240V 2-Speed pump + 240V Booster Pump + 240V Actuator + Heater

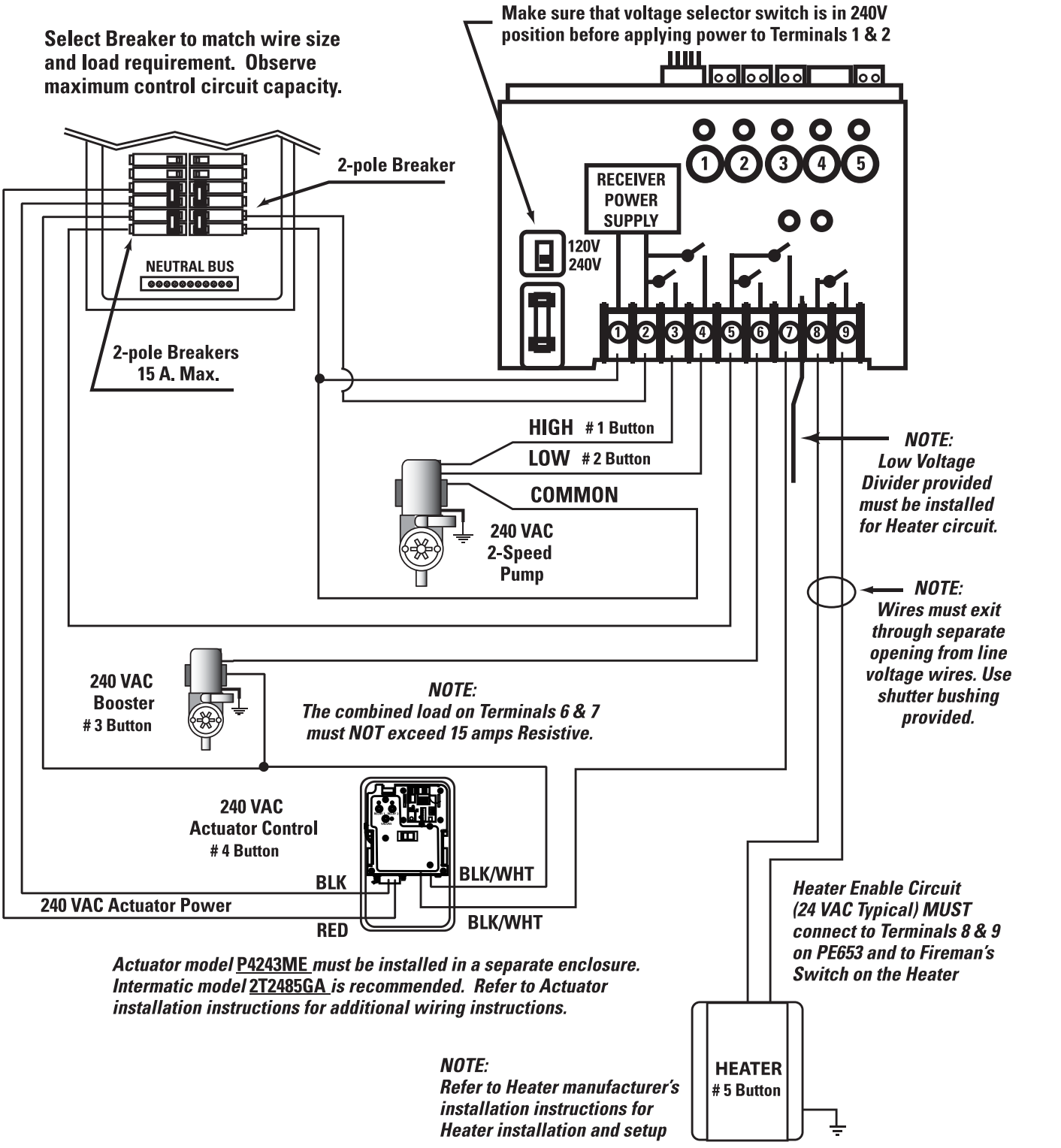


Figure 3-16

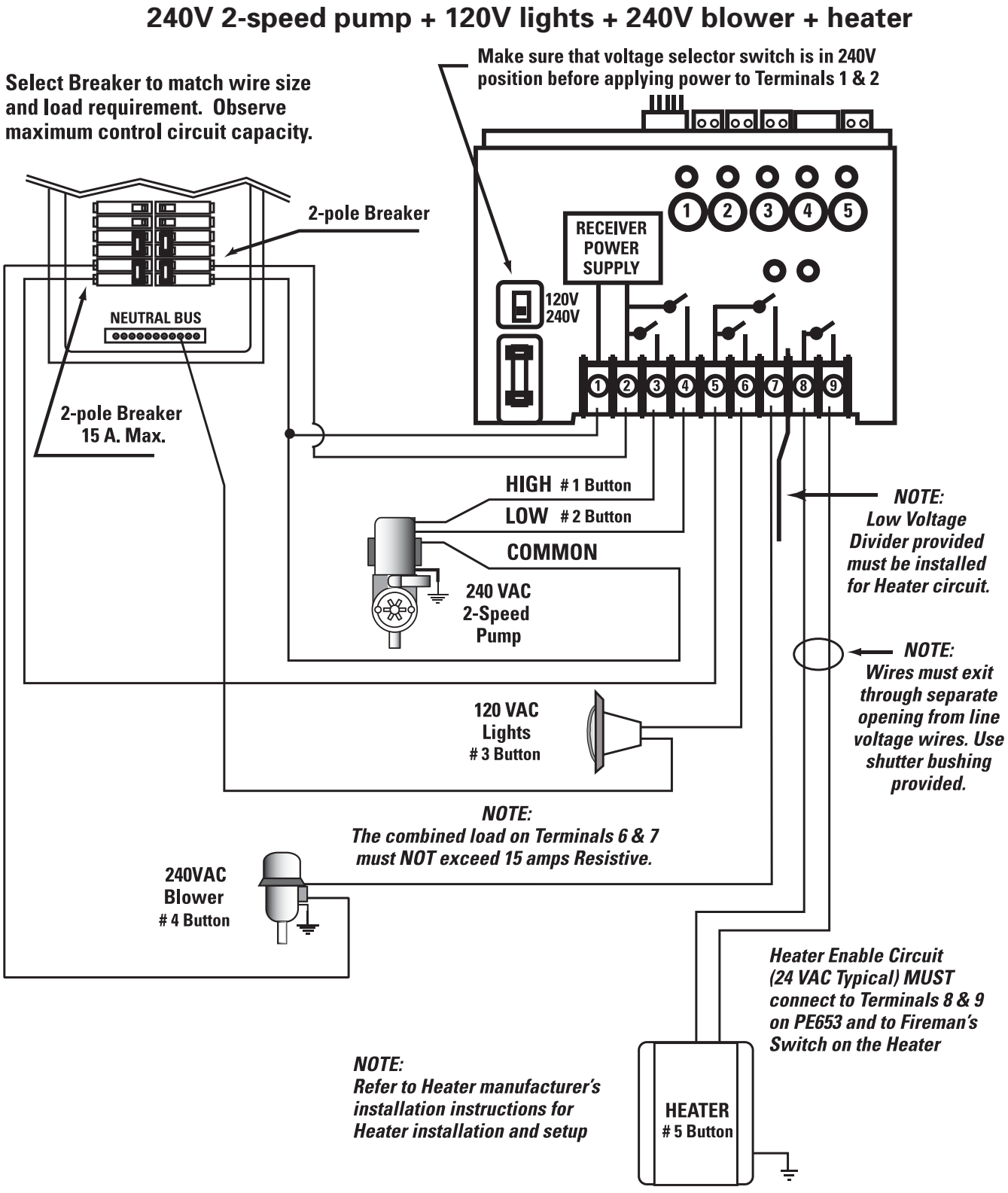


Figure 3-17

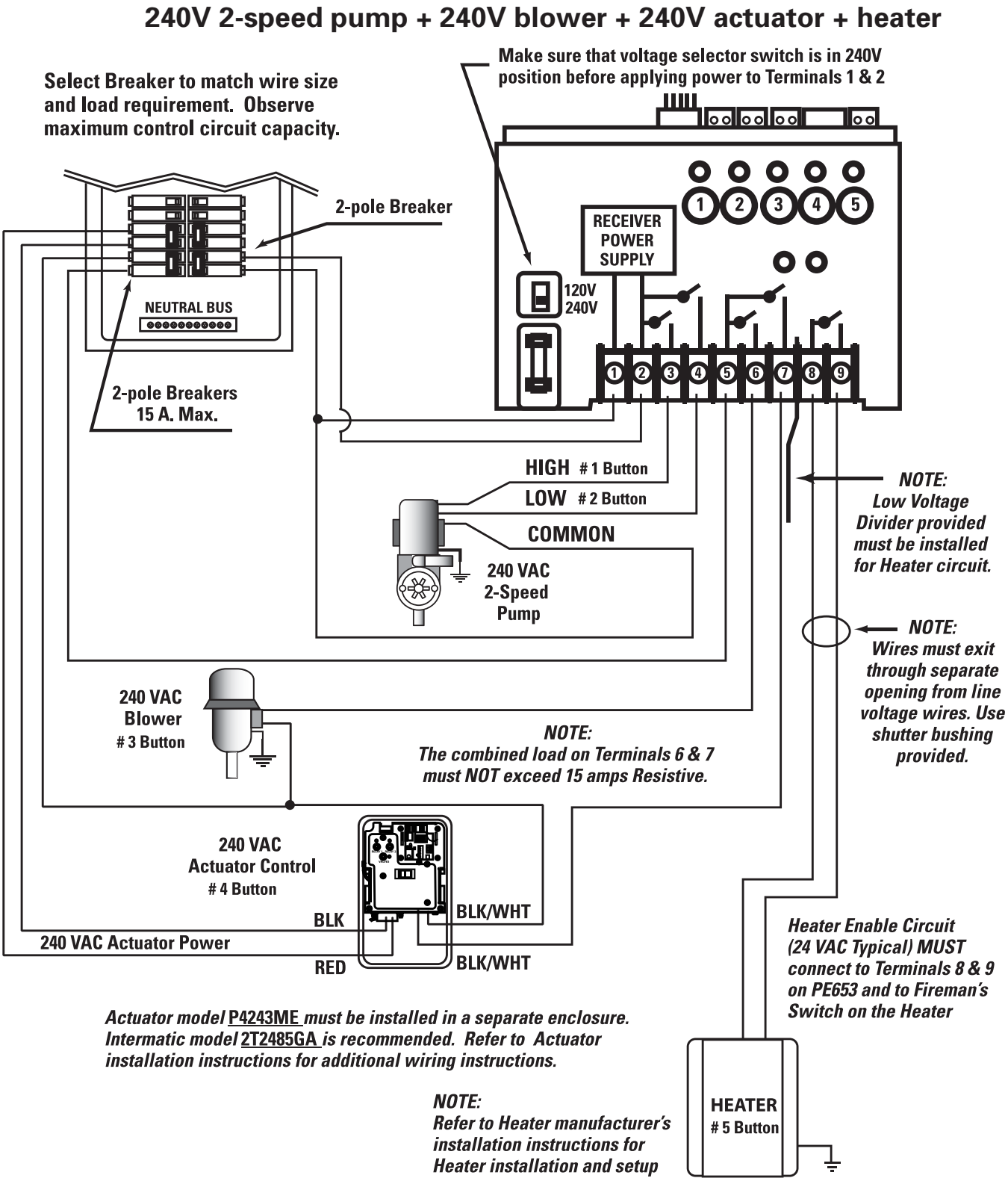

240V 2-speed pump + 240V blower + 240V actuator + heater
Select Breaker to match wire size and load requirement. Observe maximum control circuit capacity.
Make sure that voltage selector switch is in 240V position before applying power to Terminals 1 & 2
2-pole Breaker
NEUTRAL BUS
2-pole Breakers 15 A. Max.
RECEIVER POWER SUPPLY
120V
240V
1 2 3 4 5
1 2 3 4 5 6 7 8 9
HIGH # 1 Button
LOW # 2 Button
COMMON
240 VAC 2-Speed Pump
NOTE: Low Voltage Divider provided must be installed for Heater circuit.
NOTE: Wires must exit through separate opening from line voltage wires. Use shutter bushing provided.
240 VAC Blower # 3 Button
NOTE: The combined load on Terminals 6 & 7 must NOT exceed 15 amps Resistive.
240 VAC Actuator Control # 4 Button
BLK
BLK/WHT
240 VAC Actuator Power
RED
BLK/WHT
Heater Enable Circuit (24 VAC Typical) MUST connect to Terminals 8 & 9 on PE653 and to Fireman's Switch on the Heater
Actuator model P4243ME must be installed in a separate enclosure. Intermatic model 2T2485GA is recommended. Refer to Actuator installation instructions for additional wiring instructions.
NOTE: Refer to Heater manufacturer's installation instructions for Heater installation and setup
HEATER # 5 Button

Figure 3-18

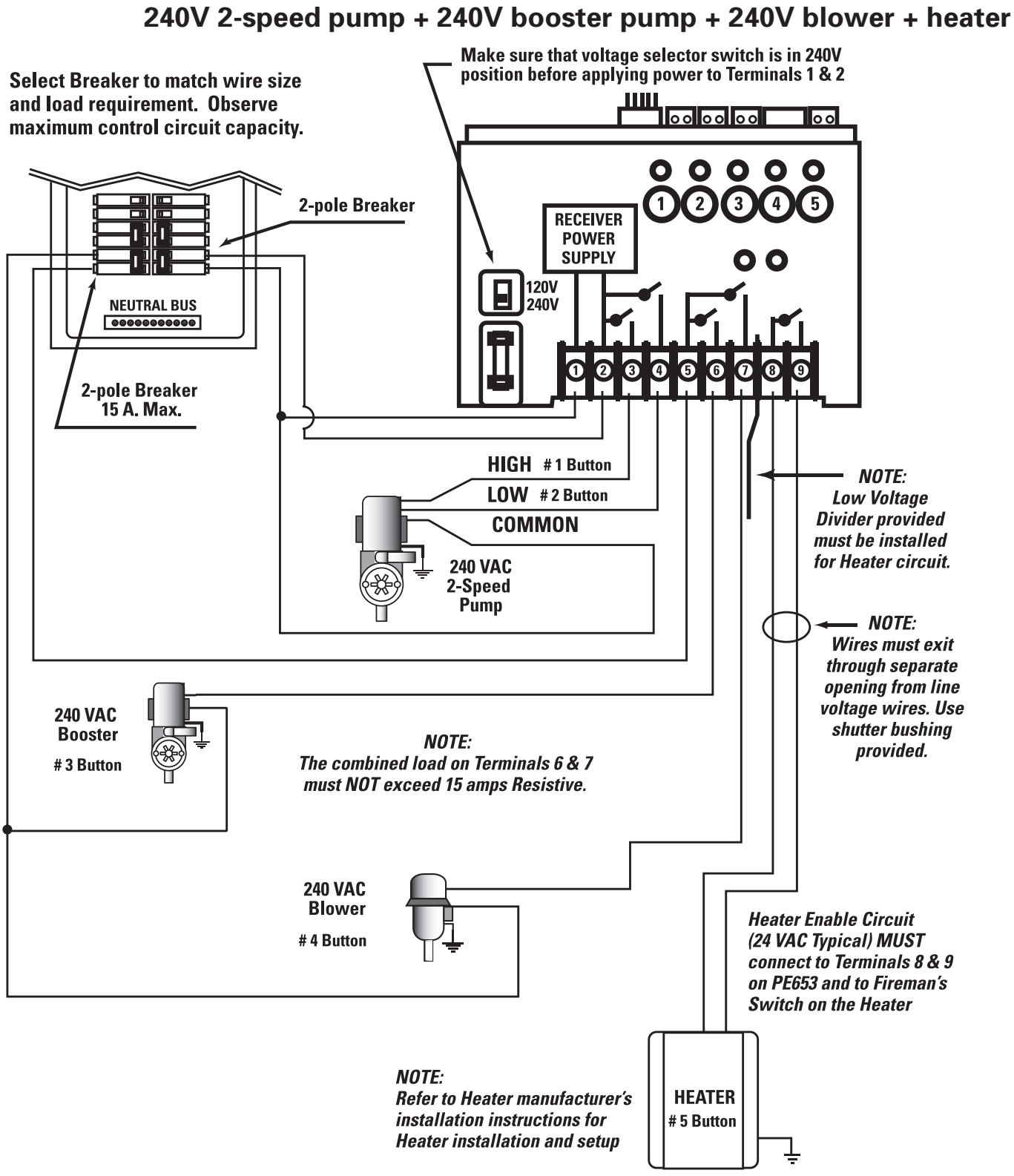


Figure 3-19

240V 2-speed pump + 240V booster pump + 120V light + heater

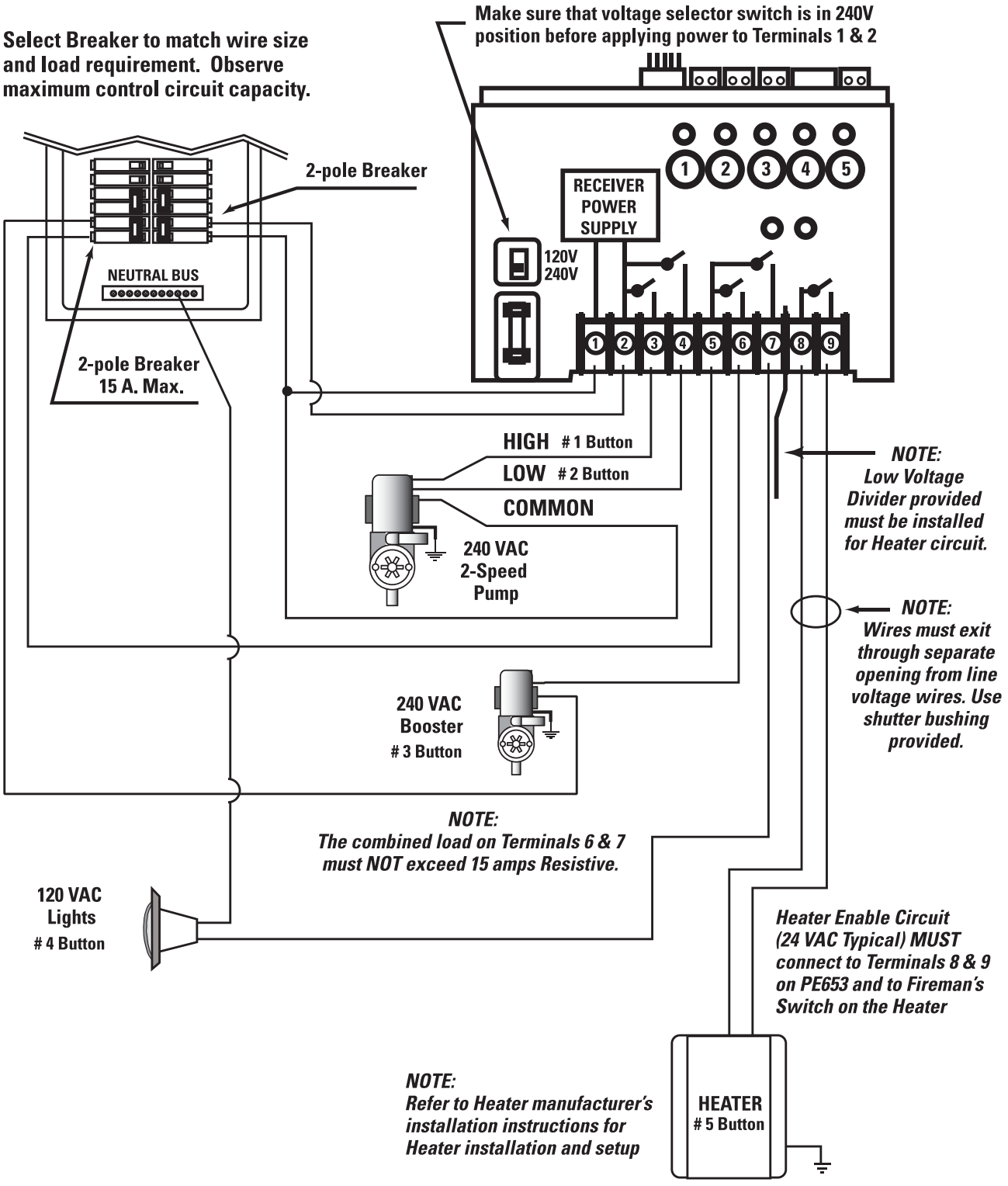


Figure 3-20

240V 2-speed pump + 240V booster pump + other 120 VAC equipment + heater

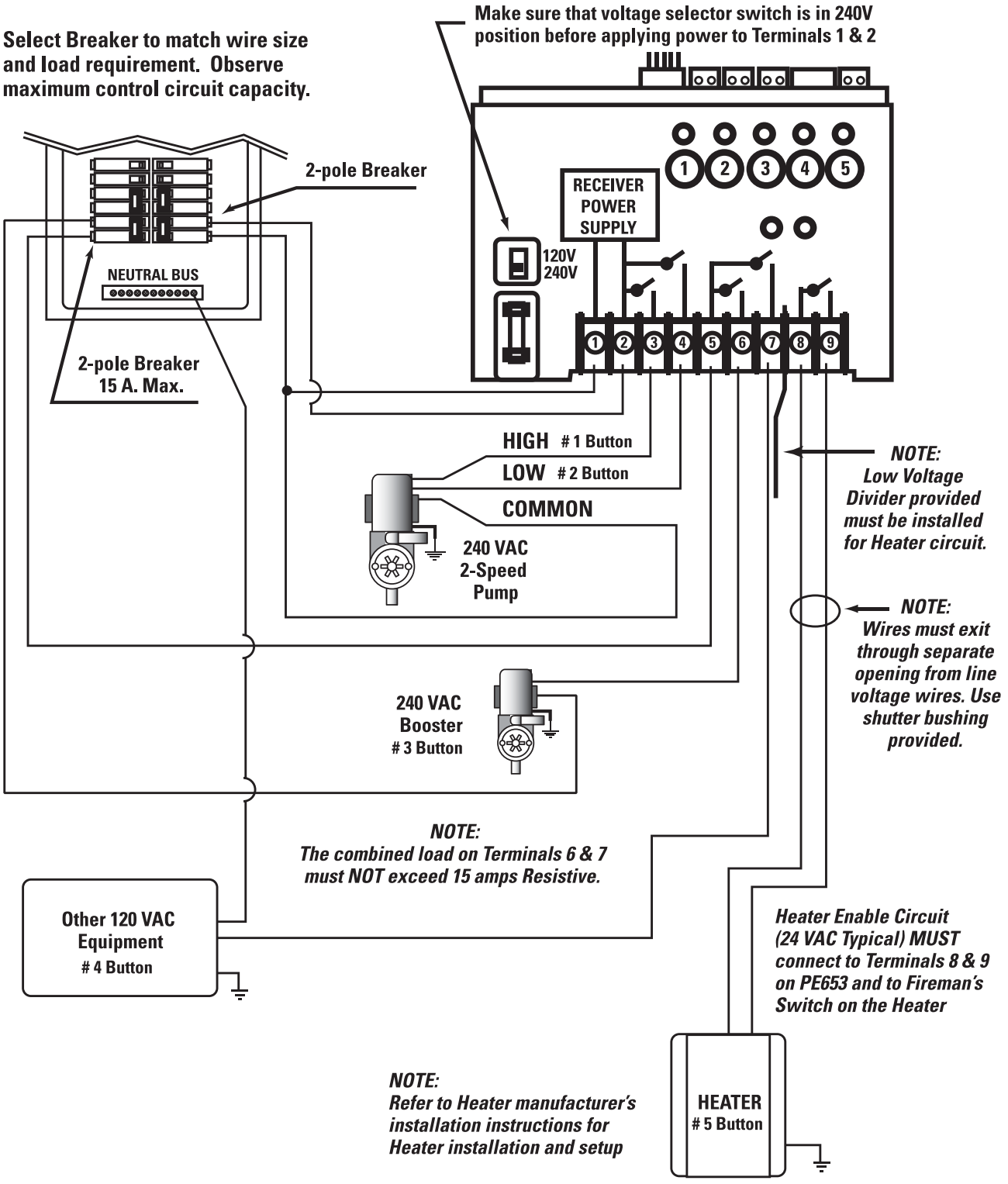


Figure 3-21

Low-Voltage Wiring

Water Temperature Sensor

The Multi-Wave Control System comes equipped with a Water Temperature Sensor. This sensor is needed to monitor both the pool and spa water temperature depending on the position of the diverter valves. It must be installed for the thermostat control to work. Power must be disconnected when connecting the temp sensor. ***Only an Intermatic Sensor will work with this controller.*** Follow these directions to install and mount the water temperature sensor.

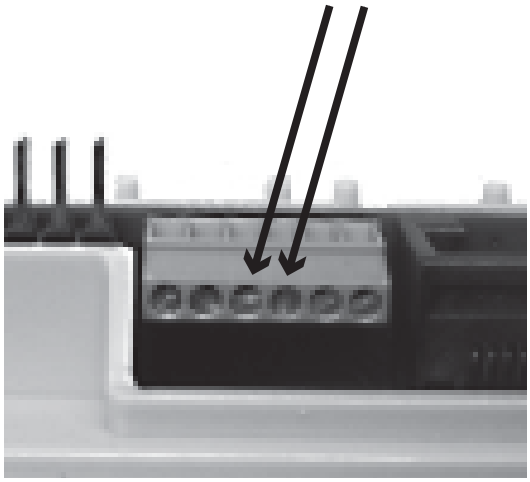


Figure 3-22

1. Drill a 3/8″ hole in the pipe between the filter pump and filter and install the Water Temperature Sensor with hose clamp (not provided). Ensure the O-ring is in place.
2. Run the wire to the Receiving Device. Insert both wires into the 3rd and 4th terminals on the sensor connection block and tighten the 3rd and 4th terminal block screws shown in Figure 3-22.

Freeze/Air Temperature Sensor

The Multi-Wave Control System uses an optional Freeze /Air Temperature Sensor *(178PA28A)* for measuring air temperature and implementing the Freeze Protection Circuit—necessary for the freeze protection circuit and programming to work. Power must be disconnected when connecting the Freeze / Air Temperature Sensor. ***Only an Intermatic Freeze / Air Temperature Sensor will work with this controller.***

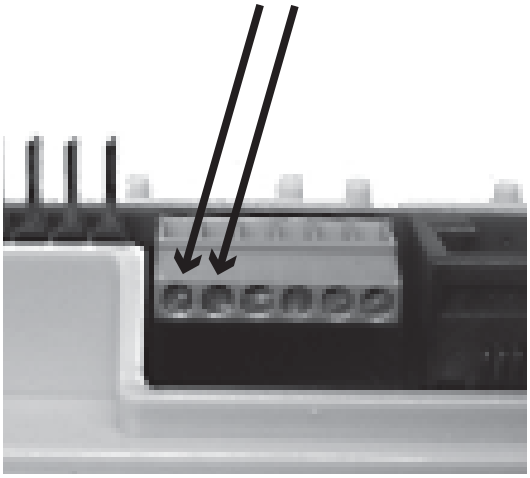


Figure 3-23

1. Install the Freeze /Air Temperature Sensor outside the Receiving Device, preferably onto a piece of conduit at or near your equipment pad. Use the clip provided with the sensor. Do not install in direct sunlight or around motors or other heat sources.
2. Run the wire to the Receiving Device. There is a connector at the end of the wires coming from the sensor. For installation onto the PE653, this connector will not be needed. Cut the connector off using a wire cutter, strip the wire ends, and insert both wires into the 1st and 2nd terminals on the sensor connection block and tighten the 1st and 2nd terminal block screws shown in Figure 3-23.

Communications to a Variable-Speed Pump

If the Multi-Wave system includes a variable-speed pump, you must wire the pump's communications cable to the PE653 so the two devices can communicate.

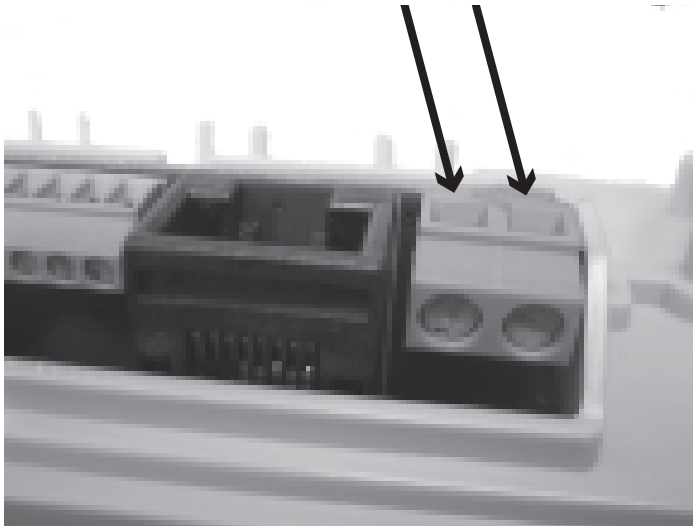


Figure 3-24

1. Connect one end of the control cable to the proper terminals on the variable-speed pump. Refer to the manufacturer's instructions. The pump manufacturer includes a cable with a plug for the motor.
2. OBSERVE POLARITY. Connect the other two wires to the wiring block at the far right of the top of the PE653. (Use the color code shown in Figure 3-4.)

Motorized Valve Actuator Connection and Synchronizing

The Multi-Wave Control System is capable of controlling Motorized Valve Actuators using Model P4243ME Valve/Pump Switch Mechanism. When used, the P4243ME must be installed in an enclosure that is separate from the PE653RC system. The P4243ME is prompted to position the 24 volt motorized actuators when the P /S (Pool / Spa) button is pushed on the PE953 Hand Held Transmitter.

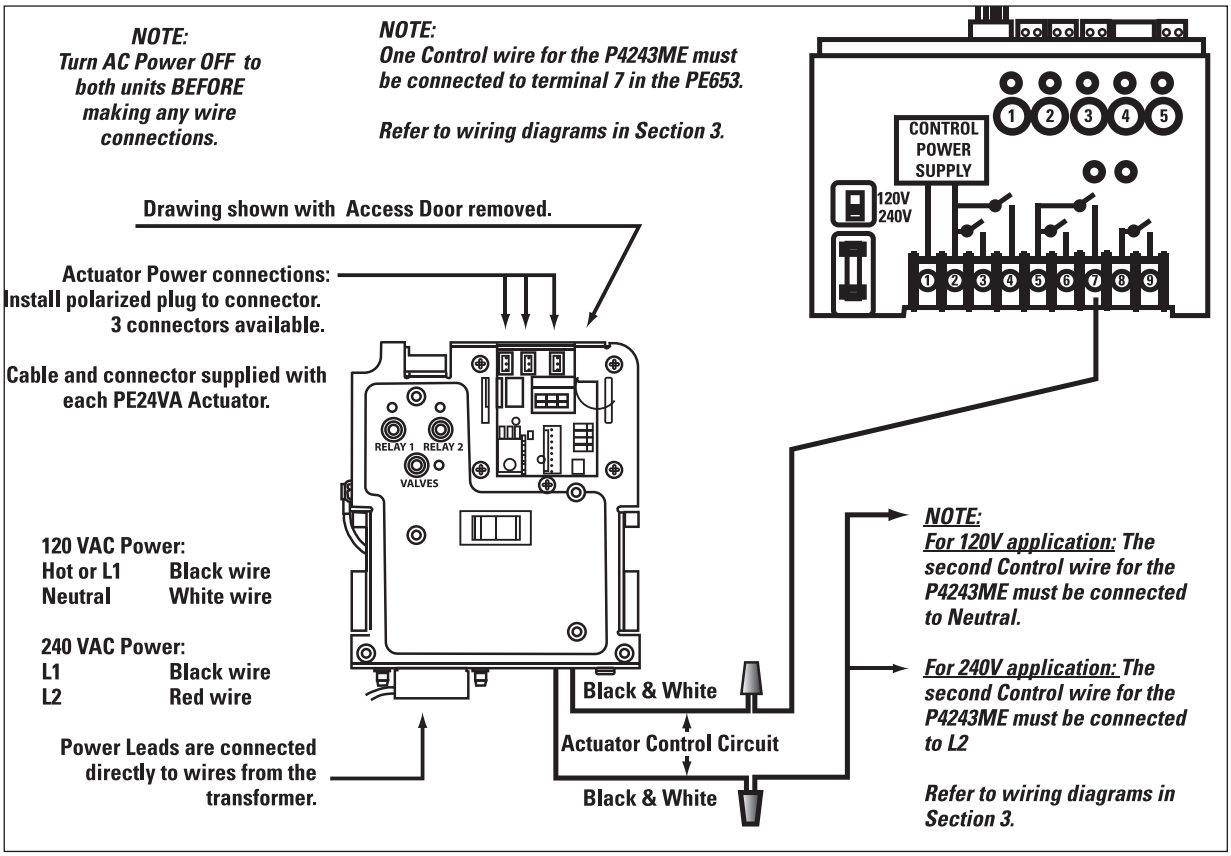


Figure 3-25

The actuators must be installed to automatically rotate your valves between the pool and spa plumbing. The 24 VAC power for the Valve Actuators is produced by a transformer in the P4243ME. All power to both units must be turned OFF when connecting the black and white actuator control leads to the PE653 (see diagram above). Refer to the installation and wiring directions for the P4243ME Actuator Control and PE24VA Actuators for additional instructions for each unit. Remove power from the P4243ME and the Multi-Wave Receiving Device.

1. Attach the valve actuators (PE24VA) to the water valves. (See instructions included with actuators).
2. Run the actuator cable(s) to the P4243ME control through the low voltage raceway.
3. Remove the access door at the top right of the P4243ME mechanism.
4. Insert the three-pin connector of the motorized valve actuator to any of the three available connectors on the P4243ME circuit board.
5. Connect 120 or 240 VAC power leads to the correct colored wires of the P4243ME transformer (see above).
6. Connect the two Actuator Control wire leads as shown above in Figure 3-25.
7. Apply power to both the PE653 and the P4243ME and synchronize the actuators as follows:
   a. Make sure that circuit number 4 is OFF (Green Load ON indicator is OFF). This indicates that the switch is in POOL mode.
   b. If either of the Actuators is positioned backwards, flip the switch on the back to reverse position.
   c. Turn circuit number 4 ON (Green Load ON indicator is ON). This indicates that the switch is in SPA mode.
   d. Verify that the Actuators are correctly synchronized with your installation.

Fireman's Switch Connection

The Intermatic Multi-Wave Control System is capable of controlling most heaters or heat pumps in the market today. Circuit number 5 in the PE653 is configured to control the heater using the 24 VAC thermostatic circuitry. Locate your type of heater in the following pages and follow the instructions for proper installation.

Refer to the heater manufacturer's installation and wiring manual if you do not find information regarding your specific brand or model of heater.

Connection for Jandy Heaters

(Jandy HiE2 shown)

1. Connect two #14 gauge wires, designed for use in hot environments to terminals 8 & 9 on the PE653 and route them through the low voltage knockout.
2. Make sure that the low voltage divider is securely installed.

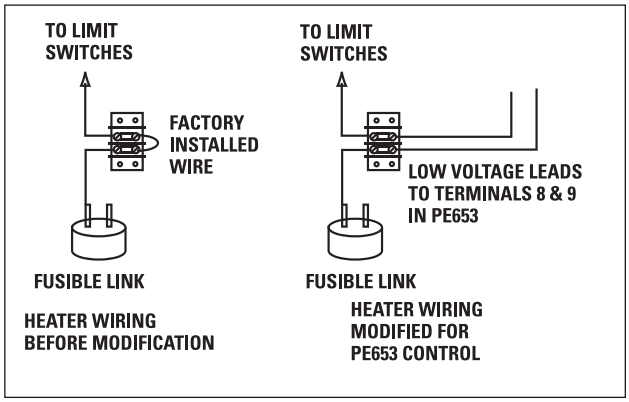


Figure 3-26 Typical Jandy heater wiring connection

3. Locate the Fireman's switch terminal in the control section of the heater.
4. Remove the factory installed jumper wire.
5. Connect the other ends of the #14 gauge wires from Step #1 to the Fireman's Switch terminal bar in place of the factory installed wire loop.
6. Do not disconnect high limit or pressure switches.
7. Turn the heater thermostat(s) to maximum setting.
8. Turn the heater switch to the ON position.

For dual thermostat heaters turn switch to Spa position.

Provide wiring with insulation at least 3/64" thick and having a temperature rating of at least 90°C.

Connection for Raypak Heaters

1. Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PE653.
2. Route the wires through the low voltage knockout in the PE653 enclosure.
3. Make sure that the Low Voltage Divider is in place.
4. Connect the orange/black wire and the black/orange wire to the wire from terminal 8 in the PE653.
5. Connect the yellow/black wire to the wire from terminal 9 in the PE653. (see Figure 3-27)

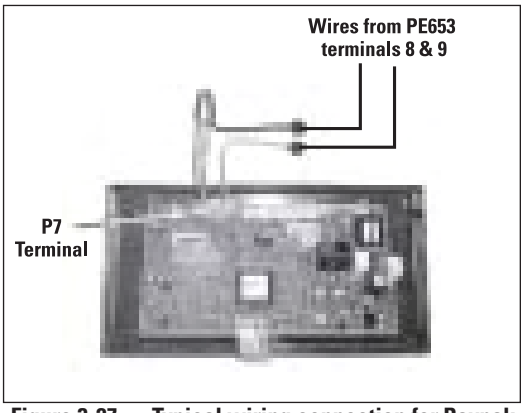


Figure 3-27 — Typical wiring connection for Raypak

Connection for Hayward Heaters

1. Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PE653.
2. Route the wires through the low voltage knockout in the PE653 enclosure.
3. Make sure that the Low Voltage Divider is in place.
4. Remove heater service door.
5. Remove factory-installed wire nut between two (2) red wires labeled "CONNECTION FOR FIELD INSTALLED CONTROL SWITCH" (see Figure 3-28).
6. Wire nut the two (2) heater wires from PE653 terminals 8 and 9 to the two (2) red wires of the heater (see Figure 3-29).
7. Do not disconnect high limit or pressure switches.
8. Set the thermostat selector switch to ON, HIGH, or SPA.
9. Set the heater thermostat(s) to maximum.

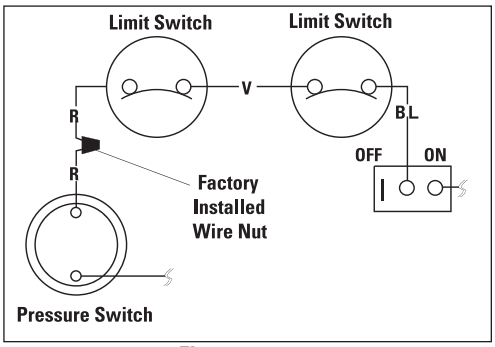


**Figure 3-28 —
Hayward Heater Wiring Before Modification**

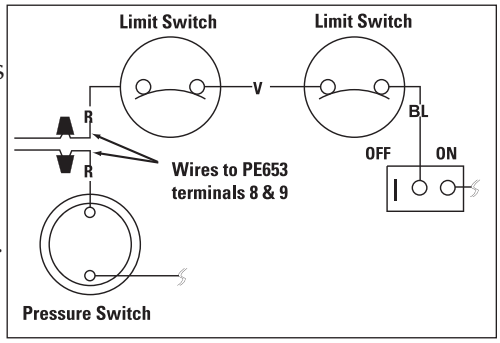


Figure 3-29 — Wiring with PE653 Receiving Device

Connection for Pentair Heater

1. Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PE653.
2. Route the wires through the low voltage knockout in the PE653 enclosure.
3. Make sure that the Low Voltage Divider is in place.
4. Remove heater service door.
5. Separate the black wires (common) from each other (see Figure 3-30).
6. Connect the wires from terminals 8 and 9 to the two black wires on the heater (see Figure 3-31)
7. Do not disconnect high limit or pressure switches.
8. Turn the heater toggle switch on, and the heater thermostat(s) to max.
9. When connecting an Intermatic PE653 to a Pentair Heater, Pentair requires that you install the low voltage thermostat wires in conduit separate from ANY line voltage wires.

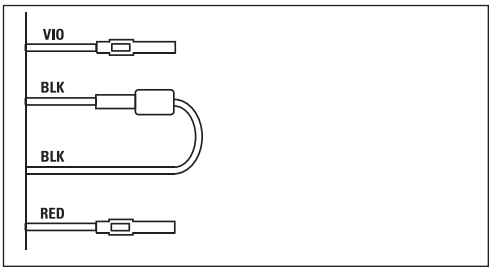


Figure 3-30 —
Pentair Heater wiring before modification

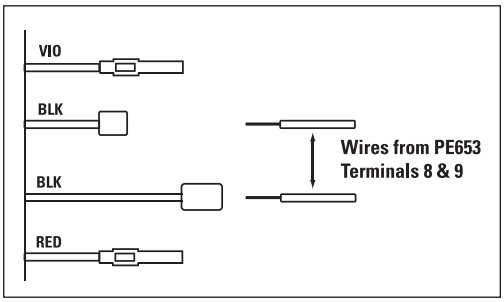


Figure 3-31 —
Pentair Heater wiring connected to PE653

Connection for Sta-Rite / Pentair Heater with DDTC

(Digital Display Temperature Controller)

1. Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PE653.
2. Route the wires through the low voltage knockout in the PE653 enclosure.
3. Make sure that the Low Voltage Divider is in place.
4. Remove heater service door.
5. Locate the DDTC circuit board. Refer to the manufacturer's instructions for location.
6. Connect the wire lead from PR653 terminal 8 to the "COM" terminal on the DDTC board. (see figure 3-32)
7. Connect the wire lead from PR653 terminal 9 to the "POOL" terminal on the DDTC board.
8. With the "POWER" and "PRESSURE" light's lit on the front panel, depress the remote button on the front display panel of the DDTC, the "REMOTE" light will come on and the remote system now has control.

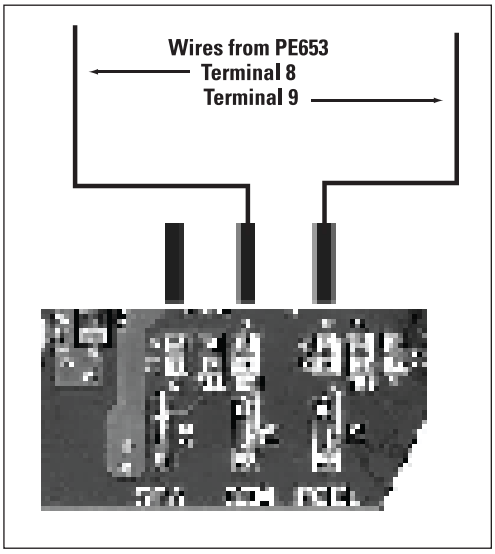


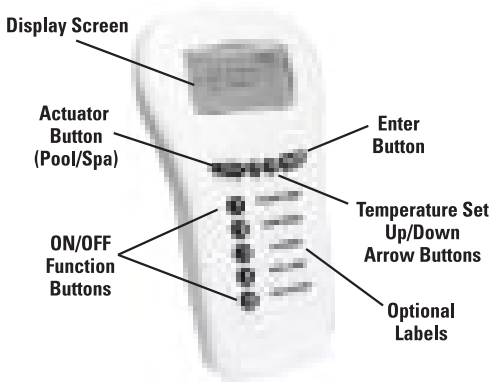
Figure 3-32 — DDTC Control Board

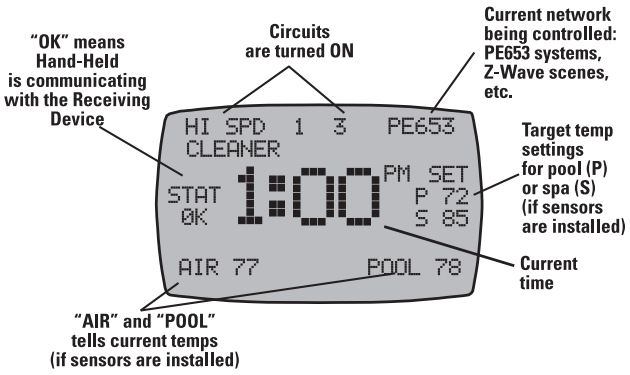
Section 4:

Programming the PE953 Hand-Held Controller

Overview

The Hand-Held Controller *(PE953)* is the focal point of user convenience. It's water-resistant, shock-resistant, and is easy to program for handy remote control of the functions at a specific pool-spa installation, as well as a range of Z-Wave home control devices. A variety of self-stick labels are provided to identify the equipment you program into the five control buttons.





Detail on a Typical PE953 Display Screen

Creating a Network Connection between the Hand-Held Controller and the PE653 Receiving Device

When you've finished physical installation and wiring and have enabled power to the Receiving Device, you need to "include" the Hand-Held Controller with the PE653 Receiving Device to create a network connection. This is a two step process: first, delete any programming that might exist in the Hand-Held Controller and Receiving Device, then synchronize the two devices with each other.

> ***NOTE:*** *If you pause in any programming procedure for 30 seconds, the screen automatically returns to a default screen. To continue programming, start over.*

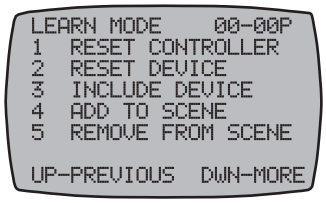
Deleting Any Existing Programming

This procedure deletes any existing network and configuration programming within the Hand-Held Controller and PE653 Receiving Device units so they are ready to be set up for the present installation. DO THIS ONLY ONCE — WHEN SETTING UP THE NETWORK — OR ANY PROGRAMMING YOU HAVE DONE WILL BE DELETED.

> ***NOTE:*** *If the word* FAILURE *instead of* SUCCESSFUL *appears at the bottom of the screen during any of the following steps, repeat the programming procedure. If the delete still fails, try replacing the batteries in the Hand-Held. If the problem persists, contact Intermatic Customer Service.*

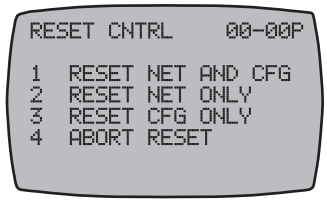
To Reset the PE953 Hand-Held Controller

1. Press and release any button on the Hand-Held Controller to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.)
2. Press and hold the **<P/S>** and **<ENTER>** buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.

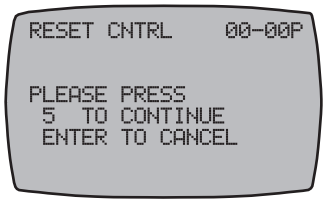


   NOTE: *If you pause in programming for more than 30 seconds, the screen automatically returns to the previous screen.*

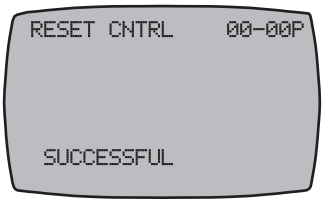
3. Press and release the **<1>** function button to select **RESET CONTROLLER**. The screen displays four options, as shown.



4. Press and release the **<1>** function button to select **RESET NET AND CFG**. This will delete any existing network connections as well as any programming entered using the Hand-Held Controller. The screen requests confirmation, as shown.



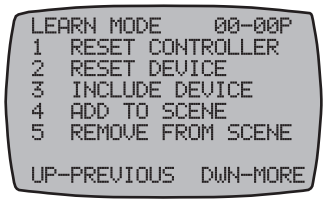
5. Press and release the **<5>** function button to select **CONTINUE**. If the action is successful, the screen displays the words PLEASE WAIT followed by SUCCESSFUL, as shown.



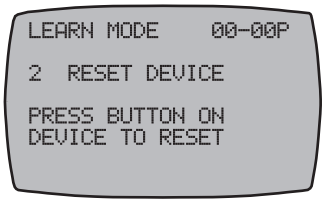
Any pre-existing network or configuration programming in the Hand-Held Controller is now deleted.

To Reset the PE653 Receiving Device

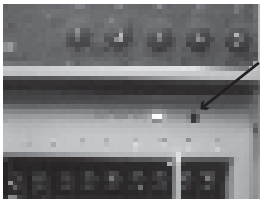
1. Press and release any button on the Hand-Held Controller to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.)
2. Press and hold the **<P/S>** and **<ENTER>** buttons at the same time to put the device into programming mode, as shown at the right.

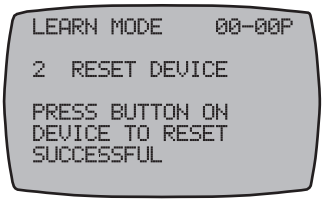


3. Press and release the **<2>** function button to select **RESET DEVICE**. The screen displays instructions.



4. Using a pen or pencil, press the **INCLUDE** button — to the right of the red light — as shown.





If the action is successful, the screen displays the word SUCCESSFUL, as shown, then returns to the LEARN MODE screen.

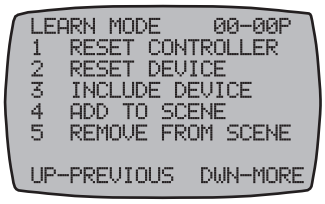
Any existing network or configuration programming in the PE653 Receiving Device is now deleted. The entire system is now at factory reset state and the components are ready to be linked together within a new electronic network.

Linking the Hand-Held Controller to the PE653 Receiving Device

This procedure creates a network connection between the Hand-Held Controller and the PE653 Receiving Device by including the PE653 into the PE953 controller., making it possible to complete the rest of the setup procedure and operate the system.

NOTE: *If the word* FAILURE *appears at the bottom of the screen during any of the following steps instead of* SUCCESSFUL*, repeat the programming procedure, or try replacing the batteries in the Hand-Held Controller. If the problem persists, contact Intermatic Customer Service.*

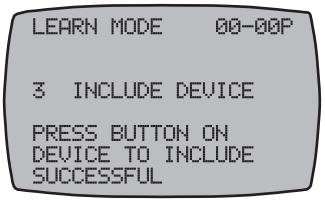
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. When all programming is deleted, the Hand-Held automatically displays the LEARN MODE screen, as shown. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press and release the **<3>** function button to select **INCLUDE DEVICE**. The screen refreshes with instructions to PRESS BUTTON ON DEVICE TO INCLUDE, as shown.

3. Using a pen or pencil, press the **INCLUDE** button — to the right of the red light — as shown.

If the action is successful, the screen displays the word SUCCESSFUL, as shown, then returns to the programming screen (LEARN MODE).



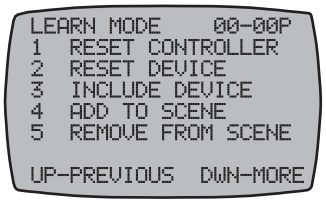
NOTE: *If the PE653 has not successfully been included and you are seeing only the word* FAILURE *at the bottom of the screen, repeat the two procedures Deleting Any Existing Programming and Linking the Hand-Held Controller to the PE653 Receiving Device. If the problem persists, contact Intermatic Customer Service.*

Configuring for a 1-Speed or 2-Speed Pump

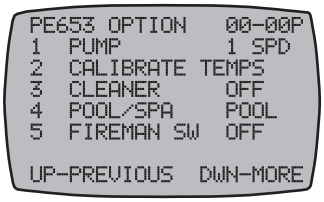
The default setup is for a single-speed pump, which you turn ON and OFF using button 1 on the Hand-Held Controller.

If the pool/spa installation uses a two-speed pump, you need to program the Hand-Held Controller to be able to switch between speeds. Once configured, the Hand-Held Controller controls these pumps as follows:

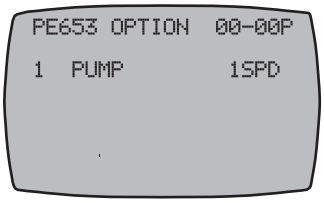
- Button **<1>** selects High speed.
- Button **<2>** selects Low speed.



1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



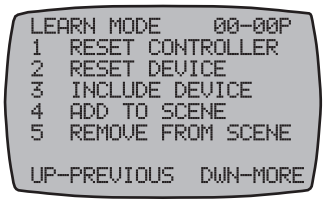
2. Press the **DOWN** arrow button until you see the PE653 OPTION screen, as shown.



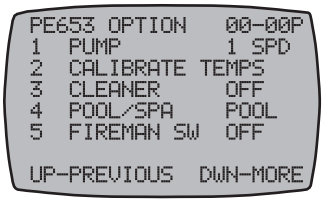
3. Press and release the **<1>** function button to select **PUMP**. The screen refreshes, as shown.
4. Press the **UP** or **DOWN** arrow button to change from 1SPD to 2SPD, then press the **<ENTER>** button. The screen adds the word SUCCESSFUL, then returns to the programming screen.
5. Press the **<ENTER>** button again to return to the Main screen.

Calibrating Pool, Spa and Air Temperature Settings

If there is a discrepancy between temperatures shown on the Hand-Held Control and independent thermometers used to measure temperatures of pool, the spa and the air, you can calibrate the Hand-Held's settings to match the independent thermometers.

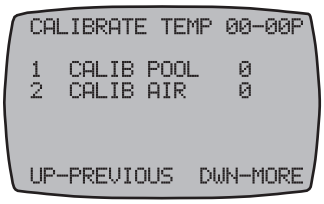


1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press the **DOWN** arrow as necessary to view the PE653 OPTION screen, as shown.

3. Press and release the **<2>** function button to select **CALIBRATE TEMPS**. The screen refreshes, as shown.



4. Using POOL as an example, press the **<1>** function button to calibrate the POOL temperature setting. The screen displays only the POOL setting, as shown.

   The AIR temperature calibration is done the same way by pressing the **<2>** *function button for AIR and continuing below.*

5. Press the **UP** or **DOWN** arrow button to add or subtract degrees from the temp that will be displayed for POOL (or SPA) temperature on the Hand-Held screen.

   NOTE: *You can set the temperature offset by ±20˚F.*

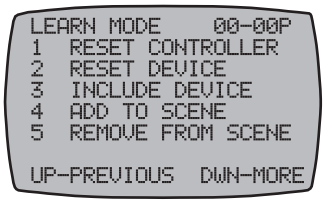
6. Press the **<ENTER>** button to save your changes. The screen adds the word SUCCESSFUL, then returns to Step 5.

7. Press the **<ENTER>** button again as necessary to return to the Main screen.

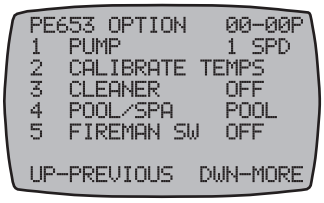
Configuring for a Booster (Cleaner) Pump

If the pool/spa installation includes a booster (cleaner) pump, you need to program the Hand-Held Controller to identify the pump and/or pump speed that must be active for the pump to operate.

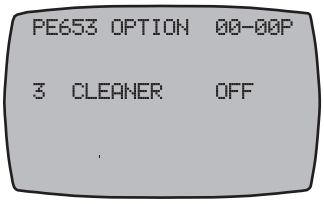
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press the **DOWN** arrow button until you see the PE653 OPTION screen, as shown.



3. Press and release the **<3>** function button to select **CLEANER**. The screen refreshes, as shown.

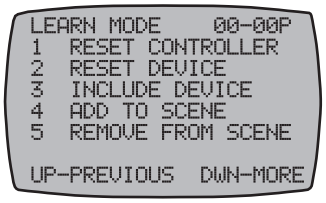


4. Press the **UP** or **DOWN** arrow button to change from OFF to CIR1 (circuit or button 1), then press the **<ENTER>** button. The screen adds the word SUCCESSFUL, then returns to the programming screen.

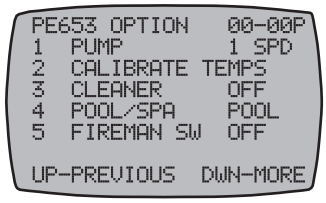
   NOTE: *If a variable speed pump has been installed, you may select one of the four variable speed pump speeds for this function.*

5. Press the **<ENTER>** button again to return to the Main screen.

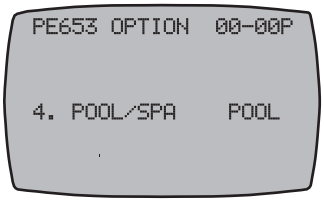
Configuring the System to Control a Pool, a Spa or Both



1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press the **DOWN** arrow button until you see the PE653 OPTION screen, as shown.
3. Press and release the **<4>** function button to select **POOL/SPA**. The screen refreshes, as shown.
4. Press the **UP** or **DOWN** arrow button to select either POOL or SPA or BOTH, then press the **<ENTER>** button. The screen displays the word SUCCESSFUL, then returns to the PE653 OPTION screen.



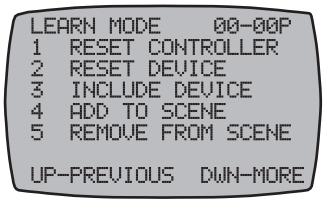
5. Press the **<ENTER>** button again to return to the TIME OF DAY screen.

Configuring the Fireman Switch Time Interval

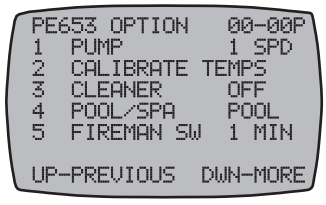
The Fireman Switch Time Interval is defined as the additional time the pump will run after the heater circuit (circuit 5) is turned off to make sure the heater is cooled down before it shuts off.

NOTE: *Refer to heater manufacturer recommendations for a specific time.*

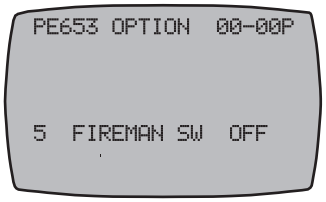
Set this interval using the Hand-Held Controller.



1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*

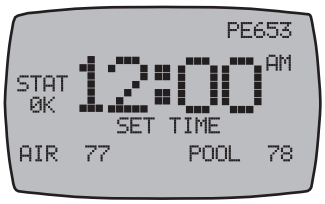


2. Press the **DOWN** arrow button until you see the PE653 OPTION screen, as shown.
3. Press and release the **<5>** function button to select **FIREMAN SW**. The screen refreshes, as shown.



4. Press the **UP** or **DOWN** arrow buttons to change from OFF to set the number of minutes you want for the interval (up to 15 minutes max), then press the **<ENTER>** button. The screen displays the word SUCCESSFUL, then returns to the PE653 OPTION screen.
5. Press the **<ENTER>** button again to return to the TIME OF DAY screen.

Setting the Time of Day



This procedure sets the clock displayed on the Hand-Held's screen. You can set the time from either the PE653 or VARSPD INT variable pump screens (as shown).

1. Press and hold the **<P/S>** button. The PE653 screen adds the words SET TIME beneath the time display, while the VARSPD INT screen highlights the time (as shown).
2. Press the **UP** or **DOWN** arrow buttons to scroll to the correct time.

   NOTE: *If you hold the button down for 5 seconds, the display will scroll quickly.*
3. When you reach the correct time, press the **<ENTER>** button to save the setting.

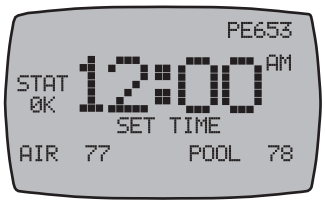
Setting Up Schedules

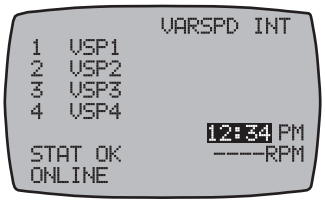
Schedules are timer-based events that can be set to turn ON/OFF a PE6534 circuit or a variable-speed pump speed at a specified time.

You can set up to three schedules for each PE653 circuit and variable-speed pump speed.

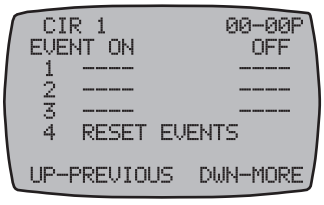
- For the PE653 circuits, begin with the PE653 main screen.
- For variable-speed pump speeds, begin with the VARSPD INT screen.

1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep.
2. If necessary, press the **<ENTER>**button to display either the PE653 or VARSPD INT screen.
3. Press and hold the **<P/S>** button. The PE653 screen adds the words SET TIME beneath the time display, while the VARSPD INT screen highlights the time (as shown). Release the **<P/S>** button.





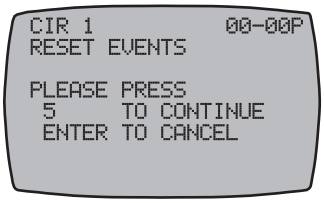
4. Press and release the **<P/S>** button again. The screen displays the schedules.



5. Press and release the **<P/S>** button again to cycle through the available circuits or variable-speed pump speeds.
6. Press the **<1>** function button to select the ON time for the first event.
7. Press the **UP** or **DOWN** arrow button to scroll and set the time.
8. Press the **<1>** function button again to advance to setting the OFF time for the first event.

   NOTE: *If you want to reset a time, you can press the* **<1>** *function button again to toggle between ON and OFF.*
9. Again, press the **UP** or **DOWN** arrow button to set the time.
10. Press the **<2>** function button to select the ON time for the second event, and repeat Steps 7 through 9 to set the times.

    The event will now activate (ON) or deactivate (OFF) according to the times you have set.



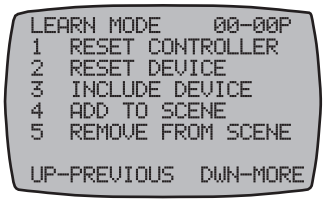
11. Press the **<P/S>** function button to advance to the next circuit.

NOTE: *To delete and reset all the events for one circuit you have scheduled for the current circuit (or VSP Speed) being configured, press the* ***<4>*** *function button. The screen displays reset instructions. You have two options:*

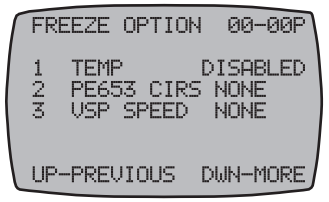
- *Press the* ***<5>*** *function button to continue with the reset.*
- *Press the* ***<ENTER>*** *button to cancel the reset.*

Configuring the Freeze Temperature (optional)

If the system has an optional Intermatic Freeze Sensor (178PA28A), you can set the temperature where the heater turns on to protect the pool.

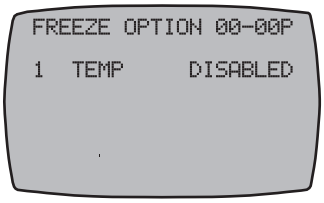


1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



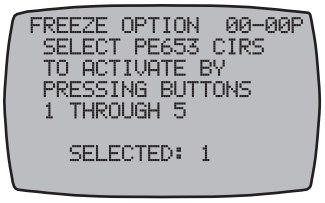
2. Press the **DOWN** arrow as necessary to view the FREEZE OPTION screen, as shown.

NOTE: *If a variable speed pump is installed, this screen will also display the VSP SPEED, as shown in this example.*



3. Press and release the **<1>** function button to select **TEMP**. The screen refreshes, as shown.

4. Press the **UP** or **DOWN** arrow button to change from DISABLED to the temperature you want (the valid selectable range is from 34°F to 44°F), then press the **<ENTER>** button. The screen displays the word SUCCESSFUL, then returns to FREEZE OPTION screen.



5. Next, press and release the **<2>** function button to select the circuit(s) you want to turn on when the freeze temperature is reached. The screen refreshes, as shown.

6. Press the appropriate button(s) for the circuit on the Hand-Held Controller, then press the **<ENTER>** button.

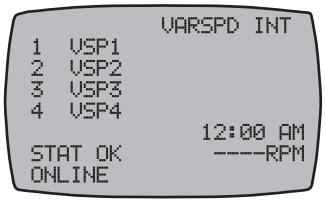
- If you have a single-speed pump, press and release the **<1>** function button.
- If you have a two-speed pump, press and release the **<1>** function button to circulate water and prevent freezing with the high speed, or the **<2>** function button to circulate with the low-speed.
- If you have a variable speed pump, return to Step 3 and select the **<3>** function button to pick the VSP speed (if any) you want to activate.

  NOTE: *Other options available will depend on how the system is configured (e.g., fireman enabled or not, booster enabled or not, etc).*

7. Press the **<ENTER>** button again to return to the Main screen.

Configuring for a Variable Speed Pump (optional)

If a variable-speed pump has been installed for the filter and cleaner pump functions, the Hand-Held Controller can be toggled between the PE653 screen and this variable speed control screen (VARSPD INT) by pressing and releasing the **<ENTER>** button.

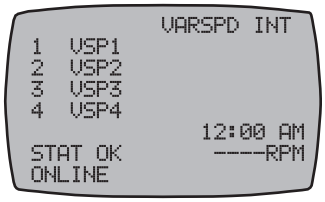


This screen controls the variable speed pump, and can be configured to display the functionalities you have selected for various pump speeds (for example, slowest speed for the cleaner, next faster speed for a booster pump, etc.).

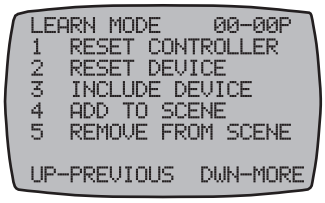
Buttons **<1>** through **<4>** on the Hand-Held Controller choose between the 4 speeds, allowing you to toggle them from ON to OFF and vice-versa.

You can change the four variable speed pump speed settings from the factory default values by following these steps on the Hand-Held Controller. Once configured, Buttons **<1>** through **<4>** will switch between the variable speeds according to your settings.

1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep.
2. Press the **<ENTER>** button to display the variable speed screen VARSPD INT as shown.

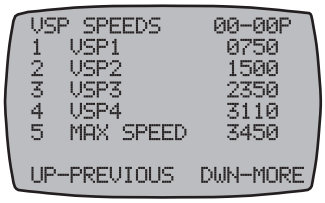


3. Press and hold the **<P/S>** button first, then press and hold the **<ENTER>** button within 2 seconds. The LEARN MODE screen is displayed.



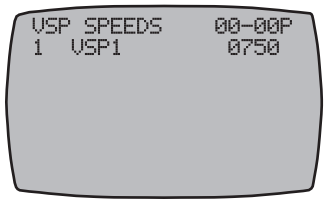
NOTE: *If you don't press and hold the* **<ENTER>** *button within 2 seconds then the displayed time may highlight, and the LEARN MODE screen will NOT display. Release both the* **<P/S>** *and the* **<ENTER>** *buttons, then press* **<ENTER>** *to un-highlight the displayed time. Repeat this procedure from the beginning until the LEARN MODE screen is displayed.*

4. Press the **DOWN** arrow button until you see the VSP SPEEDS screen, as shown.



NOTE: *The MAX SPEED setting is the highest speed the pump can safely operate without damaging the plumbing system.*

5. Press and release the **<1>** function button to set the speed for that button. The screen displays that speed.



6. Press the **UP** or **DOWN** arrow button to raise or lower the speed setting.
7. Repeat Steps 5 and 6 to set speeds for button **<2>** through **<5>**.
8. Press the **<ENTER>** button again to return to the VARSPD INT screen.

Testing Z-Wave Reception

At the heart of the Multi-Wave system is Z-Wave wireless technology. Test reception by walking around the yard with the Hand-Held Controller and look on the screen to see if there are any areas where STAT OK changes to STAT (which means the Hand-Held and the Receiving Device are no longer communicating).

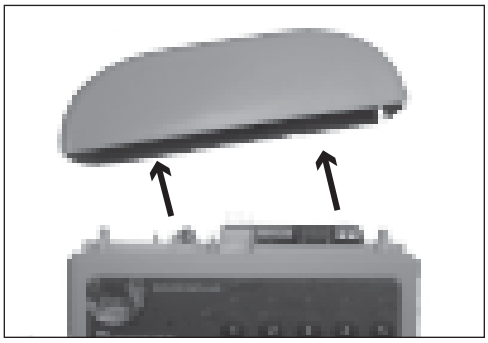
The STAT OK refreshes approximately once every 6 seconds, so you must stay in each location being tested for at least that long (and even 2 to 3 times longer in fringe areas, where the signal is becoming too weak to be considered a GOOD signal strength).

Signal reception between Hand-Held Controllers and the Receiving Device is affected by distance (about 100 feet,) direct line of sight, and by physical obstacles (like brick, wire lath in walls, or steel structures).

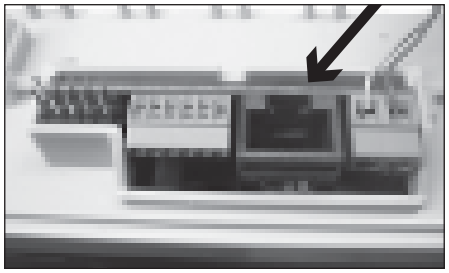
If you identify any locations in the area of operation where communications problems occur, typically when a structure blocks the line of sight between the Hand-Held Controller and the Receiving Device, use a length of Cat 5 ethernet cable, suitable for outdoor use and/or for burying in the ground to relocate the antenna to a new location where the reception is stronger.

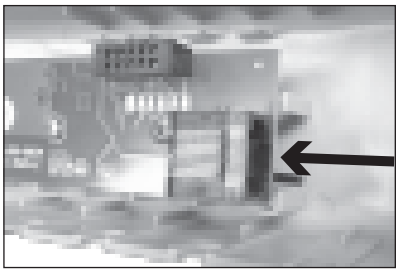
Moving the Antenna to a Better Location

The removable top of the PE653 enclosure contains the system's antenna.

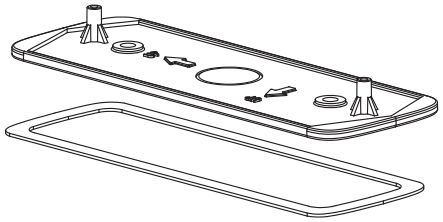


1. Remove the two screws used to attach the antenna cover to the PE653 and remove the antenna enclosure by pulling it straight away from the main body of the PE653 Receiving Device.
2. Relocate the antenna assembly to a location where it is in direct line of sight from the area of operation — the area where the home owner will be using the Hand-Held Controller.

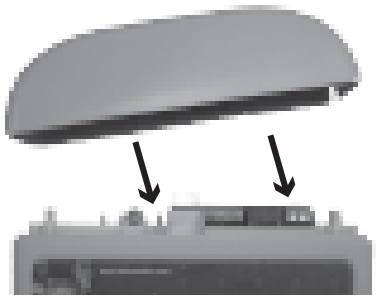




3. Connect the antenna to the PE653 Receiving Device using a length of CAT 5 ethernet cable suitable for outdoor use and/or burying in the ground.
4. Attach the mounting plate — on top of its waterproofing gasket — to the wall or post where you plan to relocate the antenna.



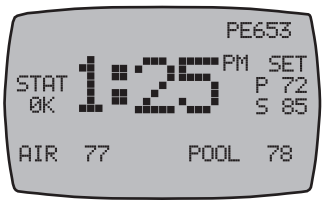
5. Cut out a knock-out for the wire to pass through the cap, then screw the antenna cap to the bracket, using the screws supplied with the remote kit.
6. Cut out a knock-out for the wire to pass through the dummy cap, then screw the dummy cap to the top of the PE653 Receiving Device, using the original screws.



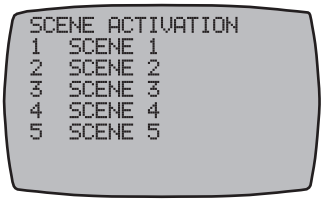
Labeling the Hand-Held Controller

Intermatic provides a sheet of peel-and-stick labels to use in identifying the five buttons on the Hand-Held Controller. When installation is complete and the system has been programmed, apply the appropriate stickers to guide the owner in using the system. *For additional stickers, contact Intermatic Inc., at 815-675-7000.*

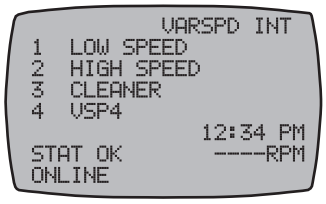
Depending on which components have been installed in the system, you have several choices for which screen you want to use as the default primary screen (displayed when the Hand-Held Controller awakes from sleep). This decision may determine which labels you might want to apply to the Hand-Held Controller.



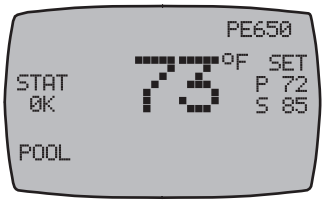
PE653 Main Screen



Z-Wave Main Screen



Variable-Speed Pump Main Screen



PE650 Main Screen

Labeling for the PE653 Screen

If you set the PE653 screen as the primary screen, the five buttons on the Hand-Held Controller are usually configured as follows:

Button **<1>** = Filter Pump

Button **<2>** = Filter Pump low speed for two-speed systems, or available for generic assignment

Button **<3>** = Cleaner Pump, or available for generic assignment

Button **<4>** = Pool/Spa control actuators, or available for generic assignment

Button **<5>** = Heater, or available for generic assignment

Labeling for the Z-Wave Screen

Label the five buttons according to the names of the five scenes.

Labeling for the Variable-Speed Pump Screen

Label the five buttons according to which speeds you have assigned to specific functions, as identified on the screen.

Labeling for the PE650 Screen

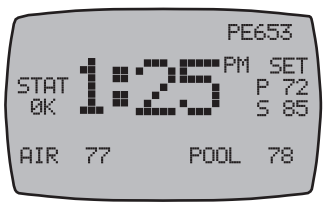
Label the five buttons according to the functions assigned to the circuits in use at the installation.

Section 5:

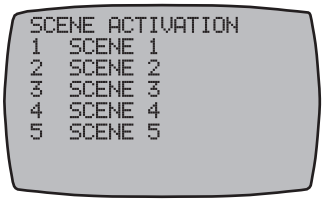
Everyday Use of the Hand-Held Controller

The complete everyday functionality of the pool/spa system you have installed can be conveniently controlled using the Hand-Held Controller.

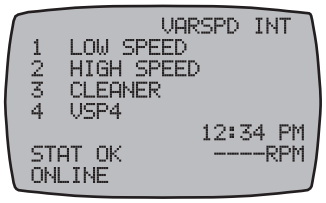
Depending on which components have been installed in the system, there may be several screens available as the primary screen when controlling the system:



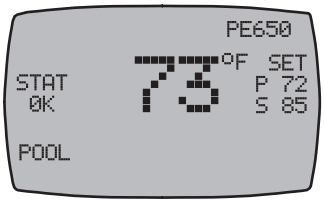
PE653 Main Screen



Z-Wave Main Screen



Variable-Speed Pump Main Screen

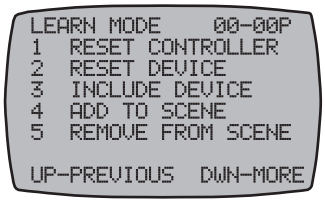


PE650 Main Screen

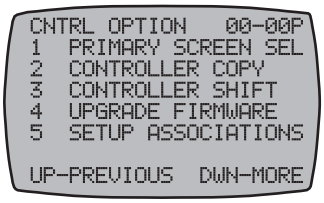
Press the **<ENTER>** button to choose the screen as the primary screen, with the functionality you want to control most frequently, and then proceed with the instructions provided below.

You can choose any one of these screens to be the default primary screen displayed when you wake up the Hand-Held Controller.

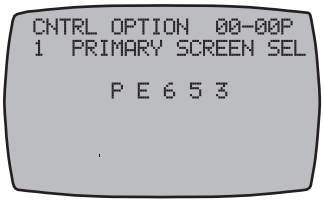
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press the **DOWN** arrow button until you see the CONTROL OPTION screen, as shown.



3. Press and release the **<1>** function button to select **PRIMARY SCREEN SEL**. The screen refreshes, as shown.

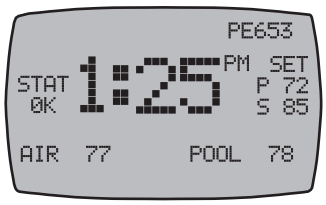


4. Press the **UP** or **DOWN** arrow button as necessary to select PE653, VSP (variable speed pump), ZWAVE, or PE650.
5. Press the **<ENTER>** button to save your choice.

The next time you wake the Hand-Held Controller from sleep, it will awaken to the screen you have selected. Press the **<ENTER>** button as necessary to toggle to other main screens.

Controlling the PE653 Receiving Device

To control settings configured with the PE653 Receiving Device



1. Press and release any button on the Hand-Held Controller to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.)
2. Press the **<ENTER>** button until you see the PE653 screen, as shown.

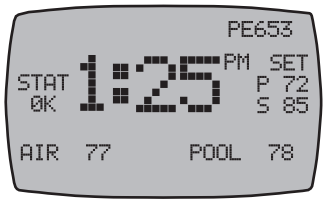
Operating Programmed Functions

Depending on how you have wired the system, the five function buttons on the Hand-Held Controller operates the five circuits in the PE653 Receiving Device.

When you press any of these buttons, the appropriate circuit toggles ON or OFF. In addition, when the circuit is ON, the Hand-Held Controller's display shows the circuit number along the top of the screen.

Changing between Pool and Spa

The Valve Actuator *(PE24VA)* that you have installed in the system directs water either to the pool or the spa. To use the Hand-Held Controller to control this valve:



1. Press and release any button on the Hand-Held Controller to wake it from sleep. The screen display should look generally like the example on the right.

   If not, press the **<ENTER>** button until you see this screen.

   NOTE: *The lower-right area of Hand-Held Controller Screen displays the current mode for the system — in this example it is POOL. The screen will* indicate:

   POOL if the valve actuator is in pool mode

   SPA if in spa mode

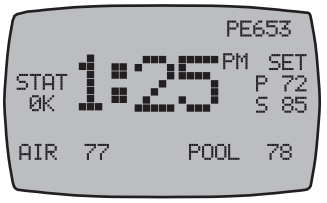
   The number following the word POOL or SPA is the current water temperature for the water in whichever mode is being displayed.

3. Press and release the **<P/S>** button. The system toggles between POOL and SPA mode.
4. In the example at the right, the mode is now changed to SPA, and the temperature shown is the water temperature of the SPA.

   NOTE: *The large numeric display shown on the Hand-Held Controller Screen shows the current time of day.*

Setting Pool and Spa Temperatures

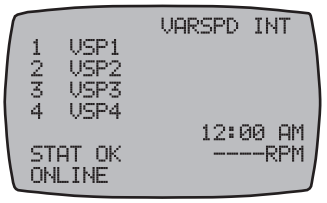
When a heater is installed, the Hand-Held Controller controls the independent water temperatures of both the pool and spa.



1. You can view the target temperature on the right side of the Hand-Held Controller Screen under the word SET.
   - P = target set pool water temperature
   - S = target set spa water temperature
2. Press and release the **<P/S>** button if necessary to change the system between Pool and Spa mode. Depending on which mode is selected, the word POOL (lower left) or SPA (lower right) appears on the screen.
3. Make sure you are in the mode for which you want to change the target set temperature before continuing to step 3 below.
4. Press the **<UP>** or **<DOWN>** arrow buttons to raise or lower the setting to the desired temperature. You can hold the button down and the value will automatically change.
5. Release the arrow button when the setting reaches the temperature you want.

Controlling a Variable-Speed Pump

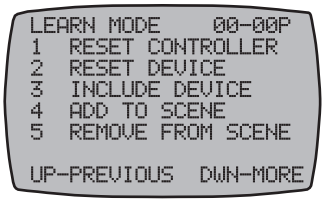
If the system has a variable-speed pump, you must control the specific speeds on the pump from the VARSPD INT screen.



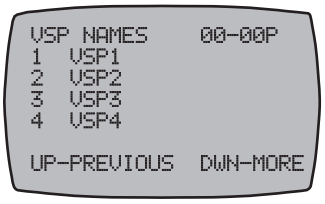
Naming the Speeds

To prevent confusion for the owner, you should enter names for the specific speeds that you have assigned to specific functions. For example, the cleaner pump speed, the booster pump speed, etc.

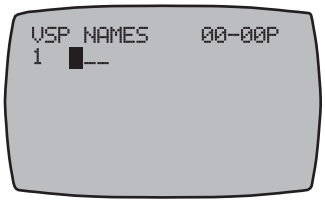
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the* **<P/S>** *and* **<ENTER>** *buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is displayed, as shown at the right.*



2. Press the **DOWN** arrow button as necessary to display the VSP NAMES screen, as shown.



3. Press the button for the speed you want to name. The screen shifts to show just that speed name, and highlights the first letter of the name.

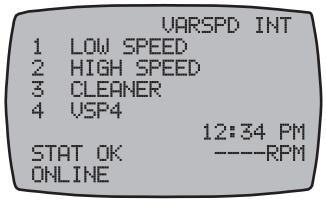


4. Use the **UP** or **DOWN** arrow buttons to scroll through the list of available characters to use in the Scene name. The valid character set for names is: A-Z, 1-9, and SPACE.

5. When you have selected the right letter or number, press the **<P/S>** button to move right to the next character.
6. Repeat Steps 6 and 7 until you have completed the renaming.
7. Press the **<ENTER>** button to save the name and return to Step 4 above. Repeat the procedure to name the other speeds.
8. Press the **<ENTER>** button when you are finished to return to the VARSPD INT screen.

Changing Pump Speeds

1. Press and release any button on the Hand-Held Controller to wake it from sleep.
2. Press the **<ENTER>** button until you see the VARSPD INT screen, as shown.
3. Press the button corresponding to the speed you want to run the pump at.

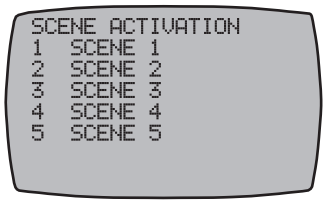


Controlling Z-Wave Devices

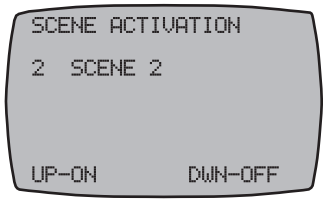
Once you have included Z-Wave devices in the network and have added them to various Scenes, you can control them using the Hand-Held Controller.

Note: *If controlling Z-Wave devices is your primary use for the controller, you might want to apply labels that define the scenes controlled by the five buttons.*

1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep.
2. If the SCENE ACTIVATION screen (shown at the right) is not displayed, press the **<ENTER>** button until you see the Z-Wave SCENE ACTIVATION screen, as shown.



3. Press button for the scene you want to activate. The screen displays the scene name.



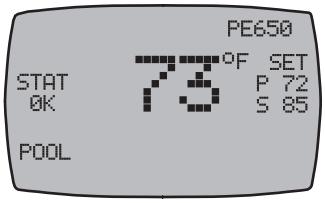
4. Depending on what you want to do:
   - Press the UP button to turn the scene ON.
   - Press the DOWN button to turn the scene OFF.

   The screen will add the word WORKING followed by SUCCESSFUL when it completes your command, and will then return to the SCENE ACTIVATION screen.
5. Press the **<ENTER>** button if you wish to return to the PE653 screen.

Controlling PE650 Functions

Depending on how the site has been installed with the PE650 Receiving Device, there may be up to five circuits being controlled. The five function buttons on the PE653 Hand-Held Controller will control the five circuits in the PE650 Receiving Device.

1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep.
2. If the PE650 screen (shown at the right) is not displayed, press the **<ENTER>** button until you see the PE650 screen, as shown.

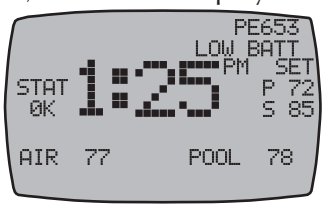


3. Press the function button for the circuit you want to turn ON or OFF.
   - Buttons **<1>**, **<2>,** and **<3>** control circuits 1, 2, and 3 on the Three-Circuit Clock Mechanism (P1353ME) that is installed on the left side of the Receiving Device.
   - Buttons **<4>** and **<5>** control Relay 1 and Relay 2 on the Valve/Pump Switch Control (P4243ME) that is installed on the right side of the Receiving Device.

The Hand-Held Controller's display shows the circuit number along the top of the screen.

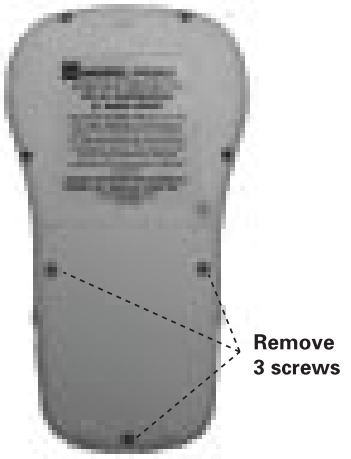
Changing Batteries in the Hand-Held Controller

The Hand-Held Controller requires three (3) AA batteries. Battery life is approximately one year in typical use. When the batteries are weak, the screen displays a LOW BATT message shown.



To change the batteries:

1. Use a small Phillips screwdriver to remove the three screws on the back of the unit, as indicated.



2. Place three new batteries in the unit, making sure to observe "+" and "–" polarity.
3. ***Be sure to re-install the gasket correctly to maintain the water-tight seal.***