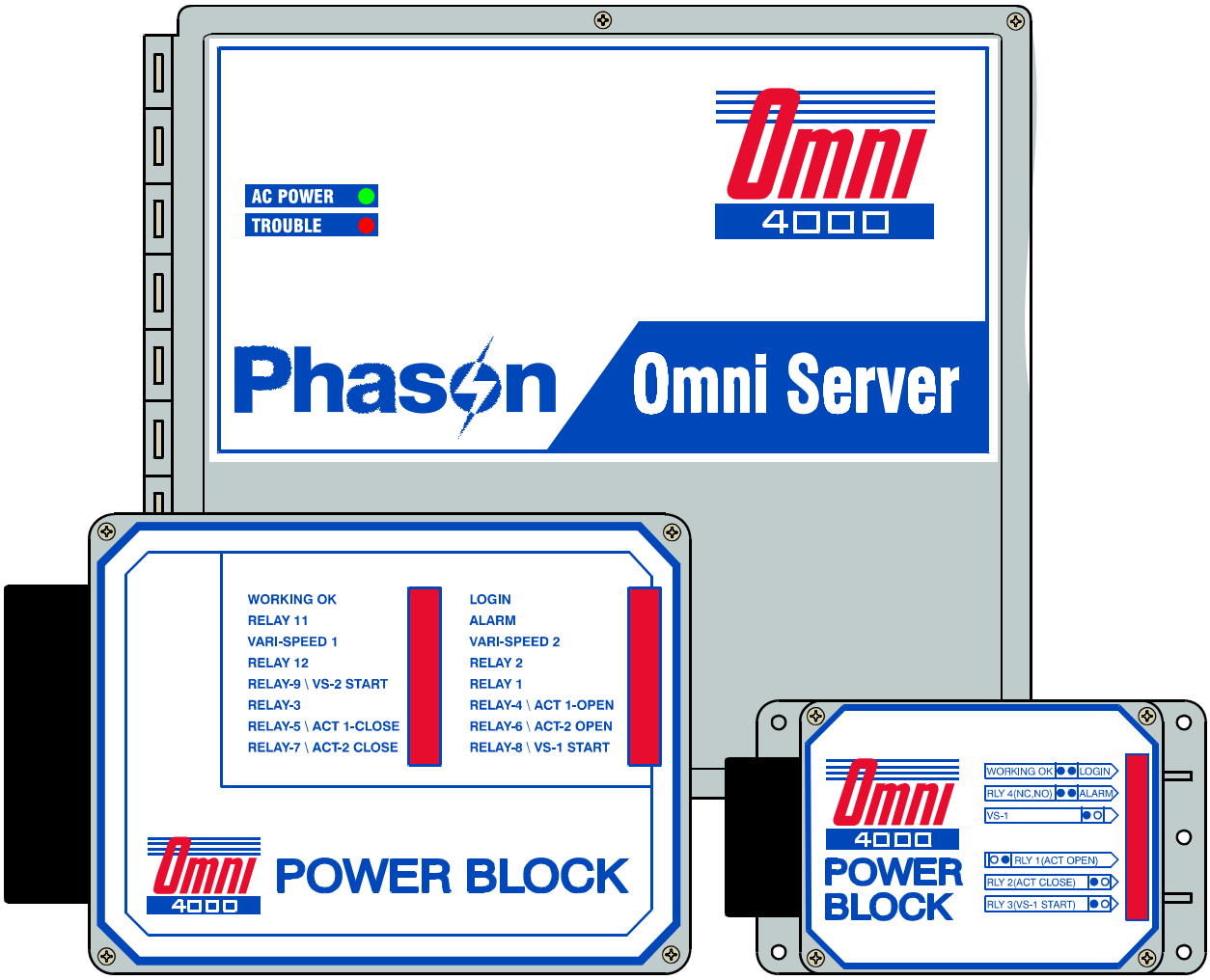


OMNI-4000 hardware installation manual

© 2007 Phason Inc.
All rights reserved.

Printed in Canada
20040204
2007-10-18

Power Block limited warranty

This warranty applies only to the OMNI-4000 Power Block (Power Block). If you need warranty service, return the product and original proof of purchase to your dealer.

Phason Inc. (Phason) warrants the Power Block 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 Power Block 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 Power Block. Any implied warranties are excluded.

Phason is not liable for consequential damages caused by the Power Block.

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 Power Block without notice.

OMNI Server limited warranty

This warranty applies only to the OMNI-4000 OMNI Server (OMNI Server). If you need warranty service, return the product and original proof of purchase to your dealer.

Phason Inc. (Phason) warrants the OMNI Server 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 OMNI Server 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 OMNI Server. Any implied warranties are excluded.

Phason is not liable for consequential damages caused by the OMNI Server.

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 OMNI Server without notice.

Service and technical support

Phason will be happy to answer all technical questions that will help you use your OMNI-4000 system. Before contacting Phason, collect the following information:

- A description of the problem
- A description of what you were doing before the problem occurred
- The model(s) and serial number(s) of the devices
- Any messages displayed by the OMNI-4000 software

My dealer's name: _____

How to contact my dealer:

Street/PO Box _____

City _____

State/Province _____

Zip/Postal _____

Phone _____

Fax _____

E-mail _____

Web site _____

Phason electronic control systems

2 Terracon Place
Winnipeg, Manitoba
Canada
R2J 4G7

Phone 204-233-1400
Fax 204-233-3252
E-mail support@phason.ca
Web site www.phason.ca

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.

About this manual

The **OMNI-4000 installation guide** explains how to install the OMNI Server and Power Blocks. The manual does not explain the software or computer requirements. For more information about the OMNI-4000 software, see the **OMNI-4000 user manual**.

Styles

Hint/tip

This is a hint or tip. It contains helpful information that might make it easier for you to install or service the OMNI-4000 equipment.

Note

This is a note. It contains information that might help you better understand the OMNI-4000 equipment.

Caution

This is a **caution**. It contains important information that you must follow when installing or servicing the OMNI-4000 equipment. Failure to follow this information can lead to damaged controls or equipment.

Warning

This is a warning. It contains important safety information that you must follow when installing or servicing the OMNI-4000 equipment.. Failure to follow this information can lead to damaged controls or equipment, electrical shocks, or severe injury.

Table of contents

Chapter 1: Introducing OMNI-4000 1

OMNI Server 1
OMNI Server features 2
OMNI Server electrical ratings 2
Power Blocks 2
Power Block models and features 3
Power Block electrical ratings 4
Power Block enclosure dimensions 5
What you need to know before installing the OMNI 6
Understanding power surges and surge suppression 6
Reducing electrical noise using filters 7
Using power contactors to increase the capacity of relays 8
Precautions, guidelines, and warnings 8

Chapter 2: Installing an OMNI Server 10

OMNI Server layout 10
OMNI Server exterior bottom and side 10
OMNI Server interior 11
Mounting the OMNI Server 12
Connecting the communications 13
Communication cable requirements 14
Installing the communication wiring 15
Connecting the RS-485A Converter 19
Connecting equipment to the OMNI Server 20
Connecting temperature probes 20
Connecting alarm systems 21
Connecting the incoming power source 22
Connecting the backup battery 23
Finishing the installation 24

Chapter 3: Installing Power Blocks 25

Power Block layout 25
PB-1/3/6 cover and base 25
PB-2/4/5 cover and base 26
PB-1 interior layout 27
PB-2 interior layout 28
PB-3 interior layout 30
PB-4 interior layout 31
PB-5 interior layout 32
PB-6 interior layout 33
Microboard layout 34
Mounting Power Blocks 35
Connecting equipment to Power Blocks 35
Connecting temperature probes 36
Extending probe cables 38
Using four-zone averaging 39
Connecting actuators 39
Determining correct actuator feedback wiring 43
Enabling and calibrating actuators 44

Connecting curtain machines 45
Connecting single-stage heating or cooling elements 46
Connecting variable-speed fans 49
Connecting variable-heat elements 50
Using three-phase power 51
Connecting alarm systems 51
Connecting the incoming power source 54
Finishing and testing the installation 55
Testing Power Blocks 56
Servicing and maintaining the controls 58

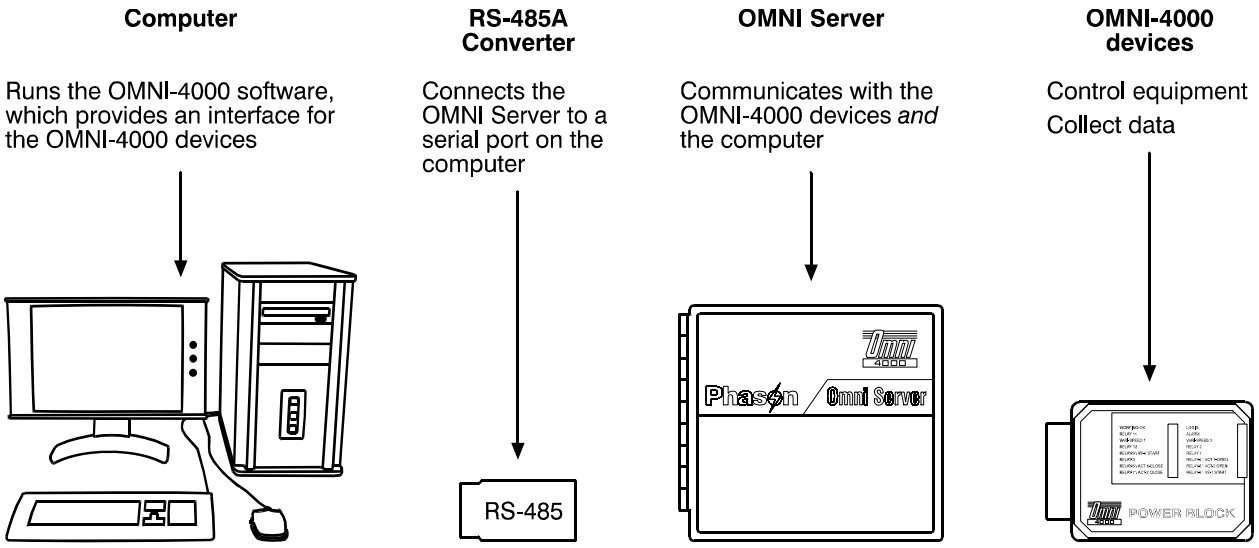
Appendixes 60

Appendix A: Glossary 60
Appendix B: Troubleshooting 62
Appendix C: Communication troubleshooting guide 64
Introduction to OMNI-4000 communications 64
Troubleshooting phase 1: create a site map 65
Troubleshooting phase 2: test the computer, RS-485A Converter, and OMNI Server 65
Troubleshooting phase 3: correct any communication wiring problems 67
Troubleshooting phase 4: run OMNI-4000 70
Appendix D: Installation worksheets 73
PB-1 worksheets 73
PB-2 worksheets 75
PB-3 worksheets 78
PB-4 worksheets 79
PB-5 worksheets 81
PB-6 worksheets 83
Index 84

Chapter 1: Introducing OMNI-4000

There are several components to the OMNI-4000 system:

- Personal computer
- OMNI-4000 software and modules (see the **OMNI-4000 user manual**)
- RS-485A Converter
- OMNI-Server
- Power Blocks
- Other OMNI-4000 devices (see the installation guide for the specific device)



OMNI Server

The OMNI Server is the control center for the OMNI-4000 hardware. The OMNI-Server's eight communication channels transfer data between the computer and the OMNI-4000 hardware. Each communication channel can communicate with up to 32 hardware devices, for a total of 256 devices ($8 \times 32 = 256$).

The OMNI Server comes with a 30-foot temperature probe for monitoring outdoor temperatures. There are five additional inputs for monitoring temperatures in other areas such as electrical rooms, semen storage coolers, and so on.

The OMNI Server comes with a backup battery and cable. The battery keeps the OMNI Server operating during brief power failures. The internal charger keeps the battery charged.

OMNI Server features

- Eight communication channels—a total of 256-device capacity
- Six temperature monitoring inputs
- Thirty-foot temperature probe, extendable to 500 feet
- Alarm relays—one for power/communication failure, six for the temperature inputs
- Maintenance-free backup battery and cable
- Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- CSA approval
- Two-year limited warranty

OMNI Server electrical ratings

Input power	115/230 VAC, 50/60 Hz
Incoming power fuse (F2)	1 A, 250 VAC non-time-delay glass
Backup battery	12 V, 7.2 Ah gel cell
Battery circuit fuse (F1)	1/4 A, 250 VAC slow-blow glass
Alarm relay	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

Power Blocks

Power Blocks can control virtually any type of load from variable and single-speed fans, to feed augers, to lights. No matter what your ventilation or control strategy is, there is a Power Block that suits your needs.

Power Blocks work with the ventilation module of the OMNI-4000 system to control equipment according to your programmed settings. If the computer or communications fail, the Power Blocks continue to operate according to the last settings received from the OMNI-4000 software. When communication is restored, the software sends updated settings to the Power Blocks.

Power Block models and features

There are six models of Power Blocks.

Model	Enclosure size①	Temperature probe②	Variable stages	Relay stages
PB-1	A	6-foot	1	3
PB-2	B	30-foot	2	9
PB-3	A	6-foot	0	3
PB-4	B	30-foot	0	9
PB-5	B	30-foot	0	5
PB-6③	A	6-foot	1	0

① For more information about enclosure sizes, see **Power Block enclosure dimensions** on page 5.
② All temperature probes can be extended up to 500 feet using extension cable. For more information, see **Extending probe cables** on page 38.
③ The variable stage on a PB-6 is for heat mat control.

In addition to the features in the table, all Power Blocks have the following:

- Alarm relay
- Pulse input for water meter monitoring
- Status LEDs
- Power-failure memory protection
- Overload protection fuse for variable stages
- Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- CSA approval
- Two-year limited warranty

Power Block electrical ratings

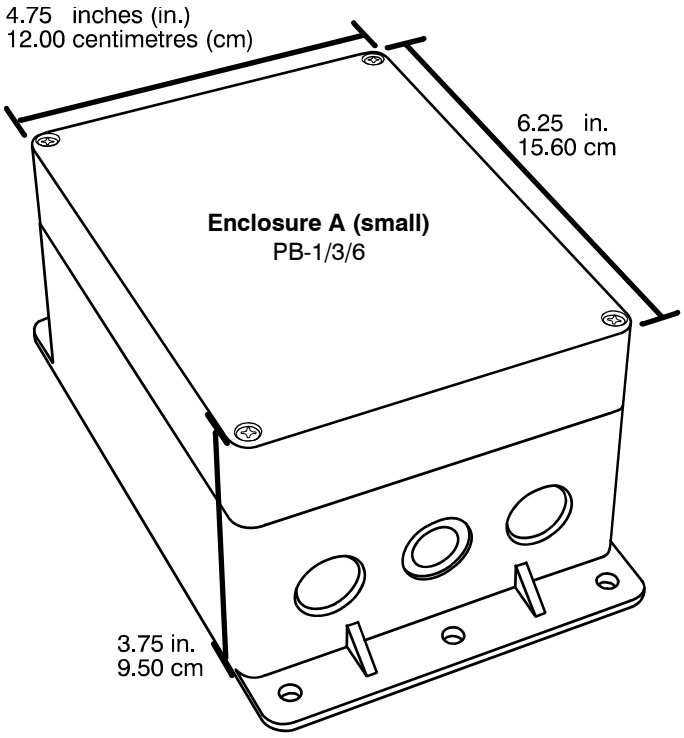
The ratings below are for all Power Blocks. Some models do not have variable stages; others do not have relay stages. For a list of Power Block models and their features, see **Power Blocks** on page 2.

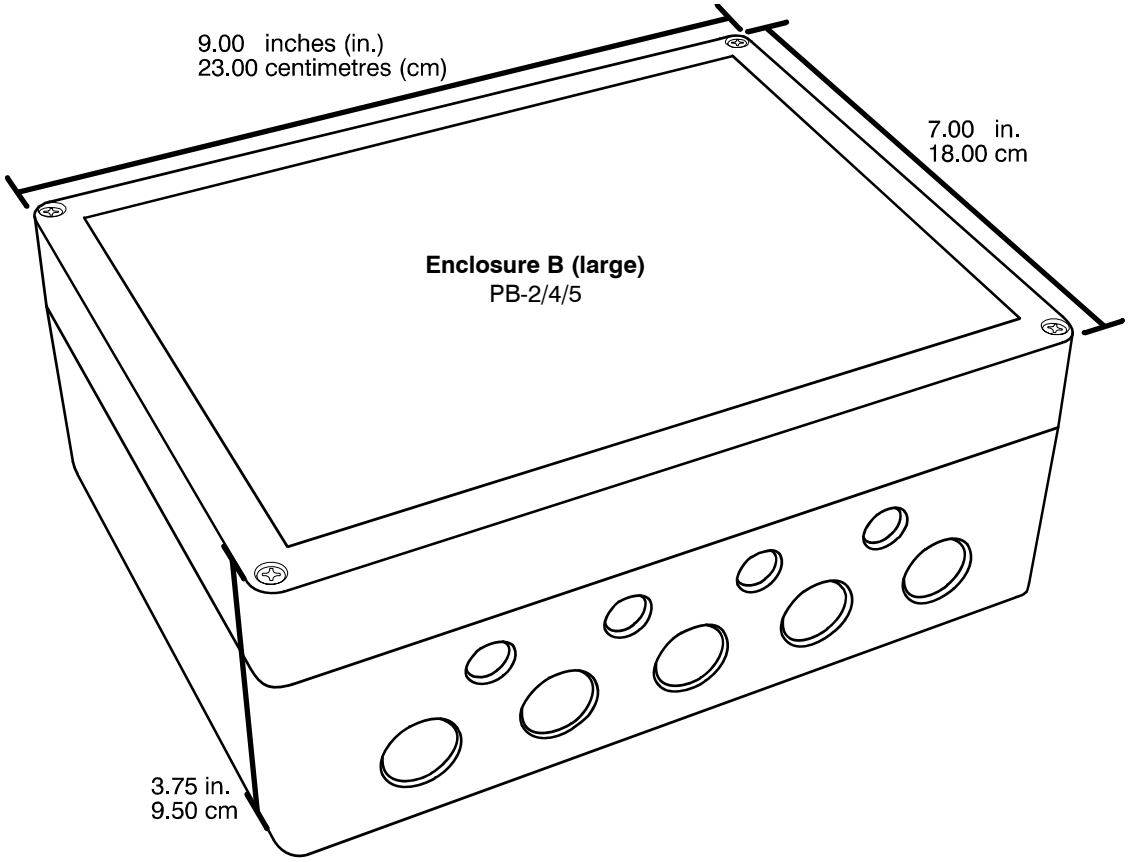
Input power	115/230/208 VAC, 60 Hz
Variable stages ① Fuses	10 FLA at 115/230 VAC 15 A, 250 VAC ABC-type ceramic
Relay stages ①②	10 FLA at 115/230/208 VAC 1/3 HP at 115 VAC, 1/2 HP at 230 VAC 360 W tungsten at 120 VAC
Alarm relay	0.4 A at 125 VAC; 2 A at 30 VDC, resistive load 0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

① You can connect two or more pieces 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 limit of the variable stage or relay.
② If you are connecting a load that exceeds the ratings of the relay, you must install a power contactor. For more information, read **Using power contactors to increase the capacity of relays** on page 8.

Make sure the startup amperes (inrush current) of the connected devices do NOT exceed the relay's current rating. Failure to do this can overload the Power Block and void the warranty.

Power Block enclosure dimensions





What you need to know before installing the OMNI

Before installing your OMNI-4000 system, 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 your OMNI-4000 devices (OMNI Server, Power Block, and so on), which might cause them to fail.
>
> Because it is not possible to *completely* protect the OMNI-4000 devices 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 **Appendix D: Installation worksheets** on page 73, list all the equipment you want to control using the Power Blocks. Install the equipment and make your electrical connections according to the sheet. You can connect more than one piece of equipment to a single relay or stage *as long as the total current draw does not exceed* the relay or stage's limit. For more information, read **Power Block electrical ratings** on page 4.

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 Power Blocks. 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 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.

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 affects of electrical noise are not always visible. Over time, electrical noise can cause electronic circuits, relay contacts, and power contactors to deteriorate.

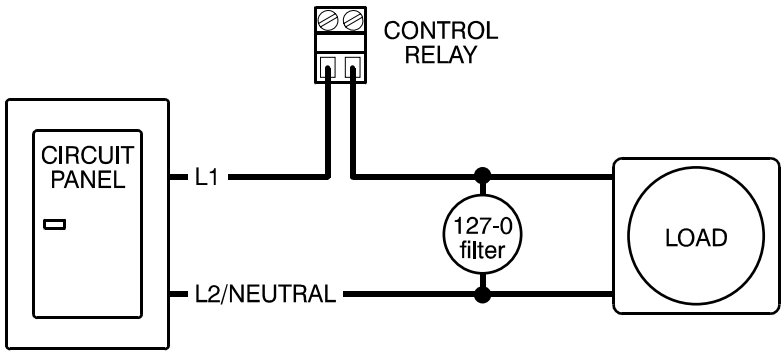
Phason highly recommends installing filters on *all* inductive loads.

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 8.

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

Phason offers three power contactor options.

- **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.

For more information about power contactors or other Phason accessories, see your dealer or visit **www.phason.ca**.

Precautions, guidelines, and warnings

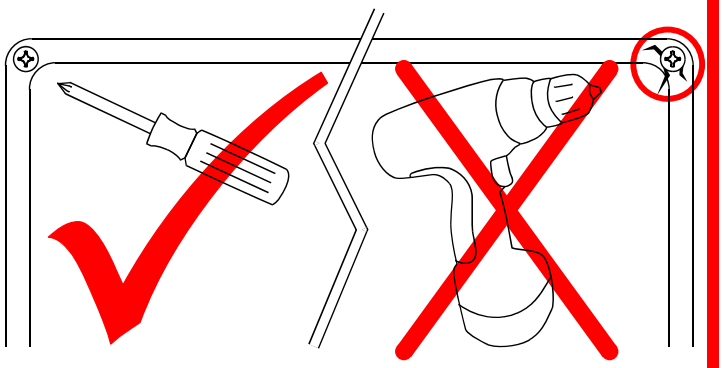
See also **Servicing and maintaining the controls** on page 58.

The OMNI Server and Power Blocks must be installed by a qualified electrician.

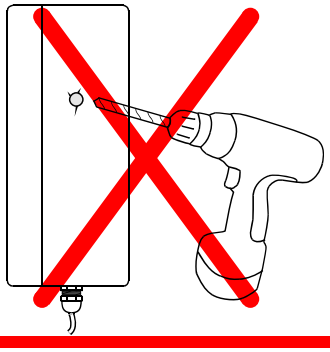
Before installing or servicing the OMNI equipment, switch OFF the incoming power at the source.

Install the OMNI Server, Power Blocks, and all equipment connected to them according to local electrical codes.

Mount the enclosures on a sheltered, vertical surface, with the electrical knockouts facing down.



Use a screwdriver to tighten the screws in the enclosures. Do not use a drill or over tighten the screws; this can crack the enclosures and ruin the watertight seal.



Use the electrical knockouts for bringing wires or cables into or out of the enclosures. Use watertight strain reliefs or conduit connectors at all cable-entry points.

Do not make additional holes in the enclosures; this can damage the watertight seal or control components and void the warranty.

Routing data wires

Routing data wires in the same conduit as, or beside AC power cables, can cause electrical interference, erratic readings, and/or improper control. Data wires include **all** of the following:

- Temperature probe and humidity sensor cables
- Actuator feedback (potentiometer) wires
- Data communication wires, including RS-232/RS-485
- Any cable or wire that does not provide AC power

Guidelines for routing data wires

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

If in doubt, **do not run any wire or cable that is not an AC-power wire** inside the same conduit or beside other AC-power wires.

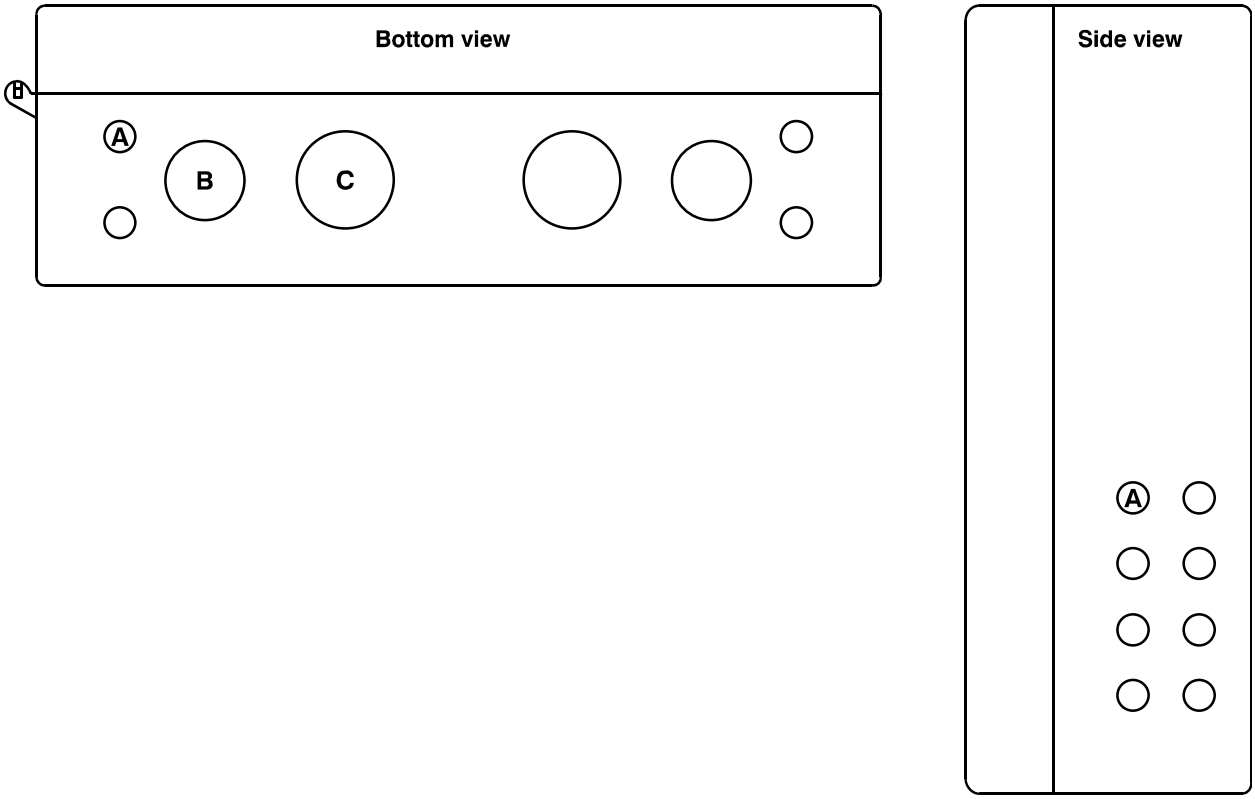
Chapter 2: Installing an OMNI Server

Before installing the OMNI Server, read the section **What you need to know before installing the OMNI** on page 6.

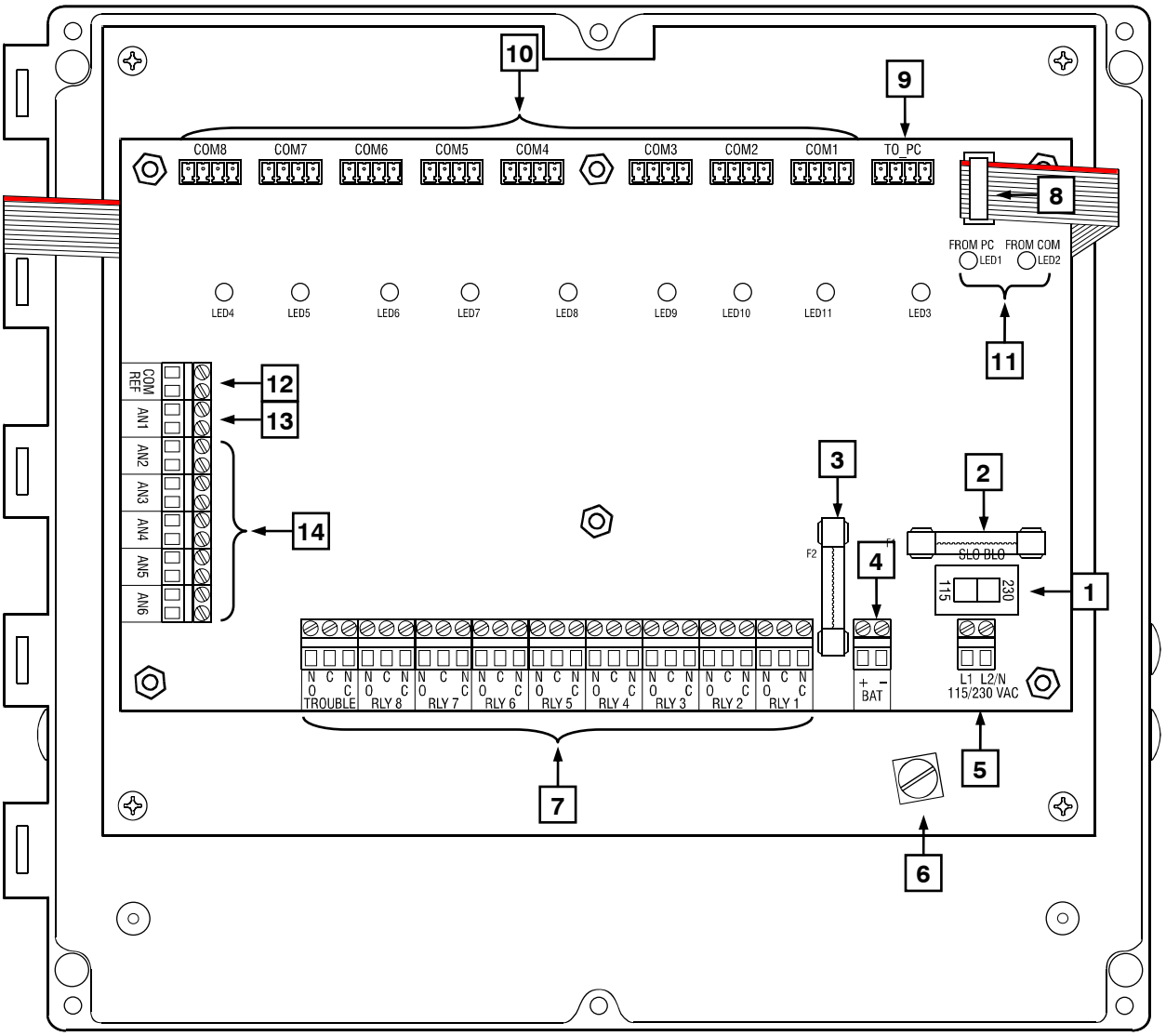
OMNI Server layout

OMNI Server exterior bottom and side

- Size **A** knockout/hole is designed for size PG7 strain relief
- Size **B** knockout is designed for 3/4-inch conduit
- Size **C** knockout is designed for 1-inch conduit



OMNI Server interior



1	Voltage selection switch—set this switch to the correct voltage before installing the OMNI Server. For more information, read **Connecting the incoming power source** on page 22.
2	Incoming power fuse (F1)—1/4 A, 250 VAC slow-blow glass
3	Battery circuit fuse (F2)—1 A, 250 VAC non-time-delay glass
4	Battery backup terminal—connect the 12-V backup battery to this terminal. For more information, read **Connecting the backup battery** on page 23.
5	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal. For more information, read **Connecting the incoming power source** on page 22.
6	Ground plate screw—connect a ground wire to this screw.
7	Alarm relay terminals—connect an external alarm system or alarm siren to these terminals. For more information, read **Connecting alarm systems** on page 21.

8	Cover cable socket—make sure the ribbon cable from the cover is properly connected to this socket.
9	Computer communication socket (TO_PC)—connect the RS-485 communication wiring to this socket. For more information, read **Connecting the communications** on page 13. The LED below the socket is a power indicator. When the LED is lit, the Server has power.
10	Communication channel sockets (COM1 to COM8)—connect the device (Power Blocks and so on) communication wiring to these sockets. For more information, read **Connecting the communications** on page 13. When the LED below a socket is lit, that means the OMNI Server is communicating on that channel.
11	Transmit/receive LEDs—When the OMNI Server is sending information, the FROM PC LED is lit. When it is receiving information, the FROM COM LED is lit.
12	Common reference terminal—connect the common reference wiring from the RS-485A Converter to one of these terminals. For more information, read **Connecting the communications** on page 13.
13	Outdoor temperature probe terminal (AN1)—connect the temperature probe for monitoring outdoor temperatures to this terminal. For more information, read **Connecting temperature probes** on page 20.
14	Additional temperature probe terminals (AN2 to AN6)—connect temperature probes for monitoring additional areas to these terminals. For more information, read **Connecting temperature probes** on page 20.

Mounting the OMNI Server

Follow these guidelines when mounting the OMNI Server:

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

To mount the OMNI Server

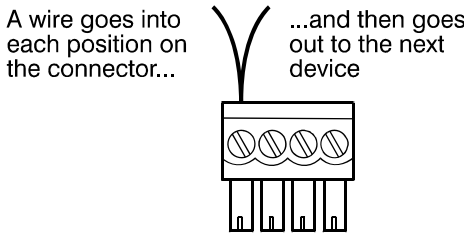
1. Select a location for the OMNI Server.
2. Remove the screws from the front cover and then swing it open.
3. Mount the enclosure to a wall using the four screws provided with the control. Insert the screws into the large holes in each corner of the box and tighten.

Connecting the communications

NOTE

If you are installing an OMNI Alarm Manager (OAM) in the OMNI Server, follow the additional instructions in the **OAM installation guide** when connecting the communications.

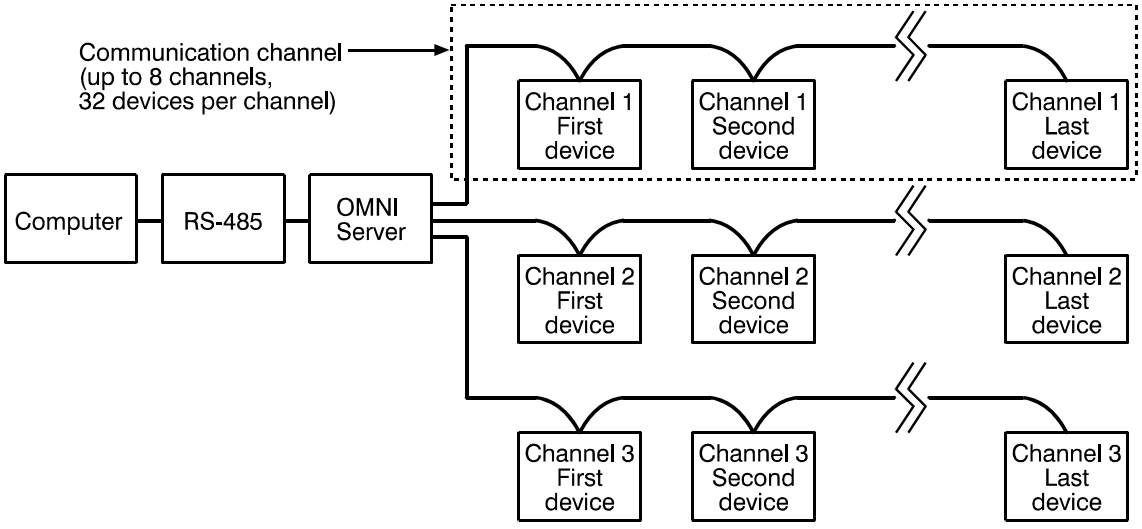
All OMNI-4000 devices, including Power Blocks, Local Environment Monitors, Feed Level Sensors, and more, communicate with the computer along "communication channels." A communication channel is a continuous line of cable connecting all devices in the series, in other words, a "daisy chain". Each device connects to the communication channel as shown below.



The last device on a communication channel must have the termination resistors in place or a termination module installed. For the location of the termination resistors on Power Blocks, see **Microboard layout** on page 34. For other OMNI devices, see the installation guide for the particular device.

The OMNI Server is the control center for the OMNI-4000 hardware. The OMNI-Server's eight communication channels transfer data between the computer and the devices. Each communication channel can communicate with up to 32 devices, for a total of 256 (8 x 32=256).

The following diagram is a simplified overview of the OMNI-4000 system.



Communication cable requirements

The following types of cable are acceptable:

- Unshielded twisted pair (UTP), category 3 (CAT3) or category 5 (CAT5)
- Shielded twisted pair (STP), CAT3 or CAT5

Phason does not recommend other types of wire.

If you are using STP cable, you must follow the specific instructions in **Using shielded twisted pair (STP) cable** below.

Using shielded twisted pair (STP) cable

The advantage of using STP cable is that it can improve communications by reducing electromagnetic interference.

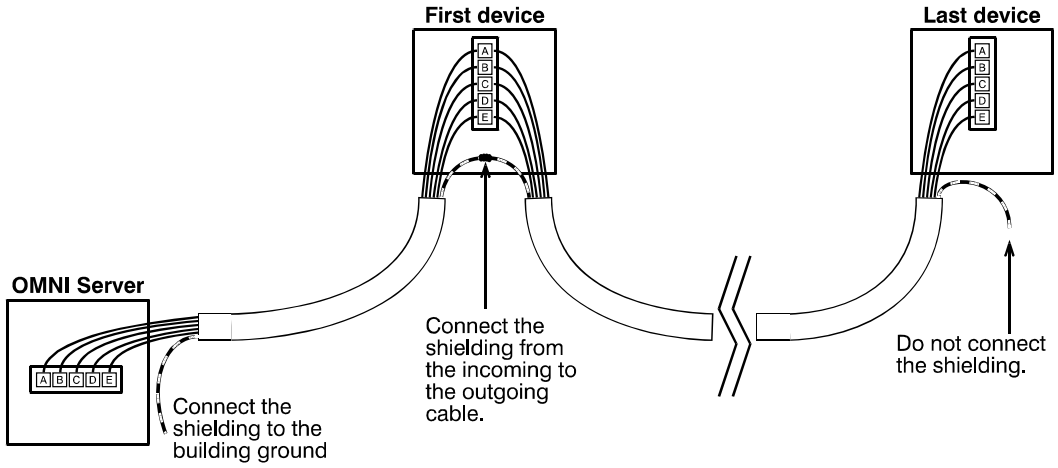
The drawback of STP cable is that it requires more care during installation. If the shielding is connected incorrectly, shielded cable can cause more problems than it solves.

How to install shielded cable

When installing shielded cable, you must connect the shielding to the building ground at one end only. Phason recommends connecting the cable to the building ground near the computer or OMNI Server.

When connecting the devices along the communication channel (daisy-chain), connect the shielding of the incoming cable to the shielding of the outgoing cable. Do not connect the shielding to the device or to anything else. At the last device on the daisy chain, do not connect the shielding; leave it unconnected.

The following diagram shows how to connect shielded cable. Connect the cabling for each channel as shown.



Installing the communication wiring

Before installing the communication wiring, read *all* the following:

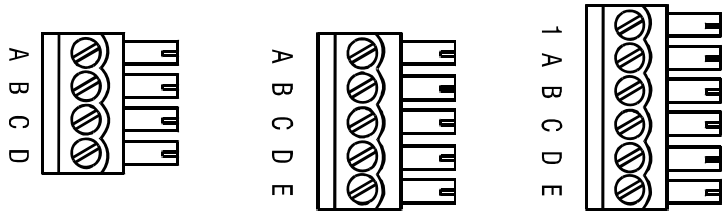
- Connector types (below)
- Consistent wiring (on page 16)
- Common reference wiring (on page 16)
- Common mistakes in communication wiring (on page 17)

Connector types

There are three possible connector types on Phason devices.

- The four-positions, **A B C D**, are common to all models.
- Some models have five positions and include **E** for common reference wiring.
- The six-position connectors that include position **1** are included on the RS-485A and OMNI Alarm Manager (OAM) only.

The proper connector alignment is shown below.



Consistent wiring

Using consistent wiring helps eliminate communication connection errors and makes troubleshooting much easier. Use the wire colors shown below when connecting all devices to the communication system.

Wire function	RS-485A/OMNI Server	First device	All remaining devices
1 alarm signal①	**1** white/green	**1** white/green	**1** white/green
A communication	**A** blue	**A** blue	**A** blue
B communication	**B** white/blue	**B** white/blue	**B** white/blue
C communication	**C** orange	**C** orange	**C** orange
D communication	**D** white/orange	**D** white/orange	**D** white/orange
E common reference②	**E** green	**E** green	**E** green

① Only for OMNI systems with an OMNI Alarm Manager
② Not available on all models

Common reference wiring

Common reference wiring helps eliminate communication problems. The common reference wire normally connects to position **E** on the communication connector.

For devices, such as Power Blocks, that have four-position connectors, it is a good idea to leave the communication cable one foot longer than is needed for connecting to the terminals (**A**, **B**, **C**, and **D**). You can then use the extra length of wire to connect to a reference point on the circuit board in place of the **E** terminal.

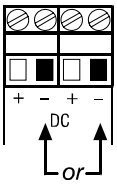
From the RS-485A to the OMNI Server

- For systems with an OMNI Alarm Manager, follow the instructions in the **OAM installation guide**.
- For systems *without* an OMNI Alarm Manager, connect the wire from the '**E**' on the RS-485A to one of the **COM REF** terminals on the OMNI Server.

From the OMNI Server to each device

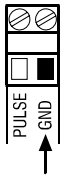
For *each communication channel*, connect a wire from the **COM REF** terminal on the OMNI Server to the following terminal on each device. Follow the same guidelines for continuing the wiring properly as you would for communication wires.

- Devices with a five-position communication connector—connect the common reference to the **E** terminal.
- DC-powered devices with a four-position connector

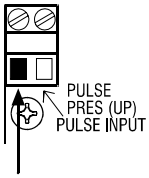


- Power Blocks

PB-1/3/6



PB-2/4/5

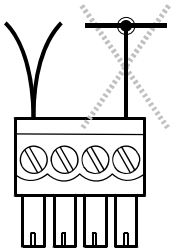


Common mistakes in communication wiring

- **Not using the correct type of communication cable**—the communication cable must be twisted pair cable, category 3 (CAT3) or category 5 (CAT5). You can use either unshielded twisted pair (UTP) or shielded twisted pair (STP) cable. Phason does not recommend other types of wire. For more information, read **Communication cable requirements** on page 14.

- **Not continuing the communication wiring properly**—all the devices on the communication channel must be connected in series (in a daisy-chain) and the wire must be continued properly from one device to the next. When continuing the communication wiring from one device to the next, the wires must be connected as shown below.

A wire goes into each position on the connector and then goes out to the next device



Do not use "branches" ot "T-connections".

- **Not terminating the last device on the communication channel**—the last device on the communication channel must have the termination resistors in place or a termination module installed. The termination resistors are located on the circuit board of all OMNI devices. You must remove the termination resistors from all devices, *except* the last one on the channel.

  The termination resistors on OMNI Power Blocks are in sockets on the Micro Board and can be removed and replaced if necessary. Termination resistors on all other devices must be removed using wire cutters. For the location of the termination resistors on Power Blocks, see **Microboard layout** on page 34. For other OMNI devices, see the installation guide for the particular device.

  If you remove the termination resistors from the last device by mistake, you will have to install a Termination Module on that device. The Termination Module connects to the communication socket on the last device. For information, contact your dealer or Phason Customer Support.

- **Running the communication cable in the same conduit as, or beside AC power cables**—routing communication cable in the same conduit as, or beside AC power cables, can cause electrical interference and communication failures. Follow the guidelines below when routing communication cable.

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

  For more information, read **Routing data wires** on page 9.

To connect the communication and common reference wiring

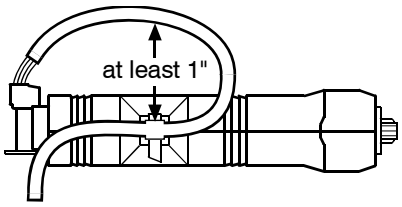
1. Connect all the devices on each communication channel in series. For example, 'A' on the OMNI Server to 'A' on the first device, to 'A' on the second device, and so on. Use the wires specified in **Consistent wiring** on page 16.

   As you go to each device, remove the termination resistors from each device, *except for the last one on the communication channel*. The last device must have the termination resistors in place.

2. Connect the **TO_PC** connector on the OMNI Server to the connector on the RS-485A Converter.

Connecting the RS-485A Converter

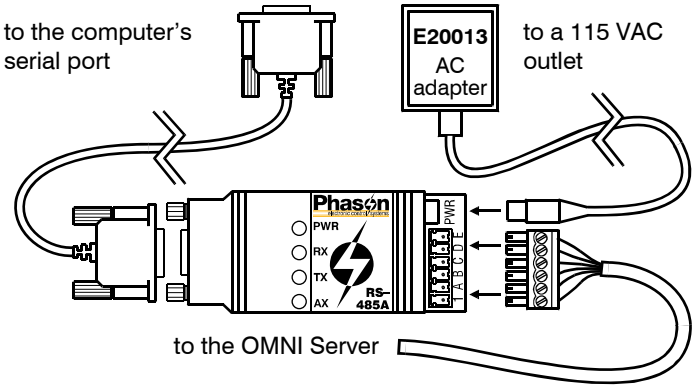
After connecting the communication and common reference wiring to all OMNI devices, the OMNI Server, and the RS-485A Converter, connect the RS-485A to the computer.



1. Attach the adhesive mount to the side of the RS-485A.
2. Fasten the communication cable to the RS-485A using the tie-wrap. Make sure the bend in the wire is at least one inch in diameter.
3. Connect one end of the extension cable to the RS-485A and the other end to your computer's serial port.
4. Connect the AC adapter to the RS-485A.

Use only the E20013 adapter provided with the RS-485A Converter. Other adapters can damage the converter and void the warranty. If the RS-485A Converter requires warranty service, return the adapter along with the converter.

5. Plug the AC adapter into a 115 VAC outlet.



Connecting equipment to the OMNI Server

This section contains the following:

- Connecting temperature probes (below)
- Connecting alarm systems (on page 21)
- Connecting the incoming power source (on page 22)
- Connecting the backup battery (on page 23)

Connecting temperature probes

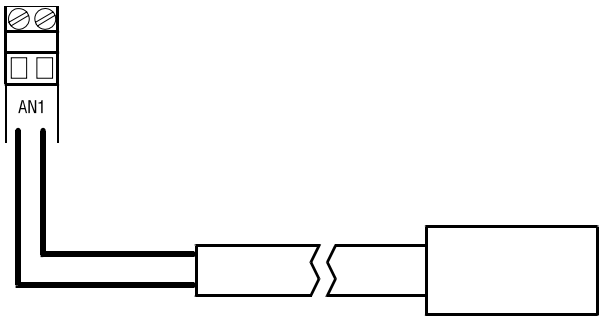
The OMNI Server comes with a 30-foot probe for monitoring outdoor temperatures. You can monitor temperatures in up to 5 additional areas by connecting additional probes.

All temperature probes cables can be extended up to 500 feet. For more information, read **Extending probe cables** on page 38.

To connect temperature probes

Follow the guidelines below and connect the temperature probe to the OMNI Server.

- 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.
- When connecting the outdoor temperature probe, connect it to terminal **AN1**. For any additional probes, connect to any of **AN2** to **AN6**.



Connecting alarm systems

An alarm system can be a siren, an alarm panel, or an auto-dialer. See your alarm siren's installation guide for installation instructions and information about the type of system, *normally open* or *normally closed*.

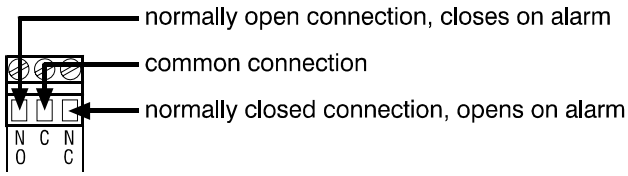
- If you are connecting the alarm system to the alarm relays and your system uses a *normally open* connection (closes on alarm), connect the system as shown in the normally open diagram.

  Join all the common connections together and all the closed-on-alarm (**NO**) connections together. The alarm relays must be in parallel with each other so any device can trigger the alarm system when an alarm condition occurs.

- If you are connecting the alarm system to the alarm relays 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 alarm relays must be in series with each other so any device can trigger the alarm system when an alarm condition occurs.

OMNI Server alarm terminals



The **RLY 1** to **RLY 6** relays activate if there is a valid alarm condition, as defined in OMNI-4000. If the server cannot communicate with the computer (software), the relays will NOT trigger. For more information, read the **OMNI-4000 user manual**.

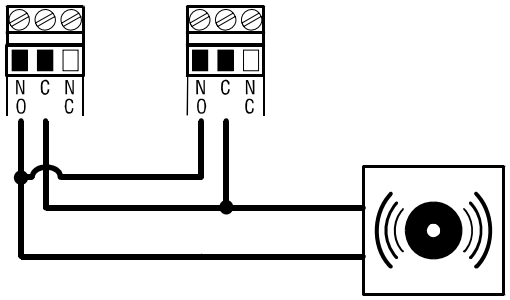
The **TROUBLE** alarm relay activates when there is a total power fail (AC power and backup battery), or a loss of communication (with the computer) that is longer than five minutes.

The ratings of the alarm system must not exceed the ratings of the alarm relay(s).

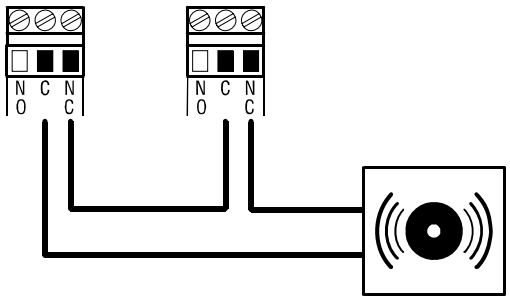
OMNI Server alarm relay ratings: 0.4 A at 125 VAC; 2 A at 30 VDC, resistive load
0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

To connect an alarm system to an OMNI Server

Normally open system (closed on alarm)



Normally closed system (open on alarm)



Connecting the incoming power source

You can connect the OMNI Server to 115 or 230 VAC, 50/60 Hz power.

NOTE

Connect the communication and common reference wiring before connecting the power source. For more information, read the **Connecting the communications** on page 13.

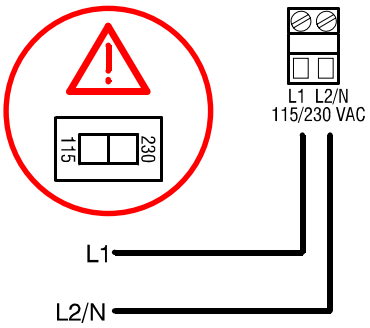
Before connecting the power, set the voltage selection switch to the correct voltage.

Before connecting the incoming power, switch OFF the power at the source.

Do not switch ON the power until you have finished all wiring.

To connect the incoming power source

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



Connecting the backup battery

The OMNI Server comes with a maintenance-free 12 V rechargeable battery and cable. The battery keeps the OMNI Server operating during brief power failures. There is an internal trickle charger on the OMNI Server that keeps the battery charged.

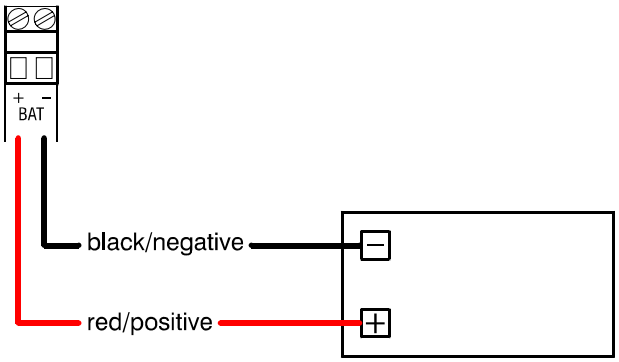
Store the battery close to the server in a vented enclosure to protect it. A marine battery storage container is an ideal enclosure.

NOTE

The battery circuit has a fuse. If the fuse is blown or missing, the Server will not maintain the charge in the battery, and the battery will not operate the Server during a power failure. For more information, read **OMNI Server interior** on page 11.

To connect the backup battery

Connect the backup battery to the OMNI Server as shown below.



Finishing the installation

After you have finished connecting all equipment, wiring, and cables to the OMNI Server, verify the wires are connected properly and then close the cover.

1. Make sure all the wires are properly connected to the correct terminals.
2. Make sure all connectors are properly connected to their sockets. For more information, read **OMNI Server interior** on page 11.
3. Make sure the voltage selection switch is in the correct setting.
4. Switch on the power to the OMNI Server and then make sure al equipment is functioning properly.
5. Close the cover.
6. Insert the four screws into the cover and then tighten them.

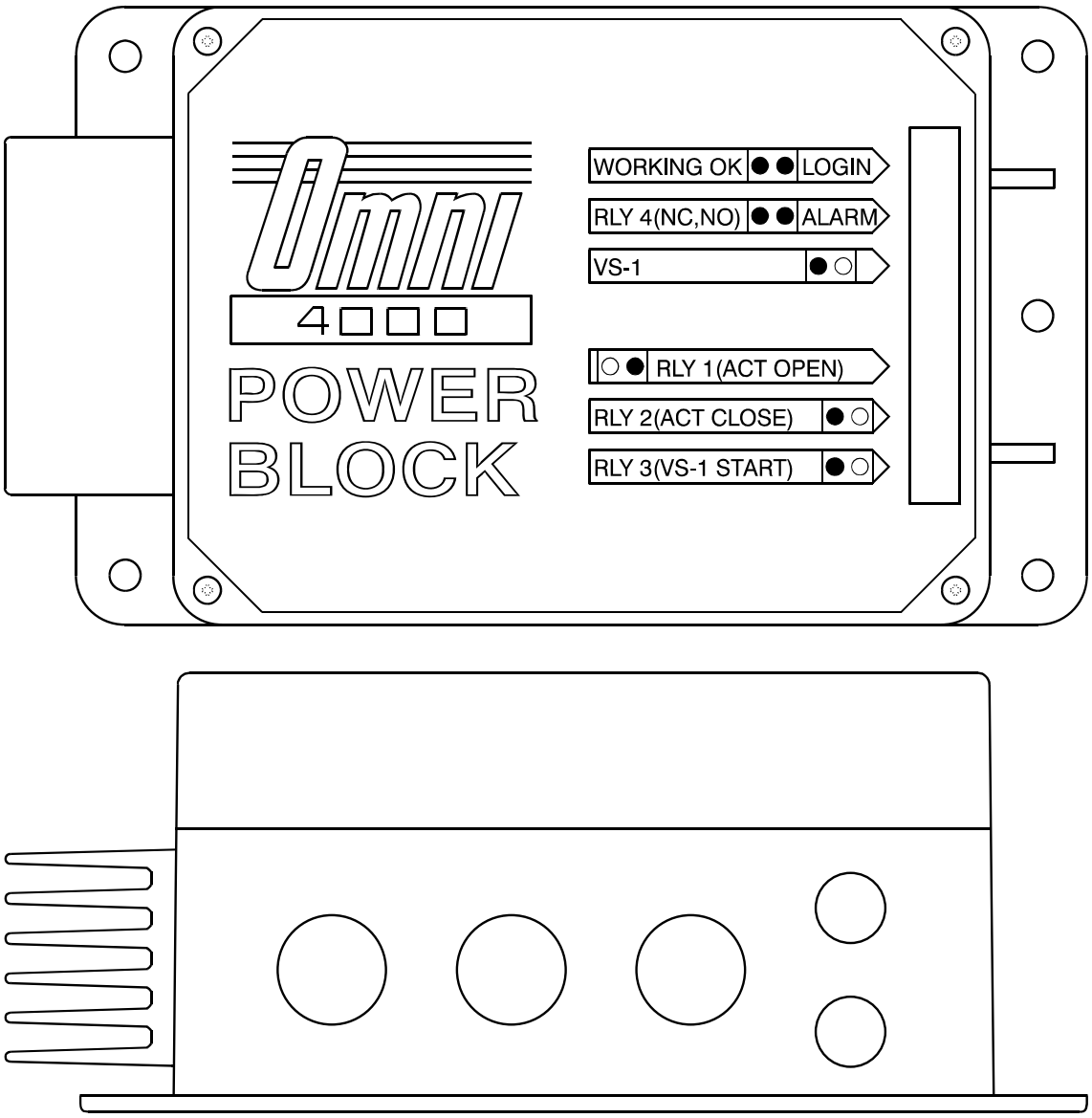
Do not over tighten the screws. Do not use power screwdrivers or drills.

Chapter 3: Installing Power Blocks

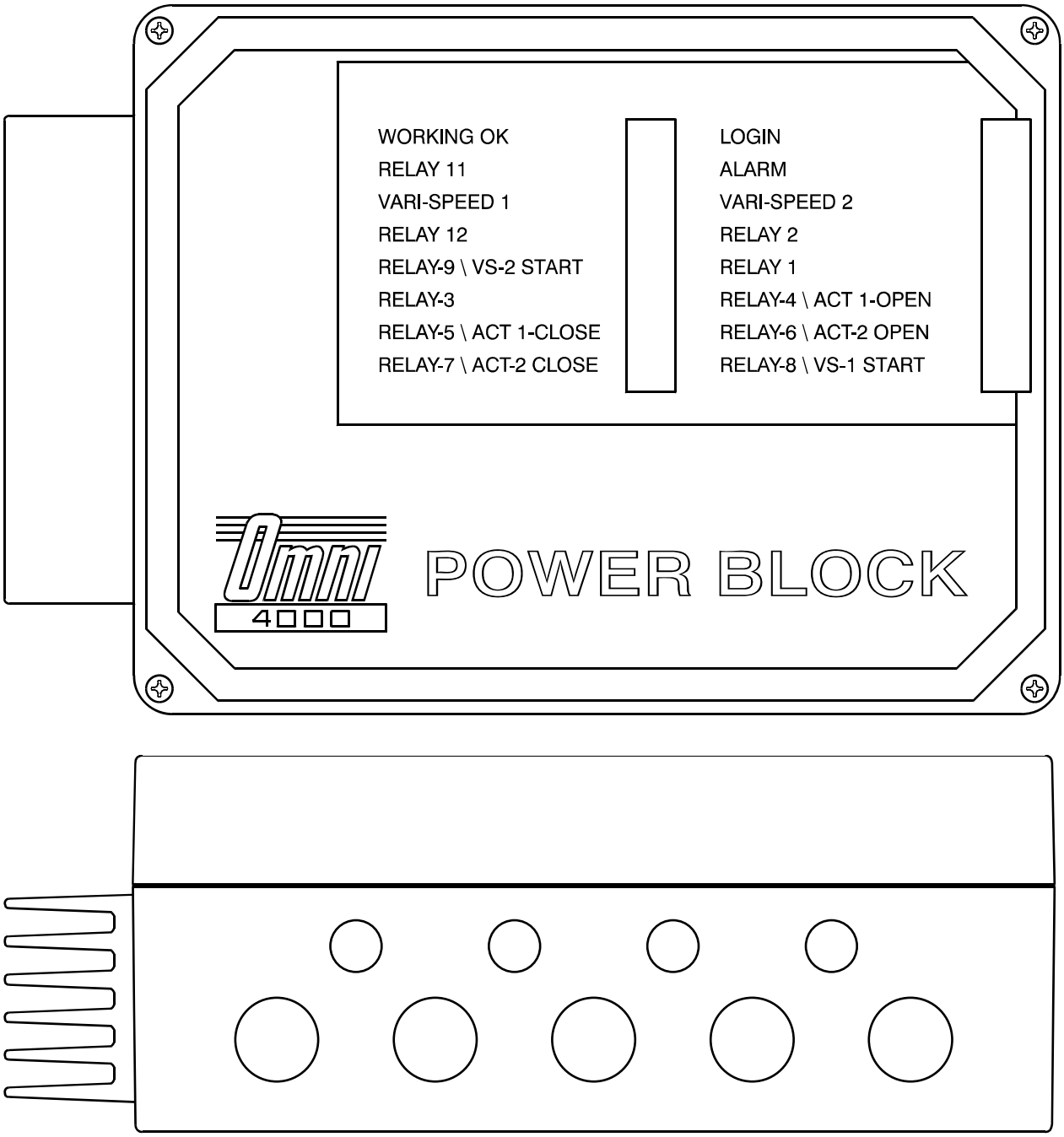
Before installing the Power Blocks, read the section **What you need to know before installing the OMNI** on page 6.

Power Block layout

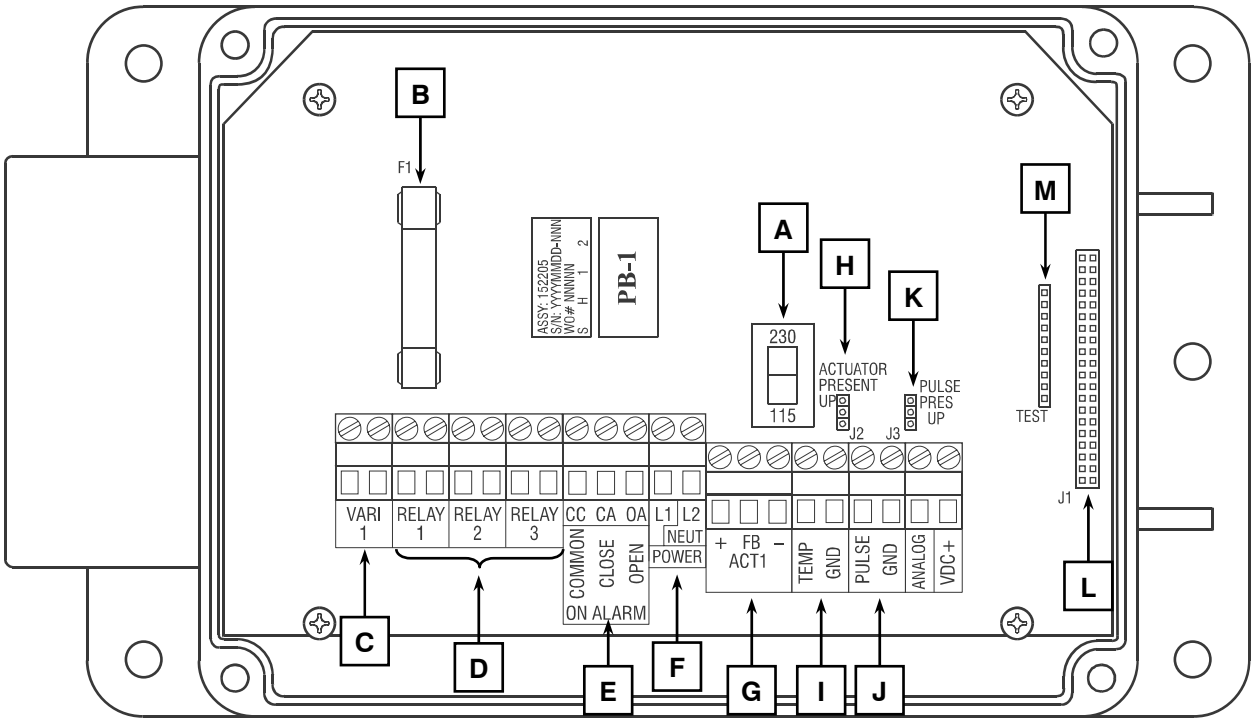
PB-1/3/6 cover and base



PB-2/4/5 cover and base

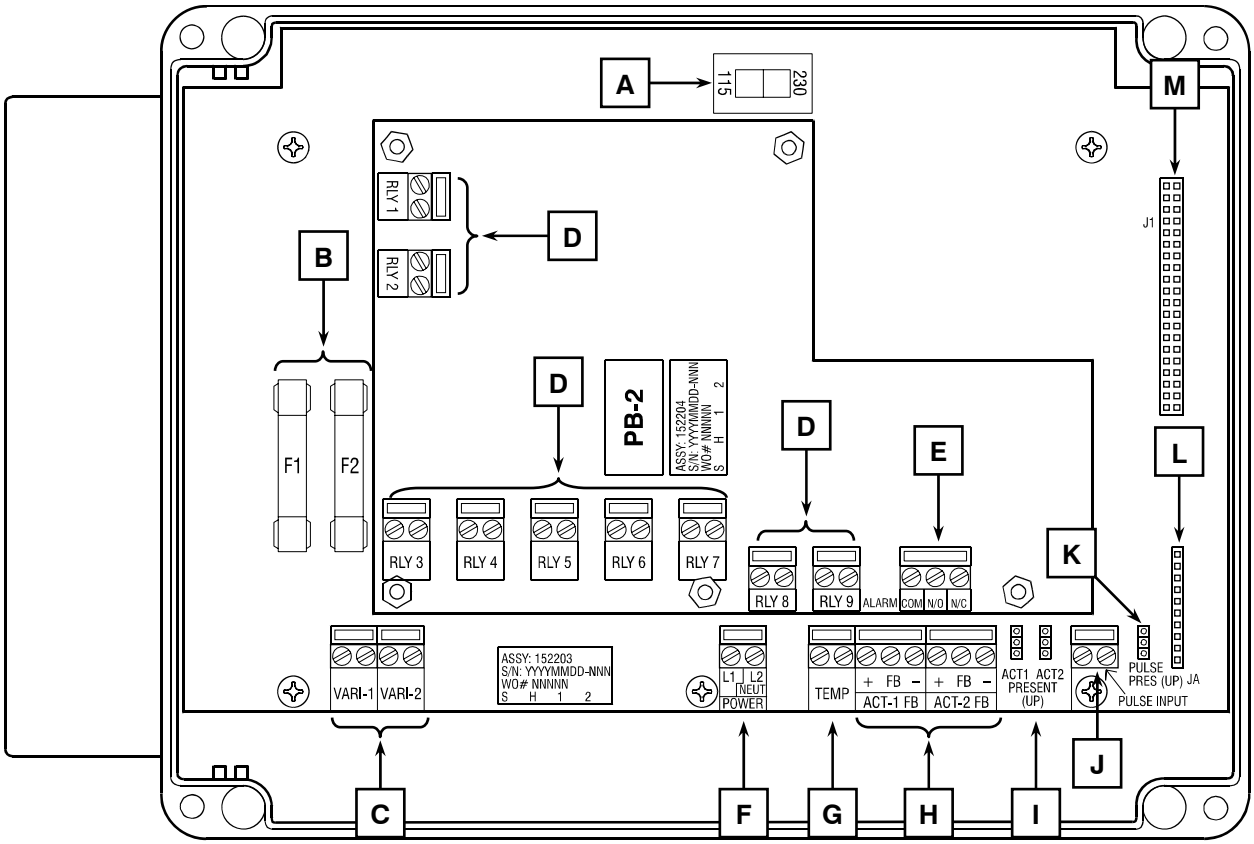


PB-1 interior layout



A	Voltage selection switch—set this switch to the correct voltage before installing the Power Block.
B	Variable stage fuse (F1)—15 A, 250 VAC ABC-type ceramic fuse.
C	Variable stage terminal (VARI 1)—connect variable speed fans to this terminal.
D	General-purpose relay terminals (RELAY 1 to RELAY 3)—connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet actuator control.
E	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
F	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
G	Actuator feedback terminal (ACT1)—connect the feedback from the actuator to this terminal.
H	Actuator present jumper (J2)—place the jumper on the top two pins to enable, or on the bottom two pins to disable actuator control.
I	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
J	Pulse counter terminal (PULSE)—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
K	Pulse counter jumper (J3)—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.
L	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.
M	Power Block test board socket—if you are using a Power Block test board, plug it into this socket when testing. For more information, read **Testing Power Blocks** on page 56.

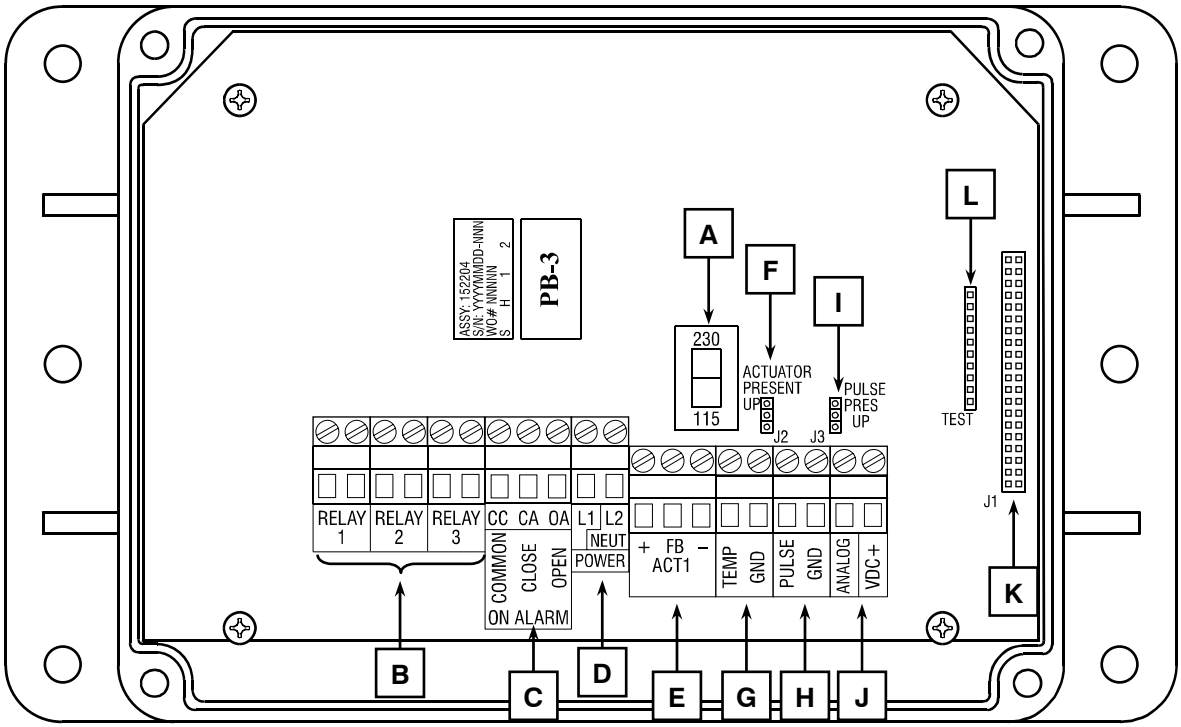
PB-2 interior layout



A	Voltage selection witch—set this switch to the correct voltage before installing the Power Block.
B	Variable stage fuses (F1, F2)— 15 A, 250 VAC ABC-type ceramic fuses. F1 is for variable stage 1, F2 for stage 2.
C	Variable stage terminals (VARI-1, VARI-2)—connect variable speed fans to these terminals.
D	General-purpose relay terminals (RLY 1 to RLY 9)—connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet actuator control.
E	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
F	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
G	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
H	Actuator feedback terminals (ACT1/2)—connect the actuator feedback to these terminals.
I	Actuator present jumpers—place the jumpers on the top two pins to enable, or on the bottom two pins to disable actuator control for the corresponding actuator.
J	Pulse counter terminal—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
K	Pulse counter jumper—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.

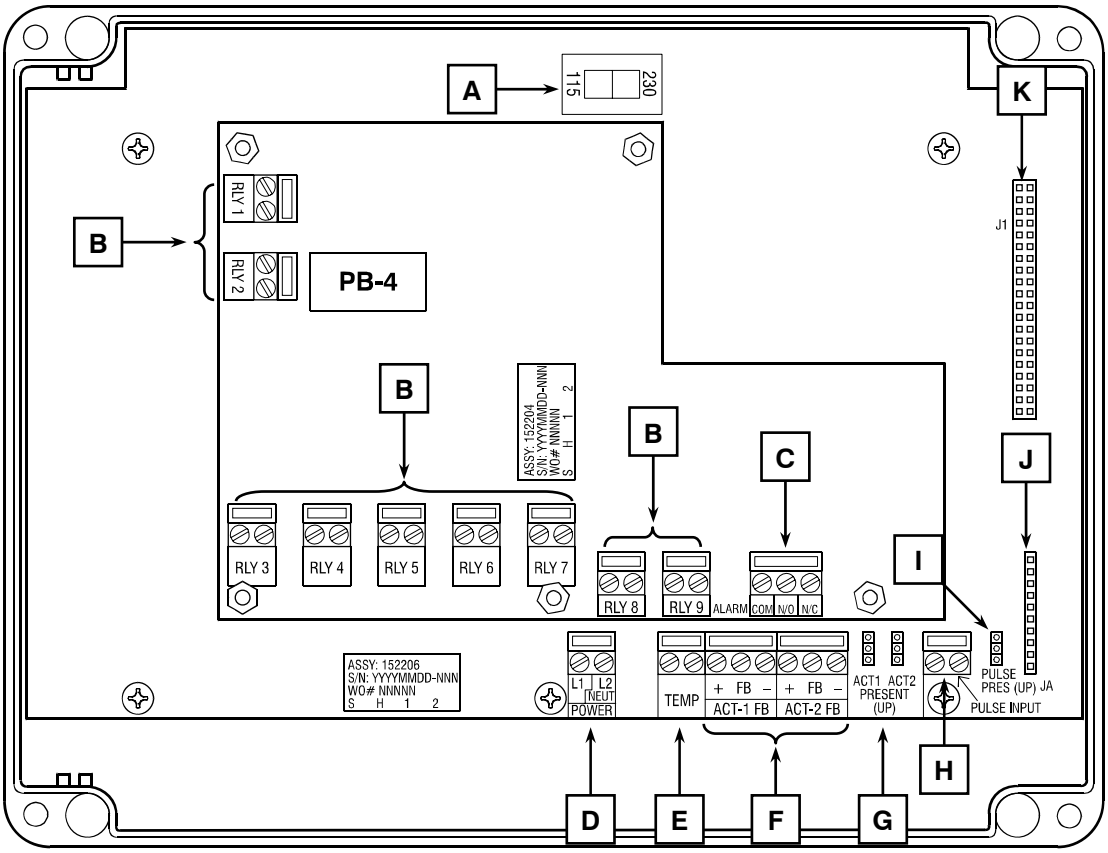
L	Power Block test board socket—if you are using a Power Block test board, plug it into this socket when testing. For more information, read **Testing Power Blocks** on page 56.
M	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.

PB-3 interior layout



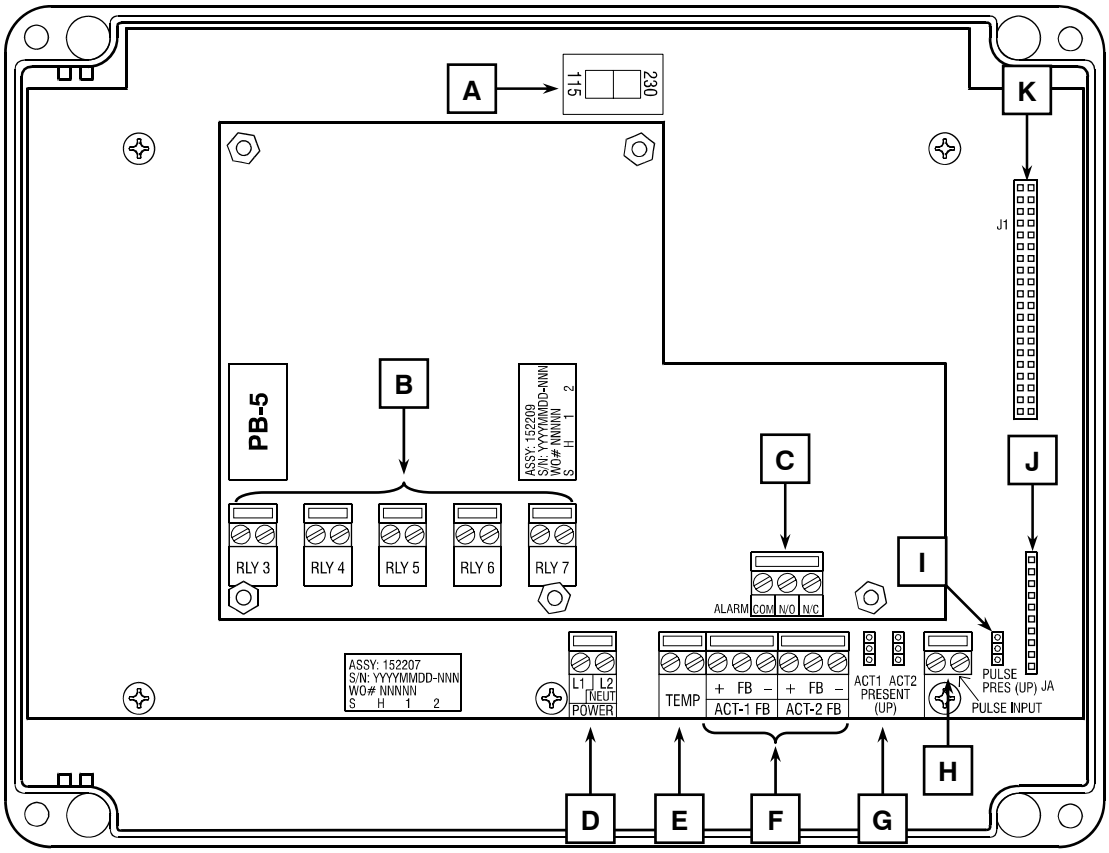
A	Voltage selection switch—set this switch to the correct voltage before installing the Power Block.
B	General-purpose relay terminals (RELAY 1 to RELAY 3)—connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet actuator control.
C	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
D	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
E	Actuator feedback terminal (ACT1)—connect the feedback from the actuator to this terminal.
F	Actuator present jumper (J2)—place the jumper on the top two pins to enable, or on the bottom two pins to disable actuator control.
G	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
H	Pulse counter terminal (PULSE)—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
I	Pulse counter jumper (J3)—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.
J	This terminal is not used.
K	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.
L	Power Block test board socket—if you are using a Power Block test board, plug it into this socket when testing. For more information, read **Testing Power Blocks** on page 56.

PB-4 interior layout



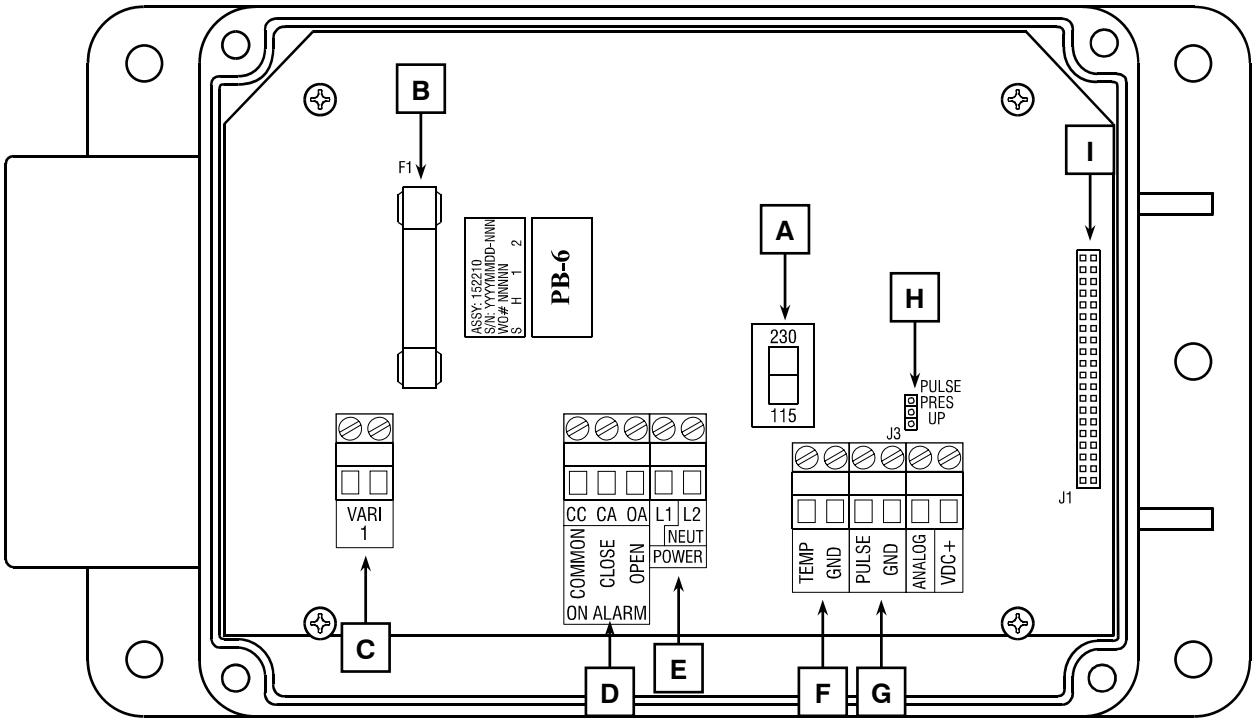
A	Voltage selection switch—set this switch to the correct voltage before installing the Power Block.
B	General-purpose relay terminals (RLY 1 to RLY 9)—connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet actuator control.
C	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
D	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
E	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
F	Actuator feedback terminals (ACT1,ACT2)—connect the actuator feedback from the actuators to these terminals.
G	Actuator present jumpers—place the jumpers on the top two pins to enable, or on the bottom two pins to disable actuator control for the corresponding actuator.
H	Pulse counter terminal—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
I	Pulse counter jumper—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.
J	Power Block test board socket—if you are using a Power Block test board, plug it into this socket when testing. For more information, read **Testing Power Blocks** on page 56.
K	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.

PB-5 interior layout



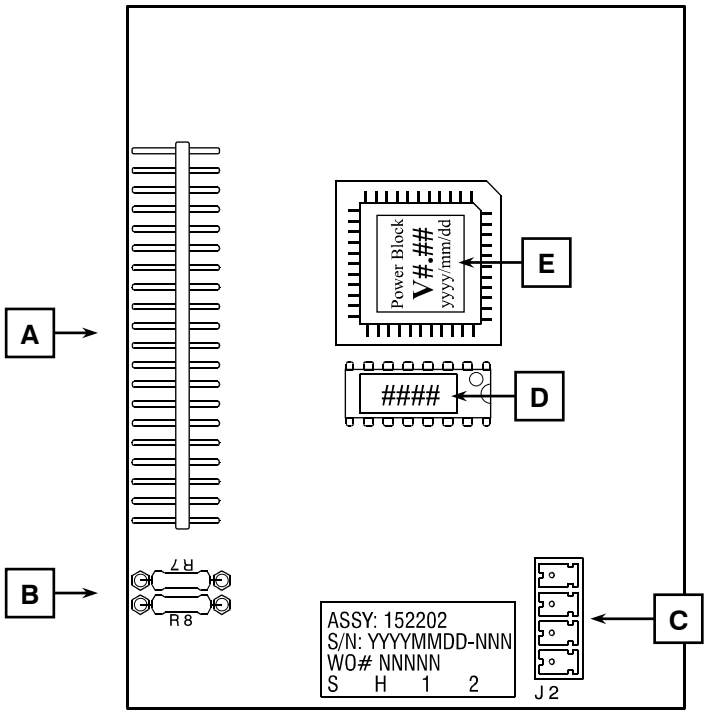
A	Voltage selection switch—set this switch to the correct voltage before installing the Power Block.
B	General-purpose relay terminals (RLY 3 to RLY 7)—connect single stage (on/off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet actuator control.
C	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
D	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
E	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
F	Actuator feedback terminals (ACT1/2)—connect the actuator feedback to these terminals.
G	Actuator present jumpers—place the jumpers on the top two pins to enable, or on the bottom two pins to disable actuator control for the corresponding actuator.
H	Pulse counter terminal—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
I	Pulse counter jumper—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.
J	Power Block test board socket—if you are using a Power Block test board, plug it into this socket when testing. For more information, read **Testing Power Blocks** on page 56.
K	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.

PB-6 interior layout



A	Voltage selection switch—set this switch to the correct voltage before installing the Power Block.
B	Variable stage fuse (F1)—15 A, 250 VAC slow-blow ceramic fuse.
C	Variable stage terminal (VARI 1)—connect variable heating equipment such as heat mats to this terminal.
D	Alarm relay terminal—connect an external alarm system or alarm siren to this terminal.
E	Power terminal—connect the incoming power (115/230 VAC, 50/60 Hz) to this terminal.
F	Temperature probe terminal (TEMP)—connect the temperature probe to this terminal.
G	Pulse counter terminal (PULSE)—if you are monitoring water usage, connect a water meter with pulse output to this terminal.
H	Pulse counter jumper (J3)—if you are monitoring water usage, place the jumper on the top two pins to enable the pulse counter.
I	Microboard socket—the microboard (not shown) connects to this socket. For more information, read **Microboard layout** on page 34.

Microboard layout



A	Connection pins—these pins plug into the microboard socket on the Power Block.
B	Termination resistors—If there are any devices on the communication channel after this one, remove these two resistors.
C	Communication socket—connect the communication wiring to this socket. For more information, read **Connecting the communications** on page 13.
D	Address label—write down this address. Each Power Block has a unique address and you will need to know which address belongs to which Power Block for the software.
E	Version label—if you need to contact Phason Customer Support, you might need to provide the information from this label.

Mounting Power Blocks

Follow these guidelines when mounting Power Blocks:

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

To mount Power Blocks

1. Select a location for the Power Block. 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 Power Blocks

Follow these instructions when installing Power Blocks and connecting equipment to them.

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

Refer to the installation worksheets starting on page 73 when installing and connecting equipment to Power Blocks.

Connecting temperature probes

Power Block models PB-1, PB-3, and PB-6 come with 6-foot temperature probes. Models PB-2, PB-4, and PB-5 come with 30-foot probes. You can extend temperature probes cables up to 500 feet. For more information, read **Extending probe cables** on page 38.

You can connect four probes to the Power Block and average them. For more information, read **Using four-zone averaging** on page 39.

When mounting probes for heat mat control on a PB-6, refer to **Using temperature probes for heat mat control** on page 37.

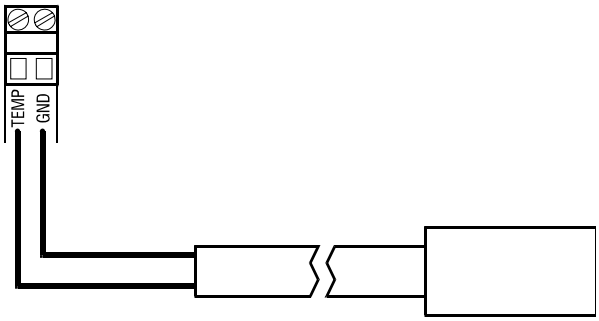
Replace damaged probes as soon as possible.

To connect temperature probes

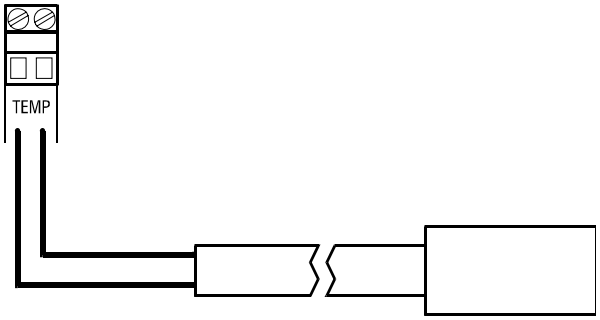
Follow the guidelines below and connect the temperature probe to the Power Block as shown in the appropriate diagram. Polarity does not matter.

- 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.

PB-1/3/6 temperature terminal



PB-2/4/5 temperature terminal

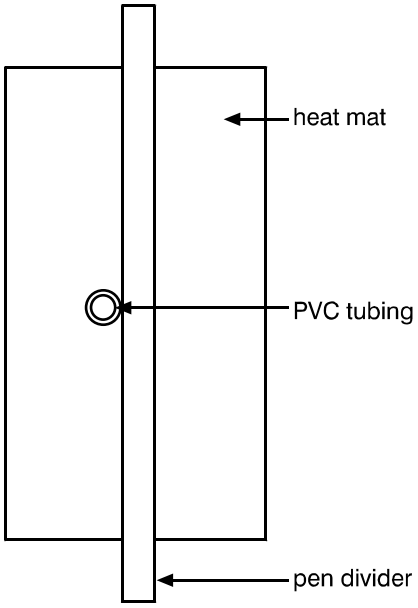


Using temperature probes for heat mat control

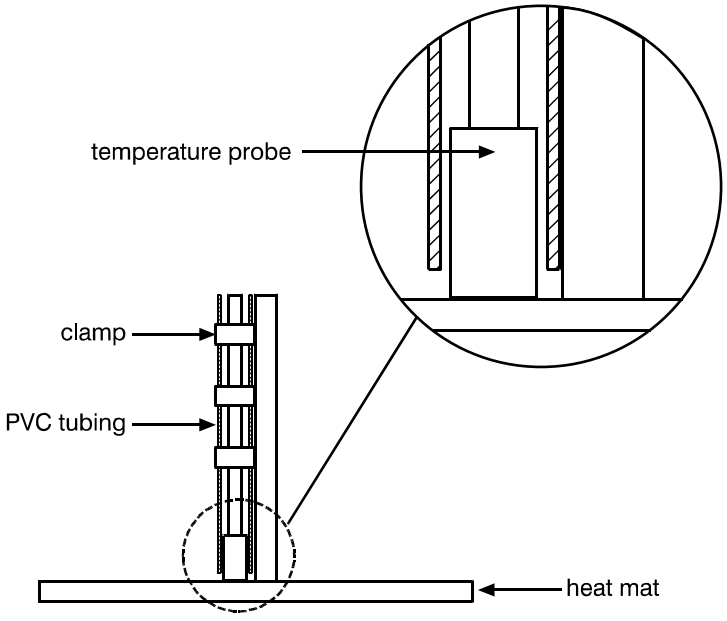
For heat mats with internal temperature probes, consult your dealer for the compatibility of the probes with the OMNI-4000 system.

For heat mats that *do not* have internal temperature probes, mount the Phason temperature probe as close as possible to the heat mat. The following diagram shows one possible mounting configuration.

Top view



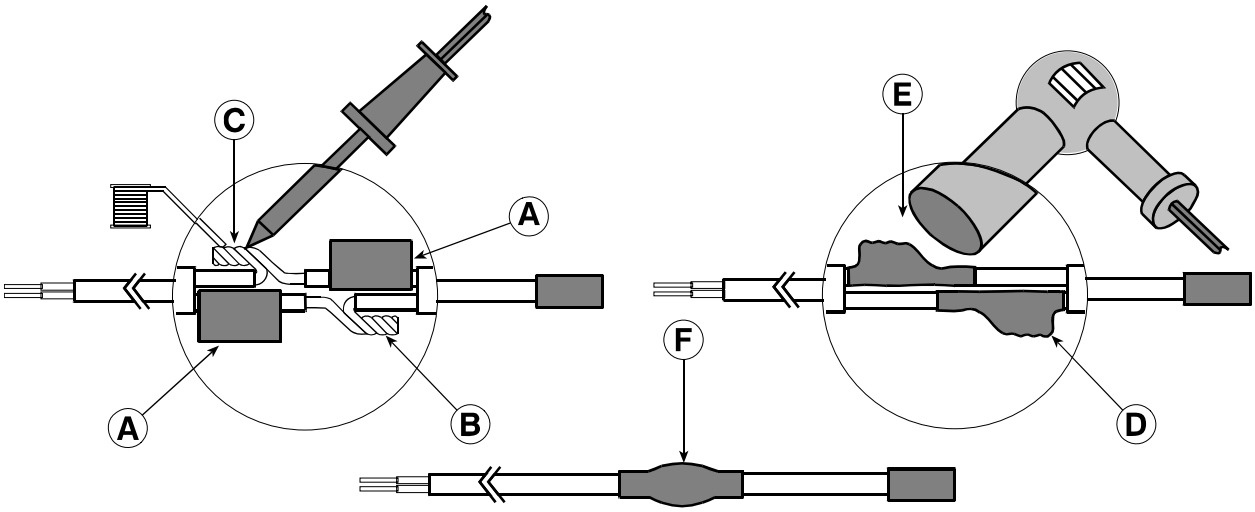
Side view



Extending probe cables

You can extend temperature probe cables to lengths of up to 500 feet. Follow the guidelines below and on page 36 when extending cables.

- Use two-wire 18 AWG jacketed cable. Phason recommends Belden # 9408, Alpha # 5052, or an equivalent. Extension cable is also available from Phason. For more information, contact your dealer or Phason.
- Join the extension cable to the temperature probe cable as shown below.
- If the unit operates erratically with the extended probe, run the cable along a different path or shorten it.



A Slide three pieces of heat shrink tubing over the wires: one for the red wire, one for the black wire, and one for both.

B Strip the ends of the wires and then twist them together.

C Solder the wires together using rosin-core flux solder—DO NOT use acid core solder.

D Slide the heat shrink tubing over the solder joints.

E Shrink the tubing using a heat gun.

F Your connection should look like this.

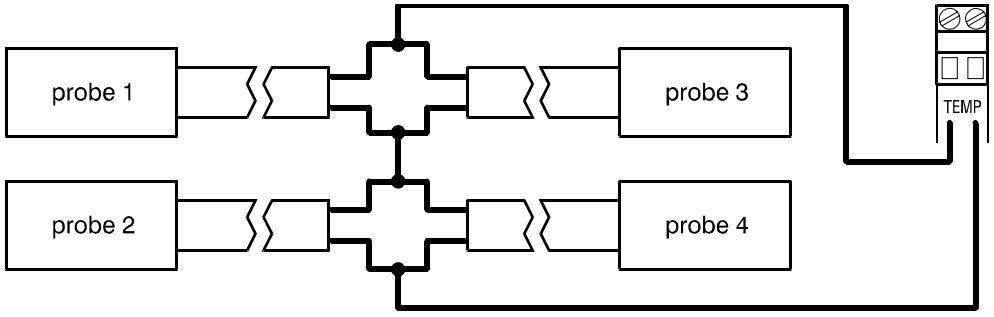
Using four-zone averaging

Power Blocks can monitor the temperature in four different zones using four-zone averaging. The Power Block takes an average of the temperatures measured by the four probes and then operates according to the average temperature.

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

To connect temperature probes for four-zone averaging

1. Connect the four temperature probes as shown below. Follow the guidelines in **Extending probe cables** on page 38.



Connecting actuators

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.

Each actuator you connect requires two relays: one for opening, and one for closing.

- Power Blocks PB-1/3 can control one actuator.
- Power Blocks PB-2/4/5 can control up to two actuators.

Feedback potentiometers

Each actuator you connect must have a feedback potentiometer. The feedback potentiometer, which you connect to the Power Block's corresponding feedback terminal, 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 your Power Block can control the actuator.

If your actuator does not have a feedback potentiometer, Phason offers an Actuator Position Sensor (APS-1). For more information, contact your dealer or Phason.

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.

DC-powered actuators, filters, and power supplies

If you are connecting DC-powered actuators, you must connect snubber filters to absorb the transient energy the motors generate. Installing the filters helps extend the life of Power Block relays. For more information, read **Reducing electrical noise using filters** on page 7.

Phason offers two models of DC-actuator power supplies. Both models are CSA-approved *and include snubber filters*.

- **DC power supply** (124-0) – includes +18 and –18 VDC fused outputs and a snubber filter, all mounted in an enclosure.
- **DC power supply** (124-1) – includes +18 and –18 VDC fused outputs and a snubber filter, all mounted in a large enclosure. The enclosure has room for two power contactor kits (PC-240 or 122-1).

A 36-V DC-powered actuator positions more slowly and accurately with an 18-V power supply, but has less thrust. For more information about power supplies or other Phason accessories, see your dealer or visit **www.phason.ca**.

Power Block relay ratings: 10 FLA at 115/230/208 VAC

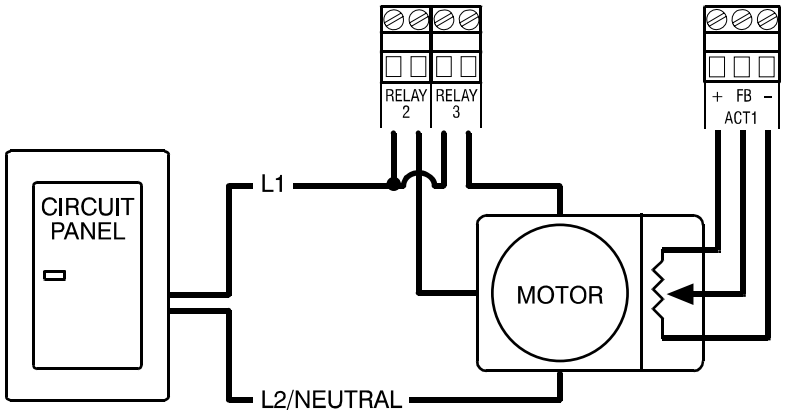
1/3 HP at 115 VAC, 1/2 HP at 230 VAC

If you are connecting an actuator that exceeds the relay ratings, you must install a power contactor. For more information, read **Using power contactors to increase the capacity of relays** on page 8.

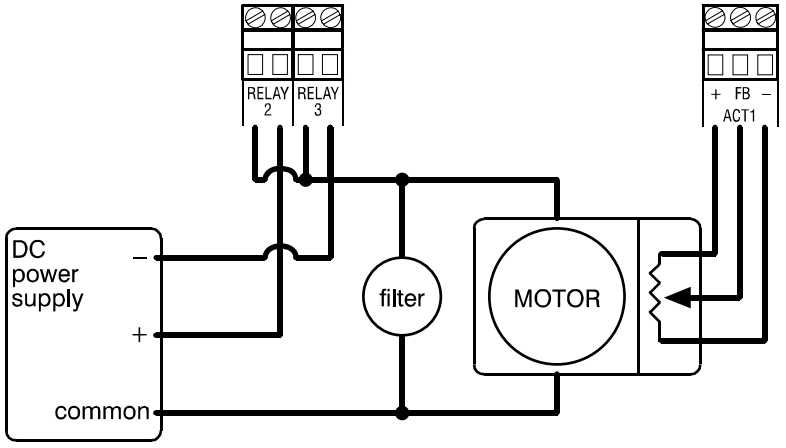
To connect actuators to PB-1 and PB-3 Power Blocks

- Refer to your actuator's installation guide for information about its power supply requirements.
- Connect the actuator to the Power Block as shown below. Use **ACT1** for feedback, **RELAY 2** for open, and **RELAY 3** for close.

AC-powered actuators



DC-powered actuators



NOTE

If you are unsure of the potentiometer wiring for your actuator, see **Determining correct actuator feedback wiring** on page 43.

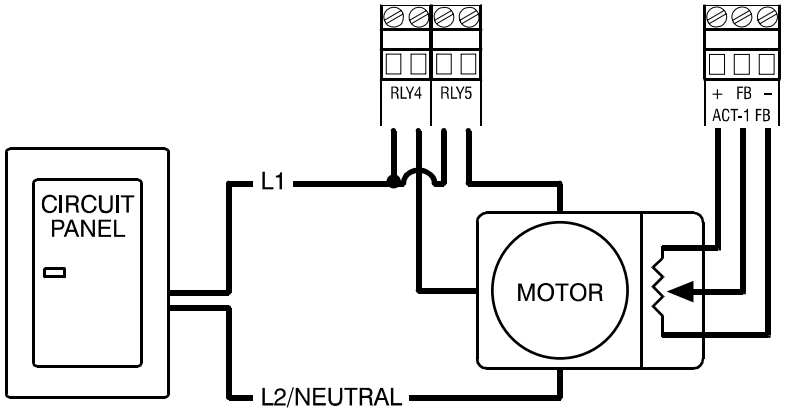
When routing the actuator feedback wires, do not run them in or along the same conduit as AC-power lines. Follow the guidelines on page 9.

If you are measuring AC power with a DMM, note that if a limit switch opens the circuit, the DMM measures voltage after the relay switch even if the relay is open.

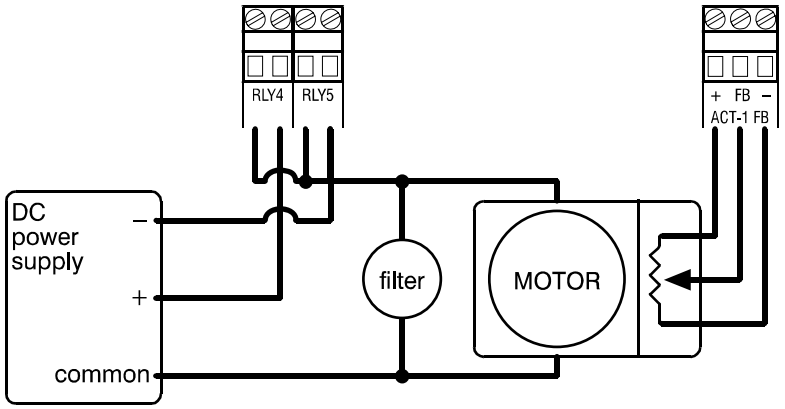
To connect actuators to PB-2, PB-4, and PB-5 Power Blocks

- Refer to your actuator's installation guide for information about its power supply requirements.
- Connect the actuator(s) to the Power Block as shown below.
  - For Actuator 1, use **ACT-1 FB** for feedback, **RLY 4** for open, and **RLY 5** for close.
  - For Actuator 2, use **ACT-2 FB** for feedback, **RLY 6** for open, and **RLY 7** for close.

AC-powered actuators



DC-powered actuators



NOTE

If you are unsure of the potentiometer wiring for your actuator, see **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. Follow the guidelines on page 9.

If you are measuring AC power with a DMM, note that if a limit switch opens the circuit, the DMM measures voltage after the relay switch even if the relay is open.

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 movement using the test card. For more information, read…

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 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.

Enabling and calibrating actuators

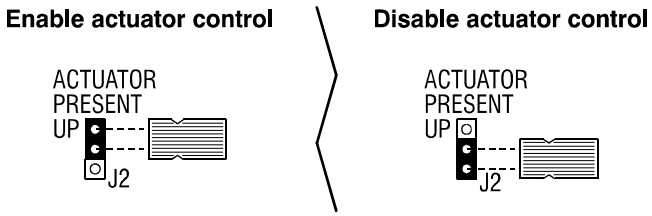
After connecting an actuator to a Power Block, you need to enable and calibrate the actuator. Placing the actuator present jumper on the correct pins enables actuator control and starts the calibration procedure.

- Enable and calibrate the actuator only after properly connecting it to the Power Block.
- The actuator and Power Block must have power to calibrate.
- If the actuator does not move, check the actuator wiring.
- If the actuator does not move through its full range off travel (fully closed to fully open), check the feedback wiring. For more information, read **Determining correct actuator feedback wiring** on page 43.

To enable and calibrate actuators for PB-1 and PB-3 Power Blocks

Calibrate the actuator by placing the **ACTUATOR PRESENT** jumper on the pins as shown below.

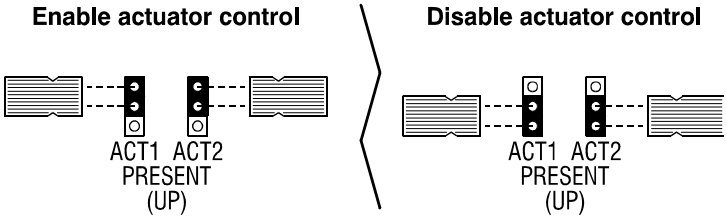
The Power Block calibrates the actuator as follows:



1. Open the inlets (extend the actuator) for eight seconds. [Relay 2 - ON, Relay 3 - OFF]
2. Close the inlets (retract the actuator) for eight seconds. [Relay 2 - OFF, Relay 3 - ON]
3. Open the inlets completely. [Relay 2 - ON, Relay 3 - OFF]
4. Close the inlets completely. [Relay 2 - OFF, Relay 3 - ON]

To calibrate actuators for PB-2/4/5 Power Blocks

Calibrate the actuator by placing the **ACT PRESENT** jumper on the pins as shown below.



The Power Block calibrates the actuator(s) as follows:

1. Open the inlets (extend the actuator) for eight seconds.	ACT1 [Relay 4 - ON, Relay 5 - OFF] ACT2 [Relay 6 - ON, Relay 7 - OFF]
2. Close the inlets (retract the actuator) for eight seconds.	ACT1 [Relay 4 - OFF, Relay 5 - ON] ACT2 [Relay 6 - OFF, Relay 7 - ON]
3. Open the inlets completely.	ACT1 [Relay 4 - ON, Relay 5 - OFF] ACT2 [Relay 6 - ON, Relay 7 - OFF]
4. Close the inlets completely.	ACT1 [Relay 4 - OFF, Relay 5 - ON] ACT2 [Relay 6 - OFF, Relay 7 - ON]

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.

Each curtain machine you connect requires two relays: one for opening the curtain, and one for closing the curtain. Use relays that are side-by-side pairs. In other words, relay 1 and 2, relay 3 and 4, or other similar pair. The first relay should be the "open relay"; the second relay the "close relay".

- Power Blocks PB-1 and PB-3 can control one curtain machine.
- Power Blocks PB-2 and PB-4 can control up to four curtain machines.
- Power Block PB-5 can control up to two curtain machines.

Power Block relay ratings: 10 FLA at 115/230/208 VAC

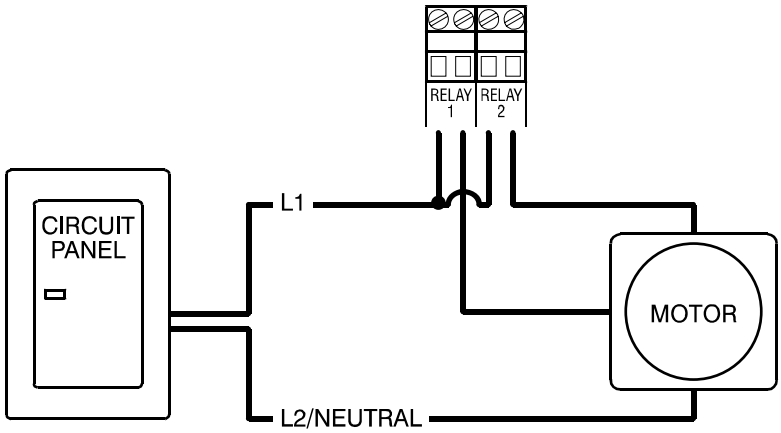
1/3 HP at 115 VAC, 1/2 HP at 230 VAC

If you are connecting equipment that exceeds the relay ratings, you must install a power contactor. For more information, read **Using power contactors to increase the capacity of relays** on page 8.

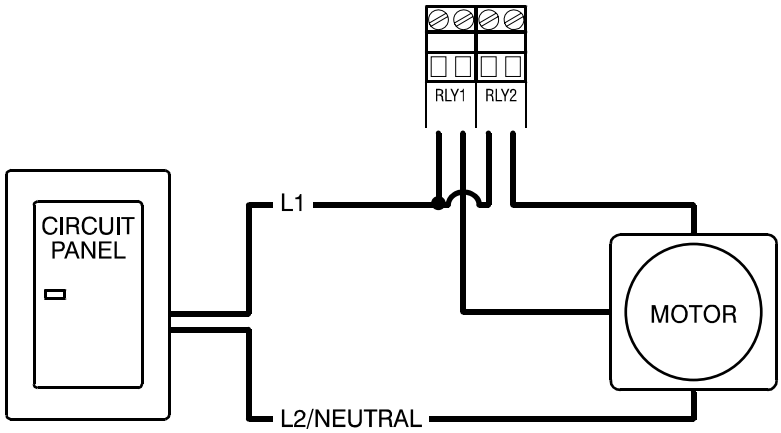
To connect curtain machines

Connect curtain machines to the Power Block as shown in the appropriate diagram.

PB-1/3



PB-2/4/5



Connecting single-stage heating or cooling elements

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

Power Block relay ratings: 10 FLA at 115/230/208 VAC

1/3 HP at 115 VAC, 1/2 HP at 230 VAC

360 W tungsten at 120 VAC

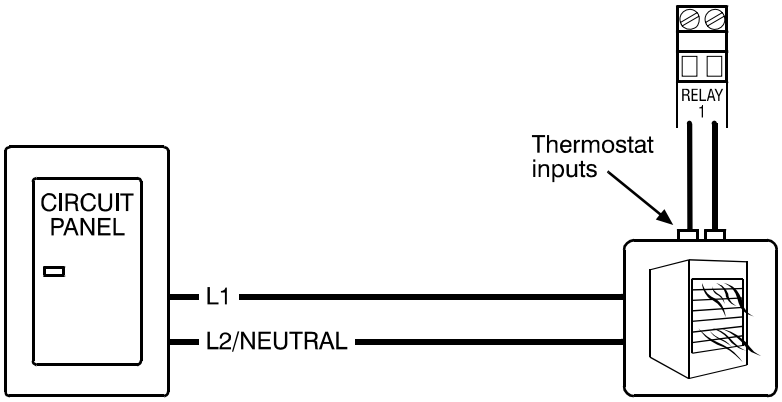
If you are connecting equipment that exceeds the relay ratings, you must install a power contactor. For more information, read **Using power contactors to increase the capacity of relays** on page 8.

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, read your furnace dealer.

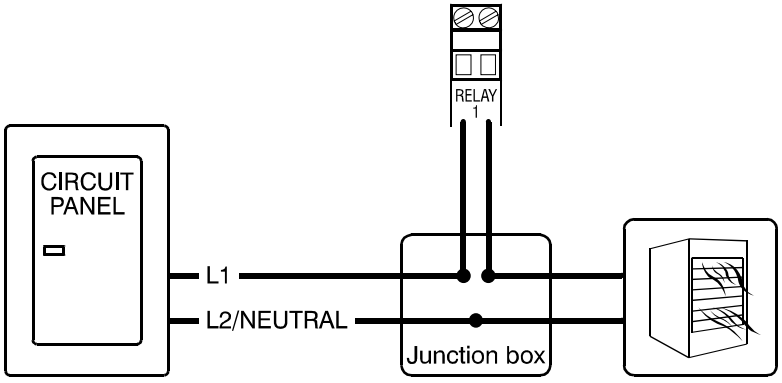
To connect single-stage heating or cooling elements

Connect single-speed heating or cooling elements as shown in the appropriate diagram.

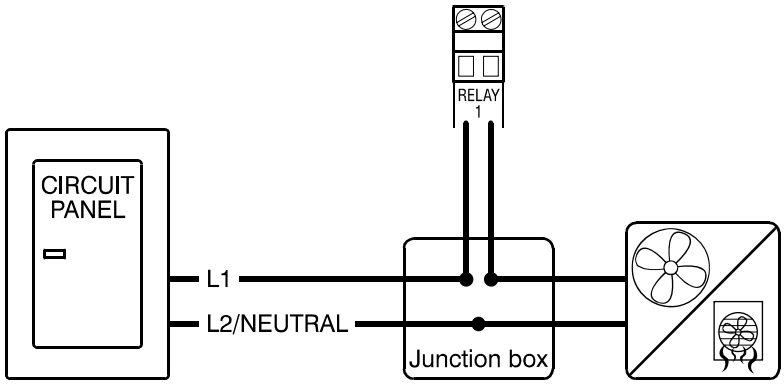
PB-1/3: gas furnace or brooder – thermostat inputs



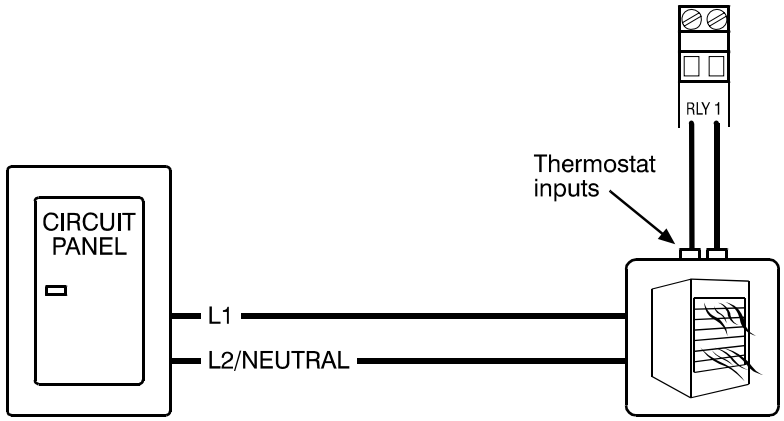
PB-1/3: gas furnace or brooder – power connections



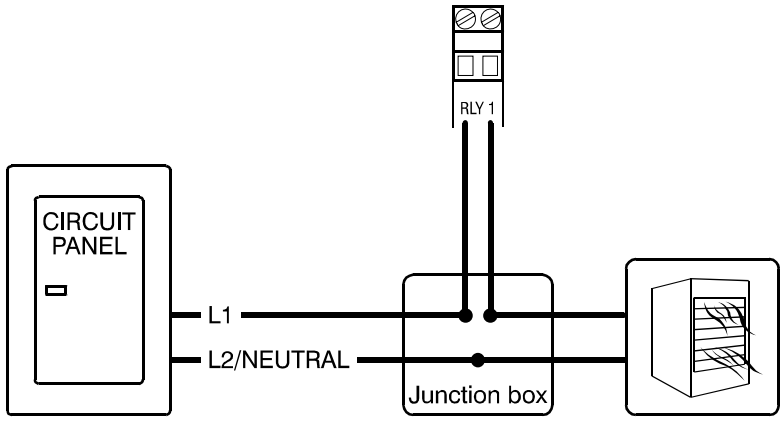
PB-1/3: all other single-stage heating or cooling elements



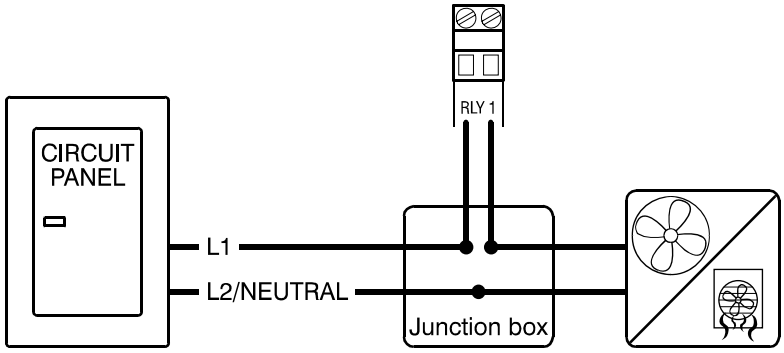
PB-2/4/5: gas furnace or brooder – thermostat inputs



PB-2/4/5: gas furnace or brooder – power connections



PB-2/4/5: all other single-stage heating or cooling elements



Connecting variable-speed fans

The variable stages are for controlling shaded pole, permanent split capacitor, or universal motors only.

If you are using three-phase power, connect the Power Block and the fan motor to the same phase. For more information, read **Using three-phase power** on page 51.

The ratings of the fan motor must not exceed the ratings of the Power Block's variable stages.

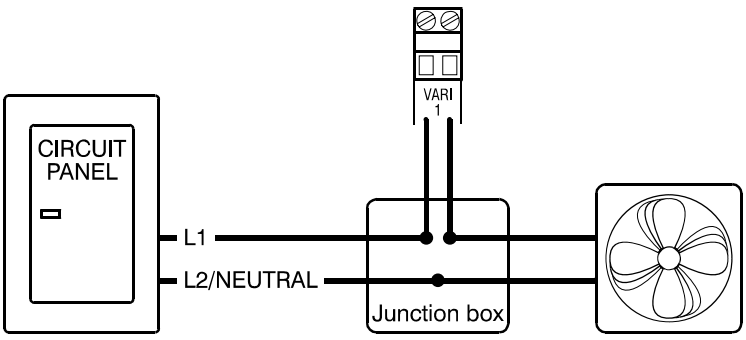
Power Block variable stage ratings: 10 FLA at 115/230 VAC

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

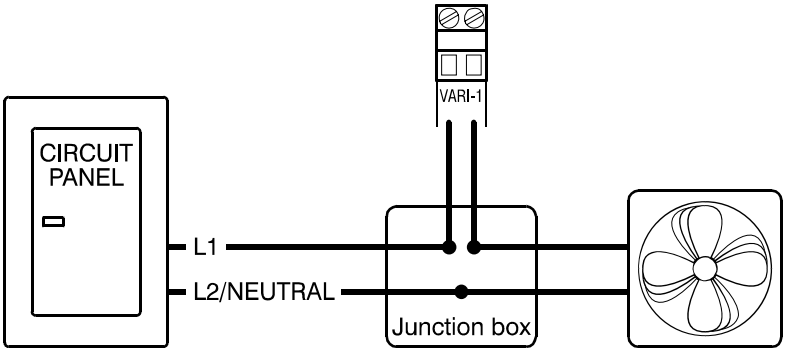
To connect variable-speed fans

Connect variable-speed fans as shown in the following diagrams.

PB-1



PB-2



Connecting variable-heat elements

You can connect variable-heat elements such as heat mats and heat lamps to a PB-6.

If you are using three-phase power, connect the PB-6 and the load to the same phase. For more information, read **Using three-phase power** on page 51.

The ratings of the equipment must not exceed the ratings of the PB-6's variable stages.

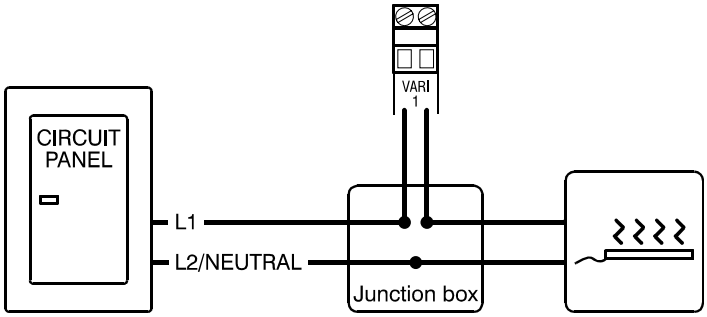
Power Block variable stage ratings: 10 FLA at 115/230 VAC

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

To connect variable-heat elements

Connect variable-heat elements as shown in the following diagram.

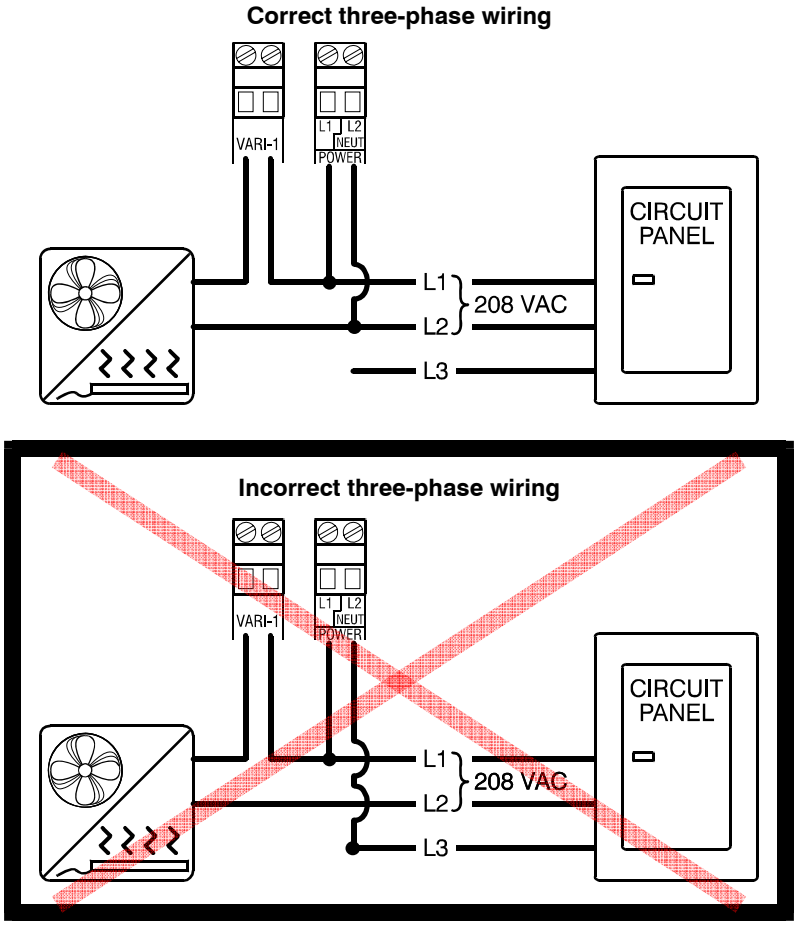
PB-6



Using three-phase power

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

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



Connecting alarm systems

An alarm system can be a siren, an alarm panel, or an auto-dialer. See your alarm siren's installation guide for installation instructions and information about the type of system, *normally open* or *normally closed*.

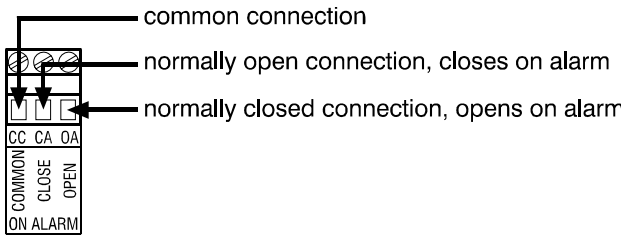
- If you are connecting the alarm system to a network of Power Blocks and your system uses a *normally open* connection (closes on alarm), connect the system as shown in the normally open diagram.

  Join all the common connections together and all the closed-on-alarm (**CA**) connections together. The alarm relays must be in parallel with each other so any device can trigger the alarm system when an alarm condition occurs.

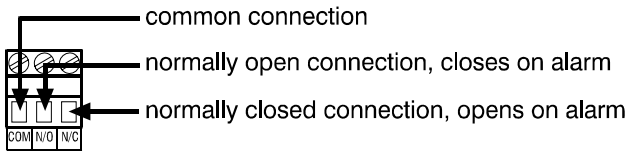
- If you are connecting the alarm system to a network of Power Blocks and your system uses a *normally closed* connection (opens on alarm), connect the system as shown in the normally closed diagram.

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

PB-1/3/6 alarm terminal



PB-2/4/5 alarm terminal



NOTE

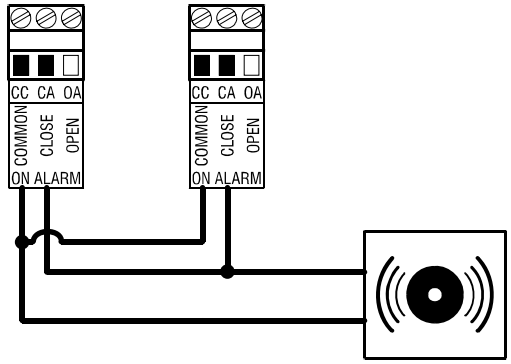
For the alarm system to sound (or dial out) during an alarm condition, you must enable the alarms for each zone. For more information, read the **OMNI-4000 user manual**.

The ratings of the alarm system must not exceed the ratings of the Power Block's alarm relay.

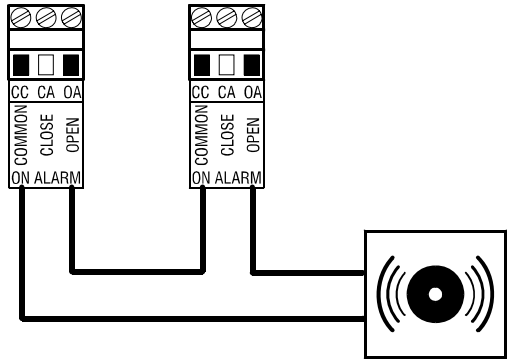
Power Block alarm relay ratings: 0.4 A at 125 VAC; 2 A at 30 VDC, resistive load
0.2 A at 125 VAC; 1 A at 30 VDC, inductive load

To connect an alarm system to a PB-1/3/6

Normally open system (closed on alarm)

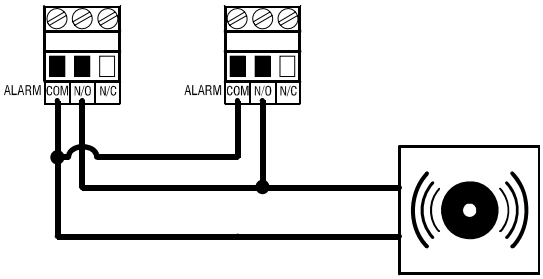


Normally closed system (open on alarm)

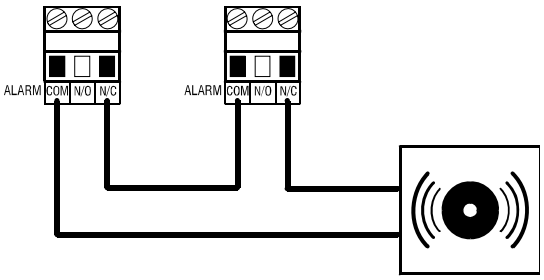


To connect an alarm system to a PB-2/4/5

Normally open system (closed on alarm)



Normally closed system (open on alarm)



Connecting the incoming power source

You can connect the Power Block to 115 or 230 VAC, 60 Hz power.

NOTE

Connect the Power Blocks to the OMNI Server before connecting the power source. For more information, read the **Connecting the communications** on page 13.

Before connecting the power, set the voltage selection switch to the correct voltage.

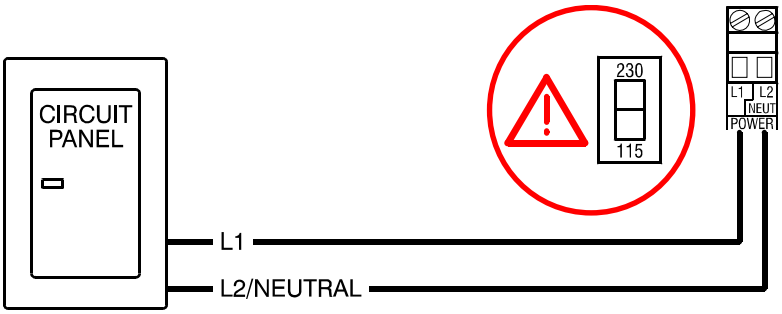
If you are using three-phase power, make sure the control power and the variable speed fans are connected to the same phase. For more information, read **Using three-phase power** on page 51.

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

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



Finishing and testing the installation

After you have finished connecting all equipment, wiring, and cables to the Power Blocks, verify the wires are connected properly. If you filled in the installation worksheets, use them to verify that you have connected all the wires and cables to the proper locations.

1. Make sure all equipment is properly installed and connected to the correct locations.
2. Switch on the incoming power at the source.
3. Verify the wiring is correct and the equipment functions properly. For more information, read **Testing Power Blocks** on page 56
4. Fasten the cover to the Power Block using the four cover screws.

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

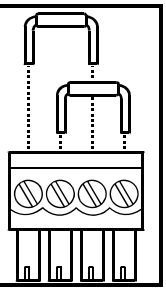
Testing Power Blocks

The Power Block test board (part number 170042) that comes with the OMNI Server allows you to quickly test Power Blocks to make sure they are wired correctly. The test verifies the variable stages, relays, and communications port are operating properly.

Additional test boards are available from your dealer or Phason.

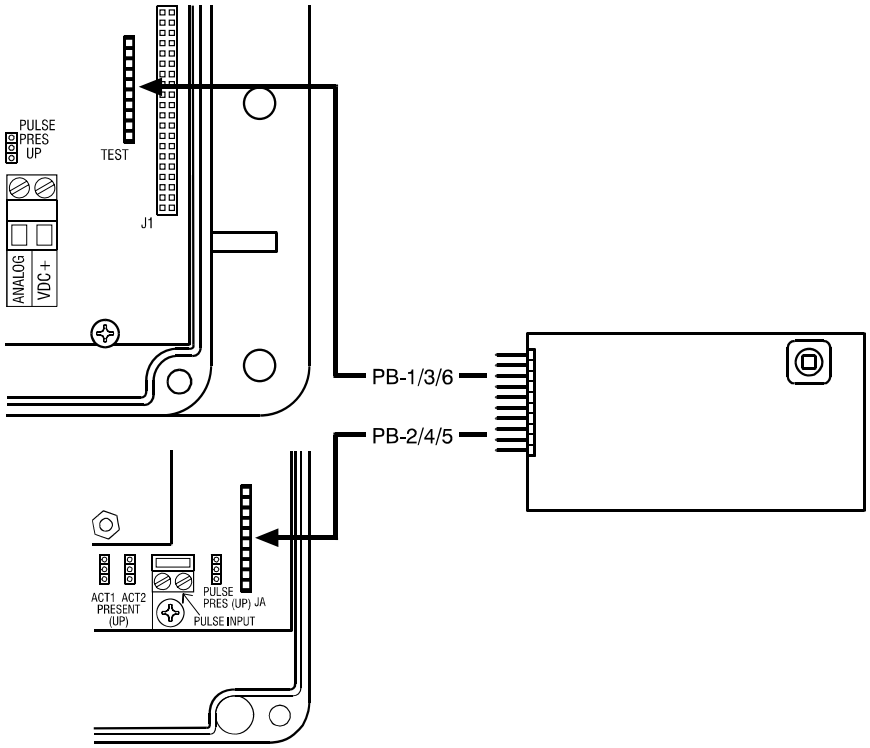
The last part of the test requires a loopback tester. Loopback testers are available from your dealer or Phason. If a tester is not available, you can make a temporary one as shown to the right.

Label all wires before removing them from the communication connector.



To connect the test board

1. Remove the cover from the Power Block.
2. Connect the test board as shown below, **JA** for PB-2/4/5 or **TEST** for PB-1/3/6. You do not have to switch off the power off while connecting or disconnecting the test board. The button faces the inside of the control. Be sure to align the pins correctly.
   When the board is in place, all variable and relay stages switch off.



To test Power Blocks

When you first connect the test board, all stages are off. Press the button to start at test 1 (variable stages). If the Power Block has no variable stage (PB-3/4/5), the test starts at test 2 (relay stages).

1. Test 1: variable stages (PB-1/2/6)

Variable stage 1 runs at 100% for the three second de-icing and then drops to 1%.

a) Press the button.
Variable stage 1 goes to 50%.

b) Press the button.
Variable stage 1 goes to 100%.

c) Press the button.
Variable stage 1 turns off. If there is only one variable stage (PB-1/3/6), the test moves to test 2. If there are two variable stages (PB-2), stage 2 runs at 100% for the three second de-icing and then drops to 1%.

d) Repeat steps a) to c) for *variable stage 2*.

2. Test 2: relay stages (PB-1 to 5)

Relay 1 switches on.

a) Press the button.
The relay switches off and the next relay switches on.

b) Repeat step a) until the last relay, the alarm relay, is on.

c) Press the button.
The alarm relay switches off and the test moves to test 3.

3. Test 3: communications

The alarm relay is on. To skip test 3, press the button twice.

a) Insert the loopback tester into the communication socket on the microboard.

b) Press the button.
If the Login LED (top-right LED – see page 25) lights, the communication port works. If the LED does not light, the test fails.

4. Finishing

The tests are complete. To repeat the tests, press the button twice to start at test 1.

a) When finished, remove the loopback tester and test board.
The control resets and resumes operation.

b) Verify that all wires and connectors are properly connected and then fasten the cover to the Power Block.

Servicing and maintaining the controls

Servicing and maintaining your Phason controls will extend the life of the controls and your equipment.

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

Maintaining actuators

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. For more information, read **Enabling and calibrating actuators** on page 44.

Cleaning the controls

- 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.

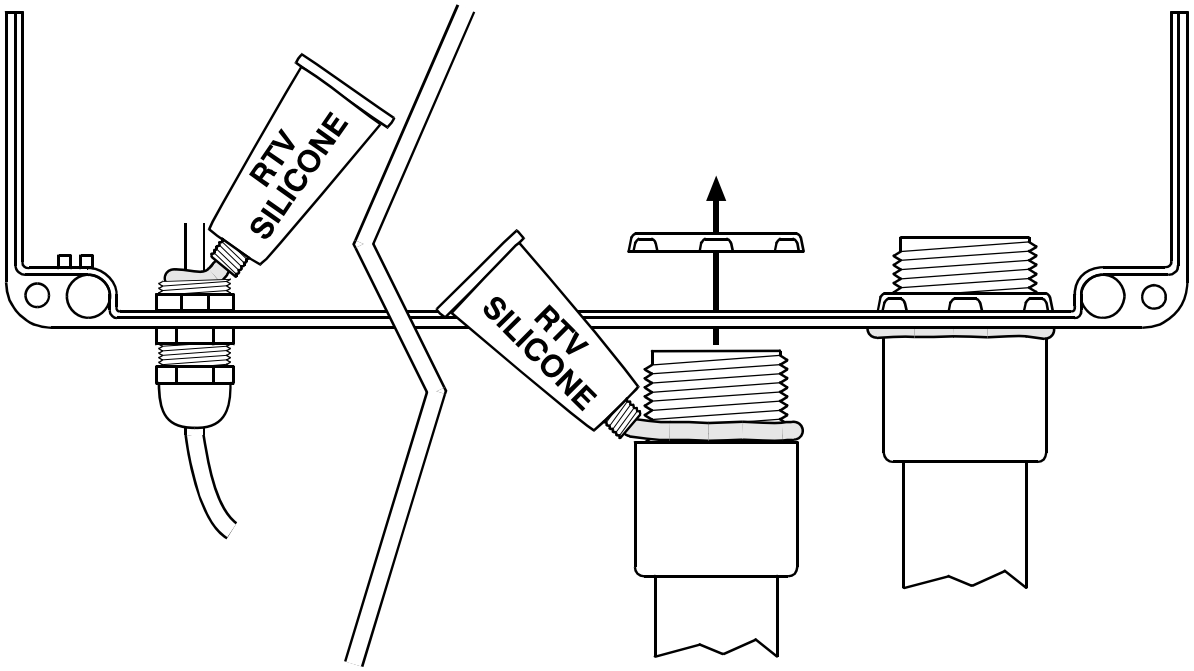
Preventing moisture

Moisture will not cause problems with the Power Block, or other Phason controls and devices, if you take proper care when installing them.

1. After the first two weeks of operation, remove the cover from the unit and check inside for moisture. Be sure to switch off the power to the control before opening the cover.
2. If there is moisture present, wipe it out with a dry cloth and then 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. This 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 again 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.

Appendixes

This section contains reference information that is useful when installing or troubleshooting the OMNI-4000 hardware.

- Appendix A: Glossary (below)
- Appendix B: Troubleshooting (on page 62)
- Appendix D: Installation worksheets (on page 73)

Appendix A: Glossary

AC power	Utility companies supply electrical power as alternating current, which is referred to as AC power.
actuator	A device that has a mechanical arm that extends and retracts. Actuators control elements that are not OFF or ON. Instead, they vary by a percentage. For example, inlets can be open various distances from 0 to 100 percent. Typically, linear actuators connect directly to the inlets, or connect using cables and pulleys. Inlets are usually located in ceilings or walls. Inlet systems are often spring loaded to help close the inlets, or counter weighted to help open the inlets. For more information, read **Connecting actuators** on page 39.
control elements	Control elements are devices connected to the Power Blocks, such as fans, heaters, actuators, and so on.
inlet actuator	See *actuator*.
inlets	Inlets are shutter-like devices mounted on a wall or ceiling that control airflow in a building.
relay	A relay is an electromagnetic switch that is either on (closed) or off (open).
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, knows as 'brown outs'. For more information, read **Understanding power surges and surge suppression** on page 6.

duty cycle	A temperature-based style of controlling heating or cooling elements using 'on durations' and 'off durations'. Duty cycles are often used to control misters. For cooling elements, when the temperature is below the set point, the cooling element is off. When the temperature rises above the set point, the element switches on for the 'on duration' and then off for the 'off duration'. If at any time the temperature drops below the set point, the duty cycle relay switches off and will not switch on again until the temperature rises above the set point. For heating elements, when the temperature is above the set point, the heating element is off. When the temperature drops below the set point, the element switches on for the 'on duration' and then off for the 'off duration'. If at any time the temperature rises above the set point, the duty cycle relay switches off and will not switch on again until the temperature drops below the set point.
terminal block	The part of a Power Block where you connect the wires for incoming power, control elements, and so on.
voltage	Electromotive force or potential difference, usually expressed in volts.

Appendix B: Troubleshooting

- If you are having trouble with communications, read **Appendix C: Communication troubleshooting guide** on page 64.
- If you are having trouble with the OMNI-4000 software, see the **OMNI-4000 software manual**, or the manual for the specific OMNI-4000 module.
- If you are having trouble with the OMNI Server, Power Blocks, or equipment connected to them, see if the situation is described in the following table, and then follow the instructions to correct it.

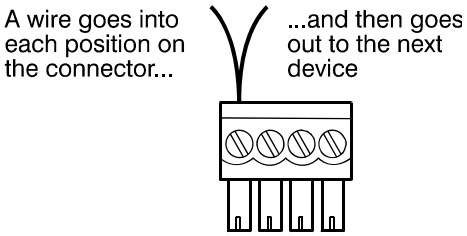
Situation	Possible cause	Possible solution
Power supply components blown out Burn marks on boards and components	Power surge, brownout, or power outage	◇ Cannot do anything when it happens, but could avoid the problem in future by providing proper voltage to the unit or by providing proper protection.
Motors and fans slow down or stop	Brownout, or power outage	◇ Cannot do anything.
No power	Circuit breaker off or tripped	◇ Reset the circuit breaker.
	Fuse blown or missing	◇ Check why the fuse was blown. Repair any problems and then replace the fuse.
	115/230 VAC switch in the wrong position	◇ Switch off the power, set the switch to the correct setting, and then switch on the power.
Variable-speed fan not running	Incorrect wiring	◇ Correct the wiring.
	Fuse blown or missing	◇ Check why the fuse was blown. Repair any problems and then replace the fuse.
	Incorrect settings	◇ Adjust the settings – *see the OMNI-4000 software manual*.
	No power to the fan	◇ Switch on the power.
	Faulty fan	◇ Replace the equipment.
	Circuit breaker off or tripped	◇ Reset the circuit breaker.
Variable-speed fan runs at maximum	Incorrect wiring	◇ Correct the wiring.
	Incorrect settings	◇ Adjust the settings – *see the OMNI-4000 software manual*.
Relay not operating load	Incorrect wiring	◇ Correct the wiring.
	Fuse blown or missing	◇ Check why the fuse was blown. Repair any problems and then replace the fuse.

Situation	Possible cause	Possible solution
	Incorrect relay configuration (“cool” for heater or “heat” for fan)	◇ Change the configuration – *see the OMNI-4000 software manual*.
	Incorrect settings	◇ Adjust the settings – *see the OMNI-4000 software manual*.
	No power to the load	◇ Switch on the power.
	Faulty equipment	◇ Replace the equipment.
	Circuit breaker off or tripped	◇ Reset the circuit breaker.
	Blown relay	◇ Solve the problem that caused the relay to blow and then replace the circuit board, or use a different relay.

Appendix C: Communication troubleshooting guide

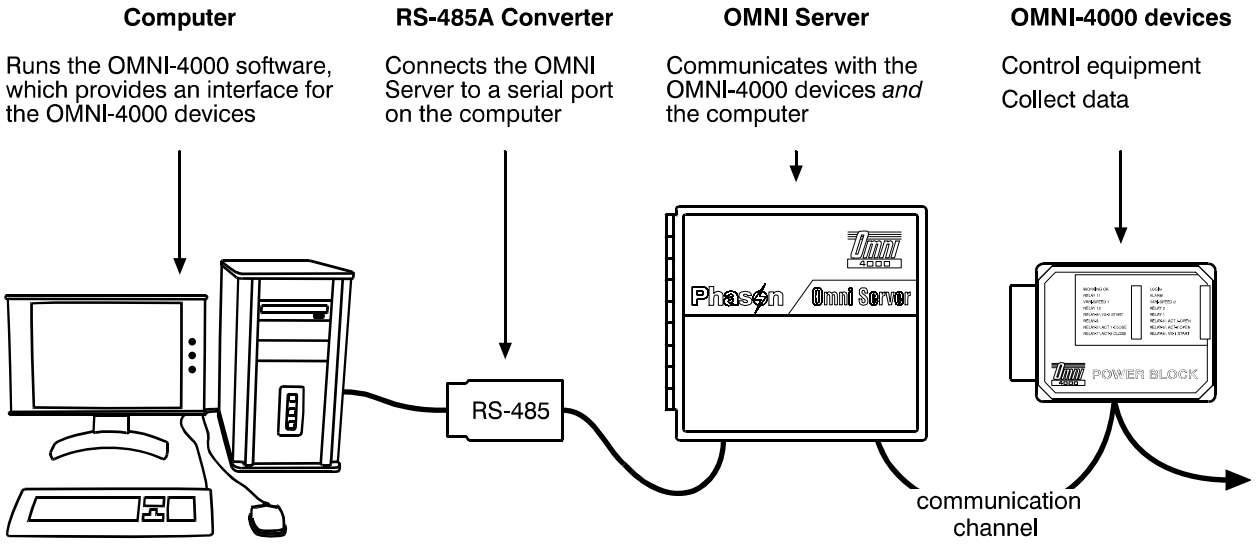
Introduction to OMNI-4000 communications

All OMNI-4000 devices, such as Power Blocks, Feed Level Sensors, and so on, communicate with the computer along "communication channels." A communication channel is a continuous line of cable connecting all devices in series, in other words, a "daisy chain". Each device connects to the communication channel as shown below.



The last device on a communication channel must have the termination resistors in place or a termination module installed. For the location of the termination resistors, see the device's installation guide.

The OMNI Server is the control center for the OMNI-4000 hardware. The OMNI-Server's eight communication channels transfer data between the computer and the devices. Each communication channel can communicate with up to 32 devices, for a total of 256 (8 x 32=256).



Troubleshooting phase 1: create a site map

A site map shows the layout of the OMNI-4000 devices on your communication system. The site map should list the device type and address, the physical location (the building name, for example), and the group name. It is also important to note the sequence of the devices on each communication channel.

- Print a Site Structure Report. Use the report to help identify the device addresses and locations. For more information, read the **OMNI-4000 user manual**.
- Use the site map template at the end of the troubleshooting guide. Fill in the template and use it as your site map. There are two sheets provided; if you need more, make copies before you start.

Create a site map

1. At the OMNI Server, select a communication channel (COM1 to COM8). On the site map template, print the communication channel number in the space provided.
2. Follow the cable to the first device.
3. On the template, print the building name, device type, device address, and group name in the space provided.
4. Follow the cable to the next device.
5. Repeat steps 3 and 4 until you have finished printing the information for the last device on the channel.
6. Repeat steps 1 to 5 for each communication channel that is in use (has devices connected).

Troubleshooting phase 2: test the computer, RS-485A Converter, and OMNI Server

Test the OMNI Server login

When OMNI-4000 is running, the TROUBLE light on the front cover of the OMNI Server should not be on. If the light *is* on, there has been no communication between the OMNI Server and computer for at least 10 minutes. It is possible the RS-485A Converter might not be working or plugged in, or the computer's COM port is not working.

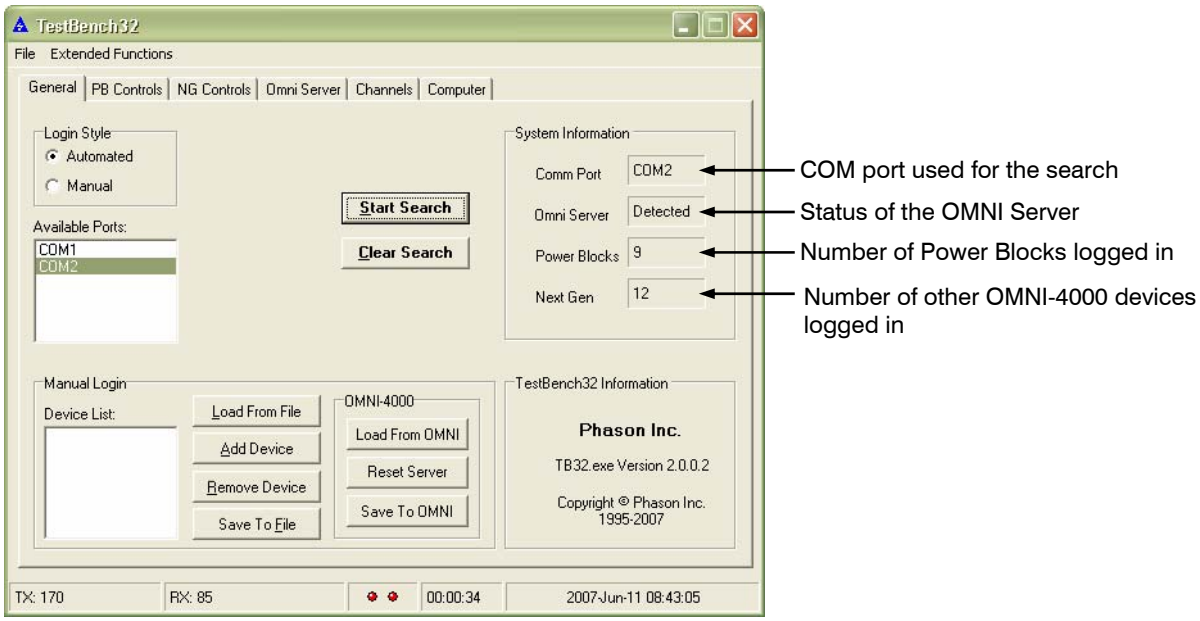
1. Reset the OMNI Server and then restart the computer.
2. After the computer is running, start OMNI-4000 (if it does not start automatically). The OMNI Server should log in within a few seconds after OMNI-4000 starts.

Test the daisy chains

A daisy chain is a continuous line of cable connecting the devices in series to a communication channel on the OMNI Server. The daisy chain test verifies that all devices are properly connected to the communication channel.

The OMNI Server has eight communication channels, labeled COM1 to COM8. Active communication channels are channels that have devices installed on them. For example, if you have a Power Block connected to COM8, then channel 8 is an active communication channel.

1. Shut down OMNI-4000.
2. On the OMNI Server, unplug all except one of the connectors from the active channels.
3. Start Test Bench – click **Start**, Programs, OMNI-4000, Diagnostics, *Test Bench*.



4. Under *Available Ports*, select the communication port that has the OMNI Server connected.
5. Click **Start Search**.
   The login starts and should take seconds rather than minutes. The login is complete when the lights at the bottom of the window stop flashing red and green, and instead stay red.
6. Verify that all devices on the daisy chain have logged in.
   - For a basic summary, see the System Information section.
   - For detailed information about Power Blocks, click the **PB Controls** tab.
   - For detailed information about other OMNI-4000 devices, click the **NG Controls** tab.
7. If all devices log in, repeat the test three times to check reliability. To repeat the test, click **Clear Search** (on the **General** tab) and then start at step 4.
8. When you are finished testing the daisy chain, close Test Bench.
9. Unplug the connector for the daisy chain you have been testing and then connect the next active channel.

10. Repeat steps 4 to 9 for each active communication channel. When you are finished testing all active communication channels, reconnect all the connectors.

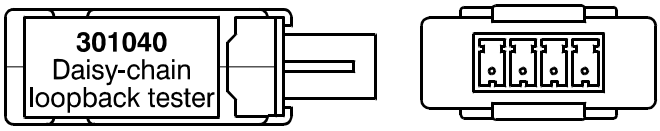
Test the OMNI Server communication channels

Repeat the daisy chain test using a daisy chain that you know is working properly. Connect the daisy chain to a different communication channel each time you run the test until you have tested all eight channels.

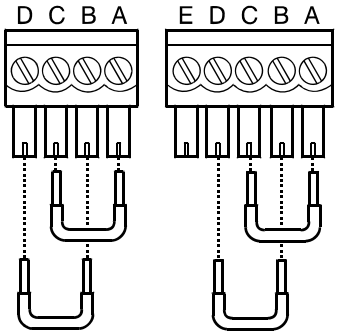
If a test fails on a channel but passes on others, the OMNI Server is failing at that specific channel.

Troubleshooting phase 3: correct any communication wiring problems

The tests in this section require a loopback tester. Loopback testers are available from your dealer or Phason.



If a tester is not available, you can create a temporary loopback by inserting wires into the connectors as shown to the right. Be careful not to damage the connectors.



Loopback tests help verify the integrity of the communication line. During the tests, the computer sends out information along the communication cable. The information "bounces back" when it gets to the loopback connector. The computer compares the information it receives back; if it is the same as the information sent out, then both the send (TX) and receive (RX) lines are intact.

Verify the daisy chain is wired correctly

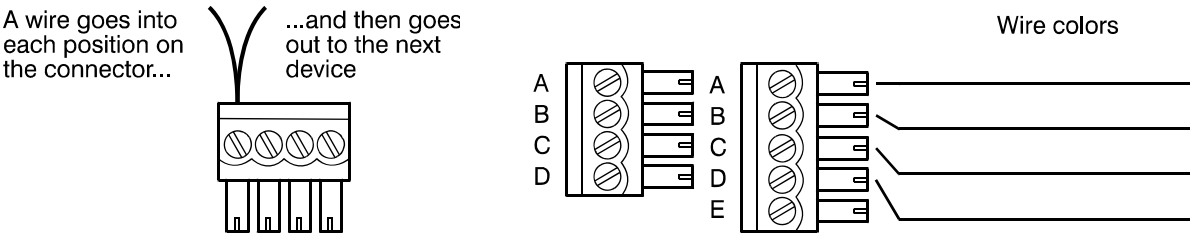
1. Unplug all devices from the daisy chain.
2. At the end of the chain, farthest from the OMNI Server, connect a loopback connector.
3. Start the Windows utility, Hyper Terminal – usually **Start**, Programs, Accessories, Communications, *Hyper Terminal*.
   You might see a window display asking if you want to make Hyper Terminal your default Telnet program. Click **No** to continue.

   Hyper Terminal's Connection Description window displays.
4. Beside *Name*, type something and then click **OK**.
   The Connect To window displays.

5. Beside *Connect Using*, select the COM port the OMNI Server is connected to and then click **OK**. The Properties window displays.
6. Beside *Bits per second*, select *115200* and then click **OK**.
   The main Hyper Terminal window displays.
7. Type your name.
   - If the window displays the characters you typed, the daisy chain is wired correctly.
   - If the window does not display the characters, there is a problem with the wiring closer to the OMNI Server. Unplug the loopback tester and connect it to the next connector closer to the OMNI Server. Repeat step 7 until you find the wiring problem.

Test for problems communicating with the devices

1. If there is a loopback at one of the connections, unplug it.
2. Connect the last device on the daisy chain. Make sure the two termination resistors are installed. For more information, read the installation guide for the specific device.
3. Unplug the daisy chain from the OMNI Server.
4. Measure the resistance at the OMNI Server-end of the cable. The measurement from "**A** to **B**" or "**C** to **D**" should be 120 to 160 ohms.
   - If the resistance is *higher*, there might be corrosion or poor connections at the devices.
   - If the resistance is *lower*, there might be more than one device with termination resistors.
5. Connect the daisy chain to the OMNI Server.
6. Connect the devices one at a time, starting with the device closest to the OMNI Server. Make sure the wiring is consistent at each connector.



Each time you add a device, test the login using Test Bench. If adding a device slows down the login time by more than 30 seconds, the device likely has communication problems.

Leave devices with communication problems disconnected for now and continue along the daisy chain until you have connected all properly communicating devices.

You can speed up the process by using two people with two-way radios. One person can check and connect the devices; the other can test the logins.

Test Power Blocks for microboard problems

1. Remove the microboard from the Power Block with communication problems and set it aside for now.
2. Connect a microboard to the Power Block. Use one from a different Power Block that you know works.
3. Connect the Power Block to the daisy chain.
4. Test the communications using Test Bench. Remember to look for the address of the *current* microboard, not the original.
   - If the Power Block has no more communication problems, the problem is the original microboard. Order a replacement microboard.
   - If the Power Block still has communication problems, the problem is likely the main (bottom) board. Remove the microboard and reconnect the original one.
5. Reconnect the microboard you used in step 2 to its original Power Block.

Check Power Blocks for bottom board problems

1. Check the Power Block for enclosure damage or improper sealing. Corrosion caused by exposure to the barn atmosphere can cause the bottom board to fail. If the enclosure has damage or does not seal properly, replace the entire Power Block.
2. Keep the microboard from the new Power Block for future use. Instead, connect the original microboard.
3. Test the communications using Test Bench. If the Power Block still has communication problems, remove the original microboard and then connect the new one. Discard the original microboard.

Checking other OMNI-4000 devices

All other OMNI-4000 devices (LEM, OWM, OWS, FLS, MLS) have only one circuit board. For the FLS and MLS, power and communications are in the control units.

If you have one of these devices and the wiring is OK and there is power to the board, but Test Bench cannot find it, replace the circuit board using a kit.

Troubleshooting phase 4: run OMNI-4000

Remove obsolete device addresses

1. Start OMNI-4000
2. Open the Configuration Manager and then click the **Buildings** tab.
3. Remove obsolete device addresses – under Available, select a device and then press DELETE.
4. Repeat step 3 until you have removed all obsolete addresses.

Configure the new addresses

If you replace a device that has communication problems, or you replace the microboard in a Power Block, the address of the device changes. When the address changes, you need to:

1. Add the new device to OMNI-4000.
2. Assign the device to a building.
3. Edit the group the old device belonged to so that the group represents the new device.
4. Verify that OMNI-4000 can communicate with the new device. A good way to do this is to check the appropriate tab in the Settings Manager, or check the viewer if one is available for that type of device.

For more information about any of the above steps, see the **OMNI-4000 user manual**, or the manual for the specific module.

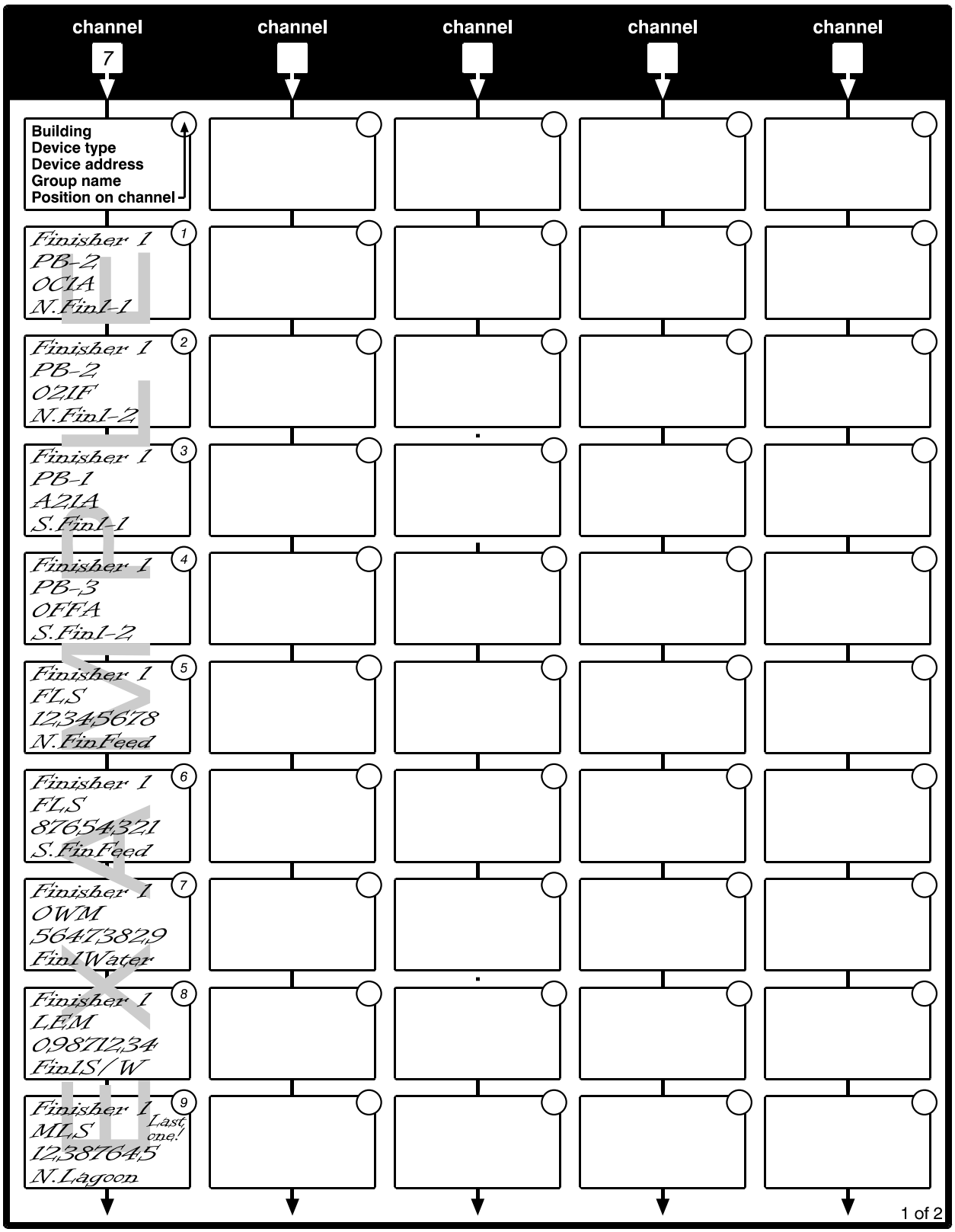
Check the Site Structure Report

1. Print a Site Structure Report.
2. Compare the report to your site map. In particular, check the number of devices; if the report shows more devices than exists, there are obsolete device addresses in the system.

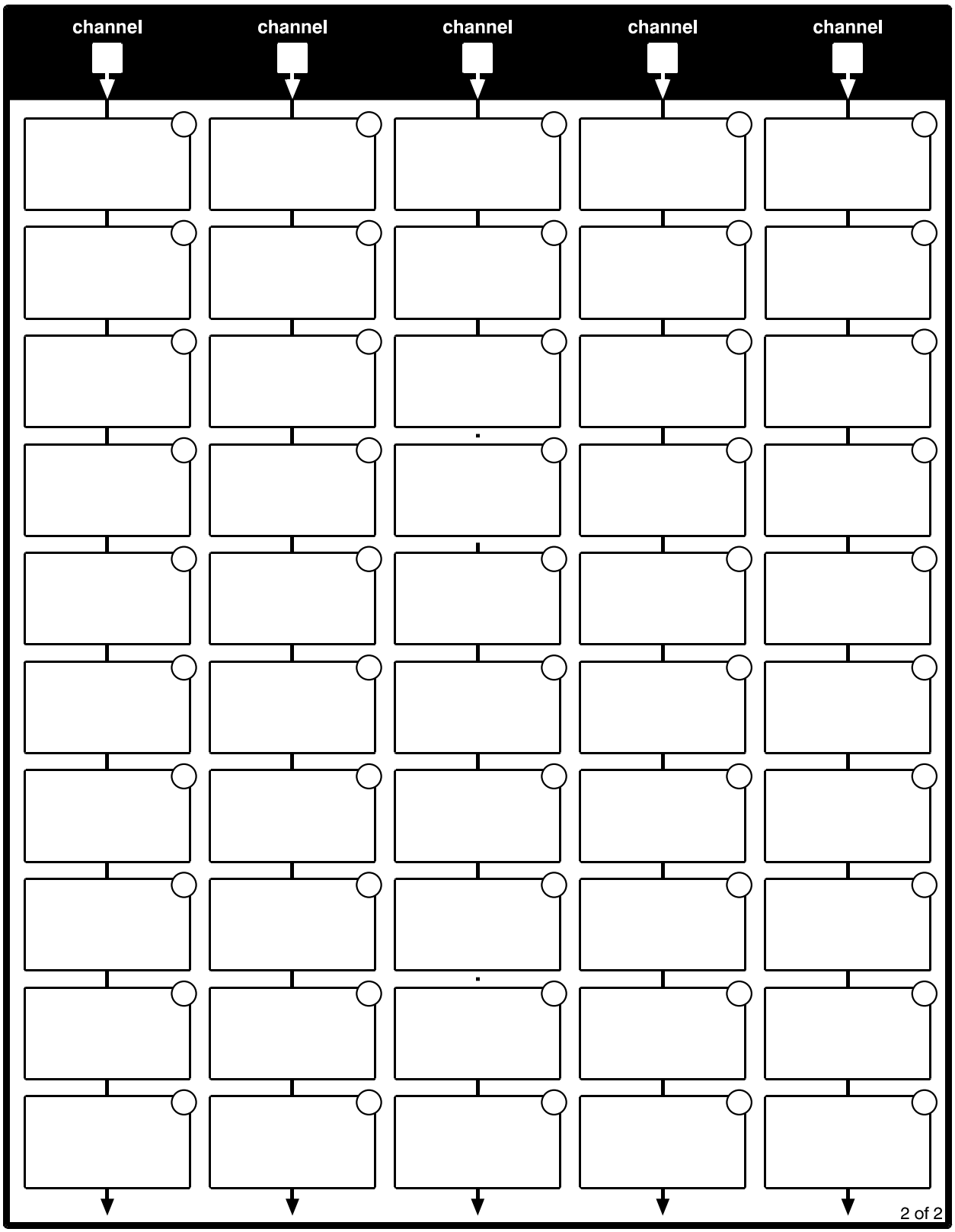
For more information about any of the above steps, see the **OMNI-4000 user manual**.

Back up your configuration and settings

After correcting any problems, back up your configuration and settings using the Backup and Restore Utility. For more information, read **OMNI-4000 user manual**.


channel
7
channel
channel
channel
channel
Building
Device type
Device address
Group name
Position on channel
1
Finisher 1
PB-2
OC1A
N.Fin1-1
2
Finisher 1
PB-2
O21F
N.Fin1-2
3
Finisher 1
PB-1
A21A
S.Fin1-1
4
Finisher 1
PB-3
OFFA
S.Fin1-2
5
Finisher 1
FLS
12345678
N.FinFeed
6
Finisher 1
FLS
87654321
S.FinFeed
7
Finisher 1
OWM
564738291
Fin1Water
8
Finisher 1
LEM
098712345
Fin1S/W
9
Finisher 1
MLS
123876545
N.Lagoon
Last one!
1 of 2

SAMPLE


channel
channel
channel
channel
channel
2 of 2

Appendix D: Installation worksheets

There are two or three copies of each worksheet. If you need additional worksheets, make copies before filling them in, or download additional worksheets from **www.phason.ca**.

- PB-1 worksheets (below)
- PB-2 worksheets (on page 75)
- PB-3 worksheets (on page 78)
- PB-4 worksheets (on page 79)
- PB-5 worksheets (on page 81)
- PB-6 worksheets (on page 83)

PB-1 worksheets

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI 1	VSP1	Cooling/variable speed fan	
RELAY 1	Relay 4		
RELAY 2	Relay 5		
RELAY 3	Relay 8		

① Actuator 1 open, Actuator 1 close, Curtain 1 open, Curtain 1 close, Heat, Cool, Duty cycle, or Timed event
② Actuator 1 must use relay 4 for open and relay 5 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI 1	VSP1	Cooling/variable speed fan	
RELAY 1	Relay 4		
RELAY 2	Relay 5		
RELAY 3	Relay 8		

① Actuator 1 open, Actuator 1 close, Curtain 1 open, Curtain 1 close, Heat, Cool, Duty cycle, or Timed event
② Actuator 1 must use relay 4 for open and relay 5 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI 1	VSP1	Cooling/variable speed fan	
RELAY 1	Relay 4		
RELAY 2	Relay 5		
RELAY 3	Relay 8		

① Actuator 1 open, Actuator 1 close, Curtain 1 open, Curtain 1 close, Heat, Cool, Duty cycle, or Timed event
② Actuator 1 must use relay 4 for open and relay 5 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

PB-2 worksheets

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI-1	VSP1	Cooling/variable speed fan	
VARI-2	VSP2	Cooling/variable speed fan	
RLY 1	Relay 1		
RLY 2	Relay 2		
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		
RLY 8	Relay 8		
RLY 9	Relay 9		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Curtain 3 open, Curtain 3 close, Curtain 4 open, Curtain 4 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI-1	VSP1	Cooling/variable speed fan	
VARI-2	VSP2	Cooling/variable speed fan	
RLY 1	Relay 1		
RLY 2	Relay 2		
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		
RLY 8	Relay 8		
RLY 9	Relay 9		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Curtain 3 open, Curtain 3 close, Curtain 4 open, Curtain 4 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
VARI-1	VSP1	Cooling/variable speed fan	
VARI-2	VSP2	Cooling/variable speed fan	
RLY 1	Relay 1		
RLY 2	Relay 2		
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		
RLY 8	Relay 8		
RLY 9	Relay 9		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Curtain 3 open, Curtain 3 close, Curtain 4 open, Curtain 4 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

PB-3 worksheets

Info	**Address**		**Description**	
	Building		**Group**	
Stages	**PB label**	**OMNI label**	**Function①②**	**Description**
	RELAY 1	Relay 4		
	RELAY 2	Relay 5		
	RELAY 3	Relay 8		
	① Actuator 1 open, Actuator 1 close, Curtain 1 open, Curtain 1 close, Heat, Cool, Duty cycle, or Timed event ② Actuator 1 must use relay 4 for open and relay 5 for close.			
Alarm	**Connected to?**		**System type**	
			Normally open ☐	Normally closed ☐

Info	**Address**		**Description**	
	Building		**Group**	
Stages	**PB label**	**OMNI label**	**Function①②**	**Description**
	RELAY 1	Relay 4		
	RELAY 2	Relay 5		
	RELAY 3	Relay 8		
	① Actuator 1 open, Actuator 1 close, Curtain 1 open, Curtain 1 close, Heat, Cool, Duty cycle, or Timed event ② Actuator 1 must use relay 4 for open and relay 5 for close.			
Alarm	**Connected to?**		**System type**	
			Normally open ☐	Normally closed ☐

PB-4 worksheets

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
RLY 1	Relay 1		
RLY 2	Relay 2		
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		
RLY 8	Relay 8		
RLY 9	Relay 9		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Curtain 3 open, Curtain 3 close, Curtain 4 open, Curtain 4 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
RLY 1	Relay 1		
RLY 2	Relay 2		
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		
RLY 8	Relay 8		
RLY 9	Relay 9		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Curtain 3 open, Curtain 3 close, Curtain 4 open, Curtain 4 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

PB-5 worksheets

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

Info

Address	Description
Building	**Group**

Stages

PB label	OMNI label	Function①②	Description
RLY 3	Relay 3		
RLY 4	Relay 4		
RLY 5	Relay 5		
RLY 6	Relay 6		
RLY 7	Relay 7		

① Actuator 1 open, Actuator 1 close, Actuator 2 open, Actuator 2 close, Curtain 1 open, Curtain 1 close, Curtain 2 open, Curtain 2 close, Heat, Cool, Duty cycle, or Timed event

② Actuator 1 must use relay 4 for open and relay 5 for close. Actuator 2 must use relay 6 for open and relay 7 for close.

Alarm

Connected to?	System type
	Normally open ☐ Normally closed ☐

PB-6 worksheets

Info	**Address**			**Description**	
	Building			**Group**	
Stages	**PB label**	**OMNI label**	**Function**	**Description**	**Temperature probe**
	VARI 1	VHS1	Heating		Phason 3K ☐ Heat mat 1K ☐
Alarm	**Connected to?**			**System type**	
				Normally open ☐	Normally closed ☐

Info	**Address**			**Description**	
	Building			**Group**	
Stages	**PB label**	**OMNI label**	**Function**	**Description**	**Temperature probe**
	VARI 1	VHS1	Heating		Phason 3K ☐ Heat mat 1K ☐
Alarm	**Connected to?**			**System type**	
				Normally open ☐	Normally closed ☐

Index

A

AC actuators ..... *See* actuators
Actuator Position Sensor 40
actuator power supplies 40
actuators
  calibrating 44–45, 58
  connecting 39–42
  feedback 40
  maintaining ..... *See* calibrating
alarm systems
  connecting to a Power Block 51–54
  connecting to an OMNI Server 21–22

B - C

backup battery 23–24
calibrating actuators 44–45, 58
cleaning 58
communications 13–19
connecting
  curtain machines 45–46
  single-stage cooling/heating elements . 46–49
  variable speed fans 49
contactors ..... *See* power contactors
curtains machines 45–46

D

data wires 9
DC actuators ..... *See* actuators
DC power supplies 40

E

electrical noise 7
electrical ratings ..... *See* Power Block or OMNI Server
extending temperature probes 38

F

feedback potentiometer 40
filters 7, 40
four-zone averaging 7

G - I

gas furnaces 46–49
hot-surface ignition 47
incoming power ..... *See also* three-phase power
  connecting to a Power Block 54–55
  connecting to an OMNI Server 22–23

L - M

layout ..... *See* OMNI Server *or* Power Block
loopback tester ..... *See* testing Power Blocks
maintaining the controls 58–59
microboard 34
moisture 58–59
mounting .... 9, *See* OMNI Server or Power Block

N - O

normally open/closed ..... *See* alarm systems
OMNI Server
  features 2
  layout 10–12
  mounting 12
  ratings 2
OMNI Server communications 13–19

P

potentiometer ..... *See* feedback potentiometer
power ..... *See* incoming power or three-phase power
Power Blocks
  features 3
  layout 25–34
  mounting 35
  ratings 4
  testing 56–57
power contactors 8

P (continued)

power supplies (DC) 40
power surges 6
preventing moisture 58–59
probes ..... *See* temperature probes

R - S

routing data wires 9
RS-485A 19
sealing ..... *See* moisture
servicing 58–59
shielded cable 14–15
single-stage cooling/heating elements 46–49
surge suppression 6

T

temperature probes
  averaging 7
  connecting to an OMNI Server 20
  connecting to Power Blocks 36–37
  extending 38
  for heat mats 37
termination resistors ..... 34, See also communications
testing Power Blocks 56–57
three-phase power 51

V

variable heating 50
variable speed fans 49–50

Phason Inc.
2 Terracon Place
Winnipeg, Manitoba, Canada
R2J 4G7

Phone: 204-233-1400
Fax: 204-233-3252

E-mail: support@phason.ca
Web site: www.phason.ca