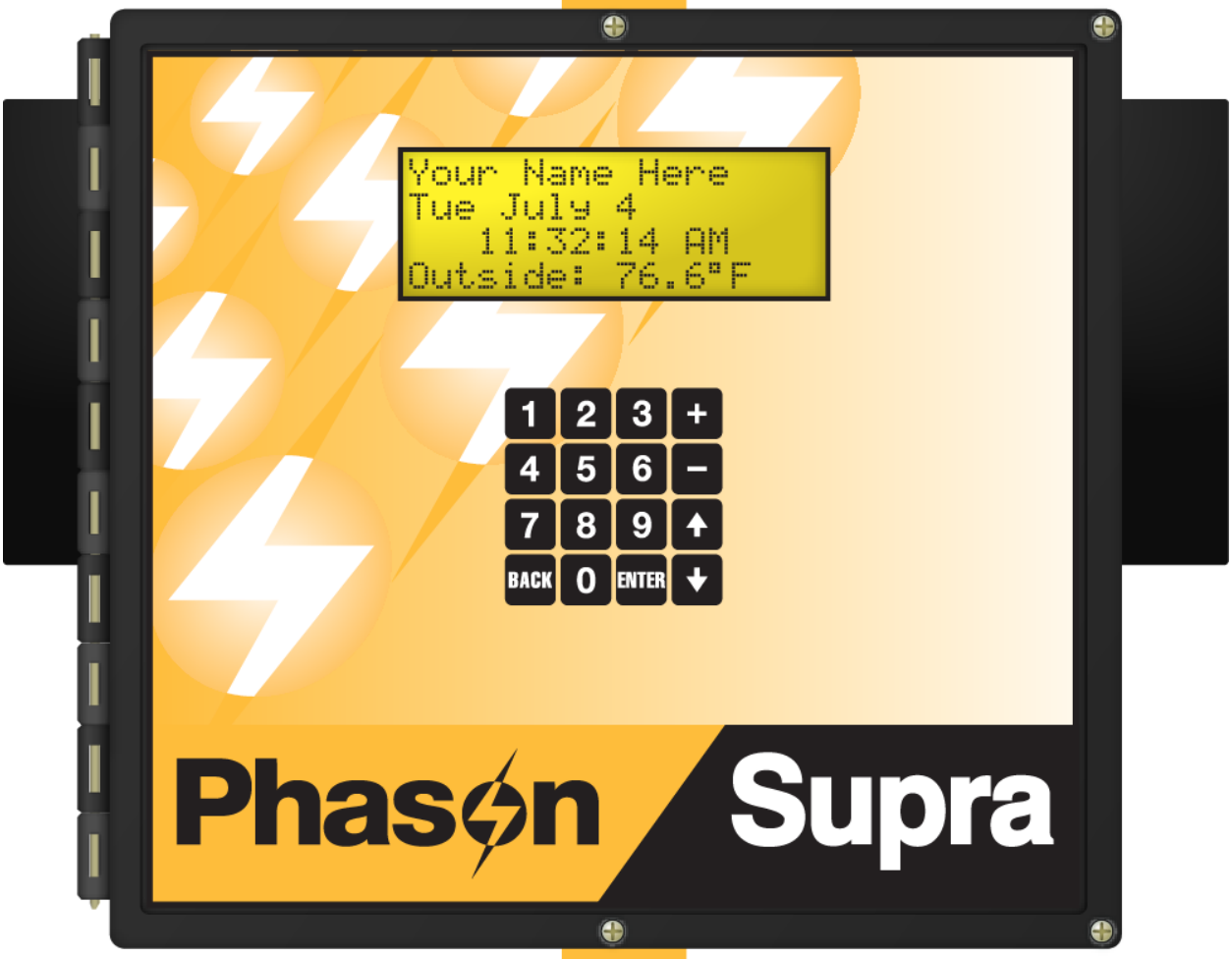
MAIN MENU

1 Settings
2 Maintenance
3 View Logs
4 Security
5 Configuration
6 Diagnostics
7 Factory Settings



SETTINGS

1 Group Setpoint
2 Heat/Cool Stages
3 Variable Stages
4 Growth Curve
5 Curtains
6 Alarms
7 Actuators
8 Duty Cycle
9 Timed Events
10 Water Meter
11 Humidity Control
12 Temp Setback
13 Tunnel Mode

MAINTENANCE

1 Manual Override
2 Calibrate Actuator
3 Set Clock
4 Switch F/C
5 Set Unit Name
6 Set Main Display
7 Hysteresis
8 De-Icing
9 Warnings
10 Temperature Probe
11 Motor Curves
12 Averaging On/Off
13 Averaging Setup
14 Humidity Factor
15 Startup Timer
16 Restore Settings
17 Save Settings

VIEW LOGS

1 Daily Log
2 Alarm Log
3 Audit Log
4 Erase All Logs

SECURITY

1 Security On/Off
2 Change PIN
3 Add User
4 Remove User

CONFIGURATION

Relay Stages 1 to 12
Variable Stages 1 to 4
0 to 10-V outputs 1 to 4
Humidity Zone

DIAGNOSTICS

1 Display All Inputs
2 Power Supply
3 View relay stages
4 Set relay stages
5 Change Version
6 Force Reset

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About the manual

The manual describes and explains how to use the features of Supra version 3.04. It does not describe ventilation strategies or equipment you can connect to the Supra.

The following styles are used in the manual.

- All buttons and menu commands are in a bold font.
  For example: Scroll to the next line and then press **ENTER**.
- All LCD display examples are in a dotted font.
  For example: From the Main Menu, select `Settings`.
- If a menu has a shortcut key, the number for the shortcut will be in brackets after the menu name.
  From the Maintenance menu, select `Set Unit Name` (5).

This is a hint or tip. It contains helpful information that might make it easier for you to set up or use the Supra.

This is a note. It contains information that may help you better understand the Supra.

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

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

How to use this manual

This section is a "quick-reference guide" of the manual. You can look at the chart on the next page to help you find what you are looking for. If you are not sure where to find something specific, look in the **Table of contents** at the front of the manual or the Error! Reference source not found. **Error! Bookmark not defined.**.

The following are some helpful suggestions.

- If you have not installed and configured the Supra, read **Chapter 2:** on page 16 and **Chapter 3:** on page 35.
- If you are ready to install, configure, or program the Supra, use the worksheets starting in **Appendix D** on page 121.
- If you are not sure how to use the keypad or how to read the display and menus, read **Becoming familiar with the Supra** on page 12.
- If you need to program the Supra or adjust settings (set points, growth curves, fan speeds, etc.), read **Chapter 4: Programming** on page 62.
- If you have an alarm condition displayed and are not sure what to do, look up the message in the **Alarm messages** table on page 115.
- If you are not sure of the meaning of a term, look it up in the **Glossary** on page 109.

Quick reference chart

◇ Supra overview, features, and accessories ◇ Introduction to the display and menu structure ◇ Keypad functions ◇ Display characters and text	**Chapter 1** Starting on page 8
◇ Installation instructions ◇ Equipment installation (probes, fans, actuators, and so on) ◇ Electrical ratings ◇ Supra layout (map of the inside and outside of the Supra)	**Chapter 2** Starting on page 16
◇ Configuration instructions ◇ Zone, probe, and sensor assignments ◇ Variable and relay stage assignments	**Chapter 3** Starting on page 35
◇ Programming instructions ◇ Group settings (set points and growth curves) ◇ Equipment settings (set points, fan speeds, and so on) ◇ Alarm settings (bias, duration, silencing, and so on) ◇ Security, including users and PINs	**Chapter 4** Starting on page 62
◇ Monitoring instructions ◇ Daily, alarm, and audit logs ◇ Status display ◇ Acknowledging to alarms ◇ Diagnostic tests ◇ Manual override ◇ Maintenance	**Chapter 5** Starting on page 97
◇ Glossary ◇ Troubleshooting information ◇ Factory settings ◇ Installation worksheets ◇ Configuration worksheets ◇ Settings worksheets ◇ Motor curves	**Appendixes** Starting on page 109

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Chapter 1: Introduction

Introducing the Supra

All of us at Phason want to welcome you to the Supra 16-stage environmental control, the most versatile and cost-effective 16-stage control available. The Supra is ideal for poultry, livestock, greenhouse, or light-industrial buildings and is compatible with any ventilation strategy: natural, forced, tunnel, and chimney ventilation.

Features

- Four variable stages (heat or cool) with overload protection fuses
- Twelve general-purpose relays (heat, cool, timed event, duty cycle, or actuator control)
- Optional 0 to 10 V DC output
- One alarm relay (for external alarm siren or alarm system)
- Four-zone temperature monitoring and control
- Outdoor temperature monitoring
- Adjustable temperature settings, including two configurable seven-step growth curves
- Temperature setback for day/night temperature (DIF) control
- Water usage monitoring
- Humidity monitoring and control
- Staggered start for distributing backup generator initial startup load
- Customizable alarm settings
- Three-second full-power-turn-on for minimizing fan ice-up
- Data logging of temperatures, alarms, and setting changes
- Power-failure memory protection, including internal 24-hour clock
- Five-level PIN security system
- Four-line, backlit LCD display
- On-board diagnostics and self-tests
- Thirty-foot temperature probe, extendable to 500 feet (additional probes available)
- NEMA 4X enclosure
- CSA approval
- Limited warranty (two years)

Some features require additional sensors or equipment. Water usage requires a water meter with pulse output. Humidity monitoring and control requires a Relative Humidity Sensor. Additional zones or outdoor temperatures require additional temperature probes.

A powerful four-zone controller

The Supra automatically monitors and controls the temperature in up to four separate zones. The Supra controls the temperature in each zone by operating ventilation equipment such as fans, heaters, inlet actuators, curtain machines, or other equipment according to your programmed settings.

The Supra has two seven-step growth curve programs you can configure for up to 250 days. This powerful feature automatically adjusts the temperature set points over time to control the temperature in a room or zone.

More than just temperature control – monitor water usage and control humidity

Not only can the Supra monitor and control temperatures using ventilation equipment, it can monitor water usage and control humidity.

The Supra's pulse counter allows you to connect a water meter (with pulse output) and monitor water usage. With an optional Relative Humidity Sensor, you can monitor humidity and automatically adjust your ventilation control strategy accordingly.

Temperature setback for day/night temperature control in greenhouses

Temperature setback allows you to automatically change the temperature set point for specific periods during the day. When temperature setback is enabled, the Supra subtracts the setback amount from the set point. At the end of the setback period, the Supra returns to the normal set point.

Temperature setback is ideal for maintaining different method (DIF) and in greenhouses.

Security and peace of mind

The Supra has a five-level PIN (personal identification number) security system. Each level has access to different menus of the Supra. When you enable security, users must enter their PIN before they can access a specific menu or function. This allows you to track who makes changes to your system and its settings.

The Supra is compatible with most alarm sirens and alarm systems. You can connect the Supra to an alarm siren or other external alarm system. The customizable list of alarm settings allows you to choose which alarm conditions you want to be notified about. The Supra automatically logs all alarm conditions.

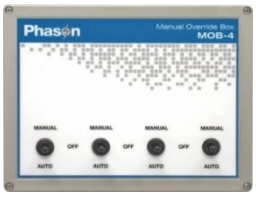
Easy to use and program

The Supra's four-line, backlit LCD display shows alarm conditions such as high and low temperatures, power failure, and low line voltage. The easy-to-use keypad and menu system make the Supra one of the easiest controls to program. The Supra's advanced and powerful features are never more than a few keystrokes away.

Available accessories

For more information about Phason accessories, contact your dealer or visit **www.phason.ca**.

Power contactors



The Manual Override Box (**model MOB-4**) increases the load handling capability of relays and provides an external disconnect. The MOB-4 includes four 240 V power contactor relays with AUTO-OFF-MANUAL switches and snubber filters. If you need to override an actuator or curtain machine, an actuator override kit is available.

FanDRIVEs

If you have the Variable DC Module, you can add FanDRIVEs. FanDRIVEs take the 0 to 10 V signal from the module and adjust fan speed. A 1×14 FLA (**model FD-1-14**) and a 2×7 FLA (**model FD-2-7**) are available.

Expansion Boxes

The Variable Load Expansion Box (**model VLX-20**) has a 20 A variable AC stage for controlling loads such as heat mats, heat lamps, and incandescent lights. Installation is simple and requires no additional configuration; all Expansion Boxes follow the programs and settings of the master control.

Variable DC Expansion Kit

The Variable DC Expansion Kit (K210050) allows you to connect equipment that requires a 0 to 10 V input, such as variable frequency drives.

The expansion kit installs in seconds and has four outputs you can configure for cooling or heating. Each output has its own settings and functions the same as the Supra's other variable stages.

Supra Saver

The Supra Saver is an innovative and easy-to-use product that allows you to store Supra configuration and settings.

The Supra Saver stores a complete copy of all a Supra's configuration and settings. The Supra Saver saves time and makes storing or transferring settings and configuration easy. You can even use the Supra Saver to set up new Supras in seconds!

Temperature probes and extension cable

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

Relative Humidity Sensors

The Relative Humidity Sensor comes in two models: **RHS** and **RHS-P**.

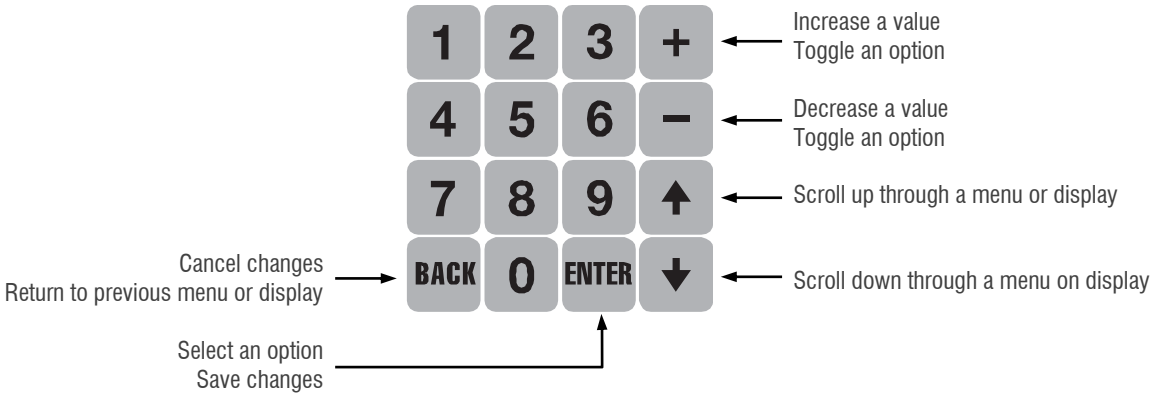
The **RHS** is designed to monitor relative humidity at **the Supra**. The RHS comes with the mounting hardware to mount the sensor to the control enclosure.

The **RHS-P** is designed to monitor relative humidity up away from the control. The RHS-P comes with the mounting hardware and cable to mount the sensor up to 100 feet (30.5 metres) away from the control.

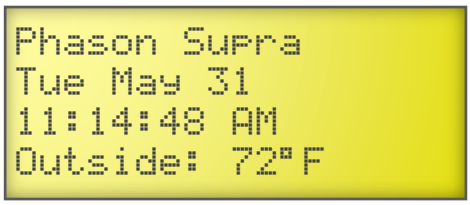
Becoming familiar with the Supra

The Supra has a 4-line, backlit LCD display and 16-button keypad that allow you program and monitor the control.

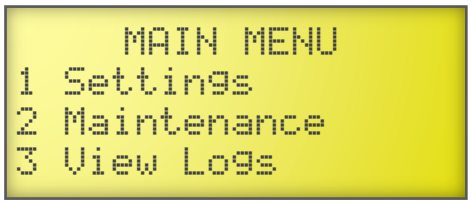
Using the keypad



Usually the Supra displays the status screens that show information about the control elements. The example on the right is one of several available status screens. For more information about status screens, see **Setting up the status display** on page 91.



To display the Main Menu from the status screen, press **ENTER**.



For an overview of the Supra menu, read **Understanding the menu structure** on page 14.

To select an items from the menu

- Press **Up** or **Down** to move the cursor over the number beside the item you want to select and then press **ENTER**.

  or

- Press the number corresponding to the item.

For example, to select Maintenance, press **2** or move the cursor over the 2 and then press **ENTER**.

If a menu has a shortcut key, the number for the shortcut will be in brackets after the menu name in the instructions. For example, From the Maintenance menu, select Set Unit Name (5).

- ◇ If the menu item you want to select has a number higher than nine, you cannot select that item by typing its number. You must move the cursor over the number and then press **ENTER**.
- ◇ If there is an alarm condition, you will see the alarm screen instead of the status screen. You must acknowledge the alarm before you can proceed. For more information, read **Acknowledging alarms** on page 98.

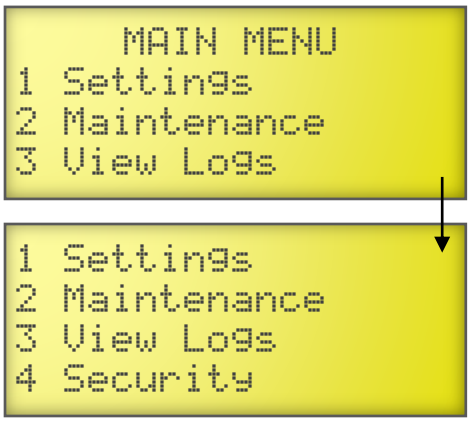
Reading the display

When you switch on the power to the Supra, the display on the front looks like the one to the right. The display has 4 lines with 20 character positions on each line.

On some screens, there can be several lines of information available. To see the remaining lines of information, you need to "scroll".

- ◆ To scroll down, press the **Down** (⇩) button on the keypad to show a new line.
- ◆ To scroll up, press **Up** (⇧).

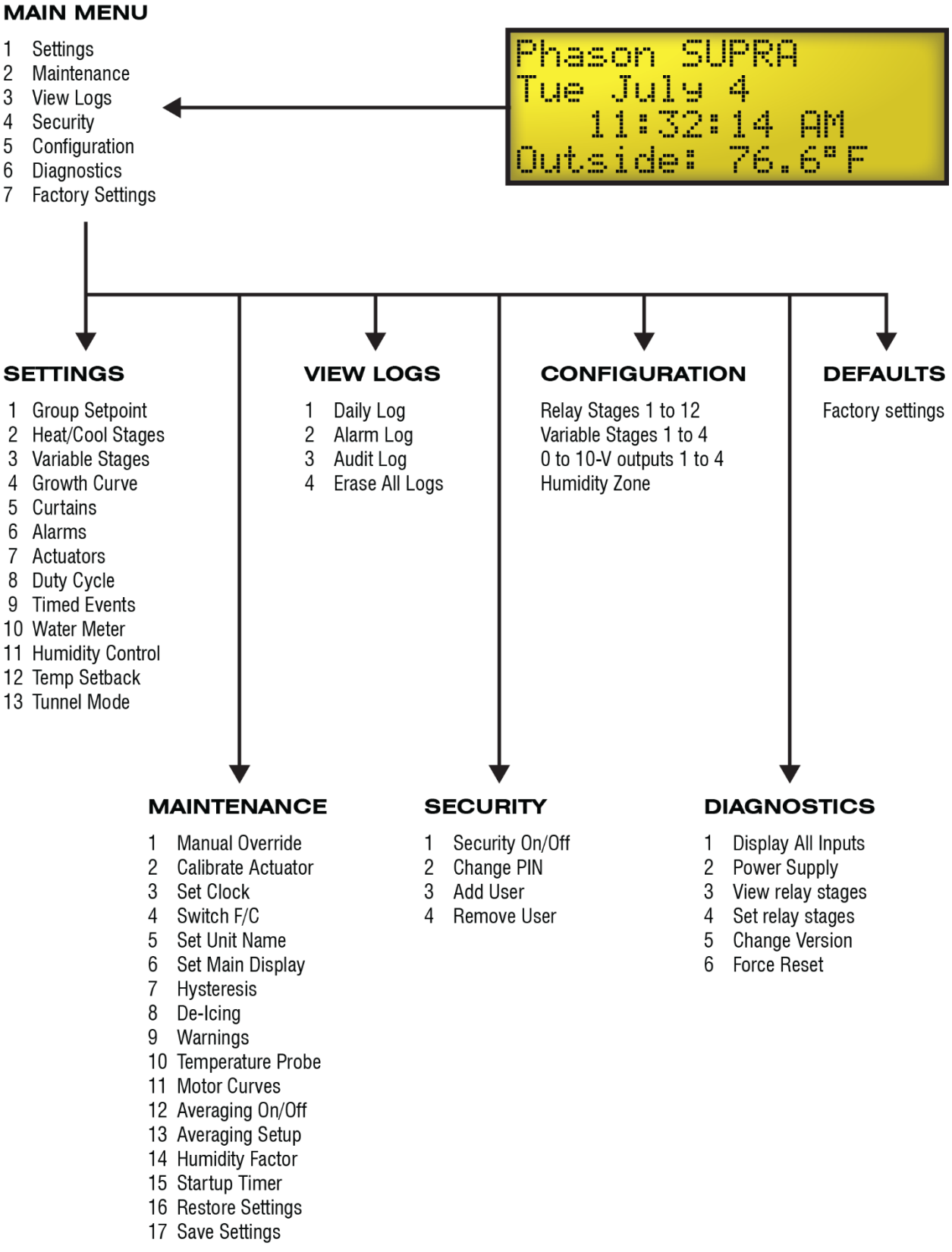
For example, when you go to the Main Menu, you see a display screen like the one to the right.



Press **Down** three times to get to the View Logs line.

Press **Down** once more, then the next line displays and the first line scrolls up out of sight.

Understanding the menu structure



Entering text in the Supra

When configuring the Supra, you need to assign names to the elements you are controlling. For example, if you have a fan connected to a variable stage, you might want to call it "VS fan 36-inch".

You can enter the following characters characters into the Supra.

- When entering text, use the **+** or **–** keys to display different characters in order.
- If there is already a character under the cursor when you press **+** or **–**, the display starts at that letter and moves up or down.
- For example, if the letter A is displayed, pressing **+** displays the letter B. Pressing **–** displays the character @.

To enter text

1. Scroll to the position where you want to enter text and then press **ENTER**.
2. Press **+** or **–** until you see the character you want to enter.
3. Press **ENTER**.
4. Repeat steps 1 to 3 for the each character you want to enter.

There is a quick way to "jump" to some characters. Select the shortcut character closest to the letter you want and then press **+** or **–** until you display the character you want.

To display this shortcut …	Press this key	To display this shortcut …	Press this key
(Space)	0	1	5
a	1	O	6
e	2	R	7
g	3	U	8
I	4	x	9

Chapter 2: Installation

What you need to know before installing the Supra

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

- ◇ If you do not install external surge suppression devices, you risk damage to the electronics inside the Supra, which may cause the Supra to fail.
- ◇ Because it is not possible to *completely* protect this product internally 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.

2. Using the installation worksheets in **Appendix D** (starting on page 121), list all the equipment you want to control using this Supra. Install the equipment and make your electrical connections according to the sheet.

3. Using the configuration worksheets in **Appendix E** (starting on page 123), decide which relays you want to use for each piece of equipment, and how you want the equipment organized by zone in the Supra. You can connect more than one piece of equipment to a single relay **as long as the total amps do not exceed the relay's limit**. For more information about the control ratings, see **Supra electrical ratings** on page 18.

Understanding power surges and surge suppression

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

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

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

Reducing electrical noise using filters

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

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

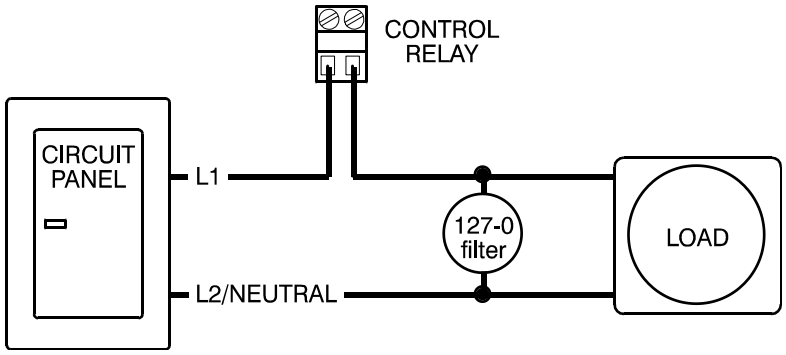
Phason highly recommends installing filters on *all* inductive loads.

Installing filters helps extend the life of equipment

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

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

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



- Some power contactors include snubber filters. For more information, read **Using power contactors to increase the capacity of relays** on page 18.
- For more information about snubber filters or other Phason accessories, see your dealer or visit **www.phason.ca**.

Supra electrical ratings

Input power Fuse (F5)	120/230 VAC, 50/60 Hz 1 A, 250 VAC non-time-delay glass
Variable stages ① (4: VAR1 to VAR4) Fuses (4: F1 to F4)	10 A at 120/230 VAC, general-purpose (resistive) 7 FLA at 120/230 VAC, PSC motor ② 1/2 HP at 120 VAC, 1 HP at 230 VAC, PSC motor 15 A, 250 VAC ABC-type ceramic
Relays ① ③ (12: RLY1 to RLY12)	10 A at 120/230 VAC, general-purpose (resistive) 1/3 HP at 120 VAC, 1/2 HP at 230 VAC 360 W tungsten at 120 VAC
Alarm relay	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 more than one piece of equipment to a variable stage or relay as long as they are the same type (for example, two fans), and the total current draw (load) is within the limits.
② The FLA (full load ampere) rating accounts for the increase in motor current draw when the motor operates at less than full speed. Make sure the motor/equipment connected to the variable stage does not draw more than the FLA rating.
③ Actuators require two relays: one for opening, one for closing. You can connect a maximum of two actuators.
Tip: You can increase the load capabilities of the Supra's variable stages 3 and 4 by connecting a Variable Load Expansion Box. Each Expansion Box increases the current capacity of the stage it is connected to by 20 A. For more information, read .

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.

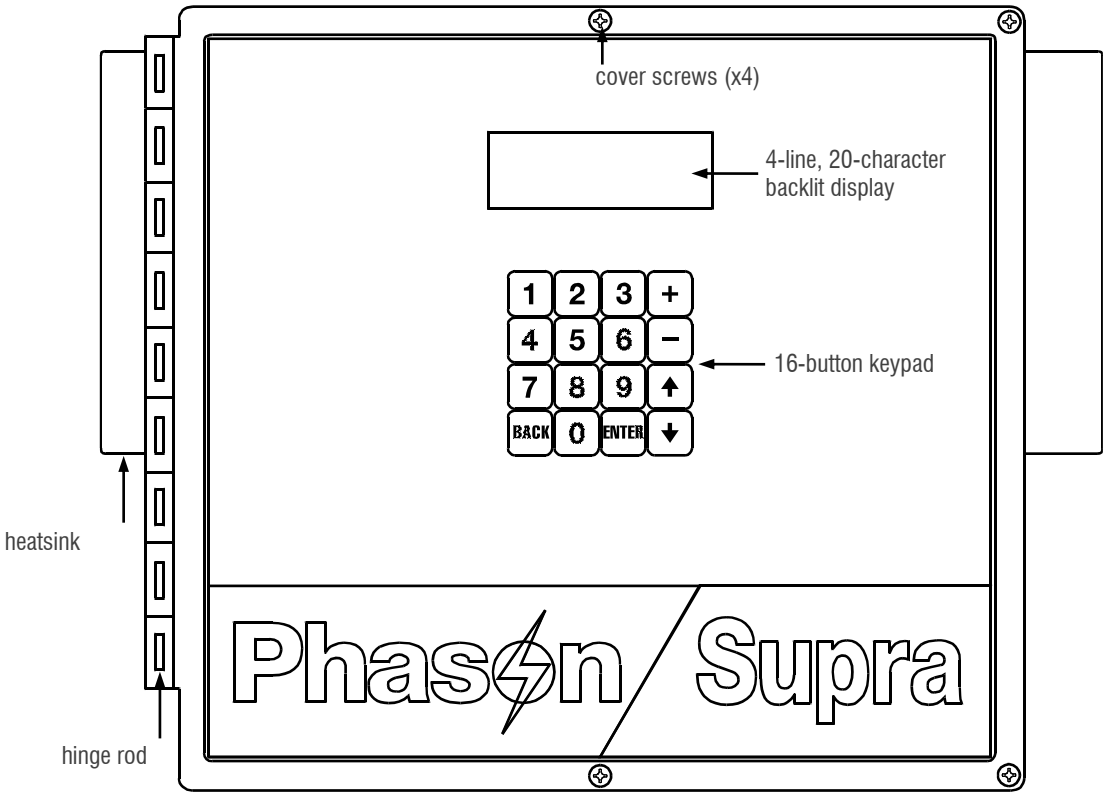
- Coil: 10.2 mA at 240 VAC
- Contact: 25 A at 240 VAC; resistive
  2 HP at 240 VAC, 1 HP at 120 VAC; motor, power factor 0.4
  1300 W at 120 VAC; tungsten

Phason offers three power contactor options.

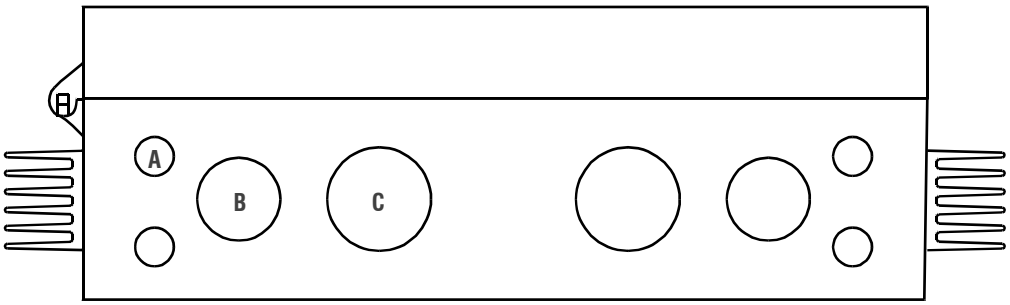
- **Power contactor relay** (model PC-240) – includes power contactor relay and mounting hardware for easy mounting in an enclosure.
- **Power contactor kit** (model 122-1) – includes power contactor relay, on-off-auto switch and label, snubber filter (reduces electrical noise), and mounting hardware for easy mounting in an enclosure.
- **Power contactor unit** (model 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.

Supra exterior layout

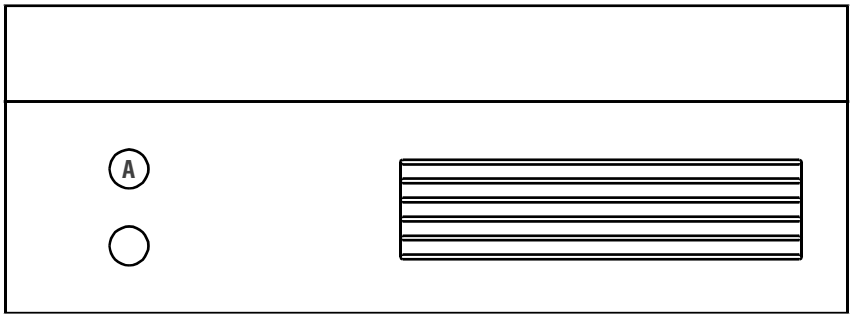
Front view



Bottom view

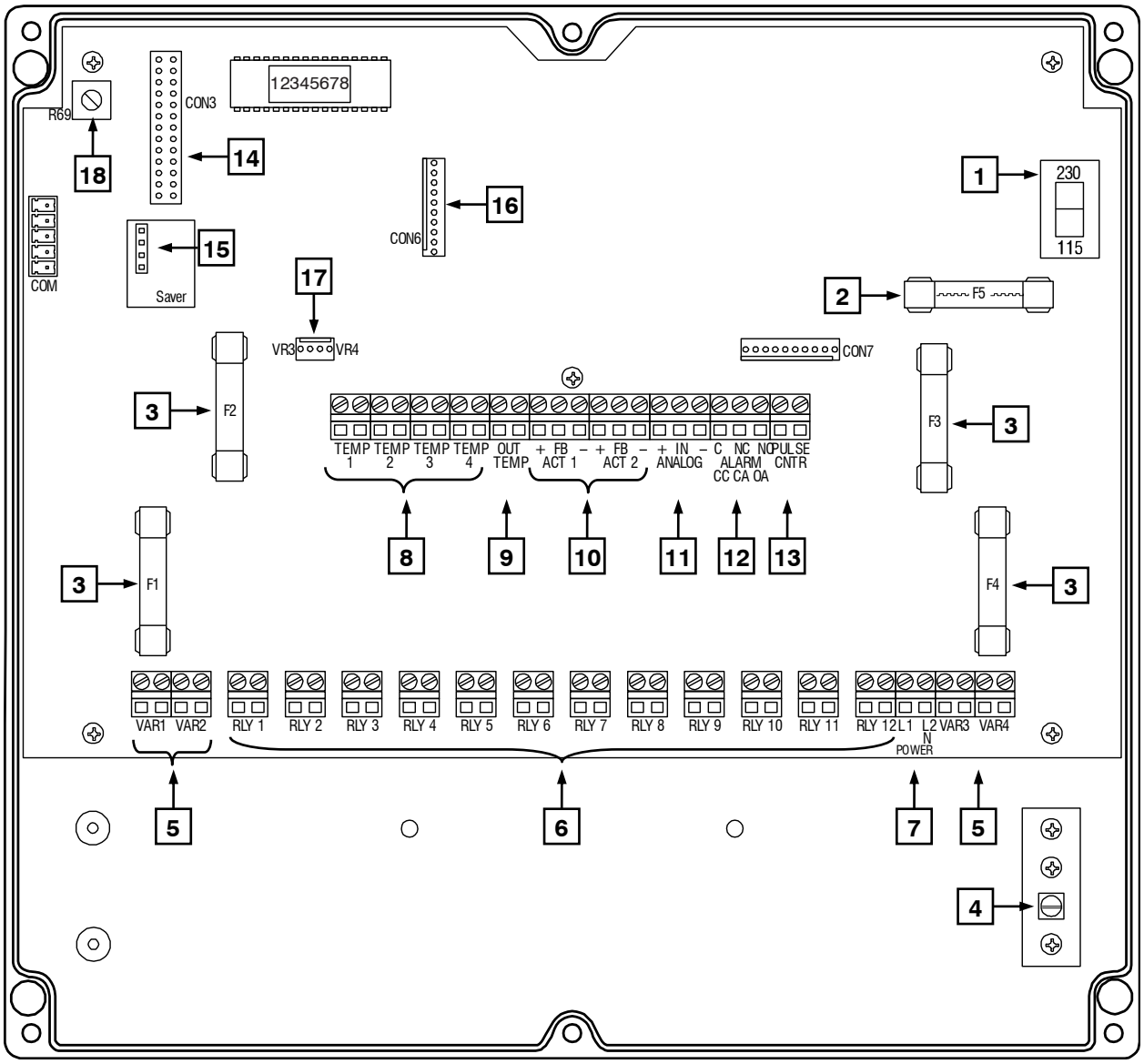


Side view



- 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

Supra interior layout

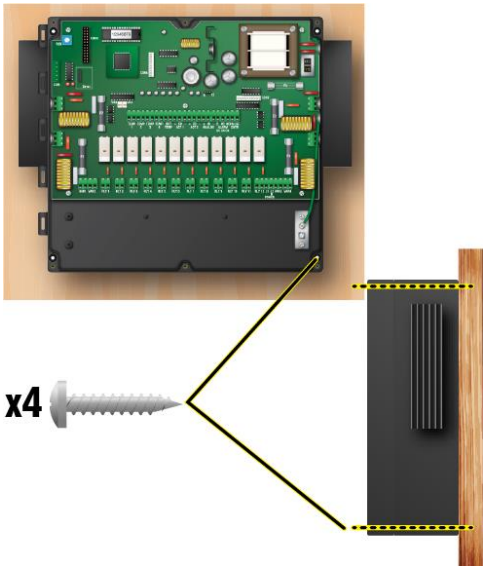


1	**Voltage selection switch** – set this switch to the correct voltage before installing the Supra.
2	**Incoming power fuse** (F5) – 1 A, 250 VAC non-time-delay glass fuse.
3	**Variable stage fuses** (F1 to F4) – 15 A, 250 VAC fast-acting ceramic. F1 is for variable stage 1, F2 for stage 2, and so on.
4	**Ground plate screw** – connect a ground wire to this screw.
5	**Variable stage terminals** (VAR1 to VAR4) – connect variable heating or cooling equipment such as fans or heat lamps to these terminals.
6	**General-purpose relay terminals** (RLY1 to RLY12) – connect single stage (on or off) equipment to these terminals. You can configure these relays as heat, cool, duty cycle, timed event, curtain control, or inlet control.
7	**Incoming power terminal** – connect the incoming power (120/230 VAC, 50/60 Hz) to this terminal.

8	**Zone temperature probe terminals** (TEMP1 to TEMP 4) – connect the temperature probes for monitoring the zones to these terminals.
9	**Outdoor temperature probe terminal** (OUT TEMP) – connect the temperature probe for monitoring outdoor temperatures to this terminal.
10	**Actuator feedback terminals** (ACT 1 and ACT 2) – connect the feedback from the actuators to these terminals.
11	**Analog terminal** – connect a Relative Humidity Sensor here.
12	**Alarm relay terminal** – connect an external alarm system or alarm siren to this terminal.
13	**Pulse counter terminal** – connect a water meter with pulse output to this terminal.
14	**Display cable socket** (CON3) – make sure the ribbon cable from the display is properly connected to this socket.
15	**Saver socket** (SAVER) – if you are using Supra Saver to store/load settings, connect it to this socket.
16	**VDC expansion connector** (CON6) – if you are installing a 0 to 10 V DC expansion kit, connect it here.
17	**Expansion Box connections** – if you are using Variable Load Expansion Boxes to expand the capacity of your control system, connect them here – VR3 for variable stage 3, VR4 for stage 4.
18	**Contrast adjuster** (R69) – if you need to adjust the display contrast, use a small flat screwdriver to turn the knob.

Mounting the Supra

1. Select a location for the Supra. 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 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 equipment to the Supra

Follow all instructions when installing the Supra and connecting equipment to it.

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

The Supra's built-in diagnostic tests are useful for testing your equipment after installing and configuring it. For more information, read **Performing diagnostic tests** on page 103.

Connecting actuators

You can connect up to two actuators to a Supra. 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 help close the inlet, or counter weighted to help open the inlets.

Each actuator you connect requires two relays: one for extending the actuator arm (opening the inlet), and one for retracting the arm (closing the inlet). You can connect the actuator to any of the available relays, but side-by-side relays are recommended.

Feedback potentiometers

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

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

A system operates more precisely when using the largest amount of stroke that is feasible with the actuator. The stroke is the distance the actuator arm extends or retracts.

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 filters helps extend the life of Power Block relays. For more information, read **Reducing electrical noise using filters** on page 17.

Phason offers a DC power supply (**model 124-0**) – includes +18 and –18 VDC fused outputs and a snubber filter, all mounted in an enclosure.

A 36 VDC 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**.

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

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 18.

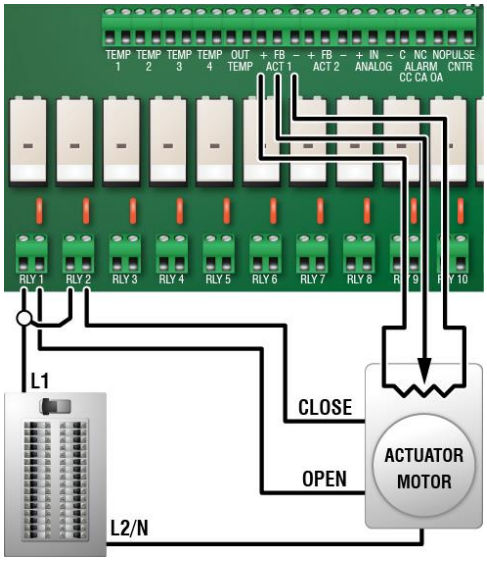
To connect actuators

Connect actuators to the Supra as shown in the following diagrams. Refer to your actuator's installation guide for information about its power supply requirements.

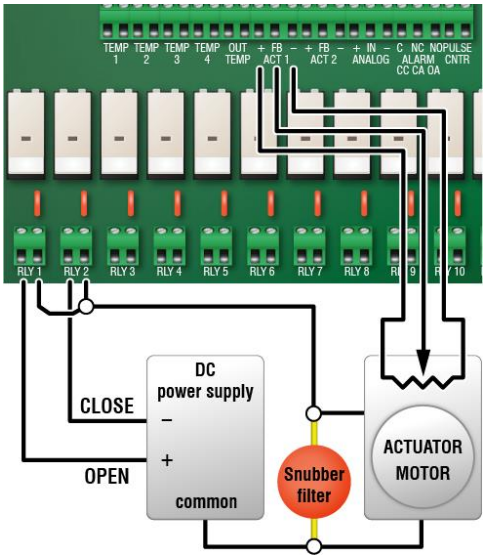
Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing actuators.

- ◇ When connecting a feedback potentiometer, connect it to ACT1 for actuator 1 and ACT2 for actuator 2.
- ◇ If you are unsure of the potentiometer wiring for your actuator, see **Determining correct actuator feedback wiring** on page 119.
- ◇ When routing the actuator feedback wires, do not run them in or along the same conduit as AC-power lines. Follow the guidelines in the **Control fundamentals**.
- ◇ 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.

AC-powered actuators



DC-powered actuators



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 is more air cools the building. You can connect up to six curtain machines to the Supra. Each curtain machine you connect requires two relays: one for opening the curtain, and one for closing the curtain.

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

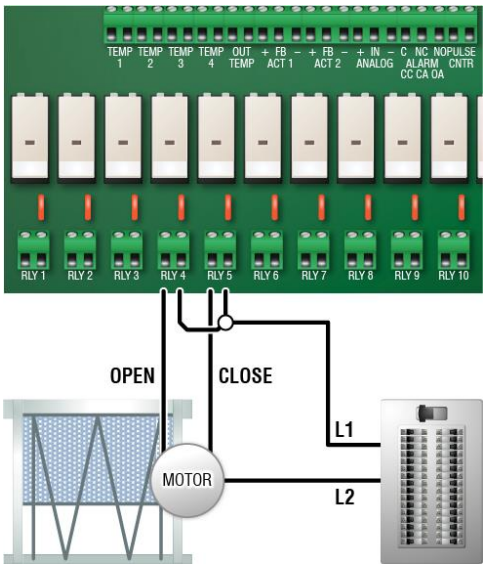
If you are connecting equipment that exceeds the relay ratings, you must install a power contactor. For more information, read **Using power contactors to increase the capacity of relays** on page 18.

TIP Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing curtain machines.

NOTE Follow these instructions to connect curtains that are **not** controlled by actuators.

To connect curtain machines

Connect curtain machines to the Supra as shown.



Connecting single-stage heating or cooling elements

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

Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing single-stage heating or cooling elements.

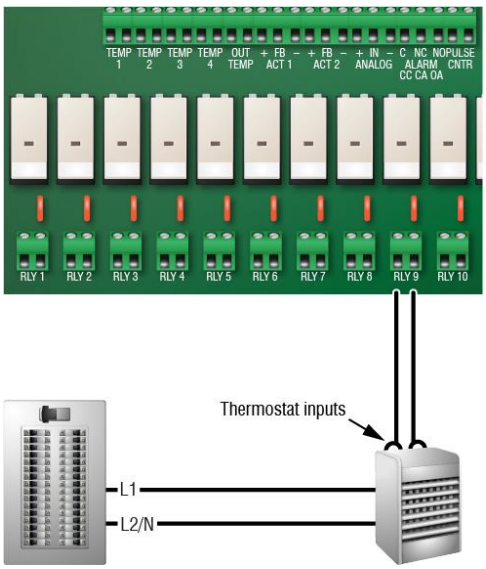
Supra relay ratings: 10 A at 120/230 VAC, general-purpose (resistive)
1/3 HP at 120 VAC, 1/2 HP at 230 VAC
360 W tungsten at 120 VAC

- ◇ 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 18.
- ◇ 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 manual.

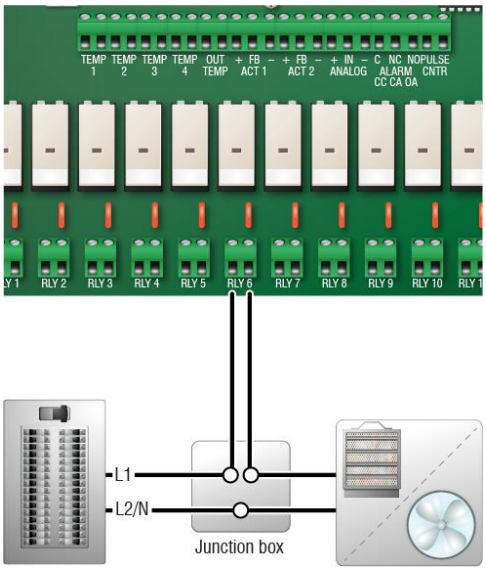
To connect single-stage heating or cooling elements

Connect single-speed heating or cooling elements to the Supra as shown in the following diagrams.

Gas-fired furnace or brooder



All other single-stage heating/cooling



Connecting variable heating or cooling elements

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

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

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

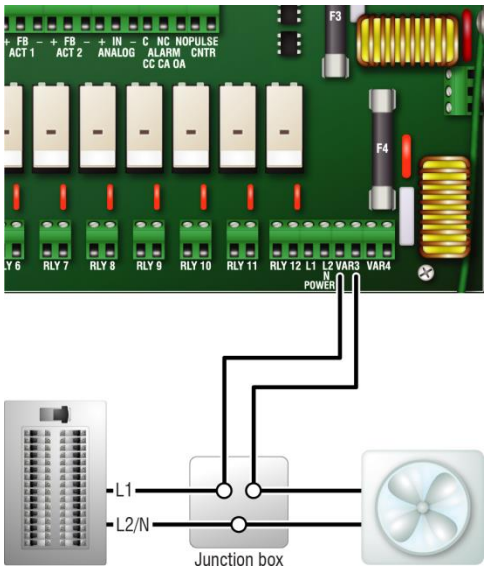
- ◇ **Only permanent split capacitor motors appropriate for variable speed control, or shaded pole motors, can be used on the variable stages.**
- ◇ The ratings of the equipment must not exceed the ratings of the Supra's variable stages.
- ◇ If you are using three-phase power, connect the Supra and the variable heating or cooling equipment to the same phase. For more information, read **Using three-phase power** on page 27.

To connect variable-stage heating or cooling elements

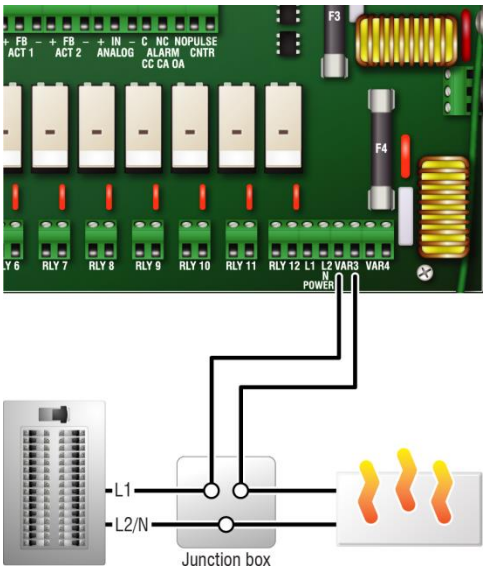
Connect variable heating or cooling elements to the Supra as shown in the following diagram.

Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing variable-stage elements.

Variable cooling elements



Variable heating elements

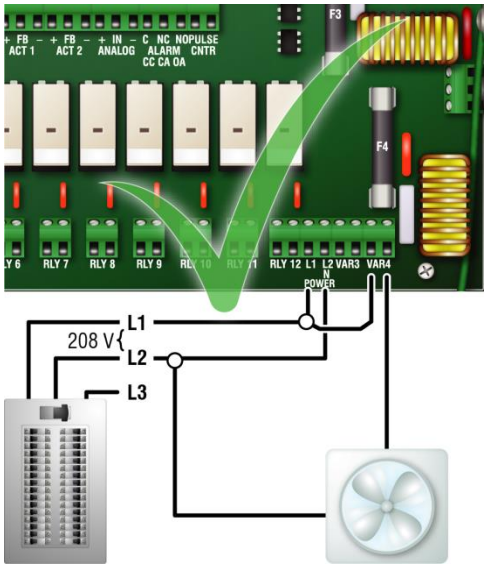


Using three-phase power

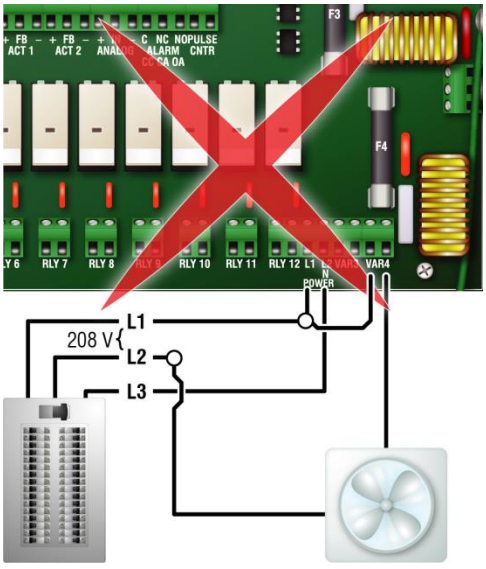
If you are connecting the Supra to a three-phase system, make sure to connect the control power and the variable heating or cooling equipment to the same phase.

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

Correct three-phase wiring



Incorrect three-phase wiring



Connecting alarm systems

An alarm system can be a siren, an alarm panel, or an auto-dialer. Read your alarm siren's installation guide for installation instructions and information about the type of system, normally open or normally closed. The descriptions for the alarm terminal are as follows: **CC**–common connection, **CA**–closed on alarm, **OA**–open on alarm.

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 **Programming alarm settings** on page 88.

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

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

To connect an alarm system

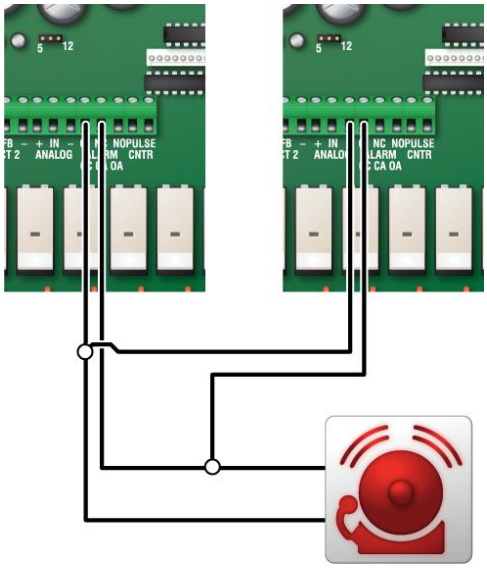
- If you are connecting the alarm system to a network of Supras and your system uses a **normally open** connection (closes on alarm), connect the system as shown in the normally open diagram.

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

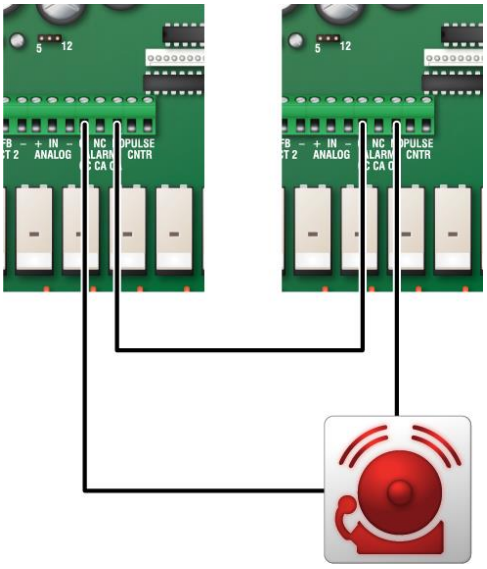
- If you are connecting the alarm system to a network of Supras and your system uses a **normally closed** connection (opens on alarm), connect the system as shown in the normally closed diagram.

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

Normally open system (closed on alarm)



Normally closed system (open on alarm)



Connecting temperature probes

You can connect five temperature probes to the Supra: one outdoor probe and up to four indoor (zone) probes. The Supra automatically detects when a probe is connected to a terminal.

You can connect zone probes to any of the four temperature terminals (**TEMP 1** to **TEMP 4**). If you are monitoring outdoor temperatures, you must connect the outdoor probe to the **OUT TEMP** terminal.

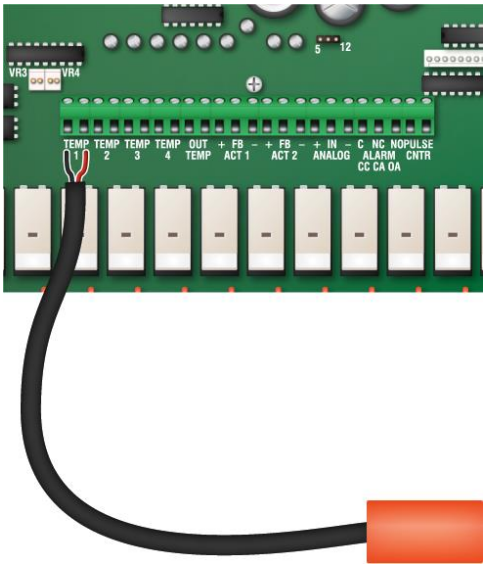
- ◇ You can extend probe cables up to 500 feet.
- ◇ Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing temperature probes.

- ◇ Replace damaged probes as soon as possible. If a probe is damaged, unless you have temperature averaging enabled, the Supra automatically selects the next active temperature probe.
- ◇ For more information, read **Configuring temperature averaging** on page 42.

To connect temperature probes

Connect the temperature probe as shown in the following diagram.

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



Connecting a Relative Humidity Sensor

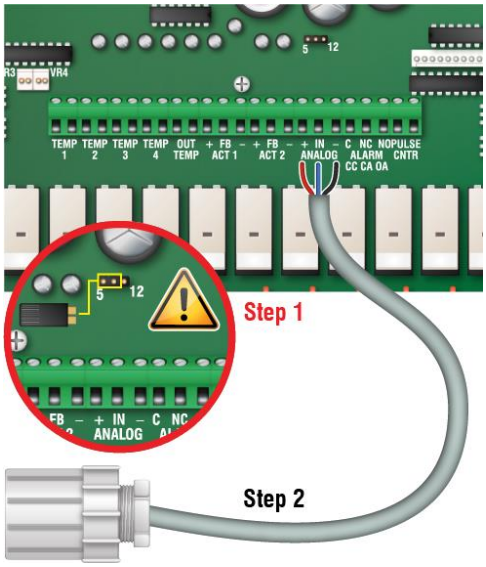
You can connect a Phason Relative Humidity Sensor (RHS) to the analog terminal. Connecting an RHS allows you to monitor relative humidity in one of the Supra's four zones.

You can monitor relative humidity with the Phason Relative Humidity Sensor (RHS or RHS-P) only. Other humidity sensors will not work properly. For more information about the RHS, see **Relative Humidity Sensors** on page 11.

Refer to **Appendix D: Installation worksheet** on page 121 and **Appendix E: Configuration worksheets** on page 123 when installing a Relative Humidity Sensor.

To connect a Relative Humidity Sensor

1. Place jumper **JA1** on the two left pins as shown below.
2. Connect the sensor to the **ANALOG** terminal as shown below.



- ◇ If the Supra's circuit board does not have the jumper, you cannot use the sensor
- ◇ Make sure the jumper is on the two left pins before switching on the power to the Supra. If the jumper is not in the correct position when you switch on the power, the sensor will be damaged. **This will void the warranty**.

Connecting a water meter

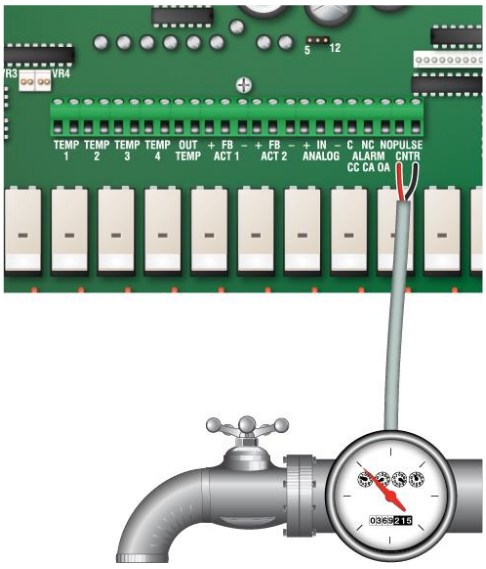
You can connect a water meter to the pulse counter (**PULSE CNTR**) terminal. The water meter must have a dry contact pulse output. Connecting a water meter allows you to monitor water usage.

NOTE

The water meter must measure one unit or greater per pulse. Also, the units per pulse must be a whole number; the Supra does not accept fractions or decimals. For example, 1 gallon per pulse or 10 gallons per pulse would work; 0.5 gallons per pulse or 1.5 gallons per pulse would not work.

To connect a water meter

Connect a water meter to the **PULSE CNTR** terminal as shown below.



Connecting the power source

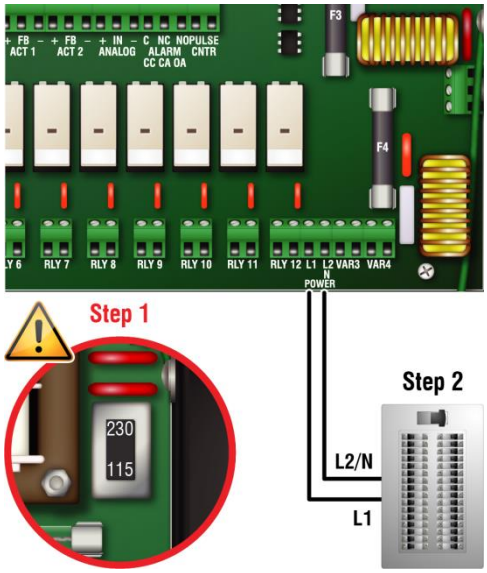
You can connect the Supra to 115 or 230 VAC, 50 or 60 Hz power.

- ◇ 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 27.

- ◇ 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 the installation

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

Verifying your connections

Make sure the configuration worksheets in **Appendix E** correspond to the way the equipment is connected to the Supra.

It is very important that the connections and the worksheet are the same, because the next step after closing the cover is to tell the Supra which equipment is connected to each terminal. It is important so you can be sure you are controlling the equipment you think you are controlling.

Closing the cover

After you have finished connecting all equipment, wiring, and cables to the Supra, it is time to verify the wires are connected properly and the close the cover.

1. Make sure all the wires are properly connected to the correct terminals.

2. Make sure the voltage selection switch is in the correct setting.
3. Make sure the display cable is properly connected to **CON3**. For more information, read **Supra interior layout** on page 20 (item 14).
4. Switch on the power to the Supra.
   When you switch on the power to the Supra, the display on the front looks like the following example. If the Supra display does not come on, go back to step 1.

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: Configuration

What you need to know before configuring the Supra

Configuring the Supra means telling it what equipment it will be controlling, and to some extent, how it will be controlling that equipment. For example, the Supra has 12 relay stages. You need to tell the stages if they will be controlling curtains, heating or cooling elements, or timed events. In addition, you need to tell the stages in which zone (1, 2, 3, or 4) they will be controlling those elements.

In addition to configuring the variable and relay stages, configuration also includes information that you set once or change very rarely, for example, the name of the Supra.

Before you begin configuring the Supra, make sure:

- It has power
- All equipment has been properly connected to the correct terminals.
- You know which equipment is connected to which relays and variable stages

This chapter does not explain set points, idle speeds, or other settings. For information about those settings, read **Chapter 4: Programming** on page 62.

How zones work

Because the Supra is a four-zone controller, you can divide your facility into real or imaginary zones – areas that can each be controlled independently of the others. Part of the configuration process is assigning relay stages and variable stages to zones (only one zone per stage).

A zone defines an area set off as distinct from surrounding or adjoining parts. Zones might or might not be separated by walls. For example, a large room could be divided into two zones to provide better control response.

Example 1: two rooms, two zones

You have a large finisher barn that is divided into two rooms. You have a forced-air ventilation system consisting of fans and inlets. You will use one Supra to control both rooms, one zone per room. The configuration could be as follows:

Room	Zone	Ventilation stage	Supra output	Equipment
Room 1	Zone 1	Stage 1	VAR 1	Two 20-inch, variable-speed fans
Room 1	Zone 1	Stage 2	VAR 2	Two 25-inch, variable-speed fans
Room 1	Zone 1	Stage 3	RLY 1	Two 36-inch, single-speed fans
Room 1	Zone 1	Stage 4	RLY 2	One 48-inch, single-speed fan
Room 1	Zone 1	Stage 5	RLY 3	Two 48-inch, single-speed fans
Room 1	Zone 1	–	RLY 4	Gas-fired furnace
Room 1	Zone 1	–	RLY 5	Inlet actuator OPEN
Room 1	Zone 1	–	RLY 6	Inlet actuator CLOSE
Room 2	Zone 2	Stage 1	VAR 3	Two 20-inch, variable-speed fans
Room 2	Zone 2	Stage 2	VAR 4	Two 25-inch, variable-speed fans
Room 2	Zone 2	Stage 3	RLY 7	Two 36-inch, single-speed fans
Room 2	Zone 2	Stage 4	RLY 8	One 48-inch, single-speed fan
Room 2	Zone 2	Stage 5	RLY 9	Two 48-inch, single-speed fans
Room 2	Zone 2	–	RLY 10	Gas-fired furnace
Room 2	Zone 2	–	RLY 11	Inlet actuator OPEN
Room 2	Zone 2	–	RLY 12	Inlet actuator CLOSE

Example 2: one room, two zones

You have a large, single-room finisher barn. You have a forced-air ventilation system consisting of fans and inlets. You will use one Supra to control the barn. Because the room is very large, you will use two zones. The configuration could be as follows:

Zone	Ventilation stage	Supra output	Equipment
Zone 1	Stage 1	VAR 1	Two 20-inch, variable-speed fans
Zone 1	Stage 2	VAR 2	Two 25-inch, variable-speed fans
Zone 1	Stage 3	RLY 1	Two 36-inch, single-speed fans
Zone 1	Stage 4	RLY 2	One 48-inch, single-speed fan
Zone 1	Stage 5	RLY 3	Two 48-inch, single-speed fans
Zone 1	–	RLY 4	Gas-fired furnace
Zone 1	–	RLY 5	Inlet actuator OPEN
Zone 1	–	RLY 6	Inlet actuator CLOSE
Zone 2	Stage 1	VAR 3	Two 20-inch, variable-speed fans
Zone 2	Stage 2	VAR 4	Two 25-inch, variable-speed fans
Zone 2	Stage 3	RLY 7	Two 36-inch, single-speed fans
Zone 2	Stage 4	RLY 8	One 48-inch, single-speed fan
Zone 2	Stage 5	RLY 9	Two 48-inch, single-speed fans
Zone 2	–	RLY 10	Gas-fired furnace
Zone 2	–	RLY 11	Inlet actuator OPEN
Zone 2	–	RLY 12	Inlet actuator CLOSE

Configuration checklist

Because some items need to be configured before others, Phason recommends configuring the Supra in following order. If you do not have elements of a particular type, skip that step. For example, if you do not have actuators, skip to the next step.

Configuring the main control functions

- ☐ Identifying the Supra
- ☐ Configuring the startup timer
- ☐ Setting the date and time
- ☐ Selecting the temperature units
- ☐ Changing the type of temperature probe
- ☐ Configuring temperature averaging

Configuring the control stages

- ☐ Configuring variable stages
- ☐ Configuring relays for actuators
- ☐ Calibrating actuators
- ☐ Configuring relays for heating, cooling, or temperature-based duty cycles
- ☐ Configuring relays for curtains
- ☐ Configuring relays for time-based duty cycles
- ☐ Configuring relays for timed events

Testing the configuration

- ☐ Testing the configuration

Configuring optional features

- ☐ Configuring hysteresis
- ☐ Configuring de-icing
- ☐ Selecting a humidity zone
- ☐ Configuring the pulse counter
- ☐ Selecting motor curves
- ☐ Configuring warnings

- ◇ We recommend configuring *all* your control elements before programming the settings (temperature set points, idle speeds, and so on). Use the Configuration worksheets, starting on page 123 to help you keep track of which equipment is connected to which relays and variable stages.
- ◇ If you receive a warning during configuration, look it up in the **Warnings worksheet** on page 128 and then follow the instructions for correcting the problem.
- ◇ The Supra's built-in diagnostic tests are useful for testing your equipment after installing and configuring it. For more information, read **Performing diagnostic tests** on page 103.

- ◇ All instructions in the configuration section start from the Main Menu. To display the Main Menu from the status screen, press **ENTER**.
- ◇ If there is an alarm condition, you will see the alarm screen instead of the status screen. You must acknowledge the alarm before you can proceed. For more information, read **Acknowledging alarms** on page 98.

Configuring the main control functions

Before configuring the variable and relay stages, you need to configure the main control functions. Main control functions include items such as temperature units that the Supra needs to know before you configure the variable and relay stages.

Depending on your specific situation and the number and type of temperature probes you have connected to the Supra, you will need to configure some or all of the main control functions.

- Identifying the Supra (below)
- Configuring the startup timer (on page 39)
- Setting the date and time (on page 40)
- Selecting the temperature units (on page 41)
- Changing the type of temperature probe (on page 41)
- Configuring temperature averaging (on page 42)

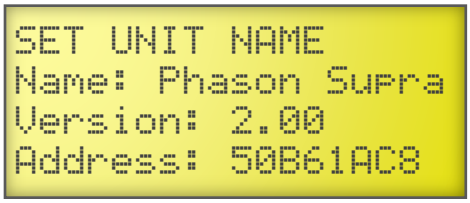
Identifying the Supra

To identify a particular Supra, you need to give it a meaningful name, such as **West Barn** or **Finishing Room**. This is even more important when you have several Supras networked together.

If you move the Supra, or change how you use the area controlled by the Supra, you might want to change the name to something more descriptive.

To give the Supra a name

1. From the Main Menu, select Maintenance (2).
2. From the Maintenance menu, select Set Unit Name (5).
   The display should look like the following example.



3. Scroll to the second line and then press **ENTER**.
4. Enter the name (maximum 14 characters) for this Supra. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
5. Press **BACK** twice to return to the Main Menu.

Configuring the startup timer

The Supra's startup timer allows you to delay the startup of each Supra's loads when the controls return from a power failure. Configuring the timer allows you to distribute the initial startup load the backup generator must handle, allowing you to use a lower-capacity, more-economical generator.

You can configure the startup timer to delay starting the Supra's loads from 0 to 59 seconds. For example, say you have 4 Supras in your facility and you set the delays to 0, 10, 20, and 30 seconds. The first Supra and its loads would switch on immediately. After 10 seconds, the second Supra's loads would switch on. After 20 seconds, the third Supra's loads would switch on, and so on.

When a Supra powers up, the display shows the time remaining and counts down until the loads start.

To configure the startup timer

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Startup Timer`.
   The display should look like the following example.

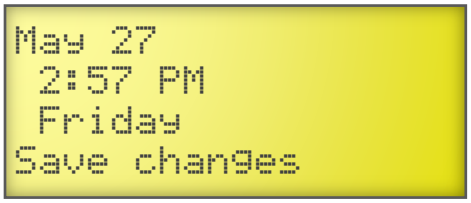
3. Scroll to the second line and then press **ENTER**.
4. Press **+** or **–** to increase or decrease the startup delay and then press **ENTER**.
5. Press **BACK** twice to return to the Main Menu.

Setting the date and time

The Supra has a real-time clock that keeps track of the date and time, regardless of power failures. However, the Supra does not automatically adjust for daylight savings time. You will have to change the clock twice a year: one hour ahead in the spring, and one hour back in the fall.

To set the date and time

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Set Clock` (3).
   The display should look like the following example.



3. Press **ENTER** to move between the month, day, and year.
4. Press **+** or **–** to change the date. To save the date, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.

- ◇ You can press the numbers on the keypad to change the day or the year.
- ◇ If the day of week is wrong, change the day number of the date; the day of week changes automatically after you save changes.

5. Scroll to the next line and then press **ENTER**.

6. Enter the correct time using the numbers on the keypad. To change from AM to PM, press the **+** or **–** key. To save the time, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
7. Scroll to the last line and then press **ENTER**.
8. Press **BACK** twice to return to the Main Menu.

Selecting the temperature units

The Supra can display temperatures in either degrees Fahrenheit (°F) or degrees Celsius (°C), but not both at the same time. The factory default is °F.

To select temperature units

1. From the Main Menu, select `Maintenance`.
2. From the Maintenance menu, select `Switch F/C` (4).
   The display shows which unit of measure the Supra is using.
3. Scroll to the second line and then press **ENTER**.
4. Press **+** or **–** to change the setting to the other unit of measure.
5. To save the setting, press **ENTER**. To cancel the change, press **BACK**.
6. Press **BACK** twice to return to the Main Menu.

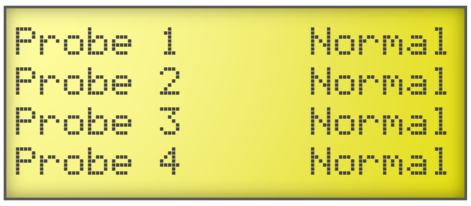
Changing the type of temperature probe

The Supra comes with a Phason 3K temperature probe – the standard for most Phason controls. If you want to connect a 1K probe, you need to tell the Supra that you have connected a different type of probe.

By default, the Supra is set to **normal** for 3K temperature probes. You need to select the type of probe **only if you are not using** a standard Phason 3K temperature probe. A 1K probe is typically used in (embedded inside) heat mats, such as, Master Mat.

To change the type of temperature probe

1. From the Main Menu, select Maintenance (2).
2. From the Maintenance menu, select Temperature Probe.
   The display should look like the following example.



3. If you are using a 1K temperature probe, scroll to the line corresponding to the zone where you installed the probe and then press **ENTER**.
4. Press **+** or **–** to change Normal to Special and then press **ENTER**.
5. Repeat steps 0 and 4 for each 1K probe you installed.
6. Press **BACK** twice to return to the Main Menu.

Replace damaged probes as soon as possible. If a probe is damaged, unless you have temperature averaging enabled, the Supra automatically selects the next active temperature probe. For more information, read **Configuring temperature averaging** below.

Configuring temperature averaging

Temperature averaging allows you to take temperature readings from up to four probes and average the values.

For example, say you have a large room controlled as a single zone. Because the room is large, you want to have temperature readings from two different ends of the room. You enable temperature averaging and then set up zone 1 to average probes 1 and 2. If probe 1 reads 72.0°F and probe 2 reads 74.0°F, the Supra uses the average of 73.0°F as the temperature for the zone.

When averaging is on, if a probe is damaged, the Supra uses the temperature from the remaining averaged probe(s) for the zone.

If all of the averaged probes for a zone are damaged (in other words, there are no probes available), the Supra switches all the heating elements off and switches all the cooling elements on 100% for that zone.

Another advantage of temperature averaging is that it prevents the Supra from using an undesirable probe if the one for a zone becomes damaged.

For example, you have four probes connected to the Supra and are using four zones. Temperature averaging is off. If probe 3 is damaged, the Supra uses the probe for zone 4 to control zone 3. If the probe for zone 4 is a heat mat probe, this can cause the ventilation equipment for that zone to operate undesirably. To prevent this, use averaging to isolate dissimilar zones.

With averaging, you could set up the Supra to average one probe for each zone as follows: zone 1 - probe 1; zone 2 - probe 2; zone 3 - probe 3; zone 4 - probe 4. In this case, if probe 3 is damaged, the Supra does not default to probe 4; instead, it switches off all the heating elements and sets all the cooling elements to 100% for that zone.

Temperature averaging and high/low temperature alarms

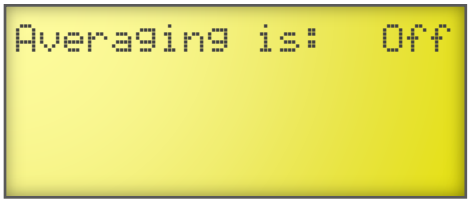
The Supra generates an alarm condition if **any** averaged probe measures a temperature that is an alarm condition.

For example, a Supra has four probes averaged and alarms enabled for each of them. The low temperature alarm setting is 65°F. Probes 1, 2, and 3 read temperatures of 68°F, but probe 4 reads 64°F. Because probe 4 reads a temperature that is below the low alarm setting, the Supra gives a low temperature alarm, even though the average temperature is 67°F, 2°F above the low alarm setting.

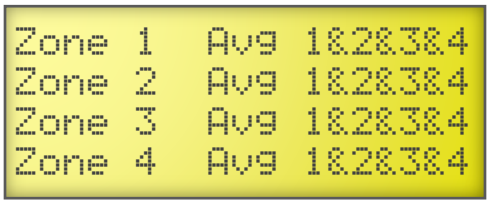
Use the **Temperature averaging worksheet** on page 125 when configuring temperature averaging.

To configure temperature averaging

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Averaging On/Off`.
   The display should look like the following example.



3. Press **ENTER**.
4. Press **+** or **–** to change the `Off` to `On` and then press **ENTER**.
5. Press **BACK** to return to the Maintenance menu.
6. From the Maintenance menu, select `Averaging Setup`.
   The display should look like the following example.



7. Scroll to a line you want to change and then press **ENTER**.

8. Press **+** or **–** to cycle through the options. Select the option you want and then press **ENTER**.
9. Repeat steps 0 and 8 for each zone.
10. Press **BACK** twice to return to the Main Menu.

Configuring the control stages

Configuring the control stages means selecting where, how, and what the variable stages and relays will be controlling.

For each variable stage or relay, you have the option to enable tunnel mode (set **tunnel turn off** to **yes**). Tunnel mode is valid only for variable stages and relays configured as cooling elements (including actuators and curtains). If you enable tunnel mode for heating elements, it has no effect.

For more information about tunnel mode, read **Programming the tunnel mode set point** on page 68.

Variable stages

The Supra has four variable stages that you can configure as one of three options.

- **Heat** – the stage controls a heating element.
- **Cool** – the stage controls a cooling element. This is the default.
- **Unassigned** – the stage is always off.

Relay stages

The Supra has 12 relay stages that you can configure as one of several options.

- **Unassigned** – the relay is always open (off). This is the default.
- **Actuator** – the relay controls a cooling element called an actuator. Actuators require one relay for opening and one for closing.
- **Heat** – the relay controls a heating element and switches on when the temperature falls below the **temperature set point**. An example of a heating element is an electric heater. Temperature-based duty cycles are also included in this configuration.
- **Cool** – the relay controls a cooling element and switches on when the temperature rises above the **temperature set point**. An example of a cooling element is a single-speed fan. Temperature-based duty cycles are also included in this configuration.
- **Curtain** – the relay controls a cooling element called a curtain machine. Curtains require one relay for opening and one for closing.
- **Duty Cycle** (time-based) – the relay controls an element that operates for specific durations (**on duration** and **off duration**) during certain hours of the day. An example of a time-based duty cycle element could be a feed auger.

- **Timed Event** – the relay controls an element that switches ON or OFF at certain hours of the day, regardless of the temperature or other conditions. An example of a timed event element could be lights.

Variable DC outputs

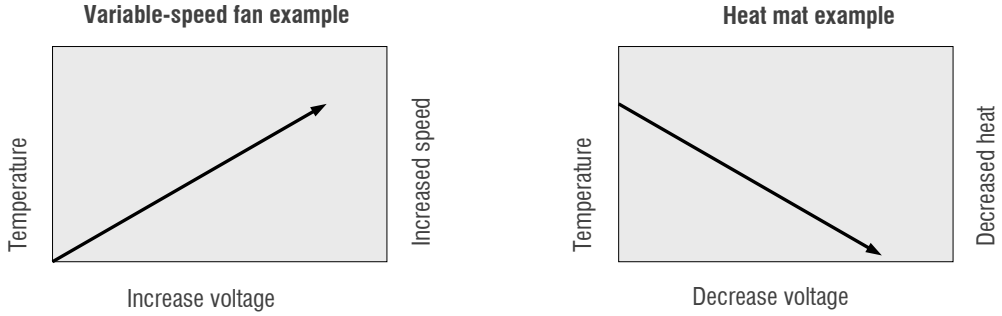
If you have a Variable DC Expansion Kit installed in the Supra, you can configure an additional four variable stages. The variable 0 to 10 VDC outputs have the same options as the normal variable stages. For more information about the expansion kit, read **Variable DC Expansion Kit** on page 10.

Expansion Boxes

If you have Variable Load Expansion Boxes connected to the Supra, you do not need to configure any additional items. When an Expansion Box is connected to variable stage 3 (**VR3**), it follows the configuration and settings for variable stage 3. When connected to variable stage 4 (**VR4**), it follows stage 4. For more information about Expansion Boxes, read **Expansion Boxes** on page 10.

Configuring variable stages

The four variable stages (**VAR1** to **VAR4**) control elements that operate with gradually increasing voltage, such as variable speed fans, or gradually decreasing voltage, such as heat mats.



Configuring variable stages means:

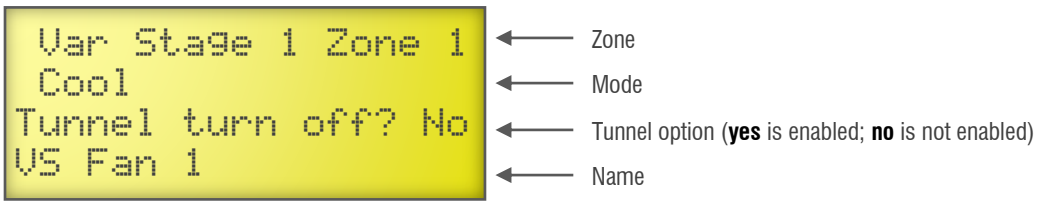
- Selecting the zone (1, 2, 3, or 4) in which the stage will be controlling the equipment
- Selecting whether the stage is a heating element (for example, a heat mat) or a cooling element (for example, a fan)
- For cooling elements only, selecting whether or not the stage reacts to tunnel mode
- Assigning a name to the stage

For information about how variable stages work, see **Programming variable stages** on page 73.

- ◇ Use the **Variable stage configuration worksheet** on page 124 when configuring variable stages.
- ◇ If you have a Variable DC Expansion Kit connected, configure the variable DC outputs in the same way you configure variable stages. The variable DC outputs display as `V1 (0-10V)`.
- ◇ For more information about the expansion kit, read **Variable DC Expansion Kit** on page 10.

To configure variable stages

1. From the Main Menu, select `Configuration` (5).
2. Scroll to the variable stage you want to configure.
   The display should look like the following example.



3. When the cursor is on the zone line, press **ENTER**.
4. Press **+** or **–** to select the zone this stage will be controlling and then press **ENTER**.
5. Scroll down to the Mode line and then press **ENTER**.
6. Press **+** or **–** to select whether the stage is a heating, cooling, or unassigned stage and then press **ENTER**.
7. Scroll to `Tunnel turn off` and then press **ENTER**.
8. Press **+** or **–** to select `Yes` (off during tunnel mode) or `No` (can be on during tunnel mode) and then press **ENTER**.
9. Scroll to the Name line and then press **ENTER**.
10. Enter the name (maximum 13 characters) for this stage. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
11. Repeat steps 2 to 10 for each variable stage you have connected to the Supra.
12. Press **BACK** to return to the Main Menu.

Configuring relays for actuators

You can connect up to two actuators to a Supra. Each actuator you connect requires two relays: one for extending the actuator arm (opening the inlet), and one for retracting the arm (closing the inlet). You can connect actuators to any of the available relays, but side-by-side relays are recommended.

Before configuring the actuator relays, you need to know the following.

- The open relay number
- The close relay number
- The feedback terminal to which the actuator is connected (FB1 for Act 1 and FB2 for Act 2)
- Whether or not the actuator closes during tunnel mode
- The zone in which the actuator is located

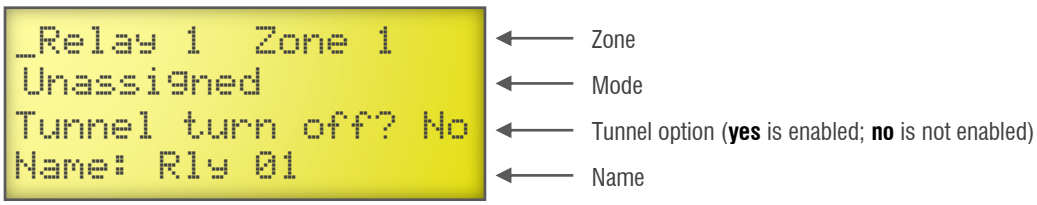
Use the **Relay configuration worksheet** on page 123 when configuring relays.

DO NOT switch on power to the actuator until you have completed the following steps. Switching on the power to the actuator before completing these steps can damage the actuator or actuator power supply and will burn out the relays.

To configure relays for actuators

- ◇ These steps use Actuator 1. If you are configuring a second actuator, follow the same steps using Actuator 2 in place of Actuator 1.
- ◇ If you are configuring the actuator to close during tunnel mode, configure both the open and close relays.

1. From the Main Menu, select Configuration (5).
2. Scroll to the relay you want to configure for opening the actuator.
   The display should look like the following example.



3. To change the zone the actuator will be controlling, place the cursor on the Zone line and then press **ENTER**. Press **+** or **–** to change the zone and then press **ENTER**.
4. Scroll to the Mode line and then press **ENTER**.
5. Press **+** or **–** until you see Actuator 1 Open (or Actuator 1 Close for the closing relay) and then press **ENTER**.
6. Scroll to Tunnel turn off and then press **ENTER**.
7. Press **+** or **–** to select Yes (actuator closes the inlet during tunnel mode) or No (actuator reacts normally during tunnel mode) and then press **ENTER**.

8. Scroll to the Name line and then press **ENTER**.
9. Enter the name (maximum 13 characters) for this relay. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
10. Repeat steps 2 to 9 using the relay you want to configure for closing the actuator.
11. Press **BACK** to return to the Main Menu.
12. Go to the section **Calibrating actuators** below.

Calibrating actuators

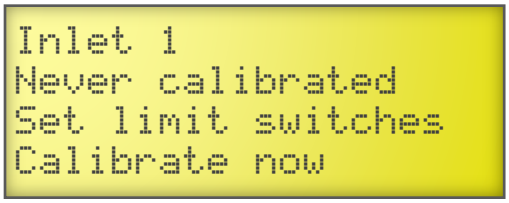
After configuring the actuator relays, you need to calibrate the actuators. Calibrating the actuator lets the Supra know the position of the actuator when it is fully extended and fully retracted. The Supra uses the limits to define the range of motion it uses to position the inlets. These limits tell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

There are two stages to calibrating actuators. Stage 1 is testing the open and close functions and setting the limit switches. Testing an actuator really means testing the inlets it is controlling. Stage 2 is calibrating the actuator. In the following steps, we assume the actuator is positioning an inlet.

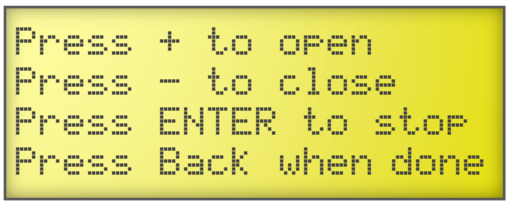
Because cables can stretch and equipment can come out of alignment (similar to tires on your car), Phason recommends resetting the limit switches and calibrating your actuators at least once each year.

Stage 1: To set the limit switches

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Calibrate Actuator` (2).
   The display should look like the following example.



3. Scroll to `Set limit switches` and then press **ENTER**.
   The display should look like the following example.

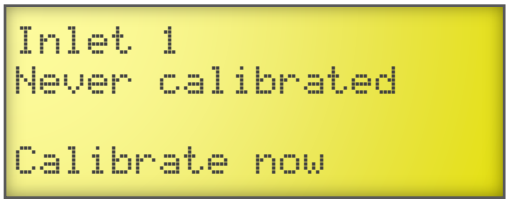


4. Press **+** to extend (open) or **–** to retract (close) the inlets.
   - If the inlets DO NOT move in the proper direction, in other words, if they open when you press **–** and close when you press **+**, the wiring for the relays is reversed. Correct the wiring before repeating the test. For more information, read **Connecting actuators** on page 22.
   - If the inlets move in the proper direction, continue the test.
5. Press **–** and then wait until the inlet reaches its fully closed position. Immediately after it reaches the fully closed position, press **ENTER**.
6. Set the limit switch for the fully closed position.
7. Press **+** and then wait until the inlet reaches its fully open position. Immediately after it reaches the fully open position, press **ENTER**.
8. Set the limit switch for the fully open position.
9. Press **–** and then wait until the inlet stops moving. If it does not stop in the proper position, repeat steps 5 and 6.
10. Press **+** and then wait until the inlet stops moving. If it does not stop in the proper position, repeat steps 7 and 8.
11. After the limit switches are set and the actuator operates properly, go to **Stage 2: To calibrate actuators**.

Stage 2: To calibrate actuators

> **NOTE** Calibrating actuators takes several minutes. You can stop the calibration process at any time, but if you do, the Supra will not be able to properly control the inlets.

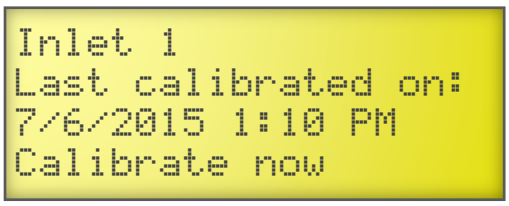
1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Calibrate Actuator` (2).
   The display should look like the following example.



3. Scroll to `Calibrate now` and then press **ENTER**.
   If the actuator is operating properly, the inlet moves to its fully open position (100%), stops, and then moves to its fully closed position (0%).

> **TIP**
> - ◇ If the actuator stops after moving in the close direction, or if it fails to position the inlet properly, the Supra is not receiving a proper feedback signal. This can be incorrect wiring or a defective potentiometer. Correct this problem and then restart the calibration at step 1. For more information read, your actuator's installation guide and **Connecting actuators** on page 22.
> - ◇ If the calibration fails (for example, if the actuator jammed), the display shows the reason for the failure. The date and time the actuator was last calibrated does not change. Check the alarm messages and then look up the problem in **Appendix B: Troubleshooting** on page 115. Check the actuator itself. Fix any mechanical or electrical problems.

4. After the actuator has calibrated properly, press **BACK** to return to the list of actuators.
   The display shows the date and time on which the actuator was calibrated.



5. If you have a second actuator to calibrate, press **Down** until the second actuator is displayed and then repeat steps 0 and 4.
6. Press **BACK** twice to return to the Main Menu.

Configuring relays for heating, cooling, or temperature-based duty cycles

Relays configured for heating can control equipment such as electric or gas heaters that can be either ON or OFF. The relays switch on when the temperature drops below the **set point** and off when it rises above.

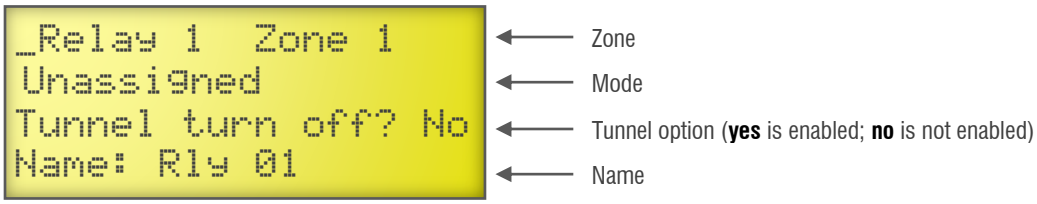
Relays configured for cooling can control single-speed fans, misters, or other cooling equipment that can be either ON or OFF. The relays switch on when the temperature rises above the **set point** and off when it drops below.

This section is for relays. For information about variable-powered heating and cooling elements, see **Configuring variable stages** on page 45.

- If you need to connect more cooling elements than you have relays, and you are not using all the variable stages, you can use any available variable stages as ON/OFF stages. For more information, read **Programming variable stages** on page 73.
- Use the **Relay configuration worksheet** on page 123 when configuring relays.

To configure relays for heating, cooling, or temperature-based duty cycles

1. From the Main Menu, select Configuration (5).
2. Scroll to the relay you want to configure.
   The display should look like the following example.



3. To change the zone the element will be controlling, place the cursor on the Zone line and then press **ENTER**. Press **+** or **–** to change the zone and then press **ENTER**.
4. Scroll to the Mode line and then press **ENTER**.
5. To configure the relay for controlling a heating element, press **+** or **–** until you see Heat and then press **ENTER**. To configure the relay for controlling a cooling element, press **+** or **–** until you see Cool and then press **ENTER**.
6. Scroll to Tunnel turn off and then press **ENTER**.
7. Press **+** or **–** to select Yes (off during tunnel mode) or No (can be on during tunnel mode) and then press **ENTER**.

8. Scroll to the Name line and then press **ENTER**.
9. Enter the name (maximum 13 characters) for this relay. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
10. Repeat steps 2 to 9 for each heating or cooling element you have connected to the Supra.
11. Press **BACK** to return to the Main Menu.

Configuring relays for curtains

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 is more air cools the building.

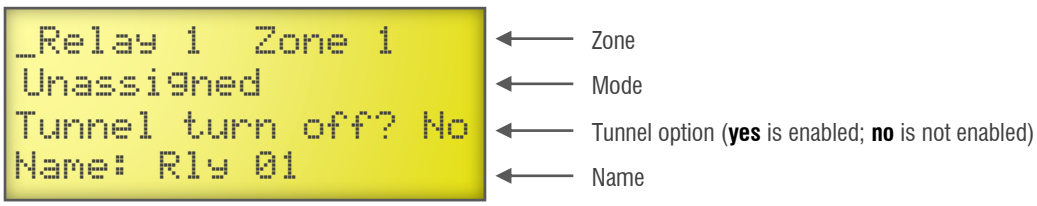
You can connect up to six curtain machines to the Supra. Each curtain machine you connect requires two relays: one for opening the curtain, and one for closing the curtain. You can connect curtain machines to any of the available relays, but side-by-side relays are recommended.

Use the **Relay configuration worksheet** on page 123 when configuring relays.

To configure relays for curtains

- ◇ These steps use Curtain 1. If you are configuring additional curtains, follow the same steps, but use the appropriate number in place of Curtain 1.
- ◇ If you are configuring the curtain to close during tunnel mode, configure both the open and close relays.

1. From the Main Menu, select Configuration (5).
2. Scroll to the relay you want to configure for opening the curtain.
   The display should look like the following example.



3. To change the zone the curtain will be controlling, place the cursor on the Zone line and then press **ENTER**. Press **+** or **–** to change the zone and then press **ENTER**.
4. Scroll to the Mode line and then press **ENTER**.

5. Press **+** or **–** until you see `Curtain 1 Open` (or `Curtain 1 Close` for the closing relay) and then press **ENTER**.
6. Scroll to `Tunnel turn off` and then press **ENTER**.
7. Press **+** or **–** to select `Yes` (curtain closes the inlet during tunnel mode) or `No` (curtain reacts normally during tunnel mode) and then press **ENTER**.
8. Scroll to the Name line and then press **ENTER**.
9. Enter the name (maximum 13 characters) for this relay. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
10. Repeat steps 2 to 9 using the relay you want to configure for closing the curtain.
11. Press **BACK** to return to the Main Menu.

Configuring relays for time-based duty cycles

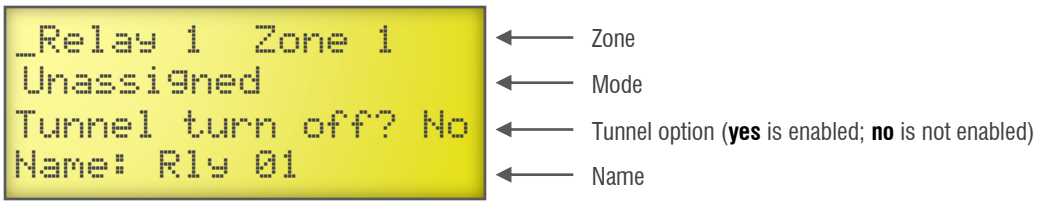
Time-based duty cycles allow you have equipment operate for specific durations (ON duration and OFF duration) during certain hours of the day. For example, you can have a feed auger run for 15 minute and then stop for 45 minutes between the 6:00 AM and 8:00 PM. In other words, "Between 6:00 AM and 8:00 PM, I want the feed auger ON for 15 minutes, OFF for 45 minutes, ON for 15 minutes…" and so on.

- ◇ This section explains how to configure time-based duty cycles.
- ◇ If you want to configure temperature-based duty cycles (duty cycles that operate for specific durations while the temperature is above or below a certain value), read **Configuring relays for heating, cooling, or temperature-based duty cycles** on page 51.
- ◇ If you want to configure elements that turn on and off at specific times, see **Configuring relays for timed events** on page 54.

Use the **Relay configuration worksheet** on page 123 when configuring relays.

To configure relays for time-based duty cycles

1. From the Main Menu, select `Configuration` (5).
2. Scroll to the relay you want to configure.
   The display should look like the following example.



3. To change the zone the element will be controlling, place the cursor on the Zone line and then press **ENTER**. Press **+** or **–** to change the zone and then press **ENTER**.
4. Scroll to the Mode line and then press **ENTER**.
5. Press **+** or **–** until you see Duty Cycle and then press **ENTER**.
6. Scroll to Tunnel turn off and then press **ENTER**.
7. Press **+** or **–** to select Yes (off during tunnel mode) or No (can be on during tunnel mode) and then press **ENTER**.
8. Scroll to the Name line and then press **ENTER**.
9. Enter the name (maximum 13 characters) for this relay. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
10. Repeat steps 2 to 9 for each time-based duty cycle element you have connected to the Supra.
11. Press **BACK** to return to the Main Menu.

Configuring relays for timed events

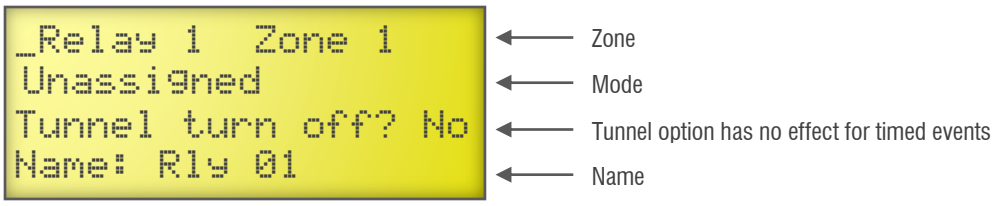
Relays configured for timed events can be used to control feed augers, turn lights on and off, or control equipment that must operate at specific times each day, regardless of temperature. An example of a timed event would be would be switching the yard lights on at 8:00 PM and off at 7:00 AM.

Tunnel mode has no effect for timed events.

Use the **Relay configuration worksheet** on page 123 when configuring relays.

To configure timed event relays

1. From the Main Menu, select Configuration (5).
2. Scroll to the relay you want to configure.
   The display should look like the following example.



3. To change the zone the element will be controlling, place the cursor on the Zone line and then press **ENTER**. Press **+** or **–** to change the zone and then press **ENTER**.
4. Scroll to the Mode line and then press **ENTER**.
5. Press **+** or **–** until you see `Timed Event` and then press **ENTER**.
6. Scroll to the Name line and then press **ENTER**.
7. Enter the name (maximum 13 characters) for this relay. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
8. Repeat steps 2 to 9 for each timed event element you have connected to the Supra.
9. Press **BACK** to return to the Main Menu.

Testing the configuration

After configuring all the control elements (variable stages relays, and so on), test the Supra to make sure the configuration is correct. In other words, make sure what you think is connected to a particular relay or stage **is** actually connected to that relay or stage.

You can test the configuration by using the diagnostic feature of the Supra. The diagnostic feature allows you to operate the equipment, regardless of temperature or time. As you operate each piece of equipment, visually check to see if that equipment is doing what you tell it.

For example, when you switch on variable stage 1 at the Supra, does the fan or heater you think have connected to that stage switch on? When you switch it off, does the fan or heater switch off?

For more information about the diagnostic test, read **Performing diagnostic tests** on page 103.

go to page 103

Configuring optional features

In addition to configuring the main control functions (startup timer, temperature units, and so on) and control stages (variable stages and relays), the Supra has some added features you can configure or enable. Depending on your setup, you will need to configure some or all of the optional features.

- Configuring hysteresis (below)
- Configuring de-icing (on page 57)
- Selecting a humidity zone (on page 58)
- Configuring the pulse counter (on page 59)
- Selecting motor curves (on page 60)
- Configuring warnings (on page 60)

Configuring hysteresis

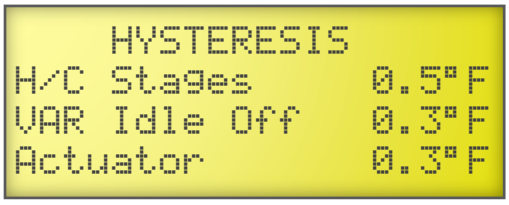
Hysteresis helps prevent damage to the relays, variable stages, and equipment connected to them by preventing the stages from switching on and off rapidly when the temperature is hovering close to the **set point**.

For example, a household thermostat might turn on a furnace at 68 °F when the house is cooling down, but turn it off at 72 °F when the house is warming up. The difference between these two values is the hysteresis.

Use the **Hysteresis worksheet** on page 127 when configuring hysteresis. The worksheet contains more-detailed explanations about the settings, as well as the defaults and ranges.

To set hysteresis values

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Hysteresis` (7).
   The display should look like the following example.



3. Scroll to the second line and then press **ENTER**.

4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the hysteresis and then press **ENTER**.

> NOTE The Supra interprets the last digit as a decimal. For example, to enter 0.5°F, press 05.

5. Scroll to the next line.
6. Repeat steps 4 and 5 for each setting.

> NOTE Actuators have three hysteresis values: one for temperature, one for position, and one for duration. For more information, read the **Hysteresis worksheet** on page 127.

7. Press **BACK** twice to return to the Main Menu.

Configuring de-icing

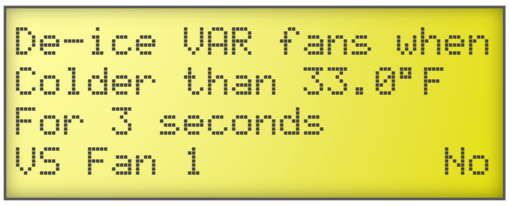
The Supra's de-icing feature helps keep variable-speed fans from icing up if the outdoor temperature is too cold. When de-icing is enabled, variable-speed fans start at full speed before dropping to the idle or normal speed. Configuring de-icing means setting the temperature at which de-icing starts, setting the duration it lasts, and selecting which variable speed fans to de-ice.

For example, if you set the de-icing temperature to 32°F and the duration to 3 seconds, when the fan starts up, it automatically runs at full speed for three seconds before dropping down to its normal speed (whatever the normal speed should be for the current temperature in that zone).

> NOTE
> - ◇ For de-icing to work properly, you must have a temperature probe connected to the **OUT TEMP** terminal. For more information, read **Connecting temperature probes** on page 29.
> - ◇ If de-icing is enabled and there is no outdoor probe (or it is damaged), the Supra operates as if the outdoor temperature is below the de-icing temperature.

To configure de-icing

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `De-Icing` (8).
   The display should look like the following example.



3. Scroll to the second line and then press **ENTER**.
4. Enter the de-icing temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> **NOTE** The Supra interprets the last digit as a decimal. For example, to enter 35.0°F, press 350.

5. Scroll to the third line and then press **ENTER**.
6. Enter the de-icing duration (in seconds) or press **+** or **–** to adjust the value and then press **ENTER**.
7. Scroll to the next line.
8. To enable or disable de-icing for this variable stage, press **ENTER** and then press **+** or **–** to switch between `Yes` (enable) and `No` (disable) for this variable stage.
9. Press **ENTER**.
10. Repeat steps 7 and 9 for each variable stage.
11. Press **BACK** twice to return to the Main Menu.

Selecting a humidity zone

If you installed a Relative Humidity Sensor, you need to select which zone the sensor will be monitoring. A humidity sensor can monitor only one zone. For more information, read **Relative Humidity Sensors** on page 11.

> **TIP** Use the **Humidity zone worksheet** on page 125 when configuring humidity.

To select a humidity zone

1. From the Main Menu, select `Configuration` (5).
2. Press **Up** until you see `Hum Zone Assignment`.
   The display should look like the following example.

3. Scroll to Unassigned and then press **ENTER**.
4. Press **+** or **–** to select the zone the sensor will be monitoring and then press **ENTER**.
5. Press **BACK** to return to the Main Menu.

Configuring the pulse counter

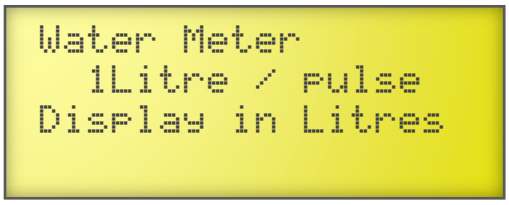
If you have a water meter connected to the Supra's pulse counter terminal and will be monitoring water usage, you need to tell the Supra how much water (in litres or US gallons) goes through the meter for each pulse the meter puts out. The Supra uses this information to convert the pulses to water usage values.

For example, let's say your water meter puts out 1 pulse for every 10 gallons of water that goes through it. If the Supra received 125 pulses from the meter during the day, you used 1250 gallons of water.

Use the **Pulse counter worksheet** on page 126 when configuring a pulse counter.

To configure a pulse counter

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Water Meter.
   The display should look like the following example.



3. Scroll to the second line and then press **ENTER**.
4. Enter the number of units (litres or gallons) for each pulse, or press **+** or **–** to adjust the number and then press **ENTER**.
5. Press **+** or **–** to select litre or gallon / pulse and then press **ENTER**.
6. Scroll to the third line and then press **ENTER**.

7. Press **+** or **–** to select whether to display water usage in litres or gallons and then press **ENTER**.
8. Press **BACK** twice to return to the Main Menu.

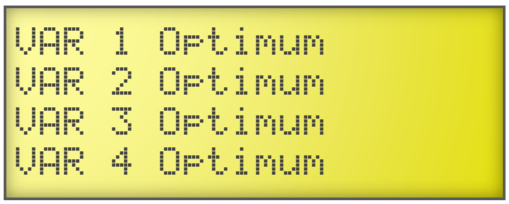
Selecting motor curves

The **Phason Optimum** curve should work properly for all fan models. However, if you have one of the fans listed in **Appendix G: Supra motor curves** on page 144, you can select a different motor curve. Phason recommends using the Optimum curve.

Motor curves have no effect on variable **heating** stages.

To change the motor curve

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Motor Curves`.
   The display should look like the following example.



3. Scroll to a curve you want to change and then press **ENTER**.
4. Press **+** or **–** to cycle through the list of curves. Select the curve you want and then press **ENTER**.
5. Repeat steps 3 and 4 for each motor curve you want to change.
6. Press **BACK** twice to return to the Main Menu.

Configuring warnings

Warnings are one of the Supra's built-in diagnostic tools. They warn you about conflicts or out-of-range conditions as you are programming the control. When the Supra comes from the factory, all warnings are active. You can select which warnings you want active and which ones you want inactive.

Use the **Warnings worksheet** on page 128 when configuring warnings. The worksheet has descriptions for each warning.

To configure warnings

1. From the Main Menu, select Maintenance (2).
2. From the Maintenance menu, select Warnings (9).
   The display should look like the following example.

3. Scroll to a line you want to change and then press **ENTER**.
4. Press **+** or **–** to activate (Yes) or deactivate (No) and then press **ENTER**.
5. Repeat steps 3 and 4 for each warning you want to change.
6. Press **BACK** twice to return to the Main Menu.

Chapter 4: Programming

What you need to know before programming the Supra

The difference between "programming" and "configuration" is that configuration is information that you set once, or change very rarely; programming is information you change more often.

Programming the Supra means telling the control what you want it to do and when you want it done. For example, for a single-speed fan set for cooling, you might say: "Switch on when the temperature rises above 80°F."

Before you begin programming the Supra, make sure:

- It has power
- All equipment has been properly connected to the correct terminals.
- You know which equipment is connected to which relays and variable stages
- All variable and relay stages have been properly configured and tested. For more information, read **Chapter 3:** on page 35.

- ◇ Use the **Settings worksheets** in **Appendix F** on page 129 when programming the Supra.
- ◇ If you receive a warning during configuration, look it up in the **Warnings worksheet** on page 128 and then follow the instructions for correcting the problem.

- ◇ All instructions start from the Main Menu. To display the Main Menu from the status screen, press **ENTER**.
- ◇ If there is an alarm condition, you will see the alarm screen instead of the status screen. You must acknowledge any alarms before you can proceed. For more information, read **Acknowledging alarms** on page 98.The Supra checks settings against a set of factory-defined rules. If any settings might cause a problem, the Supra displays a warning. The warning does not appear again until that setting is accessed. A list of warnings and their meanings is in **Appendix B: Troubleshooting** on page 115 .

Programming checklist

Because some settings must be programmed before others, Phason recommends programming the Supra in the following order. If you do not have elements of a particular type, skip that step. For example, if you do not have curtains, skip to the next step.

Programming the zones

- ☐ Setting the group set point
- ☐ Programming growth curves
- ☐ Programming the tunnel mode set point
- ☐ Programming the temperature setback
- ☐ Programming the humidity control

Programming the stages

- ☐ Programming variable stages
- ☐ Programming actuator relays
- ☐ Programming curtain control relays
- ☐ Programming heating and cooling elements and temperature-based duty cycles
- ☐ Programming timed events
- ☐ Programming time-based duty cycles

Programming the alarm and display settings

- ☐ Programming alarm settings
- ☐ Setting up the status display

Setting up security and users

- ☐ Adding and removing users
- ☐ Enabling and disabling security

Programming the zones

Programming the zones means entering the target temperatures for each zone. There are two options for the zone temperatures:

- Group set points (below)
- Growth curves (on page 65)

You can set up both group set points and growth curves. If a growth curve is enabled for a zone, the control uses the growth curve settings. If there is no growth curve for a zone, the control uses the group set points.

Other options

In addition to the group set points and growth curves, you can program three optional features:

- Tunnel mode set point (en page 68)
- Temperature setback (on page 69)
- Humidity control limits (on page 71)

Setting the group set point

A **group set point** is the desired or target temperature for a zone. The **individual set points** for each variable and relay stage will be adjusted relative to the **group set point** for that zone. **Make sure you set the group set point before setting the individual set points.**

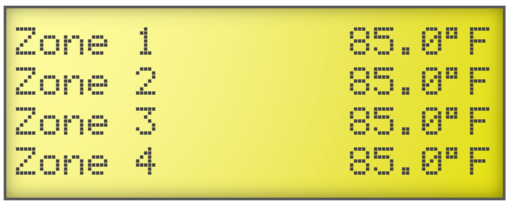
For example, say the **group set point** for zone 1 is 80°F, a variable-stage fan **set point** is 5 degrees higher (85°F), and a single-stage heater **set point** is 7 degrees lower (73°F). If you lower the **group set point** to by 5 degrees to 75°F, the **set points** for the fan and heater will also be lowered by 5 degrees to 80°F and 68°F respectively.

Once a group set point is set, it remains at that temperature until you change it, or until an enabled growth curve adjusts it.

Use the **Group set point worksheet** on page 129 when setting up groups set points.

To program a group set point

1. From the Main Menu, select `Settings` (1).
2. From the Settings menu, select `Group Setpoint` (1).
   The display should look like the following example.



3. Scroll to a zone you want to change and then press **ENTER**.
4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the *set point* and then press **ENTER**.

> NOTE The Supra interprets the last digit as a decimal. For example, to enter 80.5°F, press 805.

5. Repeat steps 0 and 4 for each zone you want to set up.
6. Press **BACK** twice to return to the Main Menu.

Programming growth curves

A growth curve is an extension of the group set point concept. The growth curve automatically adjusts the temperature set points over time to control the temperature in a room or zone. It is called a *growth curve* because it adjusts the set points as the animals grow.

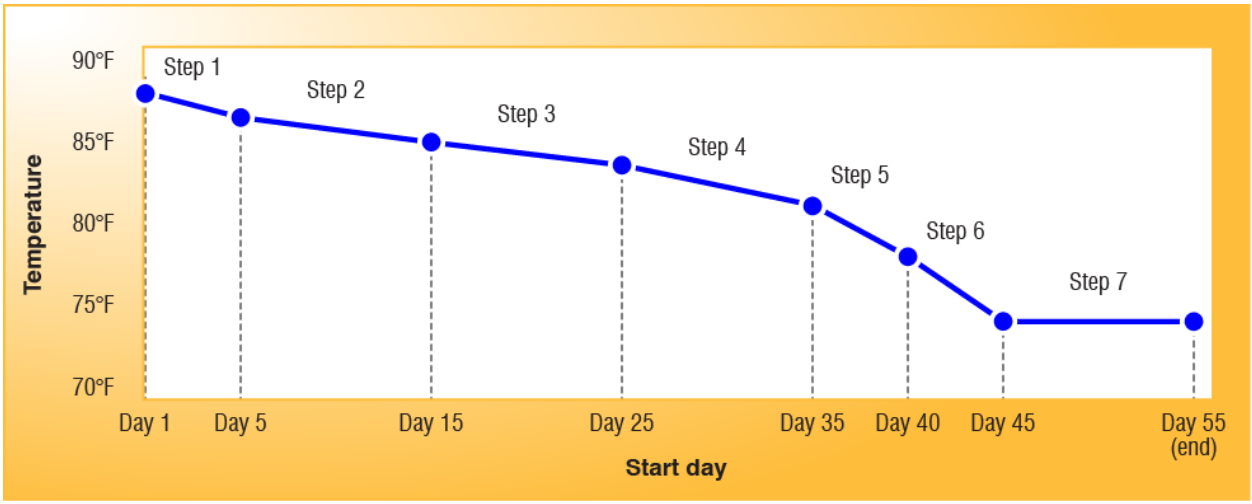
For example, in hog production, newborn piglets require a high temperature for comfort and health. As they grow older, they need a steadily lower temperature. Using the growth curve, you can have the Supra automatically adjust the temperatures. For example, start at 76°F for 1 day, drop to 74°F for 1 day, then to 71°F for 21 days, 68°F for 14 days, and so on.

You can have up to seven steps in a growth curve. Each step has a **start day** and **temperature set point**. The Supra automatically calculates the **temperature set points** for the days between the steps and adjusts the set points at midnight each day. **Individual set points** for the variable and fixed stages are adjusted relative to the growth curve temperature for that particular day. This is an extremely powerful feature because it lets you put fan and heating strategies in place once, and then adjust them automatically over time.

In the following example, step 2 has a duration of 10 days. The difference between the starting set point (86.5°F) and the starting set point for the next step (85°F) is 1.5°F.

The Supra divides the temperature difference by the duration 1.5 ÷ 10=0.15 and then automatically adjusts the set point by 0.15°F each day for 10 days.

Set point	Temperature (°F)	Start day	Duration (days)
1	88.0	1	5
2	86.5	5	10
3	85.0	15	10
4	83.5	25	10
5	81.0	35	5
6	78.0	40	5
7	74.0	45	10



You can define two growth curves: Growth Curve A and Growth Curve B. This lets you control two different areas of your facility with independent set points.

You cannot define two growth curves for the same zone. If all zones are controlled by a single growth curve, use Growth Curve A.

Growth curve status

There are several options for the growth curve status:

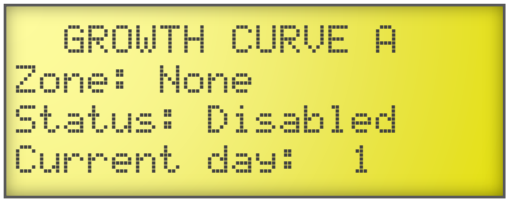
- **Disabled** – the growth curve is ignored. When enabled, the growth curve starts at day 1.
- **Enabled** – the growth curve is active for the zones specified.
- **Suspended** – all set points stay at their current values. The growth curve remains on its current day until it is enabled again. When enabled, it starts where it left off.
- **Override** – the growth curve advances one day at a time (in other words, the clock still advances), but the control uses the **group set point** instead of the growth curve.

  When enabled, the control uses the **growth curve set point** for that day. This can cause a sudden change in temperature if the **group set point** is very different from the **growth curve set point**.

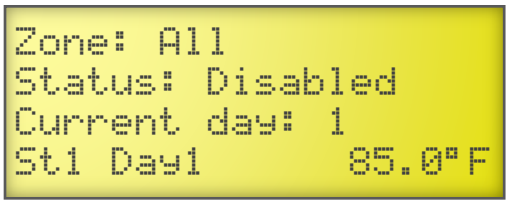
- If you are programming your growth curve a few days before you want it to start, set the status to Disabled. On the day you want to start the growth curve, change the status to Enabled.
- Use the **Growth curve worksheet** on page 130 when setting up growth curves. The worksheet contains detailed explanations about the settings and the defaults and ranges for each setting.

To program growth curves

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Growth Curve (4).
   The display should look like the following example; this is growth curve A. If you want to define growth curve B, scroll down until you see GROWTH CURVE B on the top line.



3. Scroll to Zone and then press **ENTER**.
4. Press **+** or **–** to select the zone or zones for this growth curve and then press **ENTER**.
5. Scroll to Status and then press **ENTER**.
6. Press **+** or **–** to select the status for this growth curve and then press **ENTER**.
7. Scroll to Current day and then press **ENTER**.
8. Enter 1 as the day and then press **ENTER**.
9. Scroll to the next line and then press **ENTER**.
   You start to see the **temperature set points** for each stage.



10. Scroll to St1 and then press **ENTER**.
11. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the **set point** and then press **ENTER**.

The Supra interprets the last digit as a decimal. For example, to enter 80.5°F, press 805.

12. Scroll to St2 and then press **ENTER**.

13. Enter the start day for the growth curve step using the numbers on the keypad, or press **+** or **–** to adjust the day and then press **ENTER**.
14. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the **set point** and then press **ENTER**.
15. Repeat steps 12 to 14 for each remaining step.
16. Press **BACK** twice to return to the Main Menu.

Programming the tunnel mode set point

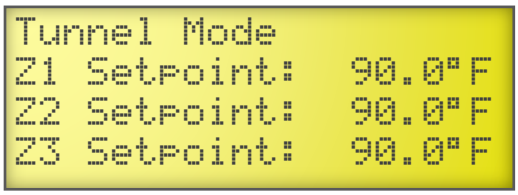
When the zone temperature is at or above the **tunnel mode set point**, variable stages and relays that are configured for tunnel mode react as follows.

- **Actuators** – move to position zero (close the inlet)
- **Curtains** – close the curtain
- **Cool relays** and **temperature-based duty cycles** – switch off the relay
- **Variable stages** – set the speed to 0%

The **tunnel mode set point** is the same for all zones. For more information about enabling tunnel mode for variable stages and relays, read **Configuring the control stages** starting on page 44.

To program the tunnel mode set point

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Tunnel Mode.
   The display should look like the following example.



3. Scroll to Setpoint and then press **ENTER**.
4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the **set point** and then press **ENTER**.

> NOTE
> The Supra interprets the last digit as a decimal. For example, to enter 80.5°F, press 805.

5. Press **BACK** twice to return to the Main Menu.

Programming the temperature setback

Temperature setback allows you to automatically change the **temperature set point** for a specific period during the day. The **temperature setback** can be from 1.0 to 25°F (0.6 to 13.9°C). When the setback is enabled, during the selected hours of the day, the Supra subtracts the **temperature setback** amount from the **set point**. At the end of the setback period, the Supra returns to the normal (group or growth curve) set point.

Temperature setback works for both group set points and growth curves. There are two separate setback groups: A and B. Having two setback groups allows you to have different setbacks for different zones or times of the day.

Using setback for day/night temperature control in greenhouses

Different method (DIF) is a means of maintaining different day/night temperatures in greenhouses. DIF helps control plant height and growth.

DIF is calculated by subtracting the nighttime temperature from the daytime temperature. Higher day temperatures give a positive DIF and promote growth. Lower daytime temperatures give a negative DIF and slow down growth. Negative DIF helps control plant height.

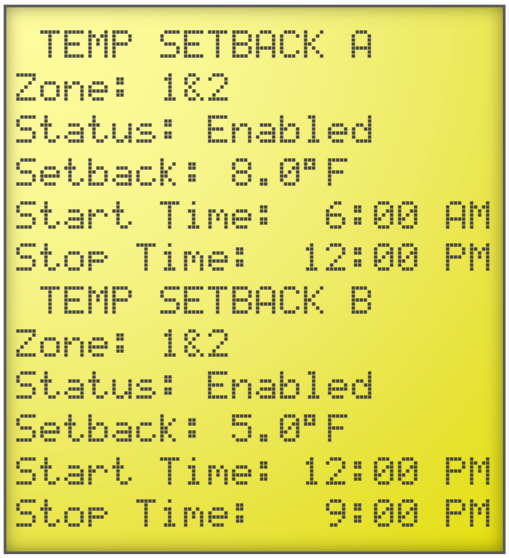
Using temperature setback, you can maintain a lower temperature set point during the critical dawn hours, and then return to the normal (group or growth curve) set point later in the day.

Example 1

Example 1 shows how you can use the two setback groups (**A** and **B**) to have two different setback values for different times in the same zones.

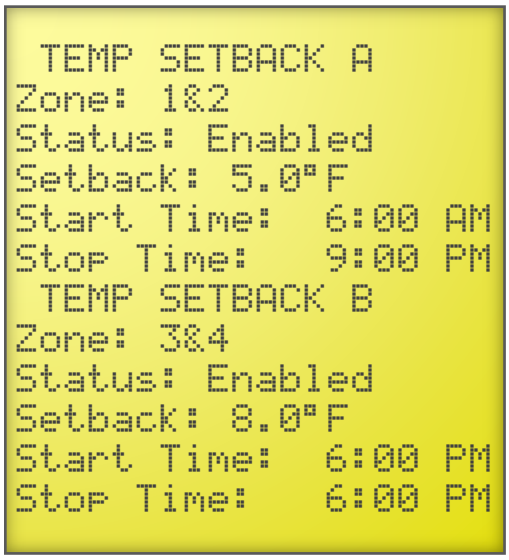
The setback for zones 1 and 2 is 8.0°F between 6:00 AM and 12:00 PM, and 5.0°F between 12:00 PM and 9:00 PM. If the **group set point** for zones 1 and 2 is 78.0°F:

- From 6:00 AM to 12:00 PM, the **adjusted set point** will be 70.0°F.
- From 12:00 PM to 9:00 PM, the **adjusted set point** will be 73.0°F.
- After 9:00 PM and before 6:00 AM, the **set point** would be the normal 78.0°F.



Example 2

Example 2 shows how you can use the two setback groups (**A** and **B**) to have two different setback values for different zones.



The setback for zones 1 and 2 is 5.0°F between 6:00 AM and 9:00 PM. If the **group set point** for zones 1 and 2 is 78.0°F:

- From 6:00 AM to 9:00 PM, the **adjusted set point** for zones 1 and 2 will be 73.0°F.
- After 9:00 PM and before 6:00 AM, the **set point** would be the normal 78.0°F.

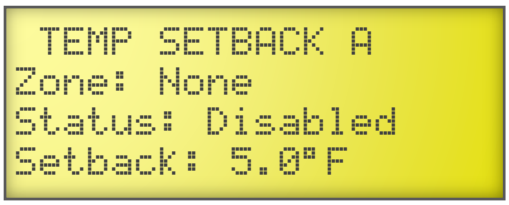
The setback for zones 3 and 4 is 8.0°F between 6:00 AM and 6:00 PM. If the **group set point** for zones 3 and 4 is 80.0°F:

- From 6:00 AM to 6:00 PM, the **adjusted set point** for zones 3 and 4 will be 72.0°F.
- After 6:00 PM and before 6:00 AM, the **set point** would be the normal 80.0°F.

Use the **Temperature setback worksheet** on page 131 when programming temperature setback.

To program the temperature setback

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Temp Setback.
   The display should look like the following example; this is setback A. If you want to define setback B, scroll down until you see TEMP SETBACK B on the top line.



3. Scroll to Zone and then press **ENTER**.
4. Press **+** or **–** to select the zone(s) affected by the setback and then press **ENTER**.
5. Scroll to Status and then press **ENTER**.
6. Press **+** or **–** to toggle between Disabled and Enable and then press **ENTER**.
7. Scroll to Setback and then press **ENTER**.

8. Enter the setback using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
9. Scroll to Start Time and then press **ENTER**.
10. Enter the start time using the numbers on the keypad. Press **+** or **–** to select AM or PM and then press **ENTER**.
11. Scroll to Stop Time and then press **ENTER**.
12. Enter the stop time using the numbers on the keypad. Press **+** or **–** to select AM or PM and then press **ENTER**.
13. Press **BACK** twice to return to the Main Menu.

Programming the humidity control

If you have installed and configured a humidity sensor, you need to program the humidity compensation. Programming the humidity compensation means setting the **humidity factor** and the upper and lower **humidity limits**. The Supra uses these settings to compensate for high humidity levels and it adjusts the ventilation accordingly.

The **humidity band** is the humidity range in which the Supra attempts to compensate for humidity. The band is defined by the **upper limit** and **lower limit**.

The **humidity factor** is a number between 0 and 10 that determines the amount of humidity compensation. A lower value produces a slight ventilation adjustment, while a higher value produces a greater adjustment.

How humidity compensation works

The Supra uses the **humidity band** and **humidity factor** to adjust the ventilation for the zone. At the beginning of the band (the **lower limit**), very little adjustment is made. As the humidity rises, the adjustment increases. At or above the **upper limit** of the band, the maximum adjustment is applied.

For example, if the maximum acceptable humidity for your zone is 70%, set the **lower limit** to 70%. The **upper limit** could be set for 90% (90% is the maximum allowed and 20% is the minimum difference between the limits). When the humidity is below 70%, the ventilation rate is controlled by the zone's normal, programmed settings. As the humidity rises above 70%, humidity compensation starts to take effect and the ventilation rate increases. When the humidity reaches 90%, the humidity compensation reaches its maximum adjusted rate.

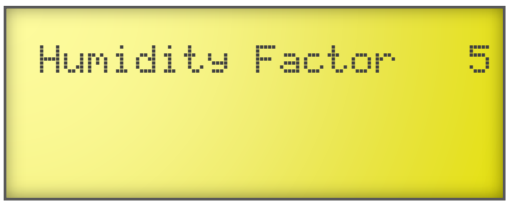
If the outside air is cooler than the zone temperature, the ambient temperature in the zone drops due to the increased ventilation. This causes the heaters to switch on, which help to dry the air. It is important to balance this effect with your heating system's ability to maintain the temperature while drying out the room. A lower humidity factor starting at a lower humidity level, and spread over a wider band, is better for lower-capacity heating systems.

Before programming the humidity compensation, you must assign the humidity sensor to a zone. For more information, read **Selecting a humidity zone** on page 58.

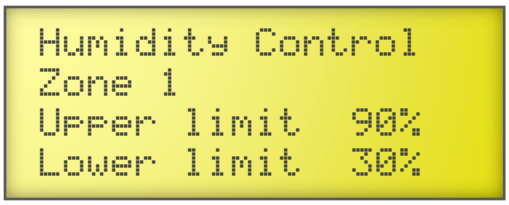
Use the **Humidity compensation settings worksheet** on page 132 when programming the humidity compensation. The worksheet includes a table of values to use as a guideline when programming.

To program the humidity compensation

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Humidity Factor`.
   The display should look like the following example.



3. Press **ENTER**.
4. Enter the humidity factor using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
5. Press **BACK** twice to return to the Main Menu.
6. From the Main Menu, select `Settings` (1).
7. From the Settings menu, select `Humidity Control`.
   The display should look like the following example.



8. Scroll to `Upper limit` and then press **ENTER**.
9. Enter the upper limit using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
10. Scroll to `Lower limit` and then press **ENTER**.
11. Enter the lower limit using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
12. Press **BACK** twice to return to the Main Menu.

Programming the stages

Programming the stages means entering the settings such as temperature set points, idle speeds, and more. Programming the stages includes the following topics.

- Programming variable stages (below
- Programming actuator relays (on page 76)
- Programming curtain control relays (on page 79)
- Programming heating and cooling elements and temperature-based duty cycles (on page 81)
- Programming timed events (on page 84)
- Programming time-based duty cycles (on page 86)

Programming variable stages

Programming up the variable stages means setting the temperature set points, idle speeds, and so on. There are four settings for each variable stage.

For a cooling stage:

- On full at (sometimes called differential)
- Idle at (sometimes called set point)
- Off at (sometimes called idle range)
- Idle speed

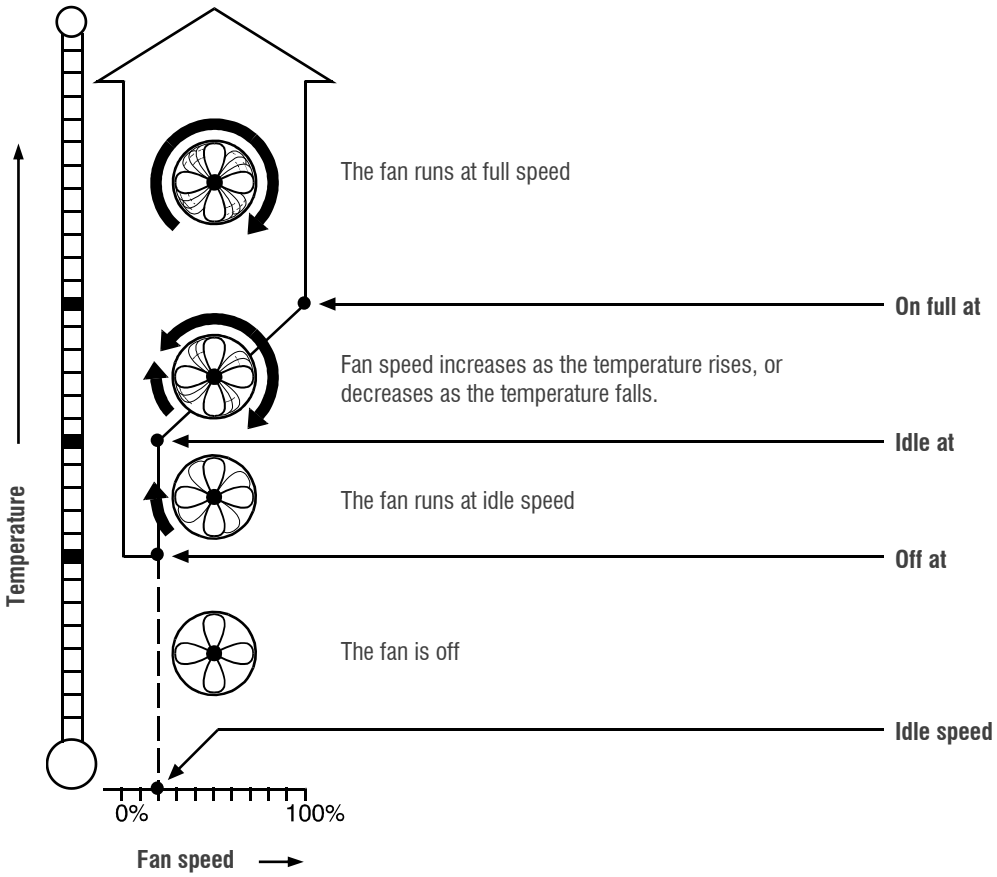
For a heating stage:

- Off at
- Set point
- On full at (sometimes called differential)
- Min heat

Before setting up the variable stages, make sure you have properly configured them. For more information, read **Configuring variable stages** on page 45.

How variable cooling stages work

- When the temperature is below the **off at** temperature, the fan is off.
- When the temperature rises above the **off at** temperature, the fan runs at the **idle speed**. The fan continues to run at the **idle speed** until the temperature rises to the **idle at** temperature.
- When the temperature is between the **idle at** and **on full at** temperatures, fan speed increases or decreases proportionally with temperature.
- When the temperature is above the **on full at** temperature, the fan runs at full speed.

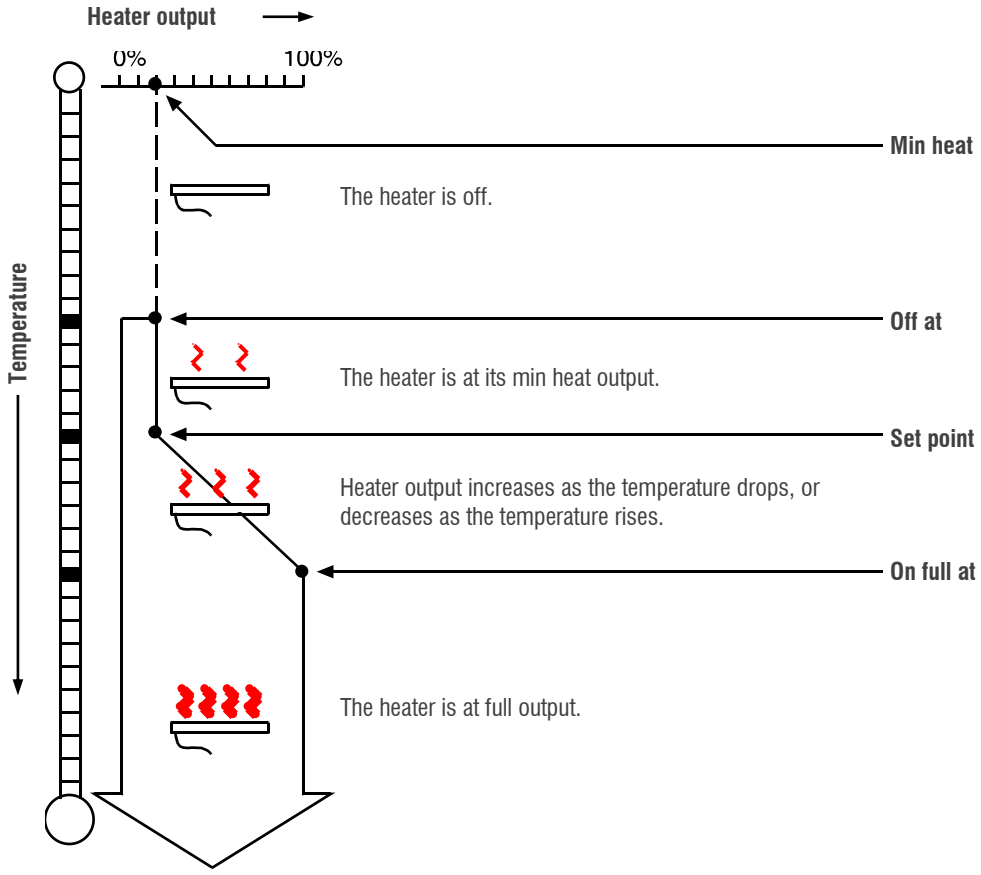


If you need to connect more cooling elements than you have relays, and you are not using all the variable stages, you can use any available variable stage as an ON/OFF stage.

◇ Set the idle speed to 100% and **off at** to the temperature at which you want the stage to switch on/off.
You no longer have "variable" speed or power; you have either "full on" or "full off", the same as a regular cooling element. The **idle at** and **on full at** settings have no effect when you use a variable stage this way.

How variable heating stages work

- When the temperature is above the **off at** temperature, the heater is off.
- When the temperature drops below the **off at** temperature, the heater is at the **min heat** output. The heater continues to operate at the **min heat** until the temperature drops to the **set point**.
- When the temperature is between the **set point** and the **on full at** temperatures, the heater output increases or decreases proportionally with the temperature.
- When the temperature is below the **on full at**, the heater is at full output.



If you need to connect more heating elements than you have relays, and you are not using all the variable stages, you can use any available variable stage as an ON/OFF stage.

- ◇ Set **min heat** to 100% and **off at** to the temperature at which you want the stage to switch on/off.
- ◇ You no longer have “variable” speed or power; you have either “full on” or “full off”, the same as a regular heating element. The **set point** and **on full at** settings have no effect when you use a variable stage this way.

Use the **Variable stage settings worksheet** on page 131 when setting up variable stages.

To program variable stages

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Variable Stages (3).
   The display should look like the following example.

Cool mode

```
VS Fan 1        Zone 2
On Full at      85.0°F
Idle at         80.0°F
Off at          40.0°F
```

Heat mode

```
Heat Mat 4      Zone 2
Off at          86.5°F
Setpoint        85.0°F
On full at      80.0°F
```

   The first line is the name you gave the variable stage when you configured it. To program one of the other variable stages, scroll down until the name is on the top line.
3. Scroll to Idle Speed (Min Heat for a heating stage) and then press **ENTER**.
4. Enter the speed (output for a heating stage) using the numbers on the keypad, or press **+** or **–** to adjust the percentage and then press **ENTER**.
5. Scroll to Off at (On Full at for a heating stage) and then press **ENTER**.
6. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

The Supra interprets the last digit as a decimal. For example, to enter 80.5°F, press 805.

7. Repeat steps 5 and 6 for Idle at and On Full at (Setpoint and Off at for a heating stage).
8. Press **BACK** twice to return to the Main Menu.

Programming actuator relays

Before programming the actuator relays, make sure you have properly configured the relays and calibrated the actuators. For more information, read **Configuring relays for actuators** on page 46 and **Calibrating actuators** on page 48.

- ◇ The Supra's actuator control function requires a potentiometer feedback on the motor. Using actuator control without a potentiometer feedback can burn out the motor.
- ◇ If you are not using a potentiometer feedback, use the curtain function to provide timers for opening and closing. For more information, read **Programming curtain control relays** on page 79.

Programming actuators means setting the **temperature set points**, **differential**, and **position** for each stage of the actuator. Each actuator has four stages. For each actuator you are setting up you need to program the:

- Minimum set point temperature
- Minimum position
- Set point temperature, differential temperature, and position for stages 1 to 4

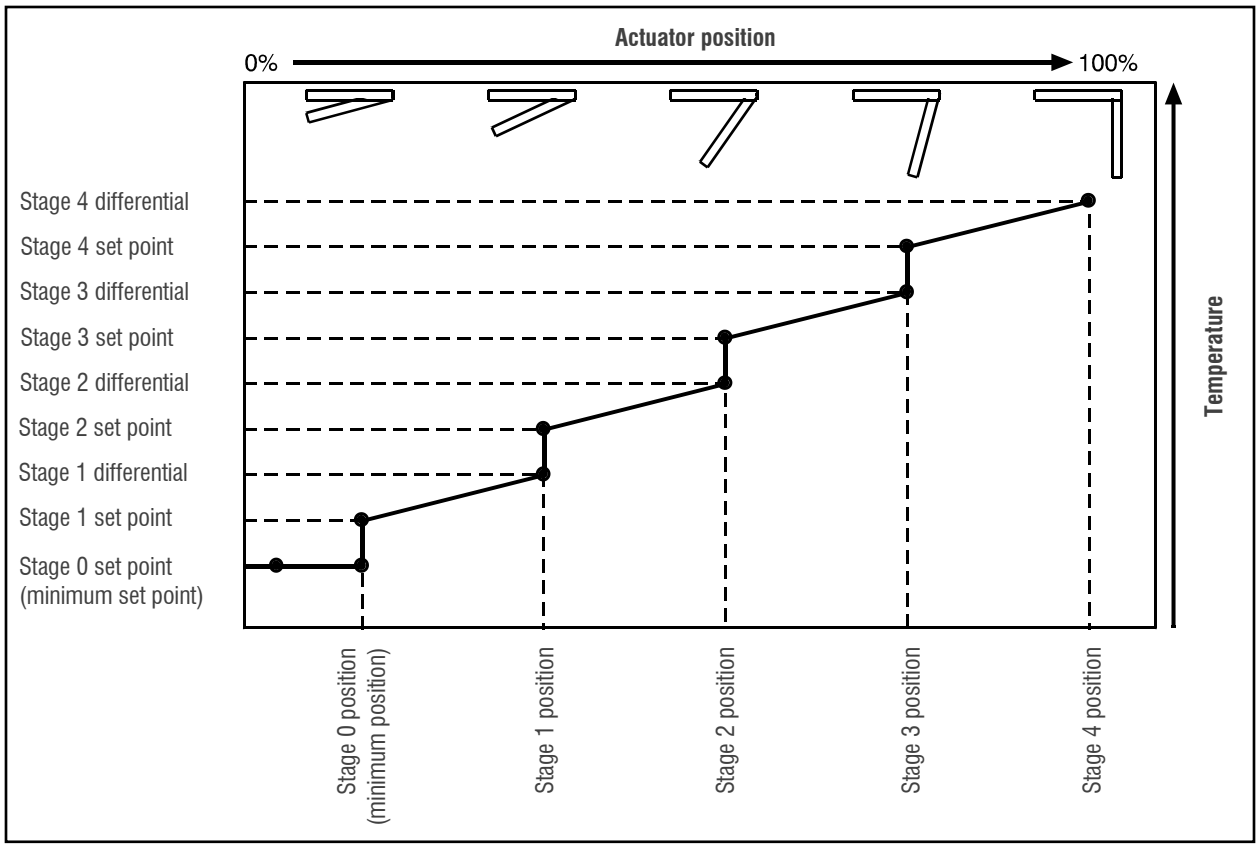
How actuators work

- While the temperature is below the **minimum set point**, the actuator is closed.
- When the temperature rises to the **minimum set point**, the actuator moves to the **minimum position**.
- As the temperature rises, the actuator has four stages it moves through until it reaches its **maximum open position**. This method lets you gradually open inlets instead of fully opening them when the temperature rises above a single set point.

For example, you might decide to have the actuator open to 40 percent at stage 1, 60 percent at stage 2, 80 percent at stage 3, and 100 percent at stage 4.

However, you do not want the actuator to open directly to 40 percent. That is why there are two temperature settings for each stage. The first setting is the **stage set point**. This is where the actuator starts opening. The second setting is the **differential**. This is where the actuator reaches the **stage position**.

In other words, "when the temperature is here (**stage set point**), I want the actuator to start opening. When the temperature reaches here (**stage differential**), I want the actuator to be at this position (**stage position**) percent."



Use the **Actuator settings worksheet** on page 133 when setting up actuators.

To set up actuators

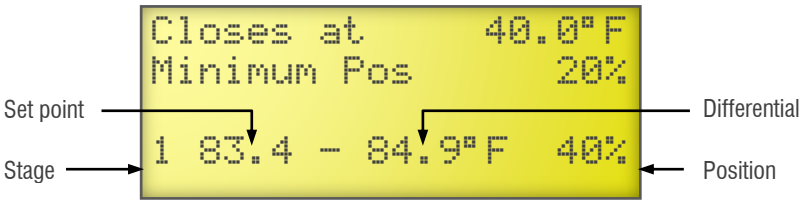
1. From the Main Menu, select `Settings` (1).
2. From the Settings menu, select `Actuators` (7).
   The display should look like the following example.

   The first line is the name you gave the open relay for the actuator when you configured it. To program the other actuator, scroll down until its name is on the top line.
3. Scroll to `Closes at` and then press **ENTER**.

4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> **NOTE** The Supra interprets the last digit as a decimal. For example, to enter 40.0°F, press 400.

5. Scroll to `Minimum Pos` and then press **ENTER**.
6. Enter the position the actuator will be at when the temperature reaches the **minimum set point**, or press **+** or **–** to adjust the value and then press **ENTER**.
7. Scroll down to the settings for the first stage and then press **ENTER**.
   The display should look like the following example.



8. Enter the stage's **set point**, or press **+** or **–** to adjust the value and then press **ENTER**. Repeat this step for the differential and position.
9. Scroll down to the next stage and then press **ENTER**.
10. Repeat steps 8 and 9 for each actuator stage.
11. Press **BACK** twice to return to the Main Menu.

Programming curtain control relays

Curtains control the temperature by adjusting the airflow into the facility. Before setting up the curtains, make sure you have properly configured the relays. For more information, read **Configuring relays for curtains** on page 52.

Programming the curtains means setting the temperature set point, idle band, and idle and run times. Each curtain has six settings:

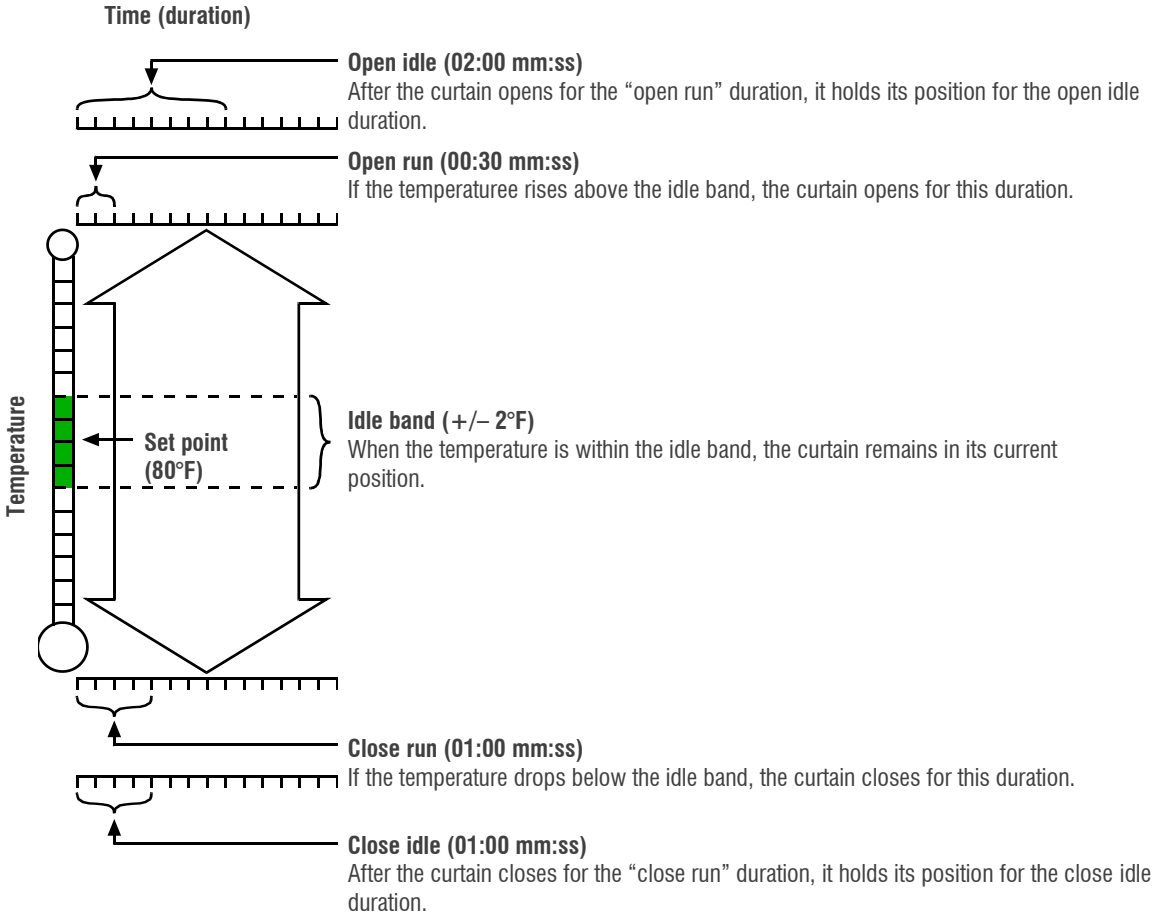
- Set point – the temperature at which the curtain holds its position.
- Idle band – the buffer around the set point within which the curtains hold their position.
- Open run time – the duration the curtains open during the OPEN cycle
- Open idle time – the duration the curtains hold their position during the OPEN cycle
- Close run time – the duration the curtains open during the CLOSE cycle
- Close idle time – the duration the curtains hold their position during the CLOSE cycle

How curtains work

Curtains hold their position while the temperature is within the **idle band** of the **set point**. For example, if the **set point** is 80°F and the **idle band** is 4°F, the curtain holds its position when the temperature is between 78°F and 82°F.

If the temperature rises above the **idle band** (above 82°F in our example), the curtain opens for the **open run duration**. After opening, it holds its position for the **open idle duration**. If the temperature is still above the **idle band**, the curtain again opens for the **open run duration** and the process repeats.

If the temperature drops below the idle band (below 78°F in our example), the curtain closes for the close run duration. After closing, it holds its position for the close idle time. If the temperature is still below the idle band, the curtain again closes for the close run duration and the process repeats.

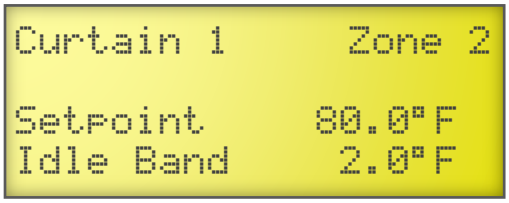


Use the **Curtain worksheet** on page 135 when setting up curtains.

To program curtains

1. From the Main Menu, select Settings (1).

2. From the Settings menu, select Curtains (5).
   The display should look like the following example.



   The first line is the name you gave the open relay for the curtain when you configured it. Only curtains that have been configured appear in the display. To program other curtains, scroll down until the name is on the top line.

3. Scroll to Setpoint and then press **ENTER**.
4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> **NOTE** The Supra interprets the last digit as a decimal. For example, to enter 80.0°F, press 800.

5. Scroll to Idle Band and then press **ENTER**.
6. Enter the temperature range using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
7. Scroll to Open Run and then press **ENTER**.
8. Enter the duration using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
9. Repeat steps 7 and 8 for open idle, close run, and close idle.
10. Press **BACK** twice to return to the Main Menu.

Programming heating and cooling elements and temperature-based duty cycles

Heating and cooling elements control the temperature by switching single-stage heating equipment such as electric heaters, or cooling equipment such as misters ON or OFF. Before setting up the elements, make sure you have properly configured the relays. For more information, read **Configuring relays for heating, cooling, or temperature-based duty cycles** on page 51.

There are two types of heating and cooling element setups: "standard" and "temperature-based" duty cycle. Programming a **standard** element means setting the temperature **set point** and selecting *Off* for the duty cycle. Programming a **temperature-based** duty cycles means setting the temperature **set point**, selecting *On* for the duty cycle, and setting the **on duration** and **off duration**.

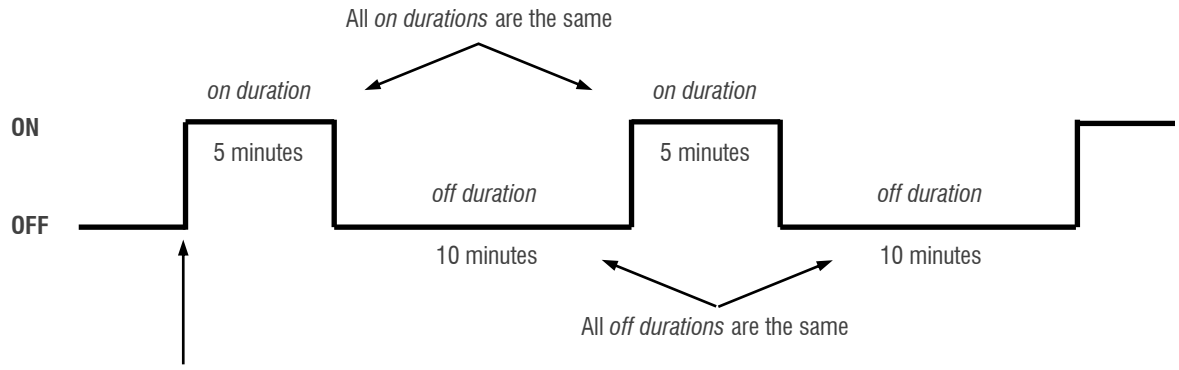
How temperature-based duty cycles work

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 the temperature rises above the **set point**, the duty cycle switches off and will not switch on again until the temperature drops below the **set point**.

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 the temperature drops below the **set point**, the duty cycle switches off and will not switch on again until the temperature rises above the **set point**.



The relay does not switch ON until a temperature condition has been met. For example, if the temperature rises above 85°F, switch on a mister for 5 minutes and then OFF for 10 minutes. Repeat this until the temperature is below 85°F.

Use the **Heating and cooling elements worksheet** on page 136 when setting up heating and cooling elements or temperature-based duty cycles.

To program heating or cooling elements (without a duty cycle)

1. From the Main Menu, select `Settings` (1).
2. From the Settings menu, select `Heat/Cool Stages` (2).
   The display should look like one of the following examples.

Duty cycle off

```
Elec. Heat      Zone 2
Setpoint       65.0°F
Duty cycle:       Off
```

Duty cycle on

```
Misters         Zone 2
Set 80.0°F    Duty On
On time         05:00
Off time        10:00
```

The first line is the name you gave the element when you configured it. Only relays that have been configured as heating or cooling elements appear in the display. To program other heating or cooling relays, scroll down until the name is on the top line.

3. Scroll to Setpoint (or Set) and then press **ENTER**.
4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> **NOTE** The Supra interprets the last digit as a decimal. For example, to enter 65.0°F, press 650.

5. If duty cycle is on, press **+** or **–** to select Off and then press **ENTER**.
6. Press **BACK** twice to return to the Main Menu.

To program temperature-based duty cycles

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Heat/Cool Stages (2).
   The display should look like one of the following examples.

Duty cycle off

Duty cycle on

The first line is the name you gave the element when you configured it. Only relays that have been configured as heating or cooling elements appear in the display. To program other heating or cooling relays, scroll down until the name is on the top line.

3. Scroll to Setpoint (or Set) and then press **ENTER**.
4. Enter the temperature using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> **NOTE** The Supra interprets the last digit as a decimal. For example, to enter 65.0°F, press 650.

5. If duty cycle is off, scroll to the Duty line and then press **ENTER**. Press **+** or **–** to select On and then press **ENTER**.
6. Scroll to On time and then press **ENTER**.

7. Enter the duration using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
8. Scroll to `Off time` and then press **ENTER**.
9. Enter the duration using the numbers on the keypad, or press **+** or **–** to adjust the duration and then press **ENTER**.
10. Press **BACK** twice to return to the Main Menu.

Programming timed events

Timed event relays control equipment such as lights that need to be switched ON or OFF during certain times of the day. Programming timed events means setting the "on" and "off" times. Timed events must occur in pairs. This means that every time you set a relay to switch on, you must set a time for it to switch off.

Before setting up the timed events, make sure you have properly configured the relays. For more information, read **Configuring relays for timed events** on page 54.

Use the **Timed events worksheet** on page 137 when setting up timed events.

To program timed events

1. From the Main Menu, select `Settings` (1).
2. From the Settings menu, select `Timed Events` (9).
   The display should look like one of the following examples.

No events programmed

```
Yard lights
Add New Event
```

Events programmed

```
Yard lights
 16:00 AM    Off
 28:00 PM     On
Add New Event
```

   The first line is the name you gave the relay when you configured it. Only relays that have been configured as timed events appear in the display. To program other timed event relays, scroll down until the name is on the top line.
3. Scroll to `Add New Event` and then press **ENTER**.
   The display should look like the following example.

4. With the cursor on the first line, press **ENTER**.
5. Enter the ON time for the first event using the numbers on the keypad, press **+** or **–** to select AM or PM, and then press **ENTER**.

> **NOTE** When you enter the time, enter it in 12-hour format. For example, if you want 3:00 PM, press 0300 and then press **+** or **–** to change the AM to PM.

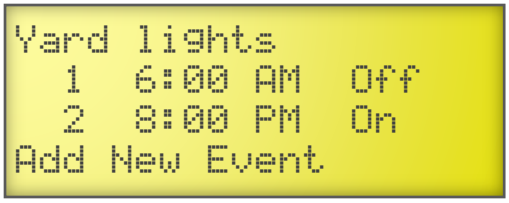
6. Press **+** or **–** to select On and then press **ENTER**.
   The event appears on the bottom line of the display.

7. Repeat steps 4 to 6 for the matching OFF time.
8. Repeat steps 4 to 7 for each pair of events you want to set up for this relay.
9. Press **BACK** twice to return to the Main Menu.

> **NOTE** Retroactive events start when you exit the menu. For example, if you set an event to switch ON at 9:00 AM and OFF at 6:00 PM and the event was added to the control at 10:00 AM, the relay switches ON when you exit the Timed Event display.

To edit or remove timed events

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Timed Events (9).
   The display should look like the following example.



The first line is the name you gave the relay when you configured it. Only relays that have been configured as timed events appear in the display. To program other timed event relays, scroll down until the name is on the top line.

3. Scroll to the on/off event you want to edit and then press **ENTER**.
4. To edit the time, enter a new time using the numbers on the keypad, press **+** or **–** to select AM or PM, and then press **ENTER**.

When you enter the time, enter it in 12-hour format. For example, if you want 3:00 PM, press 0300 and then press **+** or **–** to change the AM to PM.

5. To change the type of event, press **+** or **–** to select ON, OFF, or NONE (removes the event) and then press **ENTER**.
6. Press **BACK** twice to return to the Main Menu.

Programming time-based duty cycles

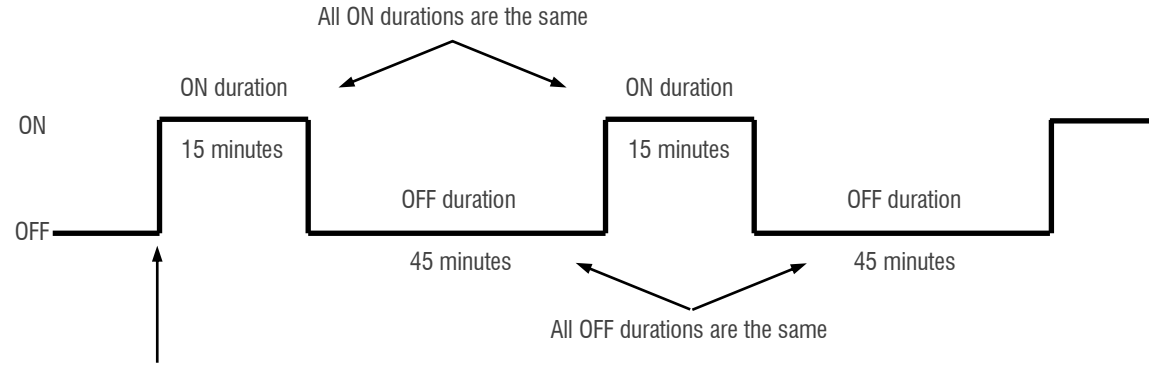
Time-based duty cycles are a cross between temperature-based duty cycles and timed events. Unlike temperature-based duty cycles, time-based duty cycles occur between certain hours of the day, regardless of temperatures.

Setting up a time-based duty cycles means setting the **on duration**, **off duration**, **start time**, and **end time**.

Before setting up the time-based duty cycles, make sure you have properly configured the relays. For more information, read **Configuring relays for time-based duty cycles** on page 53.

How time-based duty cycles work

The relay does not switch on until the **From time** (start time). Between the start time and the **To time** (end time), the relay switches on for the ON duration and then OFF for the off duration. When the time reaches the end time, the relay switches off (if it is not off already) and does not switch on again until the time reaches the start time.



The relay does not switch on until the "from" time (start time).
The relay switches off (if it is not off already) at the "to" time (end time) and does not switch on again until the time reaches the start time.

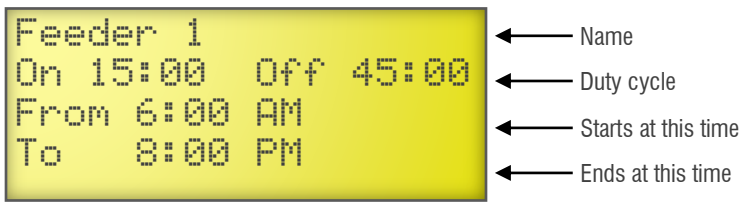
For example, you can have a feed auger run for 15 minutes and then stop for 45 minutes between 6:00 AM and 8:00 PM. In other words, "Between 6:00 AM and 8:00 PM, I want the feed auger ON for 15 minutes, OFF for 45 minutes, ON for 15 minutes… and so on."

This section explains how to set up time-based duty cycles. If you want to set up temperature-based duty cycles (duty cycles that operate for specific durations while the temperature is above or below a certain value), see **Programming heating and cooling elements** on page 81. If you want to set up elements that turn on and off at specific times, see **Programming timed events** on page 84.

Use the **Time-based duty cycle worksheet** on page 139 when setting up time-based duty cycles.

To set up time-based duty cycles

1. From the Main Menu, select `Settings` (1)
2. From the Settings menu, select `Duty Cycle` (8).
   The display should look like the following example.



   The first line is the name you gave the relay when you configured it. Only relays that have been configured as timed events appear in the display. To program other timed event relays, scroll down until the name is on the top line.

3. Scroll to the second line, and press **ENTER**.

4. Enter the ON duration using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.

> NOTE The Supra interprets the last two digits as the number of seconds. For example, if you want the relay on for 15 minutes, press 1500.

5. Enter the OFF duration using the numbers on the keypad, or press **+** or **–** to adjust the value and then press **ENTER**.
6. Scroll to From and press **ENTER**.
7. Enter the start time for the cycle, press **+** or **–** to select AM or PM, and then press **ENTER**.

> NOTE When you enter the time, enter it in 12-hour format. For example, if you want 3:00 PM, press 0300 and then press **+** or **–** to change the AM to PM.

8. Scroll to To and then press **ENTER**.
9. Enter the end time for the cycle, press **+** or **–** to select AM or PM, and then press **ENTER**.
10. Press **BACK** twice to return to the Main Menu.

Programming the alarm and display settings

After programming the variable and relay stages, you can move on to the alarm and display settings.

- Alarms (below)
- Status screen display (on page 91)

Programming alarm settings

The alarm settings for the Supra determine which alarm conditions are enabled, which are disabled, and their settings. All these work together to determine how and when the alarm relay activates (in other words, signals an alarm condition).

The alarm relay activates if an alarm condition (one that is enabled) is present for longer than the minimum duration. Minimum duration prevents alarms from activating when the temperature rises or drops for just a few seconds. Minimum duration can be between 0 and 10 minutes; setting it to 0 activates the alarm relay immediately after an alarm is detected.

Another important setting is alarm silencing. Silencing temporarily disables an alarm setting after an alarm has been acknowledged. This prevents the alarm relay from activating immediately after acknowledging the alarm. If the alarm condition is still present after the silencing period, the alarm relay activates again.

You can set the silencing duration to be from 0 seconds to 30 minutes. If you set it to 0 seconds, acknowledging the alarm will not deactivate the relay; the alarm relay remains active until the alarm condition goes away.

Besides the standard high and low temperature alarms, the Supra has many other alarm conditions. For a complete list and descriptions, see the **Alarm settings worksheet** on page 140.

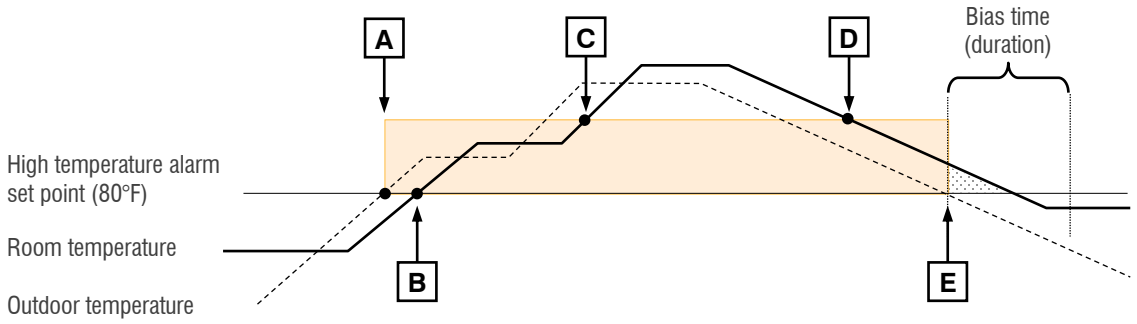
How alarm settings work

Let's say the **high temperature alarm** setting is 85.0°F, the **minimum duration** is 5 minutes, and the **silencing duration** is 15 minutes. If the temperature rises to 86 degrees, but drops below 85 degrees 2 minutes later (before the **minimum duration** of 5 minutes), the alarm relay does not activate.

If the temperature rises to 86 degrees and stays there for 5 minutes, the alarm relay activates. The alarm relay remains active until a user acknowledges the alarm or the temperature drops below the **high temperature alarm** setting. After the alarm has been acknowledged, if the temperature remains above the **high temperature alarm** setting, the relay activates again in 15 minutes (after the **silencing duration**).

How alarm biasing works

The purpose of alarm biasing is to prevent the alarm from sounding on very hot days when the temperature **set point** cannot be maintained. The **bias temperature** is added to the **high temperature alarm setting** if the outdoor temperature is higher than the **high temperature alarm setting**.



A A *bias temperature* of 5°F allowed so that the room temperature can rise to 85°F before an alarm occurs.

B The room temperature exceeds the normal alarm temperature. No alarm occurs because the room temperature is lower than the *high temperature alarm* plus the *alarm bias*.

C A high temperature alarm occurs because the room temperature exceeds the *high temperature alarm* plus the *alarm bias*.

D The alarm condition ends when the room temperature drops below the *alarm bias*.

E After the outdoor temperature drops below the *high temperature alarm*, the bias remains for the duration of the *bias time*. This gives the room a chance to cool off before removing the bias.

Use the **Alarm settings worksheet** on page 140 when setting up alarms. The worksheet contains descriptions of each setting.

To program alarm settings

1. From the Main Menu, select Settings (1).
2. From the Settings menu, select Alarms (6).
   The display should look like the following example.

3. Refer to the **Alarm settings worksheet** on page 140. Scroll to a line that needs changing and then press **ENTER**.
   - To toggle between Disabled and Enabled or between No and Yes, press **+** or **–** and then press **ENTER**.
   - To enter a number for temperature or duration use the keypad, or press **+** or **–** to adjust the number and then press **ENTER**.

- ◇ When entering durations in mm:ss (minutes:seconds), the Supra interprets the last two digits as seconds. For example, if you want 15:00, press 1500 and then press **ENTER**.
- ◇ When entering temperatures, the Supra interprets the last digit as a decimal. For example, to enter 40.0°F, press 400.

4. Repeat step 3 for each alarm setting you want to change.
5. Press **BACK** twice to return to the Main Menu.

Setting up the status display

When you are looking at the Supra while it is operating normally, you want to be able to quickly see what is happening. Alarm displays indicate if there is a problem, but there is other valuable information you might want to know.

The Supra lets you display different types of information on the display. If this information uses more than four lines, the information cycles through groups of four lines. You can watch the display for a few seconds to get all the information you need.

Setting up the status display means selecting the information you want the display to show, and for how long. The Supra automatically displays the name of the unit, current date and time. You can also display the following items.

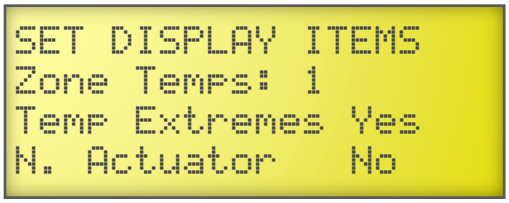
- Current outdoor temperature (if an outdoor probe is connected)
- Current temperature of each zone
- Current day's high and low temperatures
- Current status of relays and variable stages
- Current humidity (if a Relative Humidity Sensor is connected)
- Current day's water usage (if a water meter is connected)

If there are one or more alarm conditions, the Supra will display them instead of scrolling through the status display. For a list of alarm and error messages, see **Appendix B: Troubleshooting** on page 115.

Use the **Status screen display worksheet** on page 142 when setting up the status display.

To set up the status display

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Set Main Display` (6).
   The display should look like the following example.



   The relays and variable stages are the names you entered when you configured them.
3. Refer to the **Status screen display worksheet** on page 142. Scroll to a line that needs changing and then press **ENTER**.
4. Press **+** or **–** to change the setting and then press **ENTER**.
5. Repeat steps 3 and 4 for each item you want to change.
6. Press **BACK** twice to return to the Main Menu.

Setting up security and users

The Supra has a five-level PIN security system. Each level has access to different areas of the Supra.

When you first receive the Supra, security is not enabled. This means anyone can do anything with the Supra. When you enable security, users must enter their PIN (personal identification number) before they can access a specific menu or function.

- ◇ Use the **Security levels worksheet** on page 143 when setting up security and users. The worksheet contains information about the security levels and their access.
- ◇ Setting up and enabling security allows the Supra to log who acknowledges alarms and makes changes to settings. It tracks this information using the PIN each user enters when they access the control. For more information about logging, see **Reading the audit log** on page 101.

If all security PINs have been forgotten and nobody can access the control, pressing ⇧, +, ⇩, and – as a PIN number and then answering Yes on the next screen will turn off security and restore the factory settings. **Use this step only as a last resort. It erases ALL your configuration and settings. You will have to reconfigure and reprogram the Supra.**

Adding and removing users

When you initially set up the Supra, if you will be using security, you need to add users to your system. When security is enabled, each user must enter their PIN before changing any settings or acknowledging alarms. This allows the Supra to track who has performed each change and prevents unauthorized access to the control.

If you hire a new employee (user), and you are using security to control access to the Supra, you will need to add the employee to the security list. If an employee leaves your operation, you should remove the user from the Supra.

- Use the **Security levels worksheet** on page 143 when setting up security and users. The worksheet contains information about the security levels and their access.
- If you want to change the security level for a user, remove that user and then add the user with the new security level.
- To view all the users set up in the security system, in the Security menu, select Erase User, and then scroll through the list of users.

To add users

1. From the Main Menu, select Security (4).
2. From the Security menu, select Add User (3). The display should look like the following example.

3. Press **ENTER**.
4. Enter the name (maximum 14 characters) for this user. For more information, read **Entering text in the Supra** on page 15. To save the name, press **ENTER** until the cursor returns to the beginning of the line. To cancel the change, press **BACK**.
5. Scroll to Access Code and then press **ENTER**.
6. Enter a *unique* four-digit number that will be used by that person as the PIN and then press **ENTER**.

If you do not enter four numbers, the Supra will fill the remaining digits with zeros. For example, if you enter 26, the Supra changes this to 0026. The user must enter all four digits (0026) when prompted for the PIN.

7. Scroll to Level and then press **ENTER**.

8. Press **+** or **–** to select the security level for this user and then press **ENTER**.
9. Scroll to the last line and then press **ENTER**.
   The Supra saves the user and displays a screen like the following example.

10. Press **BACK** to return to the Security menu.
11. Press **BACK** to return to the Main Menu.

To remove users

1. From the Main Menu, select Security (4).
2. From the Security menu, select Remove User (4).
   The first user is displayed, like the following example.

3. Scroll down until you see the name of the user you want to remove.

Make sure you really want to remove this user. You will not be asked to confirm the removal. If you remove a user by mistake, you will have to add the user again.

4. Scroll to Erase this user and then press **ENTER**.
   The display confirms that the user has been removed.
5. Press **BACK**.
6. Press **BACK** twice to return to the Main Menu.

Changing PINs

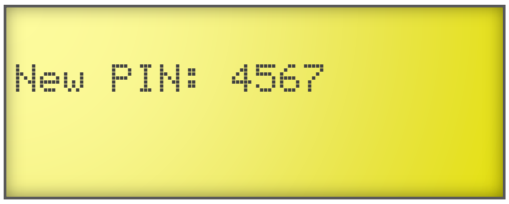
Occasionally, a PIN might need to be changed. For example, when you first set up a user, you might provide a temporary PIN, and then have that user change the PIN the first time they log in to the Supra.

Only the “owner” of a PIN can change that PIN.

To change PINs

1. From the Main Menu, select Security (4).
2. From the Security menu, select Change PIN (2).
   The display should look like the following example.

3. Scroll to Current PIN and then press **ENTER**.
4. Enter the current PIN and then press **ENTER**.
   The display should look like the following example.



5. Scroll to New PIN and then press **ENTER**.
6. Enter the new pin and then press **ENTER**.
7. Press **BACK** twice to return to the Main Menu.

Enabling and disabling security

If security is enabled, only users with Admin access can disable it. If security is off, anyone can enable it.

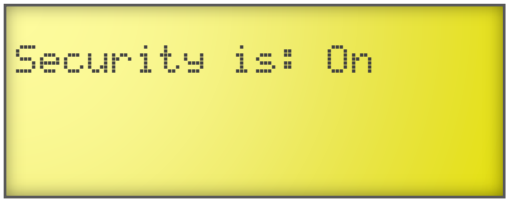
To enable security

1. From the Main Menu, select Security (4).
2. From the Security menu, select Security On/Off (1).
   The display should look like the following example.

3. Press **ENTER**.
4. Press **+** or **–** to change `Off` to `On` and then press **ENTER**.
5. Press **BACK** twice to return to the Main Menu.

To disable security

1. From the Main Menu, select `Security` (4).
2. From the Security menu, select `Security On/Off` (1).
   The display should look like the following example.



3. Press **ENTER**.
4. Press **+** or **–** to change `On` to `Off` and then press **ENTER**.
5. Press **BACK** twice to return to the Main Menu.

Chapter 5: Monitoring

Monitoring the Supra

Monitoring the Supra includes the following

- Monitoring the status display below
- Acknowledging alarms on page 98
- Reading the daily log on page 99
- Reading the alarm log on page 100
- Reading the audit log on page 101
- Erasing the logs on page 101

Monitoring the status display

The Supra status screen can display important information about what is happening with the Supra, the equipment connected to it, and the environmental conditions in your building. Check the Supra status display regularly. Some things to look for include:

- Are any temperatures approaching high or low limits that would set off an alarm if left unchecked?
- Are there large swings in the temperatures recorded by the Supra? You might need to check the settings.
- Is all equipment working as intended or as you expected?
- Has the Supra logged an unusual number of alarms? To find out, check the temperature, audit, and alarm logs (see the appropriate sections in this chapter).
- If connected to a computer, are the Supra and computer communicating correctly and consistently?

- ◇ If a probe is missing and averaging is OFF, the Supra uses and displays the temperature for the next zone. For example, if there is no probe for zones 2 and 3, the Supra uses and displays the temperature for zone 4.
- ◇ If there is a missing outdoor probe, the Supra displays ---- F (or °C).

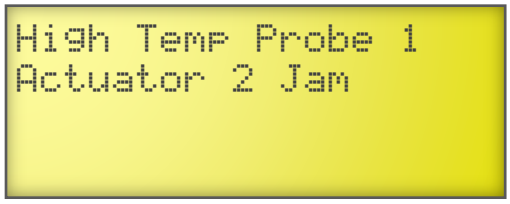
Set up a regular maintenance schedule to check different mechanical and electronic connections. Check the status display of the Supra regularly.

Acknowledging alarms

If there are one or more alarms, the Supra activates the alarm relay and displays messages. To deactivate the relay, and before you can do anything else with the Supra, you must acknowledge the alarms. If you see an alarm message and are not sure what it means, look it up in the **Alarm messages** table on page 115 and then follow the instructions for resolving the alarm condition.

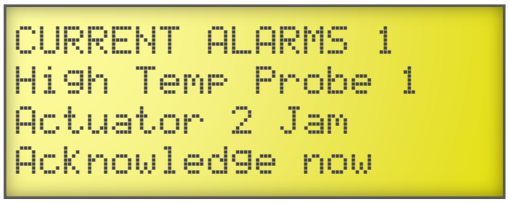
If security is enabled, only users who have access to acknowledge alarms can do so. For more information about security levels, see **Setting up security and users** on page 92.

If there are alarms, the display looks like this, with your current alarms displayed.



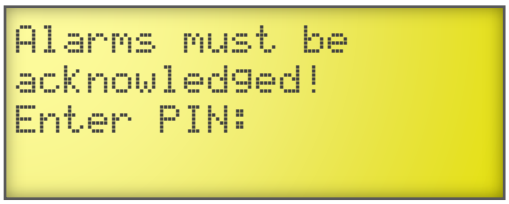
To respond to alarms

1. Press **ENTER**.
   The display should look like the following example. If there is an ⇩ in the bottom-right corner, there are more than one screen of alarms to display. Press **Down** to display all the alarms.

2. Press **ENTER**.
   If security *is not* enabled, the alarms are acknowledged and the Main Menu appears. Go to step 5.

   If security is enabled, the display should look like the following example.

3. If security is enabled, enter your PIN and then press **ENTER**.
   The Supra logs who acknowledges the alarm.
4. Press **ENTER** to go to the Main Menu.

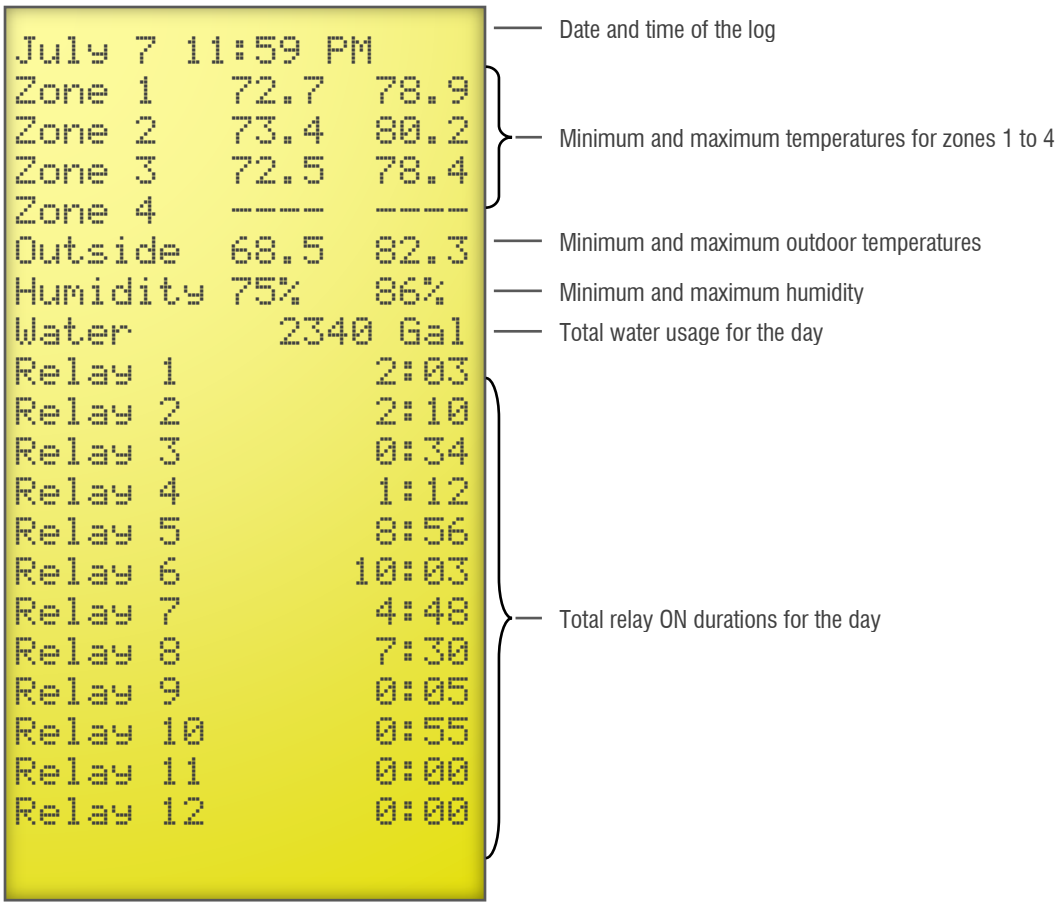
5. Look up the meaning of the alarm(s) in the table on page 115 and then follow the instructions in the table.

> **NOTE** When troubleshooting temperature probe problems, make sure you are troubleshooting the correct probe. Probe 1 does not necessarily mean Zone 1. Refer to your configuration and installation worksheets.

Reading the daily log

The Supra stores information about environmental conditions periodically in a log file called the daily log. The Supra stores outside temperatures, zone temperatures, humidity, water usage, and relay ON durations.

The following image explains each item on the daily log.



- ◇ If information is not available for one of the log items, the log displays ——————.
- ◇ To record and display outside temperatures, you must have a temperature probe connected to the **OUT TEMP** terminal. For more information, read **Connecting temperature probes** on page 29.
- ◇ To record and display water usage, you must have a water meter connected to the Supra. For more information, read **Connecting a water meter** on page 31.
- ◇ To record and display humidity, you must have a humidity sensor connected to the Supra. For more information, read **Connecting a Relative Humidity Sensor** on page 30.

To view the daily log

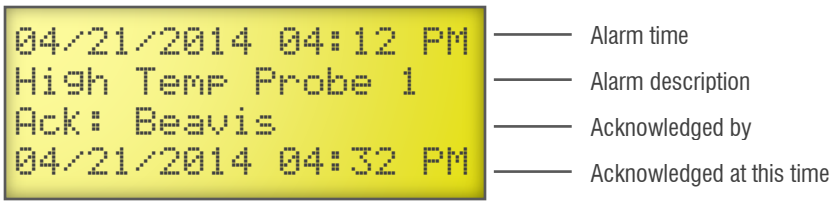
1. From the Main Menu, select `View Logs` (3).
2. From the View Logs menu, select `Daily log` (1).
   The daily log displays.
3. Scroll down to view all information that was logged or to view previous logs.
4. Press **BACK** twice to return to the Main Menu.

Reading the alarm log

For each alarm that occurs, the Supra stores information in its alarm log. If you have users set up and security enabled, the Supra stores the user who acknowledged the alarms. If you do not have users and security enabled, the Supra lists the user as "User".

To view the alarm log

1. From the Main Menu, select `View Logs` (3).
2. From the View Logs menu, select `Alarm Log` (2).
   For each alarm, the Supra displays four lines of information like the following example.



3. Scroll down to view all the information that was logged.
4. Press **BACK** twice to return to the Main Menu.

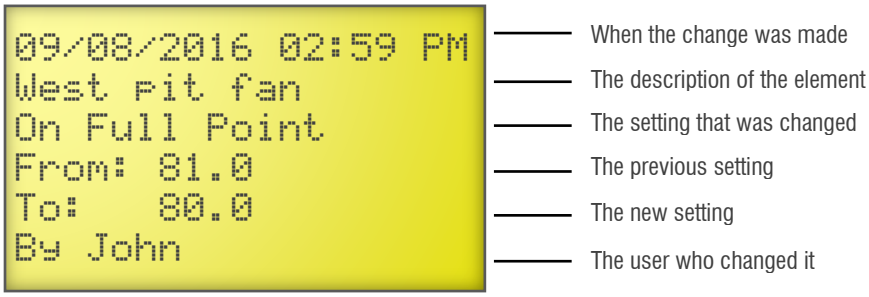
Reading the audit log

Each time someone adjusts a setting, the Supra stores information in its audit log.

If you have users set up and security enabled, the Supra stores the user who made each change. If you do not have users and security enabled, the Supra lists the user as "User".

To view the audit log

1. From the Main Menu, select View Logs (2).
2. From the View Logs menu, select Audit Log (3).
   For each adjustment, the Supra displays six lines of information like the following example.



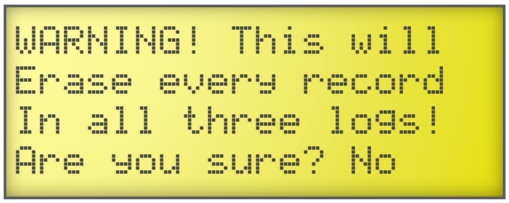
3. Scroll down to view all the information that was logged.
4. Press **BACK** twice to return to the Main Menu.

Erasing the logs

Use this option to erase every record in all three of the logs: daily log, alarm log, and audit log.

To erase all logs

1. From the Main Menu, select View Logs (3).
2. From the View Logs menu, select Erase All Logs.
   A confirmation screen like the following example displays.



3. If you do not want to erase all the logs, press **BACK**.
4. If you want to erase all the logs, scroll to the last line and then press **ENTER**.

5. Press **+** or **–** to change `No` to `Yes` and then press **ENTER**.
6. Press **BACK** to return to the Main Menu.

Using manual override

Manual override allows you to temporarily override settings for a stage. Manual override is useful for testing equipment and ventilation strategies or diagnosing problems.

- ◇ When you are finished testing the stages, set *each* stage back to "Auto" to return them to normal, programmed settings.
- ◇ Any stages you do not change back to Auto will not function according to their normal programmed settings, but will instead remain in manual override.

To enter manual override

1. From the Main Menu, select `Maintenance` (2).
2. From the Maintenance menu, select `Manual Override` (1).
   The display should look like the following example.

```
   MANUAL OVERRIDE
1 Variable Stages
2 Relays
3 Curtains
4 Actuators
```

3. Scroll to the type of element you want to override and then press **ENTER**.
   The display should look like one of the following examples.

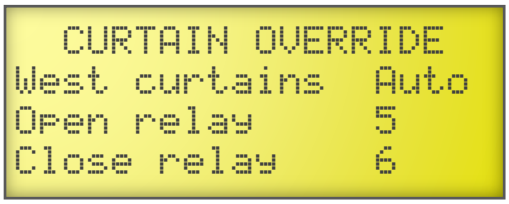
Variable stages

```
St1 36" Fan      Auto
St2 24" Fan      Auto
N Heat mats      Auto
W Heat mats      Auto
```

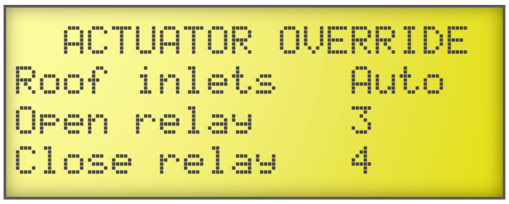
Relay stages

```
  RELAY OVERRIDE
Relay    1
West heat        Auto
```

Curtains



Actuators



4. Scroll to the Auto line for the element to you want to override and then press **ENTER**.
5. Press **+** or **–** to adjust the setting of the stage. If you need to check equipment, go to the equipment connected to the stage and check if it does what you expect (turns on or off, opens or closes, extends or retracts, and so on.

- ◇ If you press **ENTER** after adjusting the setting of the stage and then exit the menu (by pressing **BACK**), the element stays at that setting until you return to the menu and change it.
- ◇ If you do not press **ENTER** after adjusting the setting, when you press **BACK**, the setting returns to what it was before you changed it.

6. Press **BACK** three times to return to the Main Menu.

To exit manual override

Exiting manual override means restoring the stage to "Auto". When you restore a stage to auto, the stage returns to its normal, programmed settings.

1. From the Main Menu, select Maintenance (2).
2. From the Maintenance menu, select Manual Override (1).
3. Scroll to the type of element you want to return to its normal settings and then press **ENTER**.
4. Scroll to the setting line (the one that has On, Off, or a percentage) for the element to you want and then press **ENTER**.
5. Press **+** or **–** to return the setting to Auto and then press **ENTER**.
6. Press **BACK** three times to return to the Main Menu.

Performing diagnostic tests

The Supra has several built-in diagnostic tests. If you suspect the control is not responding as it should, perform the tests.

If you contact Phason Customer Support (see the contact information in the front of the manual), the technician might ask for some information displayed by the diagnostic tests.

Displaying information about each input

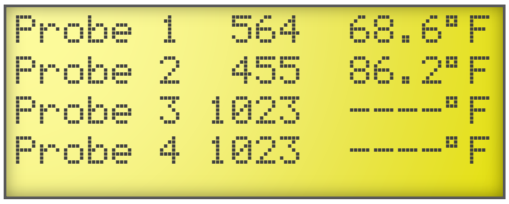
The Supra allows you to display current information for each zone and input (temperature, feedback, water, and humidity). This is called the input test. There are four information display screens.

To display information about each zone

1. From the Main Menu, select Diagnostics (6).
2. From the Diagnostics menu, select Display All Inputs (1).
   The display should look like the following example.

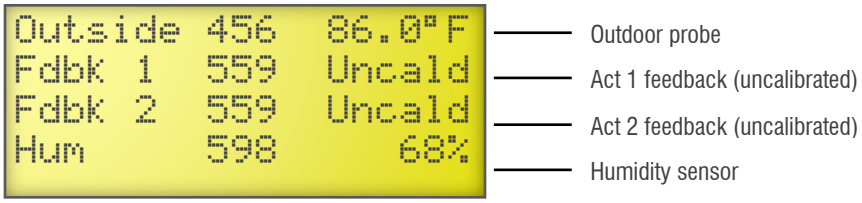
   If there is a probe missing and averaging is OFF, the Supra displays the temperature for the next zone. In the above example, there is no probe connected to 3 and 4 so the Supra uses the temperature for zone 1.

3. To display the second screen, press **ENTER**.
   The second display should look like the following example.



   If there is no probe for a zone, the Supra displays 1023 ------°F (or °C) for that zone.

4. To display the third screen, press **ENTER**.
   The third display should look like the following example.



5. To display the fourth screen, press **ENTER**.
   The fourth display should look like the following example.

This is the total water usage for the current day (12:00 AM until current time)

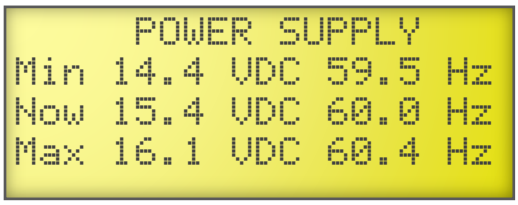
6. Press **BACK** twice to return to the Main Menu.

Monitoring power conditions

If you get several low or high power alarms, you should look at the incoming power supply. The information in the power tests can help you determine if you have power supply problems.

To monitor power conditions

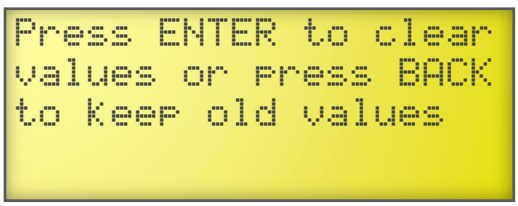
1. From the Main Menu, select Diagnostics (6).
2. From the Diagnostics menu, select Power Supply (2).
   The display should look like the following example.



3. Check the value next to Now; it indicates the condition of the power the Supra is receiving. If the value is not within approximately ±3 Hz of your power frequency, or the voltage outside of the 10 to 18 VDC range, an alarm will sound.

   The Min and Max values indicate the lowest and highest values the Supra received since the Supra was powered up or since you cleared the values.

4. Press **BACK**.
   The display should look like the following example.



5. If you want to clear the values, press **ENTER**.
6. Press **BACK** until you return to the Main Menu.

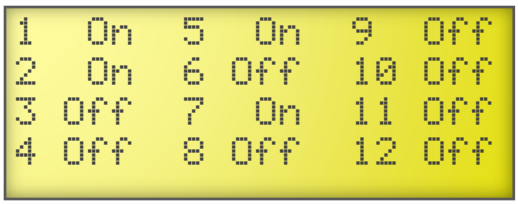
Testing equipment connected to relays

The Supra has two displays for testing equipment connected to relays: one for viewing the states (ON or OFF) and one for manually testing the equipment connected to each relay. The relay tests are useful for detecting faulty connections or configuration errors.

- ◇ Before testing equipment connected to relays, make sure you know what is connected to each relay. Testing relays without knowing which equipment is connected to them can damage your equipment. For example, switching on an actuator's open and close relays at the same time can damage the actuator power supply and the Supra's relays.
- ◇ For more information about what is connected to the Supra, see your installation worksheets.

To test equipment connected to relays

1. From the Main Menu, select `Diagnostics` (6).
2. From the Diagnostics menu, select `View relay Stages` (3).
   The display should look like the following example.

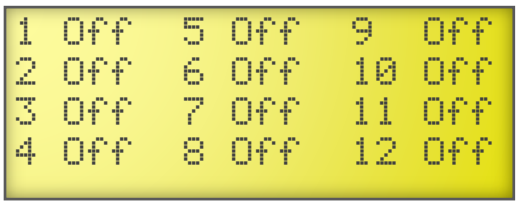


   If a relay is closed, the display shows `On` next to the relay. If a relay is open, the display shows `Off` next to the relay.

3. Confirm the equipment is producing the proper output for the current relay state. Go to the equipment connected to each stage and check that it is on if the state displays `On`, or off if the state displays `Off`.

   If the displayed states are correct, go to step 9. If any are incorrect, go to the next step.

4. Press **BACK** to return to the Diagnostics menu and then select `Set relay Stages` (4).
   All relay stages switch off. The display should look like the following example.



Press **Up** or **Down** to scroll through the lines.

Press **ENTER** to scroll from left to right on a line.

5. Scroll to the line containing the relay for which you want to change the state (ON to OFF or OFF to ON).

6. Press **ENTER** to move from left to right on a line until the relay you want to change is selected.
7. Press **+** or **–** to change the relay state and then press **ENTER**.
   The relay state changes.
8. Repeat steps 5 to 7 for each relay you want to change.
9. Press **BACK** three times to return to the Main Menu.
   The relays return to their normal, programmed settings.

While the Supra is in the Set relay stages display, the control will not operate the equipment connected to the relays according to the programmed settings. When you are finished testing, press **BACK** to return to the Diagnostics menu and return the relays to normal operation.

Maintaining actuators

Because cables can stretch and equipment can come out of alignment (similar to tires on your car), Phason recommends resetting the limit switches and calibrating your actuators at least once each year. For more information, read **Calibrating actuators** on page 48.

Resetting the Supra to its factory defaults

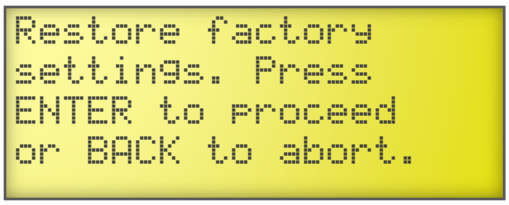
When the Supra leaves the factory, it comes with default settings and configuration. When you configure and program the Supra, you change its settings. Resetting the Supra erases all the configuration and settings you programmed and then restores the settings to what they were when the control left the factory.

For information about the Supra's factory settings, see **Appendix C: Factory defaults** on page 120.

- ◇ This function is very powerful; use caution when using it.
- ◇ If you reset the Supra to its factory defaults, disconnect the power to all loads and then reconfigure the control before restoring power to the loads.

To restore the factory default settings

1. From the Main Menu, select `Factory Settings` (7).
   The display should look like the following example.



2. Press **ENTER**.
   You are asked to confirm that you want to erase all your configuration settings.
3. Scroll to the last line and then press **ENTER**.
4. Press **+** or **–** to change the No to Yes and then press **ENTER**.
   The Supra erases all your configuration and settings and then returns to the Main Menu.

Adjusting the display contrast

The Supra's display contrast is set at the factory. You can adjust the display contrast by turning the contrast adjuster using a small, flat screwdriver. For more information, read **Supra interior layout** on page 20.

Appendix A: Glossary

actuator	An actuator is 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 22.
actuator set point	When the temperature is below the **minimum set point**, the actuator is closed. When the temperature rises to the **minimum set point**, the actuator moves to the **minimum position**. As the temperature rises, the actuator has four stages it moves through until it reaches its maximum open position. This lets you gradually open inlets instead of fully opening them when the temperature rises above a single set point. In other words, "when the temperature is here (**stage set point**), I want the actuator to start opening. When the temperature reaches here (**stage differential**), I want the actuator to be at this position (**stage position**) percent." For more information, read **Programming actuator relays** on page 76.
alarm bias	High temperature biasing helps prevent alarm conditions on days when the outdoor temperature is above the **high temperature alarm** set point. For more information, read **Programming alarm settings** on page 88.
alarm silencing	Alarm silencing temporarily disables an alarm setting after an alarm has been acknowledged. This prevents the alarm relay from activating immediately after acknowledging the alarm if the condition is still present. For more information, read **Programming alarm settings** on page 88.
control elements	Control elements are devices connected to the Supra, such as fans, heaters, actuators, and so on.
curtain idle band	**Curtain idle band** is a temperature buffer around the **curtain set point**. When the temperature is within the **idle band**, the curtains hold their position. When the temperature is outside the band, the curtains cycle open or closed. Idle band is one of six curtain settings. For more information, read **Programming curtain control relays** on page 79.

curtain set point	**Curtain set point** is the target temperature for the curtains. When the temperature is between the **set point** and **idle band** limits, the curtains hold their position. Set point is one of six curtain settings. For more information, read **Programming curtain control relays** on page 79.
different method (DIF)	DIF is a means of maintaining different day/night temperatures in greenhouses that helps control plant height and growth. DIF is calculated by subtracting the nighttime temperature from the daytime temperature. Higher day temperatures give a positive DIF and promote growth. Lower daytime temperatures give a negative DIF and slow down growth. Negative DIF helps control plant height. For more information, read **Using setback for day/night temperature control in greenhouses** on page 69.
differential	The differential temperature is a setting for variable stages. For variable cooling stages, when the temperature is above the differential temperature setting, the fan runs at full speed. For variable heating stages, when the temperature is below the differential temperature setting, the heater is at full output. For more information, read **Programming variable stages** on page 73.
duty cycle	See *time-based duty cycle* or *temperature-based duty cycle*
Expansion Box	Expansion Boxes are optional devices you can connect to expand the load-carrying capacity of your Supra. Each unit follows the configuration and settings of the variable stage to which it is connected. For more information, read **Expansion Boxes** on page 10.
expansion kit	See *variable DC*
firmware	Firmware is the internal program instructions of the Supra. It comprises all the menus, displays, and more. You can update the firmware version of the Supra to the latest version using an Intaglio. For more information, read **Available accessories** on page 10.
group set point	The **group set point** is the desired temperature for the zone. For more information, read **Setting the group set point** on page 64.
growth curve	A growth curve is an extension of the group set point concept. The growth curve automatically adjusts the temperature set points over time to control the temperature in a room or zone. It is called a "growth" curve because it adjusts the set points as the animals "grow". For more information, read **Programming growth curves** on page 65.

humidity band	The humidity band is the range in which the Supra attempts to compensate for humidity. The band consists of a lower and upper limit. For more information, read **Programming the humidity** on page 71.
humidity compensation	The adjustment the Supra makes to compensate for high humidity levels. For more information, read **Programming the humidity** on page 71.
humidity factor	The amount of effect on the ventilation rate at high humidity levels; 0 is little effect, while 10 is full effect. For more information, read **Programming the humidity** on page 71.
humidity zone	The zone the humidity sensor (if connected) is assigned to. A humidity sensor can be assigned to only one zone. For more information, read **Selecting a humidity zone** on page 58.
hysteresis	Hysteresis helps prevent damage to the relays, variable stages, and the equipment connected to them by preventing the stages from switching on and off rapidly when the temperature is hovering close to the **set point**. For example, a household thermostat might turn on a furnace at 68 °F when the house is cooling down, but turn it off at 72 °F when the house is warming up. The difference between these two values is the hysteresis. For more information, read **Configuring hysteresis** on page 56.
idle at	**Idle at** is the temperature at which a variable cooling stage is at its minimum speed. For more information, read **Programming variable stages** on page 73.
idle speed	**Idle speed** is the percentage of full speed a variable stage fan is at when the temperature is between the **off at** and **idle at** temperatures. For more information, read **Programming variable stages** on page 73.
inlet actuator	See *actuator*
inlets	Inlets are shutter-like devices mounted on a wall or ceiling that control airflow in a building.
minimum duration	**Minimum duration** is the minimum amount of time and alarm condition must be present before the Supra signals an alarm. **Minimum duration** prevents alarms from activating when the temperature rises or drops for just a few seconds. For more information, read **Programming alarm settings** on page 88.
minimum idle	See *idle speed*

minimum position	**Minimum position** is the percentage an actuator will be open when the temperature is at the **minimum set point**. For more information, read **Programming actuator relays** on page 76.
minimum set point	**Minimum set point** is the temperature at which an actuator is at its **minimum position**. When the temperature is below the set point, the actuator closes completely. For more information, read **Programming actuator relays** on page 76.
off at	**Off at** is a temperature setting for variable stages. For cooling stages, when the temperature is below the **off at** temperature, the fan is off. When the temperature rises above the **off at** temperature, the fan runs at the **idle speed** until the temperature rises to the **idle at** temperature. For variable heating stages, when the temperature is above the **off at** temperature, the heater is off. When the temperature falls below the **off at** temperature, the heater operates at **min heat** until the temperature falls to the **set point** temperature. For more information, read **Programming variable stages** on page 73.
on full at	For variable cooling stages, the fan is on full (100% speed) at and above this temperature. For variable heating stages, the heat mat is **on full at** and below this temperature. For more information, read **Programming variable stages** on page 73.
PIN	PIN is an acronym for personal identification number. A PIN is a unique four-digit number similar to a password. When security is enabled, each user must enter their PIN before changing any settings or acknowledging alarms. This allows the Supra to track who has performed each change and prevents unauthorized access to the control. For more information, read **Programming alarm settings** on page 88.
pulse counter	A pulse counter it is an electronic counter that counts the number of electric pulses (switch closures). The Supra's pulse counter can count the electronic pulses emitted by a water meter with pulse output.
relative humidity	Relative humidity is the quantity of water vapor the air contains compared to the maximum amount it can hold at that particular temperature. For example, a relative humidity of 60% means the air contains 60% of the maximum moisture it can contain at the present temperature. The warmer the air, the more moisture the air can hold.
relay	A relay is an electromagnetic switch that is either on (closed) or off (open).

set point, temperature	Set point is the temperature at which a relay stage switches on or off. For more information, read **Programming heating and cooling elements** on page 81. See also *actuator set point* and *curtain set point*
setback	See *temperature setback*
silencing	See *alarm silencing*
spikes	Spikes are 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 16.
staggered start	See *startup timer*
startup timer	The method Supra uses for balancing the initial startup load. Each Supra has a configurable startup delay that it counts down before powering its loads. For more information, read **Configuring the startup timer** on page 39.
temperature-based duty cycle	Duty cycle is a temperature-based method of controlling heating or cooling elements using on and off durations. For cooling elements, when the temperature is below the **set point**, the cooling element is off. When the temperature is above the **set point**, the element switches on for the **on duration** and then off for the **off duration**. For heating elements, when the temperature is above the **set point**, the heating element is off. When the temperature is below the **set point**, the element switches on for the **on duration** and then off for the **off duration**. For more information, read **Programming heating and cooling elements** on page 81.
temperature setback	**Temperature setback** allows you to automatically change the temperature **set point** for specific periods of time during the day. When **temperature setback** is enabled, the Supra subtracts the **setback** amount from the **set point**. At the end of the setback period, the Supra returns to the normal **set point**. **Temperature setback** is ideal for maintaining different method (DIF) and in greenhouses. For more information, read **Programming the temperature setback** on page 69.
terminal block	The part of the Supra where you connect the wires for incoming power, control elements, and so on. For more information, read **Supra interior layout** on page 20.

time-based duty cycle

A time-based duty cycle is a method of controlling elements using **on durations** and **off durations** between certain hours of the day. Time-based duty cycles are often used to control feed augers.

For more information, read **Programming time-based duty cycles** on page 86.

timed event

A timed event is a method of controlling elements using **on times** and **off times**. Timed events are often used to control equipment such as lights that need to be switched on or off during certain times of the day.

For more information, read **Programming timed events** on page 84.

tunnel mode set point

When the zone temperature is at or above the **tunnel mode set point**, cooling elements configured for tunnel mode (**Tunnel turn off** set to **yes**) react as follows.

Actuators move to position zero (close the inlet), curtains close, cool relays and temperature-based duty cycles switch off, and variable stages go to 0%.

For more information, read **Programming the tunnel mode set point** on page 68.

Variable DC Expansion Kit

The Variable DC Expansion Kit allows you to connect equipment that requires a 0 to 10 V input, such as variable frequency drives.

For more information, read **Variable DC Expansion Kit** on page 10.

variable stage set point

The variable stage **set point** is the temperature at which a variable heating stage is at its **minimum output**.

For more information, read **Programming variable stages** on page 73.

See also *idle at*

zone

A zone defines an area set off as distinct from surrounding or adjoining parts. Zones might or might not be separated by walls. For example, a large room could be divided into two zones to provide better control response.

For more information, read **How zones work** on page 35.

Appendix B: Troubleshooting

- If you see an alarm message and are not sure what it means, look it up in the **Alarm messages** table below and then follow the instructions for resolving the alarm condition.
- If you are having a problem using the Supra, see if the problem is described in the **Troubleshooting** table on page 117 and then follow the directions for correcting the problem.
- If you receive a warning during configuration, look it up in the **Warnings worksheet** on page 128 and then follow the instructions for correcting the problem.

Alarm messages

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

Alarm message	Possible cause	Possible solution
High Temp Probe 1 High Temp Probe 2 High Temp Probe 3 High Temp Probe 4	The temperature associated with a probe has gone above the high temperature alarm point and past any alarm biasing.	◇ Try lowering the temperature by turning heaters down or off, or by increasing or turning on cooling elements (such as fans or misters), or by a combination of both. ◇ Check the temperature probes. ◇ Check to see if a fan has failed. ◇ Check settings. ◇ Check if probe averaging is enabled and configured correctly.
Low Temp Probe 1 Low Temp Probe 2 Low Temp Probe 3 Low Temp Probe 4	The temperature associated with a probe has gone below the low temperature alarm point.	◇ Try to raise the temperature by turning heaters up or on, or by decreasing or turning off cooling elements (such as fans or misters), or by a combination of both. ◇ Check the temperature probes. ◇ Check to see if a heater has failed. ◇ Check settings. ◇ Check if probe averaging is enabled and configured correctly.
Probe 1 Shorted Probe 2 Shorted Probe 3 Shorted Probe 4 Shorted	An active temperature probe has shorted.	◇ The next active Probe will be used. If Averaging is ON, the defective probe will be excluded from the average. ◇ Replace the temperature probe. The control should recover automatically. ◇ Read **Connecting temperature probes** on page 29.

Alarm message	Possible cause	Possible solution
Probe 1 Absent Probe 2 Absent Probe 3 Absent Probe 4 Absent	An active temperature probe has disconnected.	◇ The next active Probe will be used. If Averaging is ON, the defective probe will be excluded from the average. ◇ Reconnect the temperature probe. The control should recover automatically. ◇ Read **Connecting temperature probes** on page 29.
Actuator 1 Jam Actuator 2 Jam	The Supra is attempting to open or close an inlet or other element operated by an actuator, and has not received the correct response from the positioning motor.	◇ Check the element controlled by the actuator to see if it is mechanically stuck. ◇ Check the feedback wires for damage. ◇ Read **Determining correct actuator feedback wiring** on page 119.
Error for a relay during the status display	You have configured an “open relay” for an actuator or curtain, but not a “close relay”.	◇ Check the relay configuration and configure the close relay. ◇ Read **Configuring the control stages** on page 44.
Low AC Line Frequency High AC Line Frequency	The AC line frequency is outside acceptable limits (±3 Hz at rated line frequency). There is a danger of damaging the control if this condition persists.	◇ Consult your local power company. ◇ If using generator power, adjust the generator frequency to 60Hz (or 50Hz).
Low Power Volt. High Power Volt.	AC power supply is outside acceptable limits (+10%/-20% at rated line voltage).	◇ Consult an electrician or your local power company.
PC Comm. Alarm	The communication cable between the Supra and the computer is damaged or disconnected.	◇ Check the cable. ◇ Verify that cable leads are properly seated in terminal block.

Troubleshooting

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

Problem	Possible cause	Possible solution
Display is difficult to read	Contrast needs adjusting	◇ Adjust the contrast. Refer to *contrast adjuster* (#20) on page 20.
Power supply components blown out Burn marks on boards and components Motors and fans slow down or stop	Power surge, brownout, or power outage	◇ You cannot do anything when it happens, but could avoid problem in future by providing proper voltage and/or protection to the unit.
No power and/or display	A circuit breaker at service panel is off or tripped.	◇ Reset the circuit breaker.
	Incorrect wiring	◇ Correct the wiring. Read **Connecting the power source** on page 32.
	Display board inter-connect cable is not plugged into the power supply board properly.	◇ Plug in the display board cable. Read **Supra interior layout** on page 20.
	115/230 VAC switch in the wrong position	◇ Switch off the power, set switch to the correct setting, and then switch on the power. Read **Connecting the power source** on page 32.
Relay not operating load	Incorrect wiring	◇ Correct the wiring.
	Switch-on setting for stage incorrect	◇ Adjust the setting.
	Relay set to cool for a heater Relay set to heat for a fan	◇ Read **Configuring relays for heating, cooling, or temperature-based duty cycles** on page 51.
	No power to load	◇ Switch on the power.
	Faulty equipment	◇ Replace the equipment.
	Circuit breaker open	◇ Reset the breaker.
	Blown relay	◇ Solve the problem that caused the relay to blow and then replace the circuit board or use a different relay.
Variable fan or variable heat element runs at maximum.	Incorrect wiring	◇ Correct the wiring. Read **Connecting variable heating or cooling elements** on page 26.
	Minimum idle speed too high	◇ Decrease the mimimum idle speed setting. Read **Programming variable stages** on page 73.
	Variable speed range matches temperature set point	◇ Adjust the temperature set point to the desired temperature. Read **Programming variable stages** on page 73.

Problem	Possible cause	Possible solution
Variable fan or variable heat element not running	Incorrect wiring	◇ Correct the wiring. Read **Connecting variable heating or cooling elements** on page 26.
	Fuse open or blown	◇ Check why the fuse was blown and repair any problems. Replace the fuse.
	Minimum Idle setting too low	◇ Increase the minimum Idle speed setting. Read **Programming variable stages** on page 73.
	Idle off setting too high	◇ Decrease the idle off setting. Read **Programming variable stages** on page 73.
	Temperature set point is above room temperature.	◇ Adjust the temperature set point to the desired temperature. Read **Programming variable stages** on page 73.
	No power to fan/heater	◇ Switch on the power.
	Faulty fan/heater	◇ Replace the equipment.
	Circuit breaker open	◇ Reset the breaker.
Fans turn off and actuators close when zone temperature rises	Tunnel mode is active	◇ Set tunnel turn off to know for stages you do not want affected by tunnel mode.
Alarm relay not operating alarm system	Incorrect wiring	◇ Correct the wiring. Read **Connecting alarm systems** on page 28.
Display showing unusually high temperature	Extension cable connected to temperature probe is providing a poor connection	◇ Check the extension cable connection. Resolder it if necessary.
	Damaged probe	◇ Replace the temperature probe.
Variable speed 1 or variable speed 2 fan switches on, runs at full speed, and then turns off. Keeps cycling.	Hysteresis not high enough. Outside temperature rising and falling quickly. Happens most often in the spring and fall.	◇ Adjust the hysteresis setting or overlap the Variable speed 1 or variable speed 2 fan settings. Read **Configuring hysteresis** on page 56.
Staged heater cycles on and off	Heater set points are too close together with variable speed fans.	◇ Adjust the hysteresis setting. Read **Configuring hysteresis** on page 56. ◇ Move the temperature probe closer to the heater. ◇ Widen the set points. Read **Programming heating and cooling elements and temperature-based duty cycles** on page 81.
	Heater too large for room	◇ Replace the heater with a smaller output unit.
	Stage is set up as a temperature-based duty cycle	◇ Remove the duty cycle from the stage's settings. Read **Programming heating and cooling elements and temperature-based duty cycles** on page 81.
Date/time not correct	Daylight savings	◇ Adjust the date/time.Read **Setting the date and time** on page 40.
Forgotten PIN		◇ Have a user with "Admin" access assign a new password. Read **Changing PINs** on page 94.

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. F

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

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

Appendix C: Factory defaults

When the Supra leaves the factory, it comes with default settings and configuration. When you configure and set up the Supra, you change its settings. Resetting the Supra erases *all the configuration and settings you programmed* and then restores the settings to what they were when the control left the factory. For more information, read **Resetting the Supra to its factory defaults** on page 107.

The following table lists the factory defaults.

Configuration defaults					
Relays (1 to 12)	Zone: Mode: Tunnel turn off:	1 unassigned no	*Variable stages (1 to 4)*	Zone: Mode: Tunnel turn off:	1 cool no
Hum zone	Unassigned		*Variable DC outputs (1 to 4)*	Zone: Mode: Tunnel turn off:	1 cool no
Settings menu defaults					
Group setpoint	Zone 1: Zone 2: Zone 3: Zone 4:	85.0°F 85.0°F 85.0°F 85.0°F	*Growth curve (A and B)*	Zone: Status: Current day: Step 1: Step 2: Step 3: Step 4: Step 5: Step 6: Step 7:	None Disabled 1 day 1 85.0°F day 4 80.0°F day 14 75.0°F day 24 70.0°F day 34 65.0°F day 44 60.0°F day 64 60.0°F
Heat/cool stages	None assigned				
Variable stages (1 to 4)	On full at: Idle at: Off at: Idle speed:	86.5°F 85.0°F 80.0°F 20%			
Curtains	None assigned				
Actuators	None assigned		*Alarms*	Probe 1: Probe 2-4: High temp: Low temp: Biasing enabled: High temp bias: Bias time: Probe damage: AC power: AC frequency: Actuator jam: PC comms: Water overflow: Max flow: Sensor damage: Silencing: Min duration:	Enabled Disabled 99.0°F 50.0°F No 10.0°F 1 hour Yes Yes Yes Yes No No 500000 No 30:00 01:00
Duty cycle	None assigned				
Timed events	None assigned				
Water meter	 Display in:	1 Litre/pulse Litres			
Humidity control	Upper limit: Lower limit:	90% 30%			
Temp setback (A and B)	Zone: Status: Setback: Start Time: Stop Time:	None Disabled 5.0°F 6:00 AM 9:00 PM			
Tunnel mode	Setpoint:	85.0°F			

Maintenance menu defaults					
Switch F/C	Temp display:	°F	*Unit name*	Phason Supra	
Main display	Zone temps:	1	*Hysteresis*	H/C stages:	0.5°F
	Temp extremes:	No		Var idle off:	0.3°F
	Rly 1 to 12:	No		Actuator:	0.3°F
	VS 1 to 4:	Yes		Position:	3%
	Water meter:	No		Timeout:	00:10
	Humidity:	No	*De-icing*	Colder than:	33.0°F
	Scroll time:	4 seconds		Duration:	3 seconds
				VS 1 to 4:	No
Temp. probe	Probe 1 to 4:	Normal	*Warnings*	H/C conflict:	Yes
Motor curve	VAR 1 to 4:	Optimum		Min Ventilation:	Yes
Averaging	Averaging:	Off		Large VAR Rng:	Yes
Humidity factor	Humidity factor:	5		Odd Timed Evnt:	Yes
Startup timer	Startup timer:	1 second		Overlap Events:	Yes
				Edit Aborted:	Yes

Appendix D: Installation worksheet

Use the worksheet on the next page to list all the equipment (fans, heaters, curtains, and so on that you want the Supra to control. Phason recommends you make a copy of the worksheet before filling it in incase you need more than one sheet or you make a mistake.

Use the **Installation worksheet** when you fill in the **Configuration worksheets** (starting on page 123).

Refer to **Supra electrical ratings** on page 18 and **Supra interior layout** on page 20. The following example shows how to fill in the worksheet.

Equipment to install	Where to connect the equipment on the Supra
Example: 24-inch single –speed pit fan	*RLY1*
Example: Actuator 1 – North room	*Open relay: RLY11 Close relay: RLY12* *Feedback: ACT 1 FB*

Equipment to install	Where to connect the equipment on the Supra (relay number, VAR number, etc)

Appendix E: Configuration worksheets

- ◇ Use the **Installation Worksheet** on page 121 when completing the configuration worksheets.
- ◇ For Actuator 1, use the feedback terminal ACT 1 FB; for Actuator 2, use ACT 2 FB.

Relay configuration worksheet

- Enter the zone number (1, 2, 3, or 4)
- Enter whether or not the relay switches off during tunnel mode
- Enter a description (13 characters maximum)
- Put a check mark in the appropriate column for how to configure the relay.
- If the relay uses one of the 6 curtains, enter the curtain number in that column (remember that you need 2 relays for each curtain you use: one for open and one for close)

Relay configuration example

Relay	Zone	Tunnel?	Description	Timed event	Dutv cvcle	Heat	Cool	Actuator 1 open	Actuator 1 close	Actuator 2 open	Actuator 2 close	Curtain open	Curtain close
1	*2*	*No*	*Inlet 1*					√					
2	*2*	*No*	*Inlet 1 cls*						√				
3	*2*	*No*	*Inlet 2*							√			
4	*2*	*No*	*Inlet 2 cls*								√		
5	*2*	*No*	*Curtain 1*									*1*	
6	*2*	*No*	*Curt 1 cls*										*1*
7	*2*	*No*	*Curtain 2*									*2*	
8	*2*	*No*	*Curt 2 cls*										*2*
9	*2*	*No*	*Large Fan*				√						
10	*2*	*No*	*Gas Heater*			√							
11	*2*	*No*	*Electric Heat*			√							
12	*2*	*No*	*Heat Lamps*			√							

Relay	Zone	Tunnel?	Description	Timed event	Duty cycle	Heat	Cool	Actuator 1 open	Actuator 1 close	Actuator 2 open	Actuator 2 close	Curtain open	Curtain close
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

Variable stage configuration worksheet

- Enter the zone number (1, 2, 3, or 4)
- Circle the type of equipment. For example, “cool” for a cooling fan, or “heat” for a heat mat.
- Enter whether or not the stage turns off during tunnel mode
- Enter a description (13 characters maximum)

Example

Stage	Zone	Type	Tunnel?	Description
1		Heat (Cool)	*Yes*	*VS fan 1*
2		Heat (Cool)	*No*	*VS fan 2*
3		Heat (Cool)	*No*	*VS fan 3*
4		(Heat) Cool	*Yes*	*Heat mat*

Stage	Zone	Type	Tunnel?	Description
1				
2				
3				
4				

Temperature averaging worksheet

Temperature averaging allows you to take temperature readings from two or more probes and average the values. When averaging is off, a temperature probe can be assigned to only one zone. When averaging is on, a probe can be one of several probes assigned to a zone.

For more information, read **Configuring temperature averaging** on page 42.

Zone	Average these probes			
1	1	2	3	4
2	1	2	3	4
3	1	2	3	4
4	1	2	3	4

Humidity zone worksheet

If you installed a Relative Humidity Sensor, you need to select which zone the sensor will be monitoring. A humidity sensor can monitor only one zone.

For more information, read **Selecting a humidity zone** on page 58.

Humidity sensor is installed in zone: 1 2 3 4

Pulse counter worksheet

If you connected a water meter to the Supra's pulse counter terminal and will be monitoring water usage, you need to tell the Supra how much water (in litres or US gallons) goes through the meter for each pulse the meter puts out.

For more information, read **Configuring the pulse counter** on page 59.

Item	Setting		Description
Pulse output			Number of units per pulse. For example, *10* gallons per pulse.
Pulse output units	Litres	US gallons	The unit of measure for the pulse output. For example, 10 *gallons* per pulse.
Display units	Litres	US gallons	Display water usage in this unit of measure.

De-icing worksheet

The Supra's de-icing feature helps keep variable-speed fans from icing up if the outdoor temperature is too cold. When de-icing is enabled, variable-speed fans start at full speed before dropping to the idle or normal speed.

For more information, read **Configuring de-icing** on page 57.

Setting	VSP 1	VSP 2	VSP 3	VSP 4
De-Icing temperature (–40.0 to 50.0°C, 14 to 110°F)				
Duration to de-ice (1 to 9 seconds)				

Hysteresis worksheet

Hysteresis helps prevent damage to the relays, variable stages, and the equipment connected to them by preventing the stages from switching on and off rapidly when the temperature is hovering close to the set point.

For more information, read **Configuring hysteresis** on page 56.

Heat/cool stages	The number of degrees above the turn-on point when a heating relay will turn off, and the number of degrees below the turn-on point that a cooling relay will turn off	_____ °C / °F Range: 0.2 to 2.8°C, 0.3 to 5.0°F Default: 0.3°C , 0.5°F
Variable speed idle off		_____ °C / °F Range: 0.2 to 2.8°C, 0.3 to 5.0°F
Actuator **Actuator position**	This adjusts the accuracy of the actuator – the tolerance in percent that the actuator can be resting away from the desired position or the number of degrees the actuators will stay at rest between the open and close points.	_____ °C / °F Range: 0.2 to 2.8°C, 0.3 to 5.0°F Default: 0.3°C, 0.3°F _____ % Range: 1 to 10% Default: 3%
Timeout	Amount of time the Supra will wait to see if the actuator has moved before actuator jam alarm.	_____ mm:ss mm=number of minutes ss=number of seconds Range: 00:02 to 00:10 seconds Default: 00:10

Warnings worksheet

Warnings are one of the Supra's built-in diagnostic tools. They warn you about conflicts or out-of-range conditions as you are programming the control. When the Supra comes from the factory, all warnings are set to "Yes".

For more information, read **Configuring warnings** on page 60.

Warning	Enable?		Description
H/C conflict	Yes	No	There is a heat/cool set point conflict – The set point for any fixed or variable heater stage is above the set point for any fixed or variable cool stage.
Min Ventilation	Yes	No	The idle band too small – The idle temperature band for any variable cool stage is less than 10°F.
Large VAR Range	Yes	No	The differential for a variable stage is more than 5°.
Odd Timed Events	Yes	No	There is an odd number of timed events – The number of timed events for any relay stage is not a multiple of two. Timed events must have an ON event for every OFF event.
Overlap Events	Yes	No	There are overlapping timed events – A device has two or more consecutive ON events, or consecutive OFF events.
Edit aborted	Yes	No	You did not press **ENTER** after changing the settings.

Appendix F: Settings worksheets

This appendix contains worksheets for you to use when programming the Supra settings. Each worksheet contains a brief explanation of the information required. For more information about programming the Supra, see **Chapter 4: Programming** on page 62.

Group set point worksheet

A **group set point** is the desired or target temperature for a zone. The **individual set points** for each variable and relay stage will be adjusted relative to the **group set point** for that zone. Make sure you set the **group set point before** setting the **individual set points**.

For example, say the **group set point** for zone 1 is 80°F, a variable-stage fan **set point** is 5 degrees higher (85°F), and a single-stage heater **set point** is 7 degrees lower (73°F). If you lower the **group set point** to by 5 degrees to 75°F, the **set points** for the fan and heater will also be lowered by 5 degrees to 80°F and 68°F respectively.

For more information, read **Setting the group set point** on page 64.

Zone	Temperature
1	(°C / °F)
2	(°C / °F)
3	(°C / °F)
4	(°C / °F)

Tunnel mode worksheet

When the zone temperature is at or above the **tunnel mode set point**, variable stages and relays that are configured for tunnel mode react as follows.

- **Actuators** – move to position zero (close the inlet)
- **Curtains** – close the curtain
- **Cool relays** and **temperature-based duty cycles** – switch off the relay
- **Variable stages** – set the speed to 0%

Zone	Temperature
1	(°C / °F)
2	(°C / °F)
3	(°C / °F)
4	(°C / °F)

For more information about enabling tunnel mode for variable stages and relays, read **Configuring the control stages** starting on page 44.

Growth curve worksheet

A growth curve is an extension of the group set point concept. The growth curve automatically adjusts the temperature set points over time to control the temperature in a room or zone. It is called a growth curve because it adjusts the set points as the animals grow.

You can have up to seven steps in a growth curve. Each step has a starting temperature **set point** and a **duration**. The Supra automatically calculates the set points for the days between the steps and adjusts the set points at midnight each day. Individual set points for the variable and fixed stages are adjusted relative to the growth curve temperature for that particular day.

You can set up two growth curves: growth curve A and growth curve B. This lets you control two different areas of your facility using independent set points.

For more information, read **Programming growth curves** on page 65.

Growth curve A						**Growth curve B**					
Zone(s)	All	1	2	3	4	**Zone(s)**	All	1	2	3	4
Step	**Temperature①**			**Start day**		**Step**	**Temperature①**			**Start day**	
St1						St1					
St2						St2					
St3						St3					
St4						St4					
St5						St5					
St6						St6					
St7						St7					

① Temperature in °F/°C, range: –10 to 43°C, 14 to 110°F

Variable stage settings worksheet

Setting	Variable 1		Variable 2		Variable 3		Variable 4	
Type of element	Heat	Cool	Heat	Cool	Heat	Cool	Heat	Cool
On full at①								
Idle at/Setpoint①								
Off at①								
Idle speed/Min heat②								

① Temperature in °F/°C, range: –10 to 43°C, 14 to 110°F
② Idle speed or Min heat in %, range: 0 to 100 %

- If you need to connect more heating or cooling elements than you have relays, and you are not using all the variable stages, you can use any available variable stage as an ON/OFF stage.
- Set the **idle speed** (**min heat** for a heating stage) to 100% and **off at** to the temperature at which you want the stage to switch on/off. For more information, read **Programming variable stages** on page 73.

Temperature setback worksheet

Temperature setback automatically changes the temperature **set point** for a specific period of time during the day. Temperature setback works for both **group set points** and **growth curves**.

There are two separate "setback groups": A and B. For more information, read **Programming the temperature setback** on page 69.

Item	Setback A setting					Setback B setting					Example				
Zone	1	2	3	4	All	1	2	3	4	All	(1)	(2)	3	4	All
Status	Enabled		Disabled			Enabled		Disabled			(Enabled)		Disabled		
Setback①				°C	°F				°C	°F	*8.0*			°C	(°F)
Start Time	:			AM	PM	:			AM	PM	*06* : *00*			(AM)	PM
Stop Time	:			AM	PM	:			AM	PM	*10* : *00*			(AM)	PM

① Setback range: 1.0 to 25°F (0.6 to 13.9°C)

Humidity compensation settings worksheet

If you have installed and configured a humidity sensor, you need to program the humidity compensation. Programming the humidity compensation means setting the humidity factor and the upper and lower humidity limits. For more information, read **Programming the humidity** on page 71.

If you are using Fahrenheit, a good guideline is to set the **humidity factor** equal to half the cooling band. If you are using Celsius, use a value equal to the cooling band. For example, if the temperature **set point** for the first stage is 70°F and the last stage switches on at 78°F, the cooling band would be 8°F. You would set the **humidity factor** to 4. For more information, see the following table.

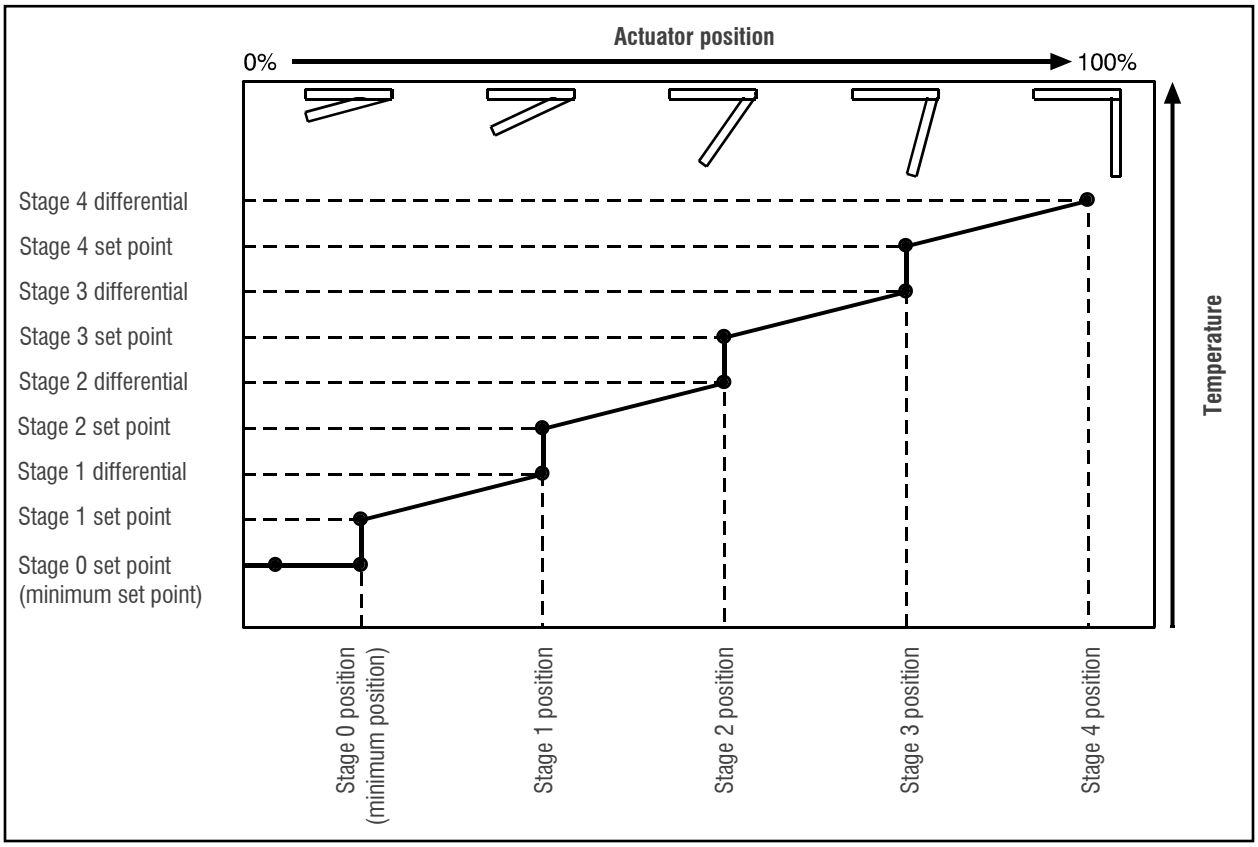
Cooling band (°C)	Cooling band (°F)	Humidity factor
1.0	2.0	1
2.0	4.0	2
3.0	6.0	3
4.0	8.0	4
5.0	10.0	5
6.0	12.0	6
7.0	14.0	7
8.0	16.0	8
9.0	18.0	9
10.0	20.0	10

Setting		Notes
Humidity factor		A number from 0 to 10 used to calculated humidity compensation.
Upper limit	%	90% maximum, must be at least 20% higher than the lower limit.
Lower limit	%	30% minimum, must be at least 20% lower than the upper limit.

Actuator settings worksheet

Each actuator has four stages. For each actuator you are setting up you need to program the:

- Minimum set point
- Minimum position
- Set point, differential, and position for stages 1 to 4



While the temperature is below the **minimum set point**, the actuator is closed. When the temperature rises to the **minimum set point,** the actuator moves to the **minimum position**.

As the temperature rises, the actuator has four stages it moves through until it reaches its maximum open position. This method lets you gradually open inlets instead of fully opening them when the temperature rises above a single set point.

In other words, "when the temperature is here (**stage set point**), I want the actuator to start opening. When the temperature reaches here (**stage differential**), I want the actuator to be at this position (**stage position**) percent."

For more information, read **Programming actuator relays** on page 76.

Setting	ACT-1	ACT-2	Description
Minimum set point①			Actuator will close completely when ambient temperature is below this
Position②			After temperature drops and begins to rise again, actuator will open to this position when ambient temperature reaches Minimum Set Pt again
Stage 1set point①			Temperature at which actuator starts opening for Stage 1
Differential①			Temperature at which actuator is open to Stage 1 Position
Position②			Percentage actuator is open
Stage 2 set point①			Temperature at which actuator starts opening for Stage 2
Differential①			Temperature at which actuator is open to Stage 2 Position
Position②			Percentage actuator is open
Stage 3 set point①			Temperature at which actuator starts opening for Stage 3
Differential①			Temperature at which actuator is open to Stage 3 Position
Position②			Percentage actuator is open
Stage 4 set point①			Temperature at which actuator starts opening for Stage 4
Differential①			Temperature at which actuator is open to Stage 4 Position
Position②			Percentage actuator is open

① Temperature in °F/°C, range: –10 to 43°C, 14 to 110°F
② Position in %, range: 0 to 100 %

Curtain worksheet

Curtains control the temperature by adjusting the air flow into the facility. Each curtain has six settings.

- Set point – the temperature at which the curtain holds its position.
- Idle band – the buffer around the set point within which the curtains hold their position.
- Open run time – the duration the curtains open during the ON cycle
- Open idle time – the duration the curtains hold their position during the ON cycle
- Close run time – the duration the curtains open during the OFF cycle
- Close idle time – the duration the curtains hold their position during the OFF cycle

For more information, read **Programming curtain control relays** on page 79.

Curtain	Zone	Set point①	Idle band①	Open run②	Open idle②	Close run②	Close idle②
				:	:	:	:
				:	:	:	:
				:	:	:	:
				:	:	:	:
				:	:	:	:
				:	:	:	:

① Temperature in °F/°C, range: –10 to 43°C (14 to 110°F)
② Duration in mm:ss, range: 0 to 10 minutes in 1 second increments

Heating and cooling elements worksheet

Heating and cooling elements control the temperature by switching single-stage heating equipment such as electric heaters, or cooling equipment such as misters ON or OFF.

There are two types of heating and cooling element setups: "standard" and "temperature-based" duty cycle. Programming a **standard** element means setting the temperature **set point** and selecting *Off* for the duty cycle. Programming a **temperature-based** duty cycles means setting the temperature **set point**, selecting *On* for the duty cycle, and setting the **on duration** and **off duration**.

For more information, **Programming heating and cooling elements and temperature-based duty cycles** on page 81

Relay	Type		Set point①	Duty cycle		On duration②	Off duration②
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :
	Heat	Cool		On	Off	: :	: :

① Temperature in °F/°C, range: –10 to 43°C, 14 to 110°F
② Duration in hh:mm:ss

Timed events worksheet

Timed event relays control equipment such as lights that need to be switched ON or OFF during certain times of the day. Programming timed events means setting the "on" and "off" times. Timed events must occur in pairs. This means that every time you set a relay to switch on, you must set a time for it to switch off.

For more information, read **Programming timed events** on page 84.

Relay	Zone	Relay	Zone	Relay	Zone
On time	OFF time	ON time	OFF time	ON time	OFF time
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:

ON/OFF time in 12-hour format (AM/PM)

Relay	Zone	Relay	Zone	Relay	Zone
On time	OFF time	ON time	OFF time	ON time	OFF time
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:

Relay		Zone		Relay		Zone		Relay		Zone	
On time		OFF time		ON time		OFF time		ON time		OFF time	
:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	
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:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	

Relay		Zone		Relay		Zone		Relay		Zone	
On time		OFF time		ON time		OFF time		ON time		OFF time	
:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	
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:		:		:		:		:		:	
:		:		:		:		:		:	
:		:		:		:		:		:	

Time-based duty cycle worksheet

Time-based duty cycles are a cross between temperature-based duty cycles and timed events. Unlike temperature-based duty cycles, time-based duty cycles occur between certain hours of the day, regardless of temperatures.

Setting up a time-based duty cycles means setting the **ON duration**, **OFF duration**, **start time**, and **end time**.

For more information, read **Programming time-based duty cycles** on page 86

Relay	Zone	Start time①	Stop time①	ON duration②	OFF Duration②
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:
		:	:	:	:

① Start/stop time in 12-hour format (AM/PM)
② ON/OFF duration in mm:ss

Alarm settings worksheet

The alarm settings for the Supra determine which alarm conditions are enabled, which are disabled, and their settings. All these work together to determine how and when the alarm relay activates (in other words, signals an alarm condition).

- **Minimum duration** prevents alarms from activating when the temperature rises or drops for just a few seconds.
- **Silencing** temporarily disables an alarm setting after an alarm has been acknowledged. This prevents the alarm relay from activating immediately after acknowledging the alarm.
- **Alarm biasing** prevents the alarm from sounding on very hot days when the **temperature set point** cannot be maintained. The **high temperature bias** is added to the **high temperature** alarm setting if the outdoor temperature is higher than the alarm setting.

For more information, read **Programming alarm settings** on page 88.

Item	Status/setting		Description
Probe 1	Enabled	Disabled	Enables the temperature alarms for the probe.
Probe 2	Enabled	Disabled	
Probe 3	Enabled	Disabled	
Probe 4	Enabled	Disabled	
High temperature①			The highest temperature to which you can safely allow your facility to rise – identified by probe. This cannot be lower than low temperature alarm.
Low temperature①			The lowest temperature to which you can safely allow your facility to fall – identified by probe. This cannot be higher than high temperature alarm.
Biasing enabled	Yes	No	To enable alarm biasing, set this parameter to “Yes”.
High temperature bias②			The maximum difference that is allowed between the zone temperature and the high temperature alarm.
Bias time③			If the outdoor temperature drops but the room has not yet cooled down, the alarm biasing will still be in effect for the length of time specified in this parameter.

① Temperature in °F/°C, range: 14 to 110°F, –10 to 43°C
② Temperature in °F/°C
③ Duration in hours, range: 0 to 5 hours

Item	Status/setting		Description
Probe damage	Yes	No	Occurs if any existing temperature probe is disconnected or shorted
AC power	Yes	No	Occurs if AC power supply drops below an acceptable level
AC frequency	Yes	No	Occurs if the AC line frequency is outside acceptable limits (± 3 Hz of frequency) Note: frequency in North America is 60 Hz, and in Europe is 50 Hz
Actuator jam	Yes	No	Occurs if the unit is attempting to open or close an inlet and does not receive the correct response from the positioning motor
PC communications	Yes	No	Occurs if there is a communications failure between the unit and the PC or another unit
Water overflow	Yes	No	Occurs if the water flow is above the max flow setting.
Max flow④			The maximum daily water flow (usage). If the usage goes above this value, there is an alarm condition
Sensor damage	Yes	No	Occurs if an existing humidity sensor is disconnected or shorted
Silencing⑤	:		The length of time an alarm is deactivated after being acknowledged.
Minimum duration⑤	:		The time between when an alarm condition is detected and the alarm is activated.

④ Flow (water usage) in litres or US gallons
⑤ Duration in mm:ss, range: 00:00 to 10:00 for silencing and 00:00 to 30:00 for minimum duration

Status screen display worksheet

When you are looking at the Supra while it is operating normally, you want to be able to quickly see what is happening. The Supra lets you display different types of information on the display. If this information uses more than four lines, the information cycles through groups of four lines so you can watch the display for a few seconds to get all the information you need.

For more information, read **Setting up the status display** on page 91.

Item	Setting	Notes
Current zone temperatures	1 2 3 4 All	Which zone(s) to display
Temp extremes	Yes No	Displays the current day's high and low temperatures for each zone selected above
Relay 1	Yes No	◇ Displays whether the relay is ON or OFF ◇ If an inlet, displays the percentage of the current stage ◇ If a curtain, displays the statistics for that curtain
Relay 2	Yes No	
Relay 3	Yes No	
Relay 4	Yes No	
Relay 5	Yes No	
Relay 6	Yes No	
Relay 7	Yes No	
Relay 8	Yes No	
Relay 9	Yes No	
Relay 10	Yes No	
Relay 11	Yes No	
Relay 12	Yes No	
Variable stage 1	Yes No	Displays the percentage (speed or voltage) of the stage
Variable stage 2	Yes No	
Variable stage 3	Yes No	
Variable stage 4	Yes No	
Vdc (0-10V)	Yes No	Displays the percentage of the stage
Water meter	Yes No	Displays the water usage for the current day
Humidity	Yes No	Displays the current humidity
Scroll duration	seconds	How often the display changes; range: 1 to 6

Security levels worksheet

The Supra has a five-level PIN security system. Each level has access to different areas of the Supra. When you initially set up the Supra, if you will be using security, you need to add users to your system.

When security is enabled, each user must enter their PIN before changing any settings or acknowledging alarms. This allows the Supra to track who has performed each change and prevents unauthorized access to the control. For more information, read **Setting up security and users** on page 92.

The following table lists the access allowed for each security level.

	Security level				
Allowed to…	**Admin**	**Manager**	**Personnel**	**Technician**	**View only**
Change settings	√	√	√		
Acknowledge alarms	√	√	√	√	
Maintenance functions	√	√			
Calibrate actuators	√	√		√	
View logs	√	√	√	√	
Add and remove users	√				
Configuration	√	√			
Diagnostics	√	√		√	
View only (no security is required)					√

	Security level				
Name	**Admin**	**Manager**	**Personnel**	**Technician**	**View only**
Example: *Handy Mann*	√				

Appendix G: Supra motor curves

The following table lists the Supra's available motor curves. For more information about motor curves, see **Selecting motor curves** on page 60.

Optimum	V1	V2	V3	V4	V5
Phason curve	Franklin 1/6 hp 3450 rpm	Canarm 18"	Marathon 1/3 hp 1625 rpm	Multifan 4E35	Multifan 4E50
	Leeson 1/3 hp 1625 rpm	Marathon 1/2 hp 1625 rpm	Canarm 24 inch	Canarm 20 inch	Multifan 4E45
	Leeson 1/4 hp 1625 rpm	Magnatek 1/6 hp 3300 rpm	Magnatek 1/3 hp 1725 rpm	Magnatek 1/3 hp 1040 rpm	Multifan 4E40
	AT09Z2 3350 rpm	Magnatek 1/6 hp 1725 rpm	AT16Z 1625 rpm	Marathon 3/4 hp 1040 rpm	Magnatek 1/2 hp 840 rpm
		Leeson 1/2 hp 1625 rpm		AT24Z 1075 rpm	Baldor 1/3 hp 840 rpm
		Leeson 3/4 hp 1625 rpm		Zielhl-Abegg 18 inch	Baldor 1/3 hp 1700 rpm
		Emerson 1/6 hp 3400 rpm		Zielhl-Abegg 20 inch	Baldor 1/4 hp 1700 rpm
					AT36Z1 850 rpm
					Zielhl-Abegg 12 inch

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Service and technical support

Your dealer will be happy to answer all technical questions that will help you use your Supra. Before contacting them, check the following:

- Read the manual for information about the feature that is causing problems.
- If you see an alarm message and are not sure what it means, look it up in the **Alarm messages** table on page 115 and then follow the instructions for resolving the alarm condition.
- If you are having a problem using the Supra, see if the problem is described in **Appendix B: Troubleshooting** on page 115 and then follow the directions for correcting the problem.
- If you received a warning during setup or while changing settings, look it up in the **Warnings worksheet** on page 128 and then follow the instructions for correcting the problem.
- If you still have a problem with the Supra, collect the following information:
  - The serial number (see page 20)
  - The firmware version (see page 38)
  - Any messages displayed by the Supra
  - A description of the problem
  - A description of what you were doing before the problem occurred

- 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.