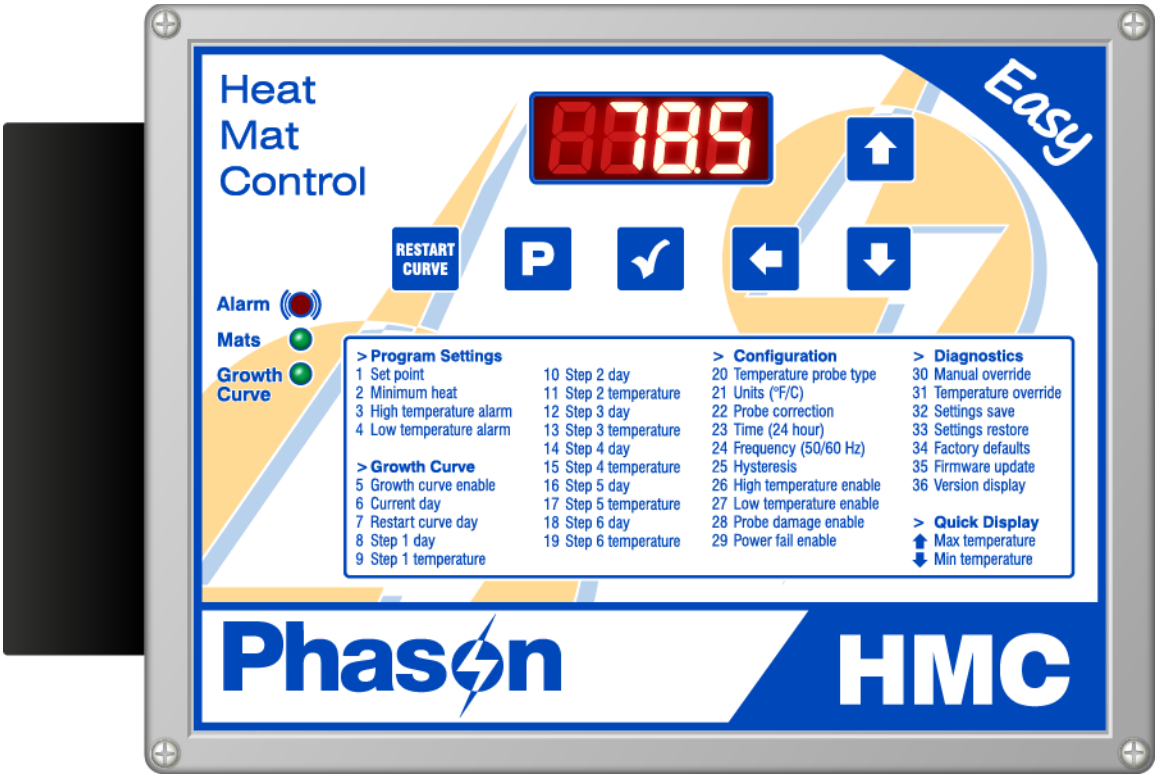
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Mat
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P
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HMC

LR 61791

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Chapter 1: Introducing the Heat Mat Control

Introducing the HMC

The Phason Heat Mat Control is an automatic temperature-based control with one 20 amp variable stage for controlling heat mats.

The Heat Mat Control is loaded with powerful features, including a six-step growth curve. All configuration and programming parameters are listed on the cover and are never more than a few button presses away, making the HMC one of the easiest controls to program.

The Heat Mat Control displays alert conditions such as high and low temperatures, power failure, and probe damage. For greater peace of mind, you can connect to an alarm siren, alarm panel, or auto-dialer.

Features

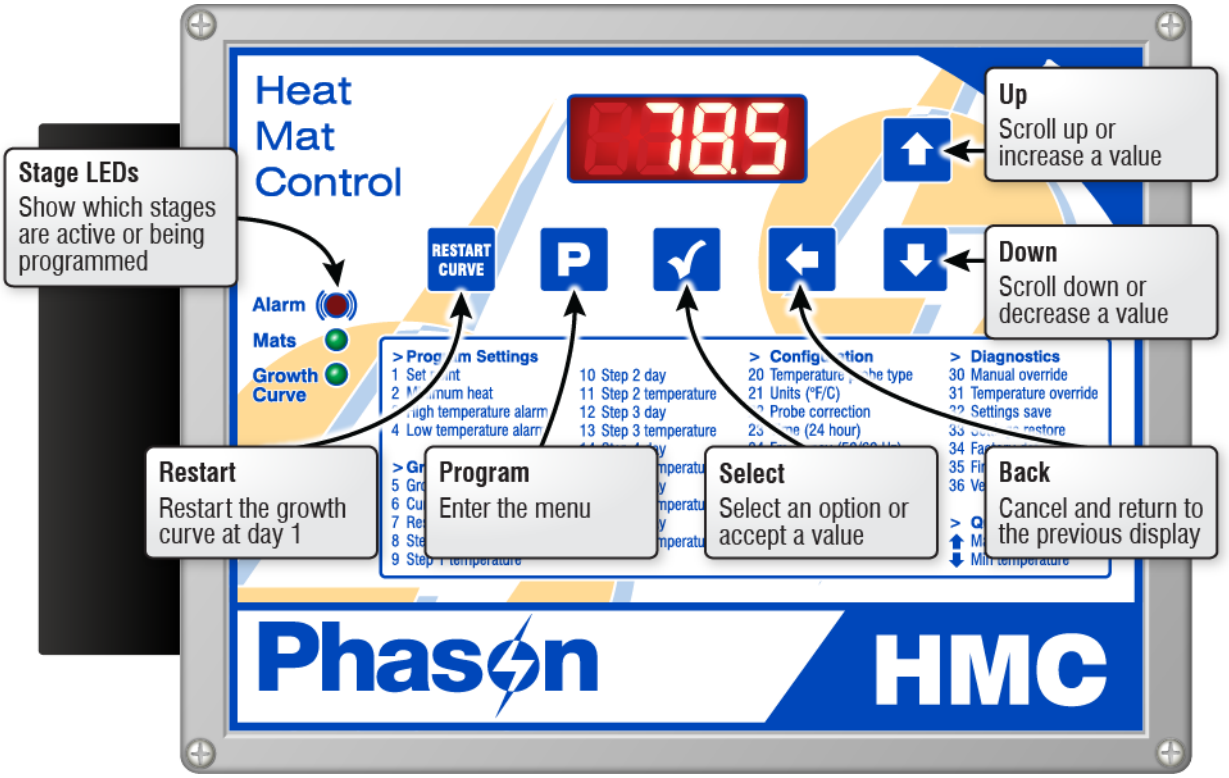
- Automatic temperature-based control, range: 70 to 125°F (21 to 51.7°C)
- Six-step growth curve, up to 365 days duration
- One variable heating stage for controlling heat mats
- One alarm relay for external alarm system or siren
- Four-character LED display and individual stage LEDs
- Minimum and maximum temperature logging
- Error code display
- Manual override/test mode
- Power-failure settings protection
- One temperature probe input
- *Easy System*, edit and store configuration and settings on a computer. For more information, visit **www.phason.ca**.
- Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- CSA approval
- Limited warranty (two years)

Electrical ratings

- Input power: 120/230 VAC, 50/60 Hz
- Input fuse: 250 V, 1 A fast-acting glass
- Variable AC: 20 A at 120/230 VAC, general-purpose (resistive)
  2300 W at 120 VAC; 4600 W at 230 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

Becoming familiar with the HMC

The four-character LED display shows temperatures, alarm messages, and programming information. If there is a dot in the top left corner of the display, you are in an editable menu.

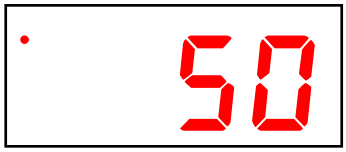


> **NOTE** If you leave the Heat Mat Control in a menu or display other than the main display, the control returns to the main display after five minutes without any key presses. The only exceptions are manual override mode and temperature override mode; the control remains in these modes until you manually exit them.

Using the Heat Mat Control

The menu consists of 36 items called **parameters**. All menu parameters are listed on the front cover of the control for easy reference. The following steps explain how to view and edit the parameters. There are more-detailed instructions later in the manual.

1. To enter the menu, press **Program**.
   The display shows P 1, the first item in the Parameter menu.
2. Press **Up** or **Down** until the parameter you want to adjust displays, for example P 2 for **Minimum heat**, and then press **Select**.
   The display shows the current setting for the parameter.
3. Press **Up** or **Down** to adjust the setting and then press **Select**.
   The control returns to the Parameter menu.
4. To return to the Main display, press **Back**.



Chapter 2: Installing your Heat Mat Control

- **What you need to know before installing** below
- **Connecting equipment** on page 10
- **Finishing the installation** on page 13

What you need to know before installing

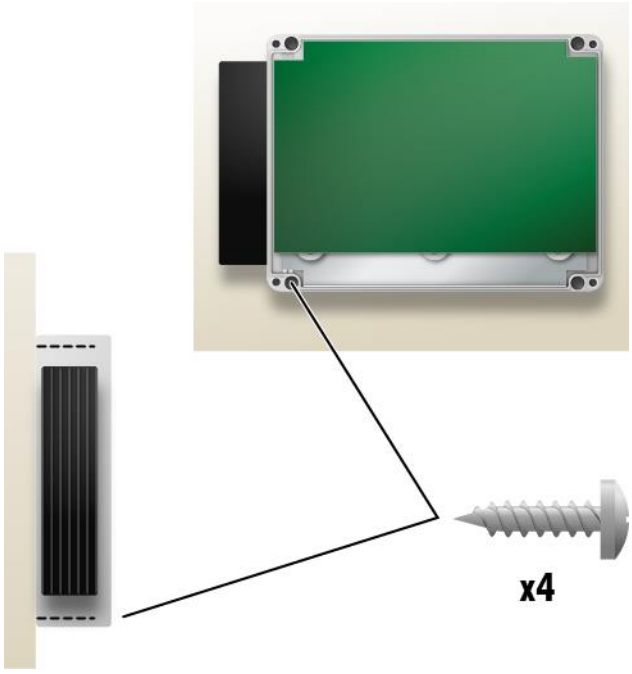
Before installing, you need to do some initial preparation:

1. Read the **Control Fundamentals** guide that came in the box with your control.
2. Read **Understanding power surges and surge suppression** on page 33.

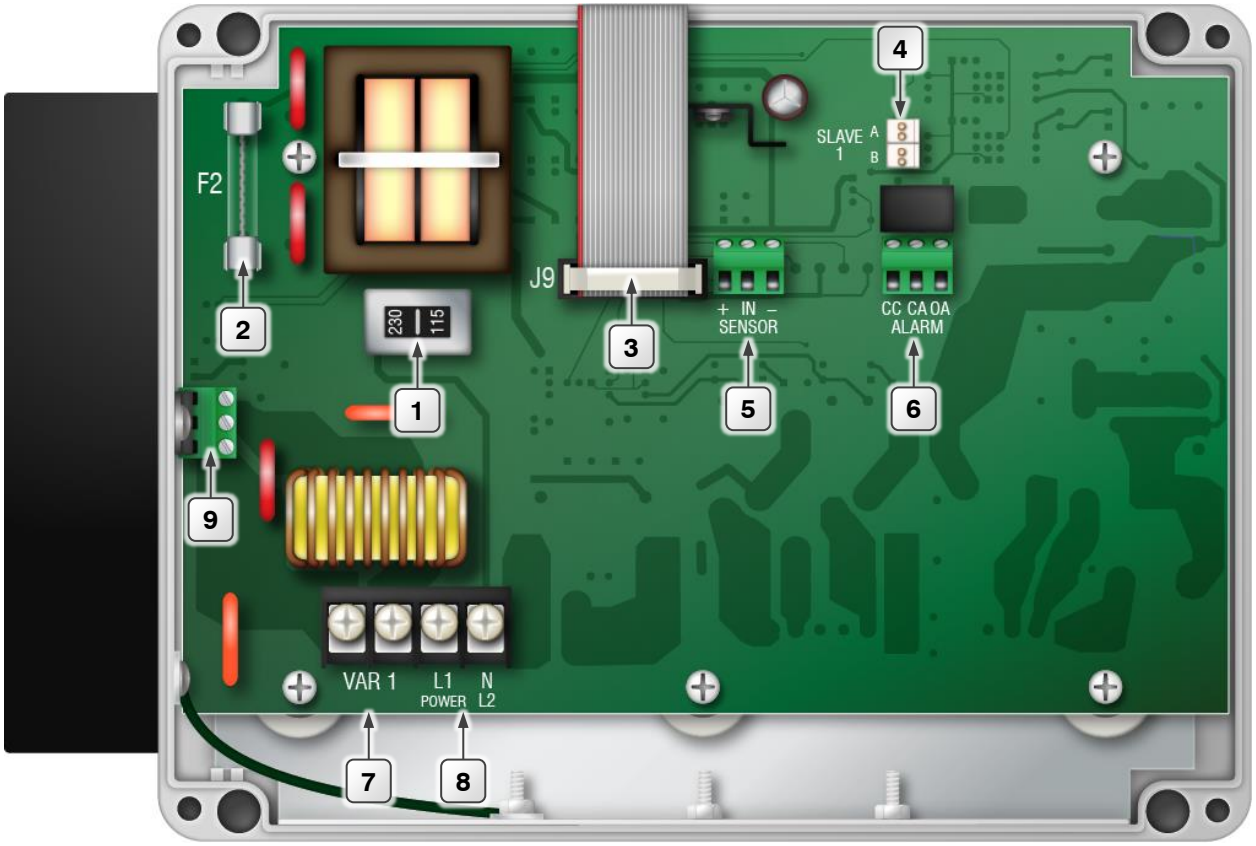
- ◇ If you do not install external surge suppression devices, you risk damage to the electronics inside your Heat Mat Control, which might cause your control to fail.
- ◇ Because it is not possible to completely protect this product internally from the effects of power surges and other transients, we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

Mounting your control

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



Heat Mat Control layout



1	**Voltage selection switch**: set this switch to the correct line voltage before installing the HMC.
2	**Control fuse:** 250 V, 1 A fast-acting glass.
3	**Display cable:** make sure the ribbon cable from the display is properly connected to the socket.
4	**Single-Phase Slave connection:** if you are using Single-Phase Slave units to expand the capacity of your control system, connect them here. For more information, read the **Single-Phase Slave installation guide**.
5	**Temperature probe terminals:** connect the temperature probe to the **IN** and **–** of this terminal.
6	**Alarm relay terminals:** connect an external alarm system or alarm siren to this terminal.
7	**Variable AC terminals:** connect heat mats to these terminals.
8	**Incoming power terminals:** connect the incoming power (120/230 VAC, 50/60 Hz) to this terminal.

Connecting equipment

- ◇ 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.

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

Connecting heat mats

To control heat mats, you need to connect the following to the Heat Mat Control.

- Incoming power (120/230 VAC, 50/60 Hz)
- Heat mat
- Temperature probe

You can connect more than one heat mat to the variable stage as long as the total current draw does not exceed the stage's limit.

Variable stage ratings: 20 A at 120/230 VAC, general-purpose (resistive)
2300 W at 120 VAC; 4600 W at 230 VAC

Temperature probe information

The HMC is compatible with heat mats that have an internal temperature probe (must be 1K Ω at 25°C), such as the Hog Hearth® heat mat.

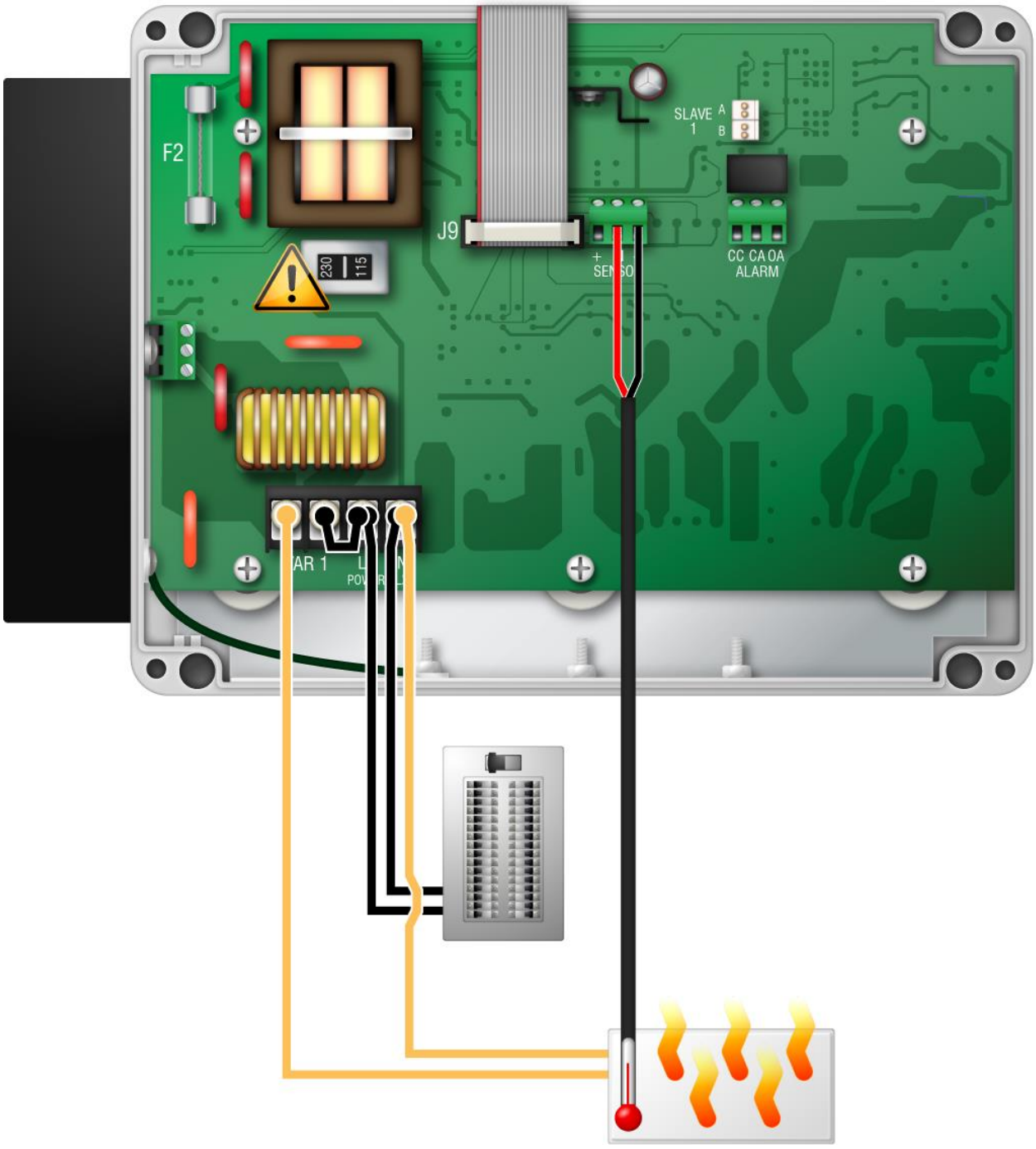
Temperature probe installation guidelines

- 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.

Replace damaged probes as soon as possible. If there is no probe present or working properly, the control uses the set point as the current temperature.

To connect heat mats

1. Set the voltage selection switch to the correct line voltage.
2. Connect the incoming power and heat mat as shown in the diagram.
3. Connect the temperature probe has shown in the diagram.



Connecting an alarm system

You can connect an alarm system to your Heat Mat Control. An alarm system can be a siren, alarm panel, or auto-dialer. Read your alarm system's installation guide for installation instructions and information about the type of system: **normally open** or **normally closed**.

Below are the descriptions for the alarm terminal.

- **CC**: common connection
- **CA**: **normally open**; closes during alarm conditions
- **OA**: **normally closed**; opens during alarm conditions

For the alarm system to sound (or dial out) during an alarm condition, you must enable the alarms. For more information, read **Programming alarm settings, parameters 3, 4, 26 to 29** on page 17.

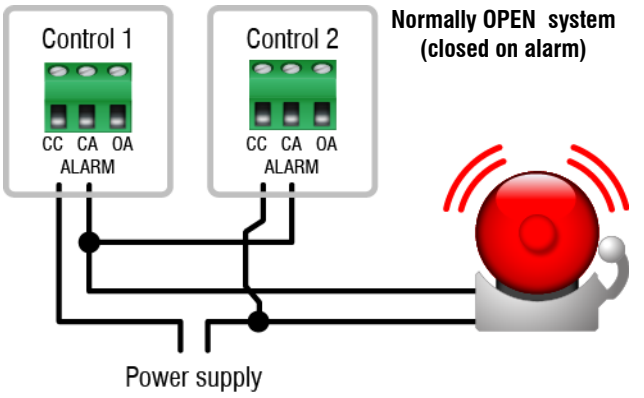
The ratings of the alarm system must not exceed the ratings of the relay.

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

To connect an alarm system

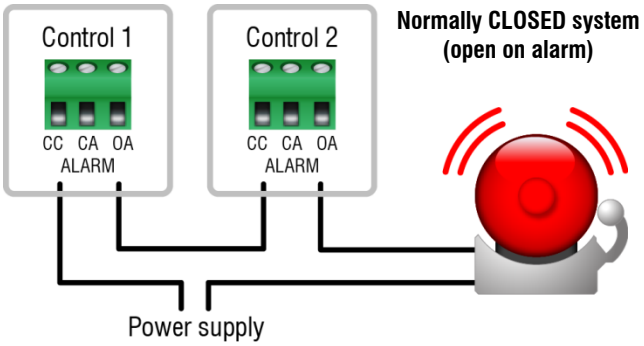
- If you are connecting the alarm system to a network of controls and your system uses a **normally open** connection (closes on alarm), connect the system as shown in the normally open diagram.

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



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

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



Finishing the installation

1. Make sure all wires are properly connected to the correct terminals.
2. Make sure the display cable is properly connected. For more information, read **Heat Mat Control layout** on page 9.
3. Place the cover on the control and then tighten the screws a few turns.
4. Switch on the power.
   As soon as the power comes on, the display should show the version, followed by the temperature. If the display does not come on, go back to step 1.

   After displaying the temperature for a few seconds, the display will flash between PF (power failure) and the temperature. Press **Select** to acknowledge the power fail alarm.

   If the display shows other messages, acknowledge them and then read **Programming alarm settings, parameters 3, 4, 26 to 29** on page 17.
5. Tighten the four cover screws.

Do not over tighten the screws. Avoid using power screwdrivers or drills.

Chapter 3: Configuring and programming

- **Configuring control functions, parameters 20 to 24** below
- **Programming control operation, parameters 1 to** on page 16

Configuring control functions, parameters 20 to 24

Control functions are parameters you change very rarely or not at all. Control functions include:

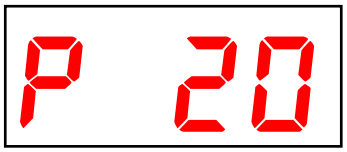
- Temperature probe type, parameter 20 (on page 15)
- Temperature units, parameter 21 (on page 15)
- Probe correction, parameter 22 (on page 15)
- Time, parameter 23 (on page 15)
- Frequency, parameter 24 (on page 16)

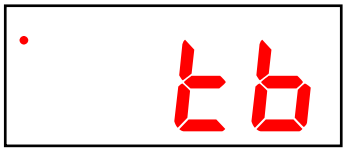
- ◇ Before you configure your control, make sure it has power and all equipment has been properly connected.
- ◇ If you receive an error message during configuration, look it up in **Appendix A: Troubleshooting** on page 29 and then follow the instructions for correcting the problem.

Selecting the temperature probe type, parameter 20

The HMC is compatible with heat mats that have an internal temperature probe (must be 1K Ω at 25°C), such as the Hog Hearth® heat mat.

Phason has external 3K probes available that are specifically designed to work with heat mats. For more information, contact Phason customer support.

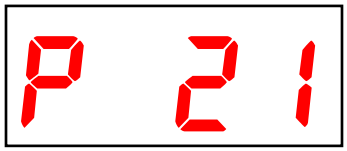




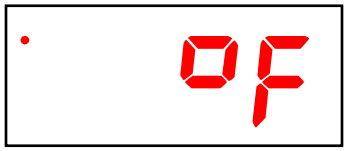
Default: 1K Ω (type B) *Option: Phason 3K (type A)*

Selecting the temperature units, parameter 21

Your Heat Mat Control can display temperatures in either degrees Fahrenheit (°F) or degrees Celsius (°C), but not both at the same time.



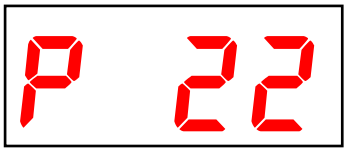
Default: Fahrenheit



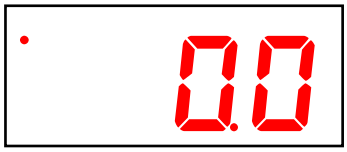
NOTE The temperature units do not change until you return to the Main display.

Setting the probe correction value, parameter 22

Probe correction allows you to adjust the temperature measured by the Heat Mat Control when using an external heat mat probe. You might want to use probe correction if the temperature measured is higher or lower than the temperature of the mat surface.



The probe correction value is an offset from the measured temperature. A negative value subtracts from the measured temperature, a positive value adds to it. For example, if the measured temperature is 70°F and the correction value is 2.5°F, the control will use and display 72.5°F as the temperature.

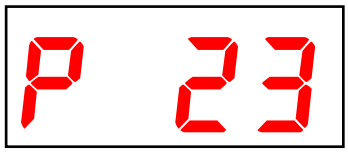


Default: 0.0°F (0.0°C) *Range: –9.0 to 9.0°F (–5.0 to 5.0°C)*

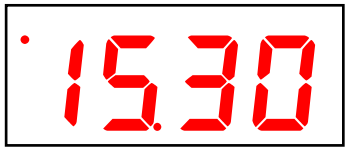
Setting the time, parameter 23

Your Heat Mat Control has a 24-hour clock. The control uses the clock to calculate settings for the growth curve function.

To set the time



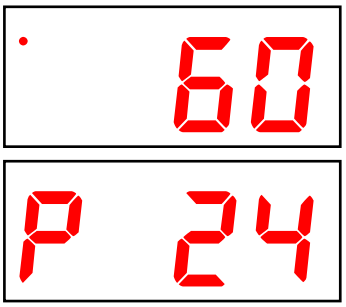
1. Go to parameter 23.
2. To adjust the hours, press **Up** or **Down**, and then press **Select**. The digits for minutes start flashing.
3. To adjust the minutes, press **Up** or **Down**, and then press **Select**. The control returns to the Parameter menu.



Changing the operating frequency, parameter 24

In North America, utility companies supply power at 60 Hz. In some areas of the world, such as Europe, power is supplied at 50 Hz.

Default: 60 Hz



To change the operating frequency

1. Go to parameter 24 and then press **Select**.
2. Press **Up** or **Down** to toggle between 50 and 60 Hz, and then press **Select**.

Configuring hysteresis, parameter 25

Hysteresis is no longer used and is unavailable.

Programming control operation, parameters 1 to 19, 26 to 29

Programming your Heat Mat Control means telling it what you want the equipment to do and when you want it done. For example, you might say "I want the temperature to remain at 99°F", or "I want to be alerted when the temperature drops below 95°F."

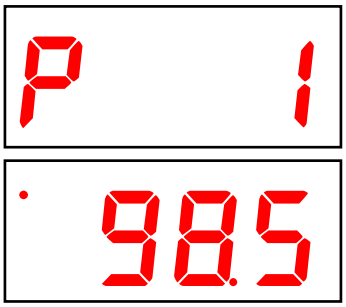
- Use **Appendix B: Factory defaults and parameter worksheet** on page 30 when programming your Heat Mat Control.
- Use temperature override to test your equipment, instead of adjusting settings. For more information, read **Using temperature override mode** on page 24.

Programming heat settings, parameters 1 and 2

The main heat setting is the set point (parameter 1). The HMC continually monitors temperature and adjusts output to maintain the set point.

Minimum heat (parameter 2) displays the output at any given time. The output is displayed as a number between 0 and 200, where 0 is off and 200 is full on. You cannot adjust this parameter.

To program the set point



1. Go to parameter 1 and then press **Select**.
   The display shows the current setting for the parameter.
2. Press **Up** or **Down** to adjust the setting and then press **Select**.
   The control returns to the Parameter menu.

To view the output

1. Go to parameter 2 and then press **Select**.
   The display shows the current output.
2. Press **Back** to return to the Parameter menu.

Programming alarm settings, parameters 3, 4, 26 to 29

There are four alarm conditions: high temperature, low temperature, power fail, and probe damage. The alarm settings determine which alarm conditions are enabled, which are disabled, and their settings. The settings determine how and when the alarm relay activates (signals an alarm condition).

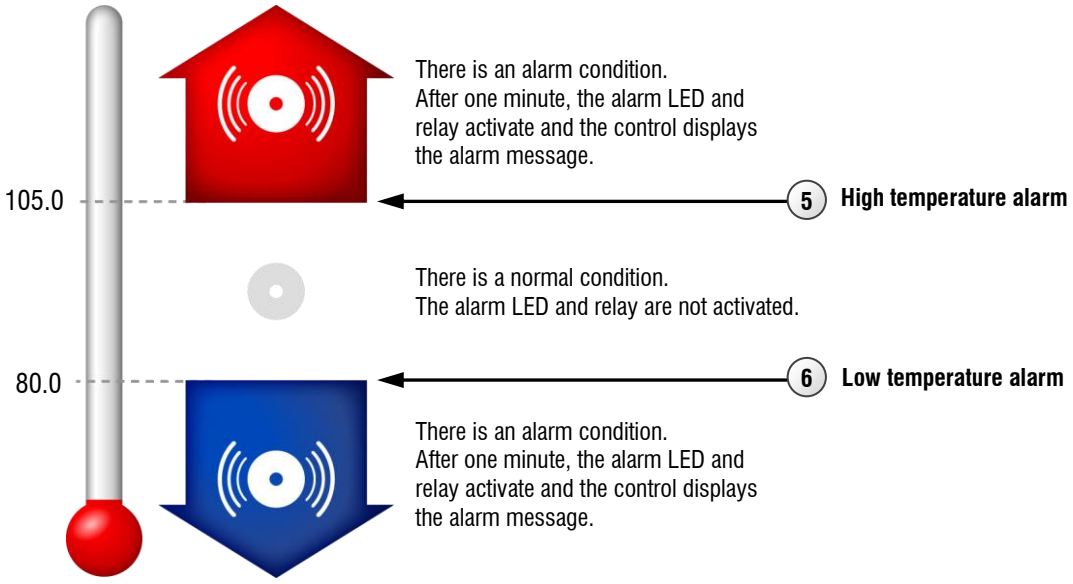
When the temperature is above the **high temperature alarm** or below the **low temperature alarm**, there is an alarm condition. If the alarm condition is present for one continuous minute, the control activates the alarm relay and displays the alarm message. The one-minute minimum duration prevents alarms from occurring when the temperature rises or drops for just a few seconds.

When the temperature returns to the normal range, the control deactivates the alarm relay. The alarm message remains until you acknowledge it.

Example

For example, let's say the high temperature alarm setting is 105 degrees Fahrenheit. If the temperature rises to 106 degrees, but drops below 105 degrees 30 seconds later, the alarm relay does not activate.

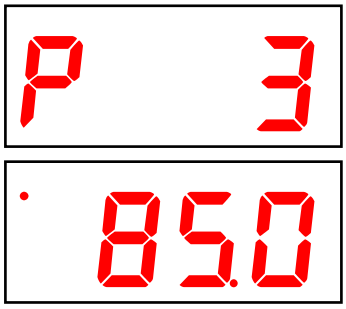
If the temperature rises to 106 degrees and stays there for more than 1 minute, the alarm relay activates. The alarm relay remains activated until the temperature drops below the alarm setting.



TIP

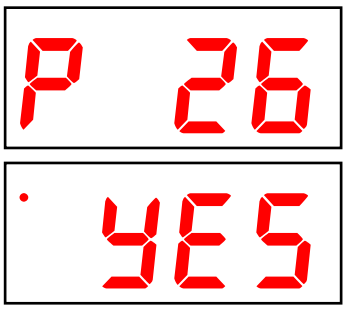
- ◇ When an alarm occurs, the **Alarm** LED switches on and the alarm message displays. For more information about acknowledging and responding to alarms, read **Acknowledging alarms** on page 21.
- ◇ Use temperature override to test your high and low temperature alarms instead of adjusting other settings. In temperature override mode, the alarm relay and status LEDs both operate as if they were in a real alarm situation. For more information, read **Using temperature override mode** on page 24.

To program high and low temperature alarm settings



1. Go to the parameter you want to program, for example P 3 for **High temperature alarm**, and then press **Select**.
   The display shows the current setting for the parameter.
2. Press **Up** or **Down** to adjust the setting and then press **Select**.
   The control returns to the Parameter menu.
3. Repeat steps 1 and 2 for the low temperature alarm.

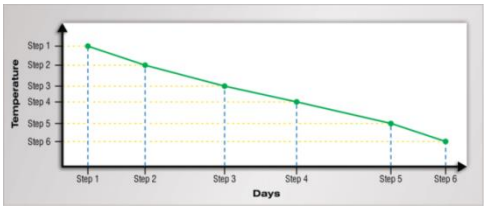
To enable or disable alarms



1. Go to the parameter you want to change, for example P 26 for **High temperature**, and then press **Select**.
   The display shows the current setting for the parameter.
2. Press **Up** or **Down** to toggle between yes and no, and then press **Select**.
   The control returns to the Parameter menu.
3. To enable or disable other alarms, repeat steps 1 and 2.

Programming the growth curve, parameters 5 to 19

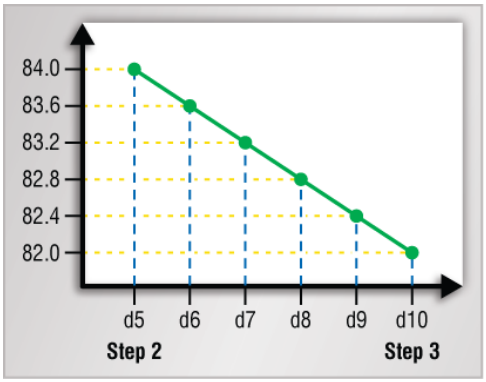
The growth curve automatically adjusts temperature set points over time, up to a maximum of 365 days.



There are 6 steps in the growth curve; each step has a start day and a temperature. The control calculates the set points for the days between the steps, and then adjusts them each day at midnight.

Example

Step 2 starts on day 5 and has a temperature of 84.0°F. Step 3 starts on day 10 and has a temperature of 82.0°F.



The difference between the step 2 and step 3 set points is 2.0°F: (84.0 – 82.0 = 2.0). There are 5 days in step 2: (10 – 5 = 5).

The Heat Mat Control divides the temperature difference by the number of days, 2.0 ÷ 5 = 0.4, and then automatically adjusts the set point by 0.4°F each day for 5 days.

Enabling and disabling the growth curve

When the growth curve is not enabled, the current day does not advance and the Heat Mat Control does not automatically adjust the temperature set points.

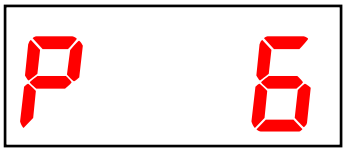
You can adjust the growth curve steps while the growth curve is not enabled, but you must enable the growth curve before the Heat Mat Control will advance the days and automatically adjust the temperatures.

Restarting the growth curve at day 1

You can restart the growth curve at day 1 by pressing **RESTART CURVE**.

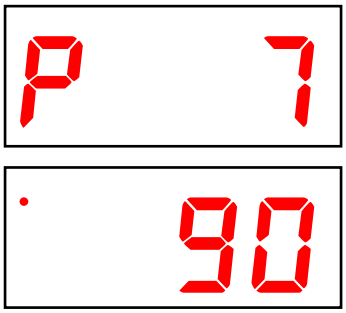
Changing the current day of the growth curve

When the growth curve is running, the Heat Mat Control automatically advances the current day and adjusts the set points each day at midnight. However, there may be times when you want to move forward or backward in the curve. You can do that easily by changing the current day of the curve.



Changing the restart curve day

By default, when the growth curve is finished its last day, it maintains the final set point until you restart it. However, you can program the HMC to restart the curve after any number of days, up to 365.



To set the restart day

1. Go to parameter 7 and then press **Select**.
   The display shows the current setting for the parameter.
2. Press **Up** or **Down** to adjust the setting and then press **Select**.
   The control returns to the Parameter menu.

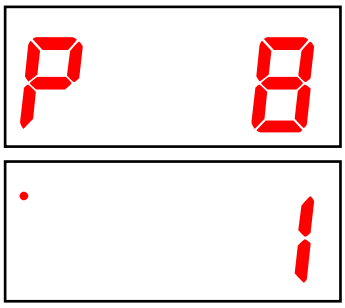
Programming the growth curve steps

The growth curve can have up to 6 steps. Each step has a start day and a temperature. The maximum length for the growth curve is 365 days.

- Growth curve temperatures can increase or decrease as the curve progresses.
- Growth curve of days must increase as the curve progresses.

- ◇ Use the **Appendix B: Factory defaults and parameter worksheet** when programming the growth curve.
- ◇ If you do not want to use all the steps in the growth curve, program the steps you want to use. Program the remaining steps the same as your last one. For example, if you want to use steps 1 to 5, program step 6 the same as 5.

To program the growth curve



1. Go to parameter 9, **Step 1 day**.
2. Press **Up** or **Down** to adjust the parameter, and then press **Select**.
   The control returns to the Parameter menu.
3. Repeat steps 1 and 2 until you have programmed *all* of the growth curve steps.

Chapter 4: Monitoring and maintaining your HMC

- **Monitoring your** below
- **Testing settings and equipment** on page 22
- **Servicing and maintaining your** on page 24

Monitoring your Heat Mat Control

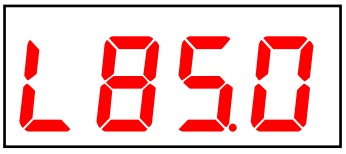
Your Heat Mat Control displays temperature, alarm, and status information. Monitoring the control regularly gives you a better idea of what is going on with your equipment and in your facility. When in normal operation, the display shows the ambient temperature.

Displaying the minimum and maximum temperatures

The Heat Mat Control logs the daily minimum and maximum temperatures. The daily minimum and maximum temperatures reset each day at midnight, or you can reset the manually.

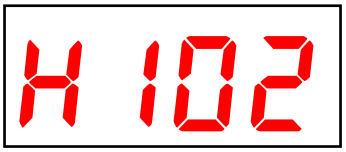
To view the minimum temperature

At the main display, press **Down**.
The display shows the lowest temperature for the current day.



To view the maximum temperature

At the main display, press **Up**.
The display shows the highest temperature for the current day.



To reset the minimum and maximum temperature logs

At the main display, press **Program** and **Down**.
The control resets the minimum and maximum temperatures.

Acknowledging alarms

The alarm relay activates if an enabled alarm condition is present for longer than the minimum duration of one minute. The one-minute minimum duration prevents alarms from occurring when the temperature rises or drops for just a few seconds. The exception to the 1-minute minimum is the power fail alarm. The power fail alarm automatically triggers the relay on a loss of power.

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

For example, if you have a high temperature and a low temperature alarm, the display shows H-AL. After acknowledging the high temperature alarm, the display shows L-AL. When all alarms have been acknowledged, the display shows the temperature.

To acknowledge alarms

Press **Select**.
If there was only one alarm message, the Heat Mat Control clears the message and returns to the main display. If there are additional alarm messages, the control displays the next message.

For a list of alarm messages, their descriptions, and possible resolutions, read **Alarm and error messages** on page 29.

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

Testing settings and equipment

The Heat Mat Control has two test utilities: **manual override mode** and **temperature override mode**.

Using manual override mode

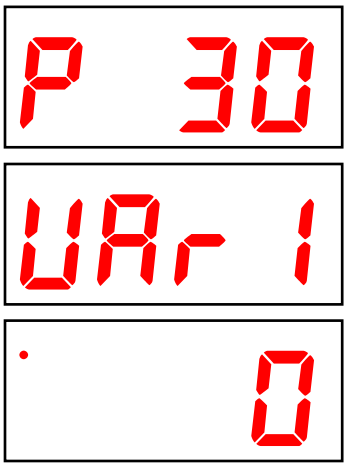
Manual override mode is for individually testing the installation and equipment connected to the Heat Mat Control. When you go into manual override mode, the control sets the variable stage output to 0%. You can then change the output from 0 to 100% for the variable stage, and OFF or ON for the alarm relay.

The variable stage and alarm relay remain at the state you set them until you leave manual override. When you leave manual override, the control returns to normal, programmed operation. For example, if you adjust the variable stage to 100%, it stays at 100% until you leave manual override.

NOTE

- ◇ When the control is in manual override mode, it does not operate the equipment according to the measured temperature.
- ◇ The control *does not* automatically exit manual override mode. When you are finished testing, press **Back** until you return to the Parameter menu.

To use manual override for the variable stage



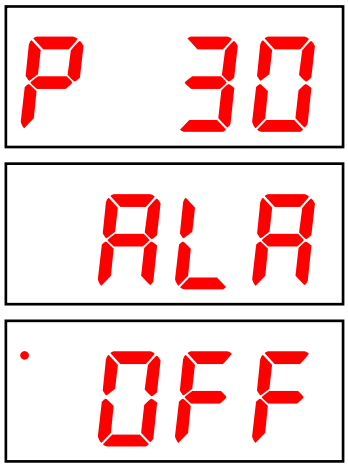
1. Go to parameter 30
   The display shows UAr 1, the variable stage. The variable stage and the alarm relay switch off.
2. Press **Select**.
   The display shows 0, the output for the variable stage.
   Press **Up** or **Down** to adjust the output.
3. Press **Back** to return to the Manual override menu.
   The display shows UAr 1. The variable stage output remains at the percentage you set it.

TIP

If you want to override both the variable stage and the alarm relay at the same time, go to step 2 of the next section.

4. To exit manual override and return to normal operation, press **Back**.

To use manual override for the alarm relay



1. Go to parameter 30.
   The display shows UAr 1. The variable stage and the alarm relay switch off.
2. Press **Up** or **Down** until ALA displays, and then press **Select**.
   The display shows oFF.
3. Press **Up** or **Down** to change the relay state.
4. Press **Back** to return to the Manual override menu.
   The display shows ALA. The relay state remains where you set it.
5. To exit manual override and return to normal operation, press **Back**.

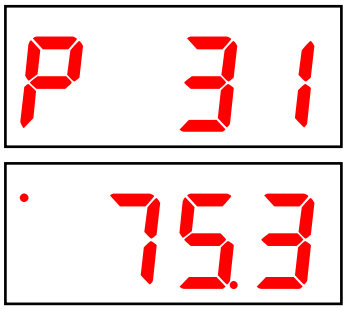
Using temperature override mode

Temperature override is for testing the Heat Mat Control settings. Temperature override allows you to test the settings by simulating the temperature. Instead of adjusting the output of the variable stage or state of the relay, you adjust the *test temperature*.

As you increase or decrease the test temperature, the variable stage and alarm relay operate according to their programmed settings and the test temperature. This lets you know how your system performs over a full range of temperatures.

- ◇ When the control is in temperature override mode, it operates according to the test temperature, not according to the temperature measured by the probe.
- ◇ The control does not exit test mode automatically. When you are finished testing, press **Back** until the control exits test mode.

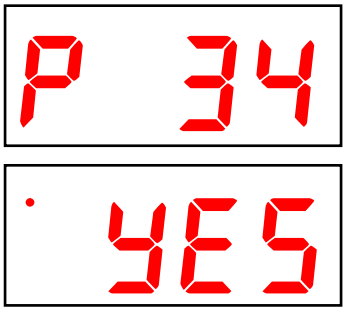
To use temperature override mode



1. Go to parameter 32.
   The display shows the current temperature, which is now the **test temperature**.
2. Press **Up** or **Down** to adjust the test temperature.
   The control responds to the changes in the test temperature.
3. To exit override and return to normal operation, press **Back**.

Servicing and maintaining your control

Restoring the factory defaults

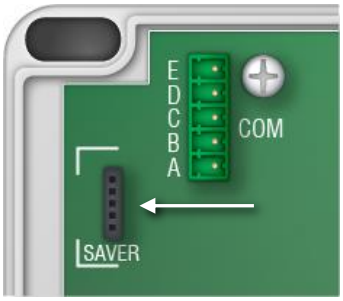


When your Heat Mat Control leaves the factory, it comes with default settings and configuration. When you program your control, you change the configuration and settings.

Resetting your control erases all the configuration and settings you programmed and restores them to what they were when the control left the factory. For a list of the factory defaults, read **Appendix B: Factory defaults and parameter worksheet** on page 30.

- ◇ **Restore the factory defaults only as a last resort. It erases ALL your configuration and settings and you will have to reconfigure the control.**
- ◇ If you restore your Heat Mat Control to its factory defaults, disconnect the power to all loads and then reconfigure the control before restoring power to the loads.

Saving and restoring settings

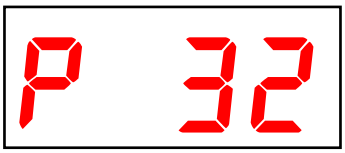


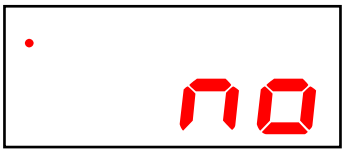
The HMC Saver is an innovative and easy-to-use product that allows you to store your Heat Mat Control configuration and settings.

The HMC Saver stores a complete copy of all a Heat Mat Control's configuration and settings. You can restore the configuration and settings any time, or even use them to set up new controls in seconds!

> **NOTE** If the display shows Err 1 (error 1) while saving or restoring settings, it means the HMC saver is not connected.

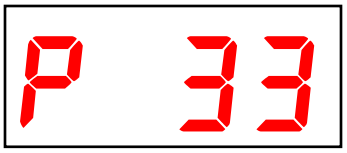
To save your settings

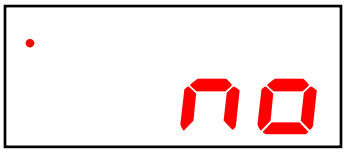




1. Gently remove the cover from the control. Make sure not to disconnect the ribbon cable.
2. Insert the HMC Saver into the connector marked **SAVER** on the inside top-left of the cover.
3. Go to parameter 32.
4. Press **Up** or **Down** to change the no to YES and then press **Select**. The control saves the information to the HMC Saver. When complete, the display shows donE.
5. To return to the Main display, press **Back** twice.
6. Remove the HMC Saver.
7. Replace the cover and then tighten the four screws.

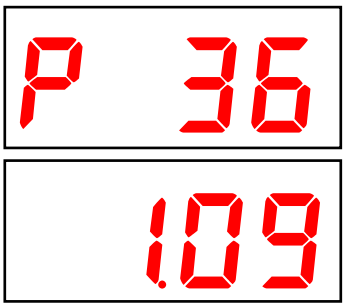
To restore your settings





1. Gently remove the cover from the control. Make sure not to disconnect the ribbon cable.
2. Insert the HMC Saver into the connector marked **SAVER** on the inside top-left of the cover.
3. Go to parameter 33.
4. Press **Up** or **Down** to change the no to YES and then press **Select**. The control reads the information from the HMC Saver. When complete, the display shows donE.
5. To return to the Main display, press **Back** twice.
6. Remove the HMC Saver.
7. Replace the cover and then tighten the four screws.

Displaying the version



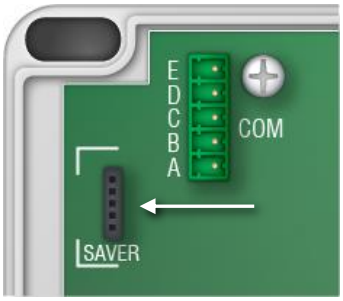
Firmware is similar to operating system software for a computer. It contains instructions that tell your Heat Mat Control how to operate.

If you need to contact Phason Customer Support about your Heat Mat Control, you might need to provide them with the firmware version of your control. For more information about technical support, read **Service and technical support** at the front of the manual. The firmware version is a number in the format #.##.

Updating the firmware

The optional HMC Updater allows you to upgrade your Heat Mat Control's firmware as new versions become available. The HMC Updater takes only seconds to use and can upgrade all the Heat Mat Controls at your site.

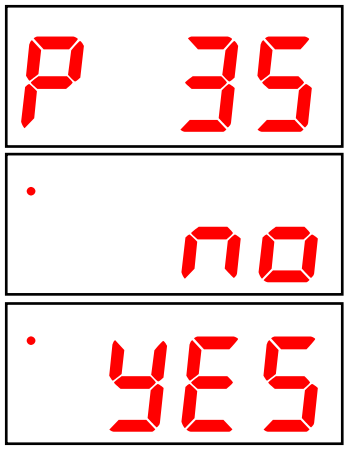
There are two methods for updating the firmware:



- **Power on**: the power on method allows you to update the firmware using the menu system, without having to switch the incoming power off and then on. If the power on method fails, use the power off method.
- **Power off**: the power off method allows you to update the firmware by switching the incoming power off and then on. Use the power off method if the power on method fails.

The **SAVER** connector on the inside of the cover is where you connect the HMC Updater. The cover label must face the right when you plug the updater into the socket.

To update the firmware using the *power on* method



1. Gently remove the cover from the control. Make sure not to disconnect the ribbon cable.
2. Insert the HMC Updater into the connector marked **SAVER** on the inside top-left of the cover.
3. Go to parameter 35.
4. Press **Up** or **Down** to change the no to YES and then press **Select**. The control updates its firmware. During the update, the display is blank and the control beeps.

   When the update is complete, the control resets, displays the current version for a couple seconds, and then shows the temperature.
5. Remove the HMC Updater.

6. Verify that the control functions properly.
7. Replace the cover and then tighten the four screws.

Because the Heat Mat Control resets during the update process, you will see a power fail (PF) message displayed. Acknowledge the message and then continue normally. For more information, read **Acknowledging alarms** on page 21.

To update the firmware using the *power off* method

1. Gently remove the cover from the control. Make sure not to disconnect the ribbon cable.
2. Insert the HMC Updater into the connector marked **SAVER** on the inside top-left of the cover.
3. Switch off the power to the Heat Mat Control for at least five seconds.
4. Switch on the power to the control.
   The control updates its firmware. During the update, the display is blank and the control beeps.

   When the update is complete, the control resets, displays the current version for a couple seconds, and then shows the ambient temperature.
5. Remove the HMC Updater.
6. Verify that the control functions properly.
7. Replace the cover and then tighten the four screws.

Optional accessories and kits

Optional, convenient accessories are available to enhance and extend your Heat Mat Control. For more information about accessories and kits, contact your dealer or visit **www.phason.ca**.

HMC Saver

The HMC Saver is an innovative and easy-to-use product that stores a complete copy of a Heat Mat Control's configuration and settings. You can restore the configuration and settings any time, or even set up new controls in seconds!

Features

- Quick and easy to use
- Portable, reliable, and safe storage of configuration and settings
- Transferable to any Heat Mat Control with the same firmware version
- Compact design, fits in a pocket
- Limited warranty (90 days)

HMC Updater

The optional HMC Updater is an innovative and easy-to-use product that updates the firmware of Heat Mat Controls as new versions become available. The HMC Updater takes seconds to use and can update all the Heat Mat Controls at your site.

Features

- Quick and easy to use
- Compact design, fits in a pocket
- Limited warranty (90 days)

Single-Phase Slave

The Single-Phase Slave (PSU-20) is an affordable way to increase the load capacity of the Heat Mat Control. Single-Phase Slaves are easy to install and there is no additional configuration required; all slave units follow the settings of the master control.

The Single-Phase Slave comes with a cable that connects to the **SLAVE 1** connection on the Heat Mat Control. You can connect up to 3 Slaves to the HMC. Each Slave increases the current capacity of the stage by 20 amps.

Features

- One 20-amp variable stage
- Expandable capacity using additional slaves
- Rugged enclosure (corrosion resistant, water resistant, and fire retardant)
- CSA approval
- Limited warranty (two years)

Parts and kits

Display kit

If your Heat Mat Control's bottom circuit board or display fails, you can replace it with a kit.

- The **control kit** part number is **K310041**.
- The **display kit** part number is **K310043**.
  After replacing the display, you will need to reprogram control.

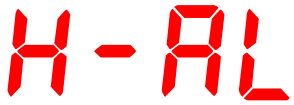
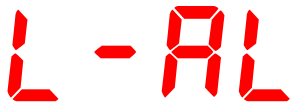
Appendices

- **Appendix A: Troubleshooting** below
- **Appendix C: Glossary** on page 32
- **Appendix B: Factory defaults and parameter worksheet** on page 30
- **Appendix D: Surge suppression and electrical noise** on page 33

Appendix A: Troubleshooting

- If you see an alarm message and are not sure what it means, look it up in the **Alarm and error messages** table below and then follow the instructions for resolving the alarm condition.
- If you are having a problem using your Heat Mat Control, see if the problem is described in the **Troubleshooting** table on page 30. Follow the directions for correcting the problem.

Alarm and error messages

Alarm message	Possible cause	Possible solution
 High temperature alarm	The temperature has gone above the high temperature alarm point.	◇ Try to lower the temperature by turning heat mats down or off. ◇ Check the temperature probes. ◇ Check the alarm settings. For more information, read **Programming alarm settings, parameters 3, 4, 26 to 29** on page 17.
 Low temperature alarm	The temperature has gone below the low temperature alarm point.	◇ Try to raise the temperature by turning heat mats up or on. ◇ Check the temperature probes. ◇ Check to see if a heat mat has failed. ◇ Check the alarm settings. For more information, read **Programming alarm settings, parameters 3, 4, 26 to 29** on page 17.
 Probe damage alarm	A temperature probe is damaged or disconnected.	◇ Check the wire between the control and the probe. Any wire damage can cause the alarm. ◇ Replace or reconnect the temperature probe. The control should recover automatically.
 Error 1 - SAVER error	The HMC Saver is not in place when trying to save or restore settings	◇ Make sure the HMC Saver is inserted correctly and then try again.

Troubleshooting

The following table lists some problems that could occur, along with their possible causes and solutions. If you are having a problem with your Heat Mat Control, see if the problem is described in the table and then follow the directions to correct the problem.

Problem	Possible cause	Possible solution
Power supply components blown out Burn marks on boards and components	Power surge, brownout, or power outage	◇ Avoid the problem in future by providing proper voltage and protection for the control.
No power and/or display	A circuit breaker at service panel is off or tripped.	◇ Reset the circuit breaker.
	Incorrect incoming power wiring	◇ Correct the wiring.
	The display board connect cable is not plugged into the control board properly.	◇ Plug in the display board cable. For more information, read **Heat Mat Control layout** on page 9.
Temperature does not change	The control is in temperature override mode.	◇ Exit test mode. For more information, read **Using temperature override mode** on page 24.
Display showing unusually high or low temperature	The probe correction value is set too high.	◇ Adjust the value. For more information, read **Setting the probe correction value, parameter 2** on page 15.
	The extension cable connected to the temperature probe is providing a poor connection	◇ Check the extension cable connection and re-solder it if necessary.
	Damaged probe	◇ Replace the temperature probe.

Appendix B: Factory defaults and parameter worksheet

When your Heat Mat Control leaves the factory, it comes with default settings and configuration. Configuring and programming the control changes the factory defaults. Restoring factory defaults erases all the configuration and settings you programmed and restores the defaults. For more information, read **Restoring the factory defaults** on page 24.

Parameter		Default	Range/options	Your setting/notes
Program settings				
1	Set point	99.0	-13 to 125°F (-25 to 51.7°C)	
2	Minimum heat	0	0 to 200	Read-only
3	High temperature alarm	105	-13 to 125°F (-25 to 51.7°C)	
4	Low temperature alarm	80.0	-13 to 125°F (-25 to 51.7°C)	
Growth curve				
5	Growth curve enable	NO	YES or NO	
6	Current day	1	1 to 365	
7	Restart curve day	off	0 to 365	
8	Step 1 day	1	0 to 365	
9	Step 1 temperature	98.0	-13 to 125°F (-25 to 51.7°C)	
10	Step 2 day	9	Step 1 day to 365	
11	Step 2 temperature	93.0	-13 to 125°F (-25 to 51.7°C)	
12	Step 3 day	17	Step 2 day to 365	
13	Step 3 temperature	88.0	-13 to 125°F (-25 to 51.7°C)	
14	Step 4 day	17	Step 3 day to 365	
15	Step 4 temperature	88.0	-13 to 125°F (-25 to 51.7°C)	
16	Step 5 day	17	Step 4 day to 365	
17	Step 5 temperature	88.0	-13 to 125°F (-25 to 51.7°C)	
18	Step 6 day	17	Step 5 day to 365	
19	Step 6 temperature	88.0	-13 to 125°F (-25 to 51.7°C)	
Configuration				
20	Temperature probe type	tb (type B)	1K (type B) or Phason 3K (type A)	
21	Units	°F	°F or °C	
22	Probe correction	0.0	-9.0 to 9.0°F (-5.0 to 5.0°C)	
23	Time (24 hour)	00.00	00:00 to 23:59	
24	Frequency	60	50 or 60 Hz	
25	Hysteresis	P---	--	No longer used
26	High temperature enable	YES	YES or NO	
27	Low temperature enable	YES	YES or NO	
28	Probe damage enable	YES	YES or NO	
29	Power fail enable	YES	YES or NO	

Appendix C: Glossary

alarm condition	There is an alarm condition when the temperature is lower than the low set point or higher than the high set point, or there is probe damage. Alarms must be enabled for there to be an alarm condition.
firmware	Firmware is the internal program instructions of your Heat Mat Control. You can update the firmware version to the latest version using an **HMC Updater**. For more information, read **Updating the firmware** on page 26.
growth curve	The growth curve gradually increases or decreases the set point each day of each growth curve step. The control automatically adjusts the set point each day at midnight. For more information, read **Programming the growth curve, parameters 5 to** on page 19.
minimum duration	The minimum amount of time an alarm condition must be present before the control signals an alarm. The minimum duration (one minute) prevents alarms from activating when the temperature rises or drops for just a few seconds. For more information, read **Programming alarm settings, parameters 3, 4, 26 to 29** on page 17.
minimum heat	**Minimum heat** is the percentage output a heat mat is at. For more information, read **Programming heat settings, parameters 1** on page 16.
set point	The set point is the temperature below which heat mat output increases toward its maximum. For more information, read **Programming heat settings, parameters 1** on page 16.

Appendix D: Surge suppression and electrical noise

Understanding power surges and surge suppression

Power surges can be caused by external influences (for example, lightning or utility distribution problems) or they can be caused internally (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 your Heat Mat Control. Lightning does not have to strike a power line to transmit a surge.

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

Reducing electrical noise using filters

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

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

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Limited warranty

This warranty applies only to the Phason Heat Mat Control (HMC). If you need warranty service, return the product and original proof of purchase to your dealer.

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

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

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

Conditions

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

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

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

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

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

Service and technical support

Phason will be happy to answer all technical questions that will help you use your **Heat Mat Control.** Before contacting Phason, check the following:

- Read this manual for information about the feature with which you are having trouble.
- If you see an alarm message and are not sure what it means, look it up in the **Alarm and error messages** table on page 29 and then follow the instructions for resolving the alarm condition.
- If you are having a problem using your Heat Mat Control, look in the **Troubleshooting** table on page 30 and then follow the directions for correcting the problem.
- If you still have a problem with your Heat Mat Control, collect the following information:
  - The serial number
  - Any messages displayed
  - 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.

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