open* connection (closes on alarm), connect the system as shown in the normally open diagram.

Join all the COMM connections together and all the N/O connections together. The PBx alarm relays must be in parallel with each other so any PBx can trigger the alarm system when an alarm condition occurs.

- ◆ If you are connecting the alarm system to a network of PBx controls and your system uses a *normally closed* connection (opens on alarm), connect the system as shown in the normally closed diagram.

Join the alarm relays in a continuous loop. The PBx alarm relays must be in series with each other so any PBx can trigger the alarm system when an alarm condition occurs.



Connecting temperature probes

The PBx comes with a 30-foot temperature probe you can extend up to 500 feet.

 ◆ When routing the temperature probe cables, do not run them in or along the same conduit as AC-power lines.

◆ Replace damaged probes as soon as possible. If there are no working probes, the PBx uses the group set point as the ambient temperature.

PBx-10

The PBx-10 has four temperature probe terminals, TEMP1 to TEMP4. Automatic zone temperature averaging is available with additional temperature probes. The PBx-10 averages the temperatures of all probes to provide a more balanced temperature reading in the room.

 If you are connecting more than one probe, you must enable the additional probes. By default, probe 1 (TEMP1) is enabled and probes 2, 3, and 4 are not enabled. For more information, read the *Configuring Power Blocks* section of the **Select Ventilation user manual**.

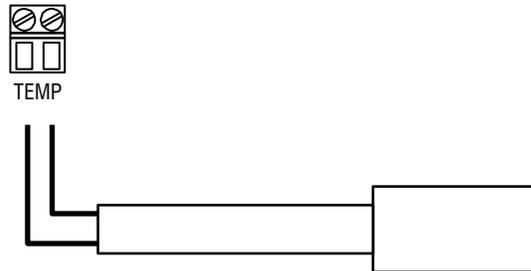
PBx-11

The PBx-11 has one temperature probe terminal, TEMP. If you want four-zone temperature averaging, you must connect four temperature probes together. For more information, read **To connect temperature probes for four-zone averaging on a PBx-11** below.

To connect temperature probes

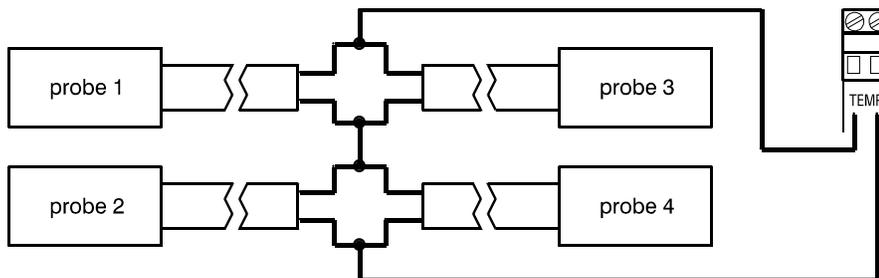
Follow the guidelines below and connect the temperature probe as shown in the following diagram.

- ◆ Do not run the probe cable in the same conduit as AC power cables
- ◆ Do not run the sensor cable beside AC power cables or near electrical equipment.
- ◆ When crossing other cables or power lines, cross them at a 90-degree angle.



To connect temperature probes for four-zone averaging on a PBx-11

Connect four temperature probes as shown below.



You must use four probes for averaging. Using two, three, or more than four probes measures the temperature incorrectly.

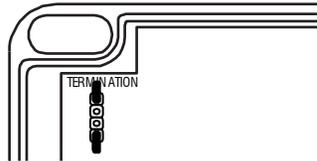
Connecting the communication wiring

Power Blocks communicate with the computer through the RS485-FD Converter. The RS485-FD connects to all OMNI Select devices using CAT5 communication cable. You can find complete instructions for connecting the communication wiring in the **RS485-FD Converter installation guide**, and the **OMNI Select user manual**.

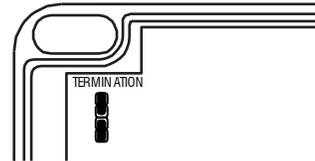
Termination jumpers

The last device on the communication channel must have the termination jumpers removed. All other devices on the communication channel must have determination jumpers in place. When connecting the communication wiring, make sure to place the jumpers in the proper positions.

Shunt position for the *last device* on the communication channel



Shunt position for *all other devices* on the communication channel



Connecting the power source

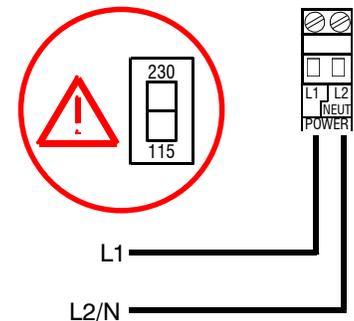
- ◇ Before connecting the power, set the voltage selection switch to the correct voltage.
- ◇ If you are using three-phase power, make sure the control power and the variable speed fans are connected to the same phase. For more information, read **Using three-phase power** on page 25.

- ◇ Before connecting the incoming power, switch OFF the power at the source.
- ◇ Do not switch ON the power until you have finished all wiring and verified all equipment is properly connected and free of obstructions.

To connect the incoming power source

You can connect the PBx to 120 or 230 VAC, 50 or 60 Hz power.

1. Set the voltage select switch to the correct voltage setting.
2. Connect the incoming power source as shown below.



Finishing the installation

After installing and connecting equipment to the PBx Power Block, you are ready to finish the installation. Before you start configuring the Power Block, you need to verify the connections and close the PBx.

Verifying your connections

Make sure the Installation worksheets correspond to the way the equipment is connected to the PBx. You will need the worksheets when configuring and programming the Power Block in the **Select Ventilation** software.

It also is important that the connections and the worksheets are the same so you can be sure you are controlling the equipment you think you are controlling.

Closing the cover

After you have finished connecting all equipment, wiring, and cables to the Power Block, it's time to verify the wires are connected properly and the close the cover.

1. Make sure all the wires are properly connected to the correct terminals.
2. Make sure the voltage selection switch is in the correct setting.
3. Make sure the display cable is properly connected.
4. Place the cover on the control.
5. Switch on the power to the PBx.

When you switch on the power to the PBx, the display should show the temperature. If the PBx display does not come on, go back to step 1. If the display shows an alarm message and or the ALARM indicator is lit, read **Alarm and error messages** on page 40.

6. Insert the four screws into the cover and then tighten them.



Do not over tighten the screws. Do not use power screwdrivers or drills.



You can use manual override to test equipment and connections. For more information, read **Using manual override** on page 33.

Chapter 3: Using and maintaining the PBx

- ◆ Monitoring and adjusting temperatures (below)
- ◆ Testing and maintaining equipment (on page 33)
- ◆ Servicing and maintaining the PBx (on page 35)



Configuration and programming must be done in the Select Ventilation software. For configuration and programming information, read the **Select Ventilation user manual**.

Monitoring and adjusting temperatures

The PBx displays temperature, alarm, and status information. Monitoring the control regularly gives you a better idea of what is going on in your facility. When in normal operation, the display shows the ambient temperature. The displayed temperature is the average from all probes connected.

For more information about probe configuration and temperature averaging, read *Configuring Power Blocks* section of the **Select Ventilation user manual**.



Acknowledging alarms

The alarm relay activates if an alarm condition (one that is enabled) is present for longer than the minimum duration of one minute. The one minute minimum duration prevents alarms from occurring when the temperature rises or drops for just a few seconds.

The exceptions to the one minute minimum are the actuator jam alarms. Actuator jam alarms activate immediately after the PBx detects an actuator jam.

When an alarm occurs, the alarm relay activates, the LED for ALARM switches on, and the alarm message displays. If there is more than one message, after acknowledging the first alarm, the next one displays.

For example, if you had a high temperature and an actuator jam alarm, the display would show **H_RI**. After acknowledging the high temperature alarm, the display would show **Ac J**. When all alarms have been acknowledged, the display shows the temperature.



For a list of alarm messages, their descriptions, and possible resolutions, read **Alarm and error messages** on page 40.

- ◇ When you acknowledge an actuator jam alarm, the control immediately tries to position the actuator.
- ◇ Acknowledging alarms clears the alarm message; it does not deactivate the alarm relay. To deactivate the alarm relay, resolve the problem causing the alarm condition.
- ◇ If you acknowledge the alarm, but do not resolve the problem causing the alarm condition, the alarm message displays again after five minutes without any key presses.
- ◇ If the condition causing the alarm returns to normal (for example, the temperature drops below the high alarm setting), the alarm relay and LED deactivate, but the alarm message remains.



To acknowledge alarms

1. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
2. Press **Select**.
If there was only one alarm message, the PBx clears the message and returns to the main display.
If there are additional alarm messages, the PBx displays the next message.
3. Press **Lock** to return to the main display.

Adjusting the group set point

A group set point is the target or desired temperature for the room or zone. This is the temperature that will be tracked by the individual stages. The individual set points for each variable and relay stage will be adjusted relative to the group set point for that zone.

For example, let's say the group set point is 80°F, a variable-stage fan set point is 5 degrees higher (85°F), and a single-stage heater set point is 7 degrees lower (73°F). If you lower the group set point by 5 degrees to 75°F, the set points for the fan and heater will also be lowered by 5 degrees to 80°F and 68°F respectively.

To adjust the group set point

1. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
2. Press **SET POINT**.
The display shows the current set point. The SET POINT indicator is lit.
3. Press **Up** or **Down** to adjust the set point.
4. Press **Lock** to return to the main display.



Testing and maintaining equipment

Maintaining your equipment will extend its life and the life of the control.

Using temperature test mode

Temperature test mode allows you to test your equipment and programmed settings by simulating the temperature. Instead of adjusting the output of a variable stage or state of a relay, you adjust the “test temperature”.

As you increase or decrease the test temperature, the stages and relays operate according to their programmed settings and the test temperature. This gives you an idea of how your system performs over a full range of temperatures. The variable stages and relays remain operating according to the test temperature until you exit temperature test mode.



- ◇ When the PBx is in temperature test mode, it operates the equipment according to the test temperature, not according to the measured temperature.
- ◇ The PBx does not exit test mode automatically. When you are finished testing, press **Lock**. The control will exit test mode and returned to the main display.

To test equipment using temperature test mode

1. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
2. Press **TEMPERATURE TEST**.
The display flashes the current test temperature. The **TEMPERATURE TEST** indicator is lit.
3. Press **Up** or **Down** to adjust the test temperature.
The variable stages and relays operate using their programmed settings according to the test temperature. When a variable stage or relay switches on, its LED switches on.
4. Press **Lock** to return to the main display.
The control returns to normal operation.



Using manual override

Manual override is for individually testing the installation and equipment connected to the PBx. When you enter manual override mode, all variable stages and relays remain at the output/state they were at. You can then change the output of the stages: 0 to 100% for variable stages, OFF or ON for relay stages and the alarm relay.

All equipment remains at the state you set it until you leave manual override mode, then it returns to normal, programmed operation. For example, if relay 3 is a cooling stage and you switch it ON, it remains on until you leave manual override mode.



- ◇ When the PBx is in manual override mode, it does not operate the equipment according to the measured temperature.
- ◇ The PBx does not exit test mode on its own. When you are finished testing, press **Back** until the control exits test mode.

To use manual override

1. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
2. Press **MANUAL OVERRIDE**.
The display shows **20**, the output percentage for variable 1. The MANUAL OVERRIDE indicator is lit and the VAR 1 AC indicator flashes.
3. Adjust the output of the stages or states of the relays.



- ◆ To move through the stages and relays, press **MANUAL OVERRIDE**. Each time you press the button, the indicator for the stage or relay flashes and the output/state displays. The order is listed below.

	PBx-10	PBx-11
Variables:	1--2--3--4	1--2
Relays:	1--2--3--4--5--6--Alarm	1--2--3--4--5--6--7--8--9--Alarm
Actuators:	1--2	1--2

- ◆ To adjust the output or state, press **Up** or **Down**.
4. When finished, press **Lock** to return to the main display. The control returns to normal operation.



- ◇ If an actuator has not been calibrated, the display shows **UCL** for that item.
- ◇ If you have two relays configured for actuator or curtain control, one for open and one for close, the control will NOT let you have both relays on at the same time.

Calibrating actuators

After configuring the actuator relays, you need to calibrate the actuators. Calibrating the actuator lets the PBx know the position of the actuator when it is fully extended and fully retracted. The PBx uses the limits to define the range of motion it uses to position the inlets. These limits tell the control how much to adjust when you want the actuators, for example, only 25% extended.

Because cables can stretch and equipment can come out of alignment (similar to tires on your car), we recommend resetting the limit switches and calibrating your actuators at least once each year.

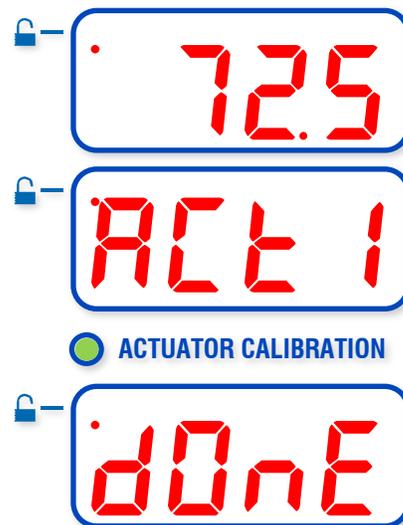
During calibration, the actuator opens, pauses, and then closes. If the actuator is operating properly, the inlet should open completely and then close completely. After closing completely, the actuators should position according to the temperature and default settings.



- ◇ Before calibrating actuators, make sure the limit switches are set and the cable and counter weights can move freely.
- ◇ If the calibration procedure stops after closing the first time, or fails to position properly, the feedback signal is not connected properly. Verify that the potentiometer wiring is correct. For more information, read **Determining correct actuator feedback wiring** on page 43.

To calibrate actuators

1. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
2. Press **ACTUATOR CALIBRATION** until the actuator you want to calibrate displays.
The display flashes the current temperature and the ACTUATOR CALIBRATION indicator is lit.
3. Press **Select** to calibrate the actuator.
The PBx calibrates the actuator. While calibrating, numbers display and the actuator relay indicators flash. When complete, the display shows **dONE**.
4. Repeat steps 2 and 3 if you need to calibrate the other actuator.
5. Press **Lock** to return to the main display.
The control returns to normal operation.



Servicing and maintaining the PBx

Servicing and maintaining the PBx will extend the life of the control and your equipment.



Before installing or servicing the PBx, switch OFF the power at the source.

Cleaning

- ◆ Use caution when washing the room with a high-pressure washer.
- ◆ To clean the surface of the control, wipe it with a damp cloth.

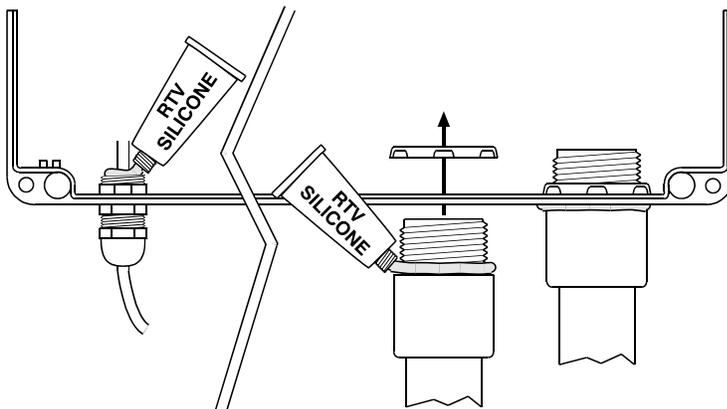
- ◆ DO NOT direct a high-pressure washer at the control.
- ◆ Do not use harsh or abrasive cleaners or rub the surface of the control with your bare hands.

Moisture

Moisture will not cause problems with the control if you take proper care during installation.

1. After the first two weeks of operation, remove the cover from the unit and check inside for moisture. Be sure to turn off the power to the control before opening the cover.
2. If there is moisture, wipe it out with a dry cloth and check the cable entry points and rubber gasket for proper sealing.
3. If the cable connectors are not sealing, apply RTV or Silicon II (non acetic acid) sealant around the cable.

- ◆ Some silicone sealants release acetic acid while curing, which can cause corrosion and damage the control.
- ◆ Let the silicone cure completely (one to three days) with the cover open and ensure no moisture enters the control. Failure to do this might damage the control and void the warranty.



4. Open and inspect the control after two weeks to verify it is sealing properly.

Open and inspect the control for moisture once a year. Proper care and maintenance will extend the life of the control.

Updating the firmware

The optional PBx Updater is an innovative and easy-to-use product that allows you to upgrade the PBx's firmware. There are PBx Updaters available for each model of PBx Power Block.

Phason constantly improves and adds new features to products. With the PBx Updater, you can upgrade the firmware in your PBx Power Blocks as new features become available. The PBx Updater takes only seconds to use and can upgrade all PBx controls (of the same model) at your site.



PBx Power Blocks display the current version at start up. To display the version, switch off the power to the control, and then observe the display as you switch on the power.

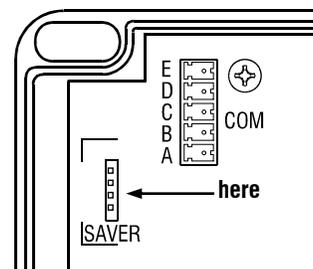
There are two methods for updating the PBx firmware: *power on* and *power off*.

- ◆ **Power on** – the power on method allows you to update the PBx firmware using the buttons, without having to switch the incoming power off and then on.
- ◆ **Power off** – the power off method allows you to update the PBx firmware by switching the incoming power off and then on.

The inside of the PBx cover is where you connect the PBx Updater. The cover label must face the right when you plug the updater into the socket.

To update the firmware using the “power on” method

1. Loosen the four screws in the PBx enclosure and then gently remove the cover. Make sure not to disconnect the ribbon cable.
2. Insert the PBx Updater into the connector marked SAVER on the inside top-left of the cover.
3. Press and hold **Unlock** for three seconds until the control beeps and the unlock indicator is lit.
4. At the same time, press **Up** and **SET POINT**.
The display goes blank and beeps while the firmware updates. When complete, the display shows the version for a couple seconds and then the ambient temperature.
5. Remove the PBx Updater.
6. Verify the control functions properly.
7. Replace the cover and then tighten the four screws.



To update the firmware using the “power off” method

1. Loosen the four screws in the PBx enclosure and then gently remove the cover. Make sure not to disconnect the ribbon cable.
2. Insert the PBx Updater into the connector marked SAVER on the inside top-left of the cover.
3. Switch off the power to the PBx for at least five seconds.
4. Switch on the power to the PBx.
The PBx updates its firmware. The display remains blank and beeps while the firmware updates. When complete, the display shows the version for a couple seconds and then the ambient temperature.
5. Remove the PBx Updater.
6. Verify that the control functions properly.
7. Replace the cover and then tighten the four screws.

Appendixes

This section contains reference information that is useful when installing, configuring, setting up, or troubleshooting the PBx.

- ◆ **Appendix A: Glossary** below
- ◆ **Appendix B: Troubleshooting** on page 40
- ◆ **Appendix C: Installation worksheets** on page 44

Appendix A: Glossary

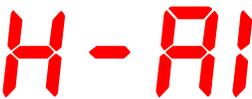
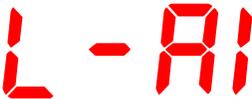
control elements	Control elements are devices connected to the PBx, such as fans, heaters, actuators, and so on.
duty cycle	Duty cycles are a temperature-based style of controlling heating or cooling elements using on and off durations.
firmware	The internal program instructions of the PBx. You can update the firmware version of the PBx to the latest version using a PBx Updater. For more information, read Updating the firmware on page 37.
group set point	The group set point is the desired temperature for the zone.
spikes	Short-term deviations or changes from a desired voltage level or signal. These deviations can cause damage to electronic devices, or cause them to malfunction. Spikes are often caused by sudden excess power, also known as "power surges", or by drops in power, known as "brown outs". For more information, read Understanding power surges and surge suppression on page 13.
terminal block	The part of the PBx where you connect the wires for incoming power, control elements, and so on. For more information, read PBx-10 layout on page 16.

Appendix B: Troubleshooting

- ◆ If you see an alarm message and are not sure what it means, look it up in the **Alarm and error messages** table below and then follow the instructions for resolving the alarm condition.
- ◆ If you are having a problem using the PBx, see if the problem is described in the **Troubleshooting** table on page 41 and then follow the directions for correcting the problem.

Alarm and error messages

The following table lists the alarm and error messages, the possible causes, and their possible solutions. If you see a message and are not sure what it means, look it up in the table and then follow the instructions for resolving the condition.

Alarm message	Possible cause	Possible solution
 High temperature alarm	The temperature has gone above the high temperature alarm point.	<ul style="list-style-type: none"> ◇ Try to lower the temperature by turning heaters down or off, or by increasing or turning on cooling elements (such as fans or misters), or by a combination of both. ◇ Check the temperature probes. ◇ Check to see if a fan has failed. ◇ Check the alarm settings. For more information, read the programming <i>Power Blocks settings</i> section of the Select Ventilation user manual.
 Low temperature alarm	The temperature has gone below the low temperature alarm point.	<ul style="list-style-type: none"> ◇ Try to raise the temperature by turning heaters up or on, or by decreasing or turning off cooling elements (such as fans or misters), or by a combination of both. ◇ Check the temperature probes. ◇ Check to see if a heater has failed. ◇ Check the alarm settings. For more information, read the programming <i>Power Blocks settings</i> section of the Select Ventilation user manual.
 Probe damage alarm The second digit shows which probe (1 to 4) the alarm is for.	A temperature probe is damaged or disconnected.	<ul style="list-style-type: none"> ◇ Replace or reconnect the temperature probe. The control should recover automatically.

Alarm message	Possible cause	Possible solution
 <p>Actuator jam alarm The third digit shows which actuator (1 or 2) the alarm is for.</p>	<p>The control is attempting to open or close an inlet or other element operated by an actuator, and has not received the correct response from the positioning motor.</p>	<ul style="list-style-type: none"> ◇ Check the inlet controlled by the actuator to see if it is mechanically stuck. ◇ Check feedback wires for damage or improper installation. For more information, read Determining correct actuator feedback wiring on page 43. ◇ Recalibrate the actuator. For more information, read Calibrating actuators on page 34 ◇

Troubleshooting

The following table lists some problems, possible causes, and possible solutions. If you are having a problem using the PBx, see if the problem is described in the following table and then follow the directions for correcting the problem.

If the problem is not listed here, it could be a problem with the configuration and/or settings. For troubleshooting information about configuration and settings, read the *Troubleshooting* section in the **Select Ventilation user manual**.

Problem	Possible cause	Possible solution
<p>Power supply components blown out Burn marks on boards and components Motors and fans slow down or stop</p>	<p>Power surge, brownout, or power outage</p>	<ul style="list-style-type: none"> ◇ Avoid the problem in future by providing proper voltage and protection for the control.
<p>No power and/or display</p>	<p>A circuit breaker at service panel is off or tripped. Incorrect wiring The display board connect cable is not plugged into the control board properly. The 115/230 VAC switch is in the wrong position</p>	<ul style="list-style-type: none"> ◇ Reset the circuit breaker. ◇ Correct the wiring. ◇ Plug in the display board cable. For more information, read PBx-10 layout on page 16. ◇ Switch off the power, place the switch in the correct position, and then switch on the power. For more information, read PBx-10 layout on page 16.
<p>Temperature does not change</p>	<p>There are no working temperature probes enabled or connected The control is in temperature test mode.</p>	<ul style="list-style-type: none"> ◇ Make sure at least one working probe is connected. ◇ If the TEMPERATURE TEST LED is on, the control is in test mode. Exit test mode. For more information, see Using temperature test mode on page 33.

Problem	Possible cause	Possible solution
Display showing unusually high or low temperature	<p>The probe is not a Phason probe.</p> <p>The extension cable connected to the temperature probe is providing a poor connection</p> <p>Damaged probe</p>	<ul style="list-style-type: none"> ◇ Remove the probe and then install a Phason probe. ◇ Check the extension cable connection. Resolder it if necessary. ◇ Replace the temperature probe.
Variable fan runs at maximum	<p>Incorrect wiring</p> <p>Incorrect motor curve</p>	<ul style="list-style-type: none"> ◇ Correct the wiring. For more information, read Connecting equipment to the PBx on page 20. ◇ In Select Ventilation, select the recommended motor curve. For more information, read the Configuration section of the Select Ventilation user manual.
Variable fan not running	<p>Incorrect wiring</p> <p>The fuse is open or blown.</p> <p>There is no power to the fan.</p> <p>Faulty fan/heater</p> <p>Circuit breaker open</p> <p>Incorrect motor curve</p>	<ul style="list-style-type: none"> ◇ Correct the wiring. For more information, read Connecting equipment to the PBx on page 20. ◇ Check why the fuse was blown and repair any problems. Replace the fuse. ◇ Switch on the power. ◇ Replace the equipment. ◇ Reset the breaker. ◇ In Select Ventilation, select the recommended motor curve. For more information, read the Configuration section of the Select Ventilation user manual.
Curtain opens when it should close or closes when it should open	Incorrect wiring, the close and open wires are reversed.	<ul style="list-style-type: none"> ◇ Correct the wiring. For more information, read Connecting equipment to the PBx on page 20.
Alarm relay not operating alarm system	Incorrect wiring	<ul style="list-style-type: none"> ◇ Correct the wiring. For more information, read Connecting equipment to the PBx on page 20.
Relay does not switch load on	<p>Incorrect wiring</p> <p>No power to the load</p> <p>Faulty equipment</p> <p>Circuit breaker open</p> <p>Blown relay</p>	<ul style="list-style-type: none"> ◇ Correct the wiring. For more information, read Connecting equipment to the PBx on page 20. ◇ Switch on the power. ◇ Replace the equipment. ◇ Reset the breaker. ◇ Solve the problem that caused the relay to blow and then replace the relay or circuit board.

Determining correct actuator feedback wiring

After installing a new actuator or potentiometer, or due to age-related potentiometer wear, the actuator might not move correctly. Common symptoms include:

- ◆ The actuator oscillating back and forth
- ◆ The actuator not traveling the full stroke during calibration

The feedback potentiometer wiring must be properly connected to the control. Determining the correct wiring can be difficult on some actuators or potentiometers.

Potentiometers have three wires: positive (+), negative (-), and feedback (FB). If the feedback wire is not connected to the FB terminal on the control, the actuator will not function properly.

Because the wires are often different colors and are not always labeled the same as above, measuring the resistance between the wires is the best way to determine which wire is the feedback wire. Follow the steps below to measure the resistance and determine the correct wiring.



- ◆ Before checking the potentiometer wires, verify that the power wires are properly connected.
- ◆ Test the actuator using stage test mode.

1. Manually move the actuator away from the end of its stroke by at least a quarter of its total stroke.
2. Disconnect all three potentiometer wires from the control.
3. Number the wires 1, 2, and 3, in any order.
4. Set your ohmmeter to measure the potentiometer's maximum resistance, normally 20,000 Ω .
5. Measure and record the resistance between wires 1 and 2. _____ Ω
6. Measure and record the resistance between wires 1 and 3. _____ Ω
7. Measure and record the resistance between wires 2 and 3. _____ Ω
8. The pair of wires with the highest measured value are the positive and negative wires. Connect the wires to the positive and negative actuator terminals on the control. At this time, do not be concerned with which wire you connect to which terminal.
9. Connect the remaining wire to the feedback terminal.
10. Test the actuator using automatic mode to see if the control moves it properly. If the actuator moves in the opposite direction than it is supposed to, switch the positive and negative wires on the control.

Appendix C: Installation worksheets

List all the equipment (for example, fans, actuators, and curtain machines) in the worksheets that you are connecting to the PBx. Use the worksheets when you complete the Configuration worksheets in the **Select Ventilation user manual**.

There is one example and three blank worksheets. Before filling in the worksheets, make a copy of them in case you need more.



Make sure the equipment connected to the variable stages and relays does not exceed the electrical readings. For more information, read **Electrical ratings** on page 15.

Example worksheet

PBx information											
Name <i>Finisher 1A</i>				Address <i>12345678</i>							
Building <i>Finisher 1</i>				Model <i>PBx-10</i>							
Variable stages											
Stage	Description	Heat	Cool	On	Off						
1 (AC)	<i>36-inch fans</i>		✓								
2 (AC)	<i>24-inch fans</i>		✓								
3 (DC)	<i>VFD 1</i>		✓								
4 (DC)	<i>VFD 2</i>	✓									
Relays											
Relay	Description	ACT 1 open	ACT 1 close	ACT 2 open	ACT 2 close	Curtain open	Curtain close	Heat	Cool	Disconnect	Other
1	<i>Inlet open</i>	✓									
2	<i>Inlet close</i>		✓								
3	<i>Lights</i>										✓
4	<i>Electric heat</i>							✓			
5	<i>VFD 1 disconnect</i>									✓	
6	<i>VFD 2 disconnect</i>									✓	
7											
8											
9											

Installation worksheets

PBx information											
Name						Address					
Building						Model					
Variable stages											
VAR	Description	Heat	Cool	On	Off						
1 (AC)											
2 (AC)											
3 (DC)*											
4 (DC)*											
* PBx-10 DC stages function independently from the AC stages, meaning they can have different settings. PBx-11 DC stages are dependent on the AC stages, meaning they follow the same settings as AC stages.											
Relays											
Relay	Description	ACT 1 open	ACT 1 close	ACT 2 open	ACT 2 close	Curtain open	Curtain close	Heat	Cool	Disconnect	Other
1											
2											
3											
4											
5											
6											
7*											
8*											
9*											
* Relays 7 to 9 are available in the PBx-11 only.											

PBx information											
Name						Address					
Building						Model					
Variable stages											
VAR	Description	Heat		Cool		On		Off			
1 (AC)											
2 (AC)											
3 (DC)*											
4 (DC)*											
* PBx-10 DC stages function independently from the AC stages, meaning they can have different settings. PBx-11 DC stages are dependent on the AC stages, meaning they follow the same settings as AC stages.											
Relays											
Relay	Description	ACT 1 open	ACT 1 close	ACT 2 open	ACT 2 close	Curtain open	Curtain close	Heat	Cool	Disconnect	Other
1											
2											
3											
4											
5											
6											
7*											
8*											
9*											
* Relays 7 to 9 are available in the PBx-11 only.											

PBx information											
Name						Address					
Building						Model					
Variable stages											
VAR	Description	Heat	Cool	On	Off						
1 (AC)											
2 (AC)											
3 (DC)*											
4 (DC)*											
<p>* PBx-10 DC stages function independently from the AC stages, meaning they can have different settings. PBx-11 DC stages are dependent on the AC stages, meaning they follow the same settings as AC stages.</p>											
Relays											
Relay	Description	ACT 1 open	ACT 1 close	ACT 2 open	ACT 2 close	Curtain open	Curtain close	Heat	Cool	Disconnect	Other
1											
2											
3											
4											
5											
6											
7*											
8*											
9*											
<p>* Relays 7 to 9 are available in the PBx-11 only.</p>											

PBx information											
Name						Address					
Building						Model					
Variable stages											
VAR	Description	Heat	Cool	On	Off						
1 (AC)											
2 (AC)											
3 (DC)*											
4 (DC)*											
* PBx-10 DC stages function independently from the AC stages, meaning they can have different settings. PBx-11 DC stages are dependent on the AC stages, meaning they follow the same settings as AC stages.											
Relays											
Relay	Description	ACT 1 open	ACT 1 close	ACT 2 open	ACT 2 close	Curtain open	Curtain close	Heat	Cool	Disconnect	Other
1											
2											
3											
4											
5											
6											
7*											
8*											
9*											
* Relays 7 to 9 are available in the PBx-11 only.											

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