

# MULTI WAVE™

## PE653RC Pool/Spa Control System



**INTERMATIC®**  
Providing a brighter solution.™



## *Installation and User Guide*

# Important Safety Instructions

All electrical work must be performed by a licensed electrician and conform to all national, state, and local codes. When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:



**DANGER:** *To reduce the risk of injury, do not remove the suction fittings of your spa or hot tub. Never operate a spa or hot tub if the suction fittings are broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the equipment assembly.*



**WARNING:** *Prolonged immersion in hot water may induce hyperthermia. Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F. The symptoms of hyperthermia include dizziness, fainting, drowsiness, lethargy, and an increase in the internal temperature of the body. The effects of hyperthermia include: 1) unawareness of impending danger; 2) failure to perceive heat; 3) failure to recognize the need to exit spa; 4) physical inability to exit spa; 5) fetal damage in pregnant women; 6) unconsciousness resulting in a danger of drowning.*



**WARNING:** *To Reduce the Risk of Injury —*

- The water in a spa should never exceed 104°F (40°C). Water temperatures between 100°F (38°C) and 104°F (40°C) are considered safe for a healthy adult. Lower water temperatures are recommended for young children and when spa use exceeds 10 minutes.
- Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit spa water temperatures to 100°F (38°C).
- Before entering a spa or hot tub, the user should measure the water temperature with an accurate thermometer since the tolerance of water temperature-regulating devices varies.
- The use of alcohol, drugs, or medication before or during spa or hot tub use may lead to unconsciousness with the possibility of drowning.
- Obese people and people with history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a spa.
- People using medication should consult a physician before using a spa or hot tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.



**WARNING:** *Risk of electric shock – Install the control center at least five (5) feet (152.4cm) from the inside wall of the pool and/or hot tub using non-metallic plumbing. Canadian installations must be at least three (3) meters from the water.*



- Children should not use spas or hot tubs without adult supervision.
- Do not use spas or hot tubs unless all suction guards are installed to prevent body and hair entrapment.
- People using medications and/or having an adverse medical history should consult a physician before using a spa or hot tub.
- People with infectious diseases should not use a spa or hot tub.
- To avoid injury, exercise care when entering or exiting the spa or hot tub.
- Do not use drugs or alcohol before or during the use of a spa or hot tub to avoid unconsciousness and possible drowning
- Pregnant or possibly pregnant women should consult a physician before using a spa or hot tub.
- Water temperature in excess of 100°F (38°C) may be injurious to your health.
- Before entering a spa or hot tub measure the water temperature with an accurate thermometer.
- Do not use a spa or hot tub immediately following strenuous exercise.
- Prolonged immersion in a spa or hot tub may be injurious to your health.
- Do not permit any electric appliance (such as a light, telephone, radio, or television) within 5 feet (1.5m) of a spa or hot tub.
- The use of alcohol, drugs or medication can greatly increase the risk of fatal hyperthermia in hot tubs and spas.
- Water temperature in excess of 100°F (38°C) may be hazardous to your health.



**WARNING:** *To reduce the risk of electrical shock, connect the grounding terminal in the metal enclosure to the grounding terminal of your electric service or supply panel with a continuous copper conductor having green insulation and one that is equivalent in size to the circuit conductors supplying this equipment. In addition, a second wire connector should be bonded with a no. 8 AWG (4.115mm) copper wire to any metal ladders, water pipes, or other metal within five (5) feet (1.52m) of the tub.*



**WARNING:** *A ground-fault circuit-interrupter must be provided if this device is used to control underwater lighting fixtures. The conductors on the load side of the ground-fault circuit-interrupter shall not occupy conduit, boxes or enclosures containing other conductors unless the additional conductors are also protected by a ground-fault circuit-interrupter. Refer to local codes for complete details.*

# Contents

<b>Important Safety Instructions</b> .....	<b>2</b>
<b>Section 1: System Overview</b> .....	<b>8</b>
Additional Detail on Key Components .....	9
Hand-Held Controller ( <b>PE953</b> ) .....	<b>9</b>
24-Volt Valve Actuator ( <b>PE24VA</b> ) .....	<b>9</b>
Water Temperature Sensor ( <b>PA122</b> ) .....	<b>9</b>
24-Volt Valve/Pump Switch ( <b>P4243ME</b> ) .....	<b>10</b>
Optional — Freeze (Air Temperature) Sensor ( <b>178PA28A</b> ) .....	10
<b>Section 2: Plumbing Examples</b> .....	<b>11</b>
For Pool and Spa Combo Installations .....	11
For Booster Pump Pool Cleaner Installations .....	11
For Non-Booster Pump Pool Cleaner Installations .....	12
<b>Section 3: Installing and Wiring the PE653 Receiving Device</b> .....	<b>13</b>
Ratings .....	13
Wiring Instructions .....	14
Power Connections .....	14
Upper Terminal Connections .....	15
Installation Instructions .....	15
List of Wiring Diagrams .....	16
Variable-Speed Pumps .....	17
240V Variable-Speed Pump .....	17
1-Speed Pumps .....	18
120V 1-speed pump .....	18
120V 1-speed pump + any four 120 VAC auxiliary equipment .....	19
120V 1-speed pump + 120 VAC blower or lights + 120V booster pump + 120V actuator + heater .....	20
120V 1-speed pump + 120V blower + 120V lights + 120V actuator + heater .....	21
240V Pumps .....	22
240V 1-speed pump .....	22
240V 1-speed pump + any four 240 VAC auxiliary equipment .....	23
240V 1-speed pump + 240V blower + 240V booster pump + 240V actuator + heater .....	24
240V 1-speed pump + 120V lights + 120V blower + 240V actuator + heater .....	25
240V 2-Speed Pump .....	26
240V 2-speed pump + any three 240VAC auxiliary equipment .....	27
240V 2-Speed pump + any 3 120 VAC auxiliary equipment .....	28
240V 2-Speed pump + 240V Booster Pump + 240V Actuator + Heater .....	29
240V 2-speed pump + 120V lights + 240V blower + heater .....	30
240V 2-speed pump + 240V blower + 240V actuator + heater .....	31
240V 2-speed pump + 240V booster pump + 240V blower + heater .....	32
240V 2-speed pump + 240V booster pump + 120V light + heater .....	33
240V 2-speed pump + 240V booster pump + other 120 VAC equipment + heater .....	34

Low-Voltage Wiring .....	35
Water Temperature Sensor .....	35
Freeze/Air Temperature Sensor.....	35
Communications to a Variable-Speed Pump .....	36
Motorized Valve Actuator Connection and Synchronizing .....	36
Fireman’s Switch Connection .....	37
Connection for Jandy Heaters .....	37
Connection for Raypak Heaters .....	38
Connection for Hayward Heaters .....	38
Connection for Pentair Heater .....	39
Connection for Sta-Rite / Pentair Heater with DDTC.....	40
<b>Section 4: Programming the PE953 Hand-Held Controller.....</b>	<b>41</b>
Overview .....	41
Creating a Network Connection between the Hand-Held Controller and the PE653 Receiving Device.....	41
Deleting Any Existing Programming.....	41
Linking the Hand-Held Controller to the PE653 Receiving Device.....	43
Configuring for a 1-Speed or 2-Speed Pump.....	44
Calibrating Pool, Spa and Air Temperature Settings.....	44
Configuring for a Booster (Cleaner) Pump .....	45
Configuring the Fireman Switch Time Interval.....	46
Setting the Time of Day .....	47
Setting Up Schedules .....	47
Configuring the Freeze Temperature (optional) .....	48
Configuring for a Variable Speed Pump (optional) .....	49
Testing Z-Wave Reception.....	50
Moving the Antenna to a Better Location.....	50
Labeling for the PE653 Screen .....	51
Labeling for the Z-Wave Screen.....	51
Labeling for the Variable-Speed Pump Screen.....	51
Labeling for the PE650 Screen .....	51
<b>Section 5: Everyday Use of the Hand-Held Controller .....</b>	<b>52</b>
Controlling the PE653 Receiving Device .....	53
Operating Programmed Functions .....	53
Changing between Pool and Spa .....	53
Setting Pool and Spa Temperatures.....	54
Controlling a Variable-Speed Pump.....	54
Naming the Speeds .....	54
Changing Pump Speeds.....	55
Controlling Z-Wave Devices .....	55
Controlling PE650 Functions .....	56
Changing Batteries in the Hand-Held Controller .....	56
Manually Turning Equipment On and Off .....	57

- Section 6:Advanced Features.....58**
  - Configuring Two or More Hand-Held Controllers ..... 58
  - Changing a Secondary Remote Control into a Primary Control ..... 60
  - Including the PE953 Controller into a non-Multi-Wave (other manufacturer’s) network. .... 61
  
- Section 7:Programming for Use with Z-Wave Home Control Devices..... 62**
  - Deleting Any Existing Programming..... 62
  - Including Z-Wave Devices into the Network ..... 63
  - Including the PE653 Receiver onto a non-Multi-Wave remote controller ..... 63
  - Adding Z-Wave Devices to Scenes for Everyday Control..... 64
  - Renaming a Scene..... 65
  - Removing Z-Wave Devices from Scenes..... 66
  - Removing Z-Wave Devices from a Network ..... 66
  - Setting Up Z-Wave Associations with Capable Devices ..... 67
  - Removing Z-Wave Devices from an Association ..... 69
  
- Section 8:Using the PE953 with the PE650 Receiving Device..... 70**
  - Linking the PE953 Hand-Held Controller with the PE650 Receiving Device ..... 70
  
- Section 9: Checking Out and Verifying the System..... 71**
  
- Section 10: Troubleshooting ..... 75**
  
- Section 11: Appendix ..... 80**
  - Glossary of Z-Wave Terminology ..... 80
  - FCC Statement ..... 81
  
- Section 12: Warranty..... 82**



Section 1:

# System Overview

The Intermatic Multi-Wave Pool/Spa PE653RC Wireless Control System brings wireless control to a new level of simplicity and affordability. The following features make the system distinctive:

- Easy to Use — with simple, push button controls and a clear, easy-to-read display panel
- Everything You Need — includes the functionality and control called for in nearly every installation.
- Dependable — with Z-Wave® technology that lets you expand your system with inexpensive repeaters that plug into available electrical outlets to help extend the RF signal range of the entire system. Z-Wave technology eliminates intermittent signal problems experienced with many other systems.
- Cost Efficiency — a superior system, easier to install and maintain, with better dependability, and at a cost that's competitive with any other system available.

The standard configuration for the Multi-Wave PE653RC Pool/Spa Wireless Control System configuration is shown in Figure 1-1. You can order individual components for a custom configuration or system as indicated.

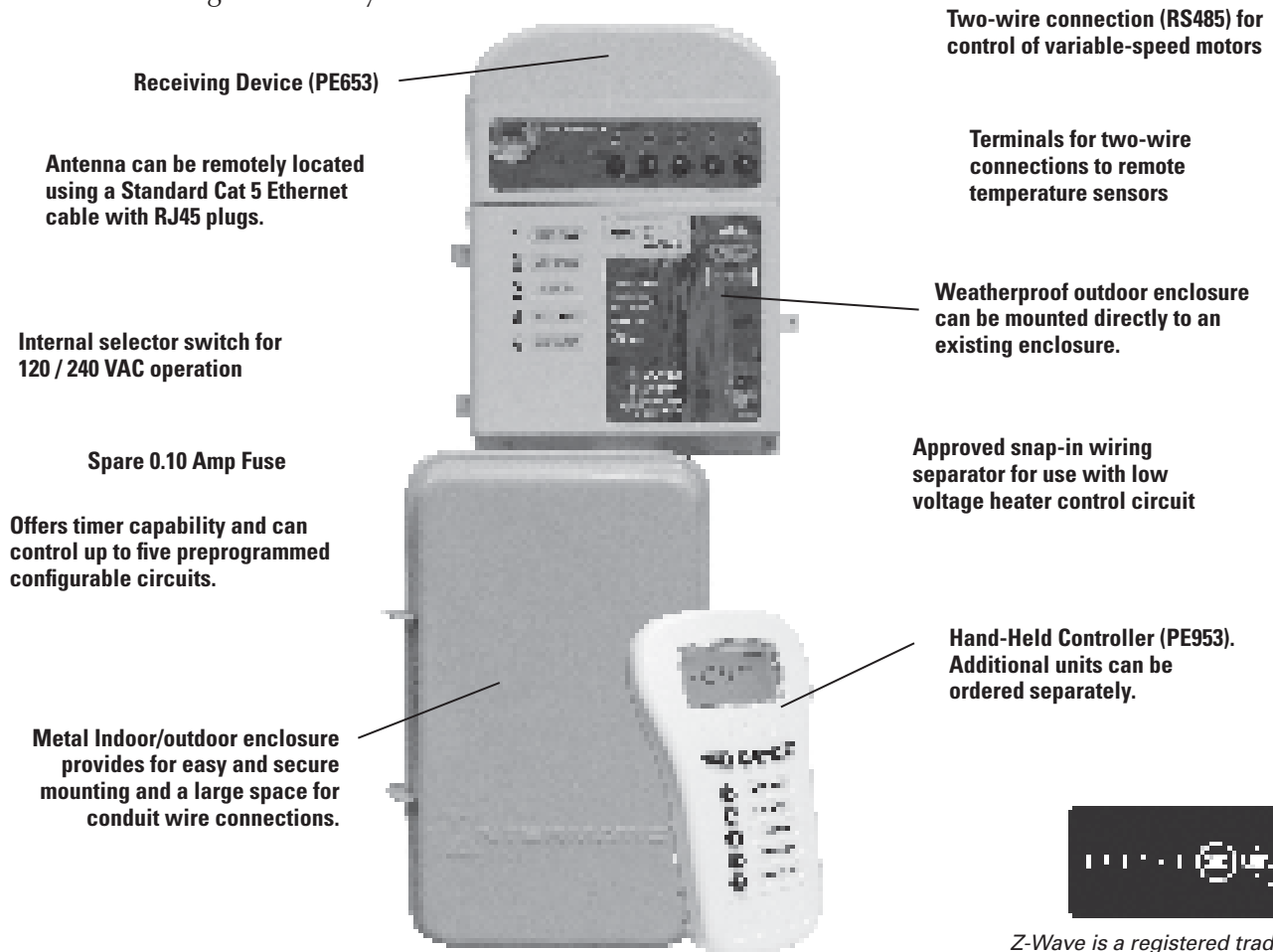


Figure 1-1



Z-Wave is a registered trademark of Sigma Designs and/or its subsidiaries.



## Additional Detail on Key Components

### Hand-Held Controller (*PE953*)

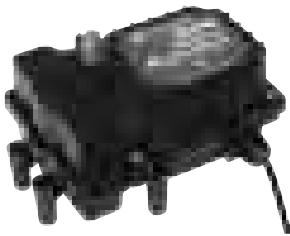


The main function of the Hand-Held Controller is to transmit user commands to the PE653 Receiving Device, PE650 Receiving Device, and/or Z-Wave home control devices, and to display the status of the installed equipment.

The unit floats if thrown in the pool or spa, is water-submersible, shock resistant, and requires three (3) AA batteries. Expected battery life is about one year in typical use.

When the components of a specific system are linked together into a network, unique network ID codes supplied by the PE953 prevent unauthorized use of the system by neighboring systems.

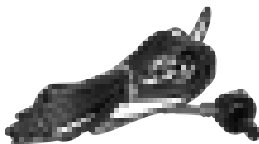
### 24-Volt Valve Actuator (*PE24VA*)



Designed with quality in mind, Intermatic's 24-volt valve actuators provide reliable control of 2-way and 3-way diverter valves for pool/spa combinations and water features. The water flow can be altered for specific applications through the adjustable cam, which rotates diverter valves to multiple degree settings. The cam settings can be easily adjusted by simply removing the lid. These valve actuators are compatible with all pool/spa valves currently offered in the industry and will retrofit into all pool/spa control systems.

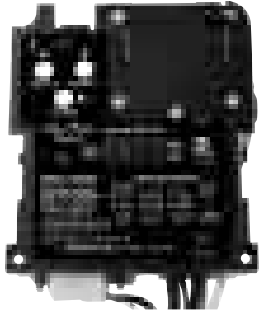
- 24VAC Input Voltage
- Automates compatible diverter valves for pool/spa combos
- Adjustable cam rotates diverter valves to multiple degree settings
- Designed to operate most 2-way and 3-way diverter valves
- Shipping Weight - 3 lbs. (1.4 kg)
- Agency Approval - CSA/C-US

### Water Temperature Sensor (*PA122*)



The Intermatic Water Sensor (*PA122*) monitors both pool and spa water temperature, depending on the position of the diverter valves. Installation is necessary for the thermostatic control to work. The sensor can be ordered separately.

## 24-Volt Valve/Pump Switch (*P4243ME*)



Designed as part of the Multi-Wave system and for aftermarket and retrofit applications, the P4243ME is most suited for controlling up to two different circuits associated with pool/spa combinations, but can also be used to control all the equipment typically needed in connection with water features, water gardening, solar heating, and other similar applications. This unit snaps into almost any Intermatic enclosure and controls pumps up to 3HP, 24 volt supply for up to three valve actuators, automated HIGH/LOW water temperature selector, heater connection circuit, and push-button control for each load with indicator lights on the face of the switch. In addition, the unit has connections for a hard-wired or wireless remote and a master switch controller. For this installation, if an enclosure must be added, we recommend Intermatic 2T2485GA.

- 120 or 208-240 input voltage
- Controls up to three valve actuators
- Controls two circuits
- Switches heater thermostat
- Remote control capabilities
- Shipping weight – 3 lb. (1.4 kg)
- Agency approval – CSA/C-US

### **Contact Ratings — Each Circuit**

- 17A Resistive, 120/240 VAC., 50/60 Hz
- 1.5 HP @ 120 VAC., 50/60 Hz
- 3.0 HP @ 240 VAC., 50/60 Hz
- 10 Amp Tungsten, 120/240 VAC., 50/60 Hz
- Valve Actuator Supply: 24VAC 40VA

## Optional — Freeze (Air Temperature) Sensor (*178PA28A*)



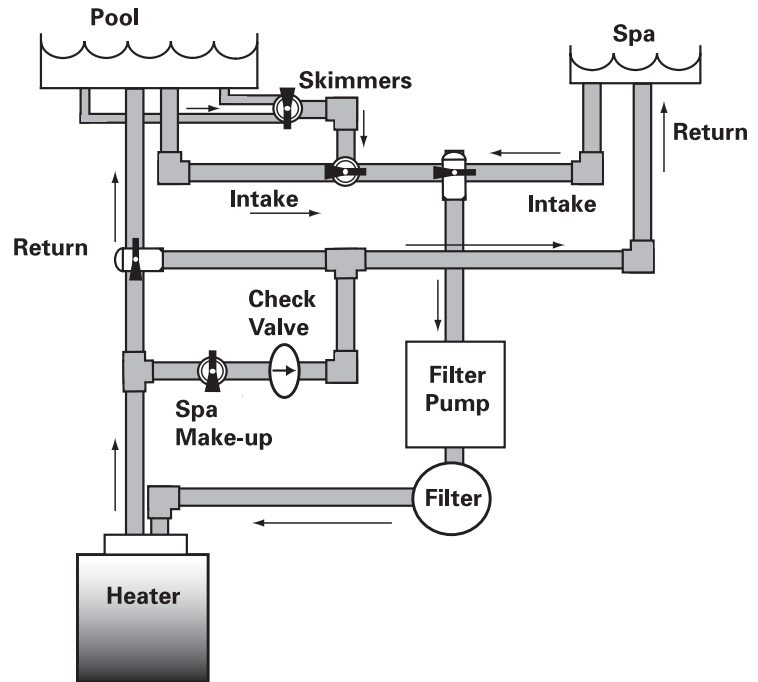
Add the Intermatic Freeze or Air Temperature Sensor (*178PA28A*) to installations where below-freezing outdoor temperatures are a concern.

## Section 2:

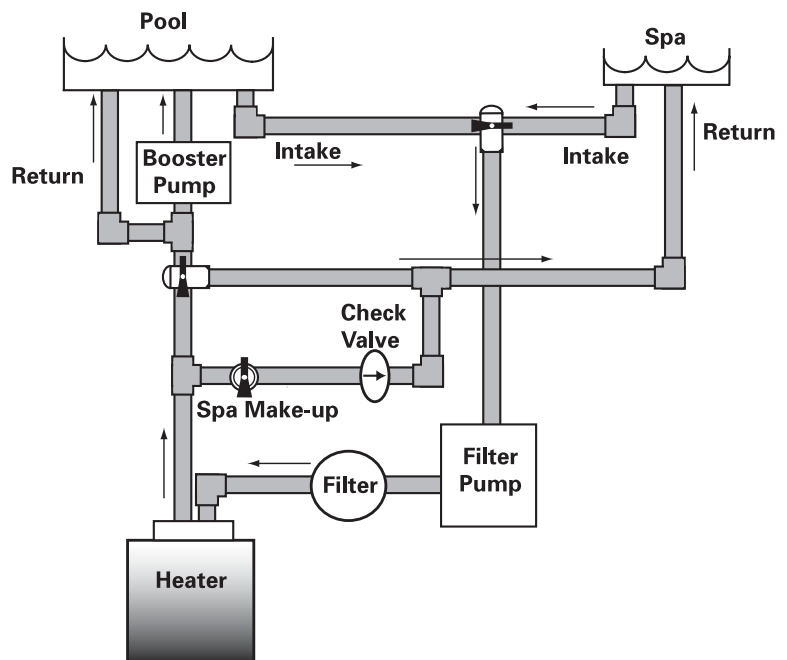
## Plumbing Examples

The following diagrams show several plumbing and wiring examples of installations for pool and spa that share a single filter pump, filter, and heater. If you are installing a pool only or spa only, these diagrams will not apply.

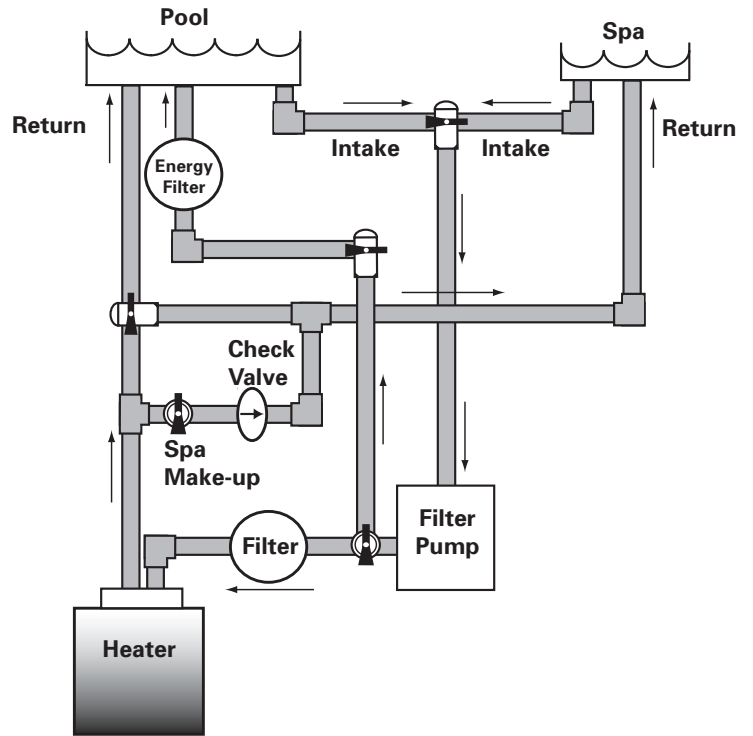
### For Pool and Spa Combo Installations



### For Booster Pump Pool Cleaner Installations



## For Non-Booster Pump Pool Cleaner Installations



## Section 3:

# Installing and Wiring the PE653 Receiving Device

## WARNING

- To avoid fire, shock, or death, turn off power at circuit breaker and test that power is off before wiring.
- Read instructions completely before installation and retain for future reference.
- Observe all national and local electrical and safety codes.
- Disconnect power when servicing or changing loads.
- Alterations or modifications to the device will void the warranty.
- For outdoor locations, rain-tight or wet location conduit hubs that comply with the requirements of UL 514B Conduit, Tubing, and Cable Fittings, must be used.

## Ratings

### Controller Power In:

- 120/240VAC, 50/60Hz - 5W MAX.

### Contact Ratings:

#### Load 1

- 120/240 VAC
- 20A Resistive
- 17 Full load A, 80 Lock Rotor A
- 5A Tungsten or Ballast

#### Loads 2-5

- 120/240 VAC
- 15A Resistive
- 10 Full load A, 60 Lock Rotor A
- 5A Tungsten or Ballast

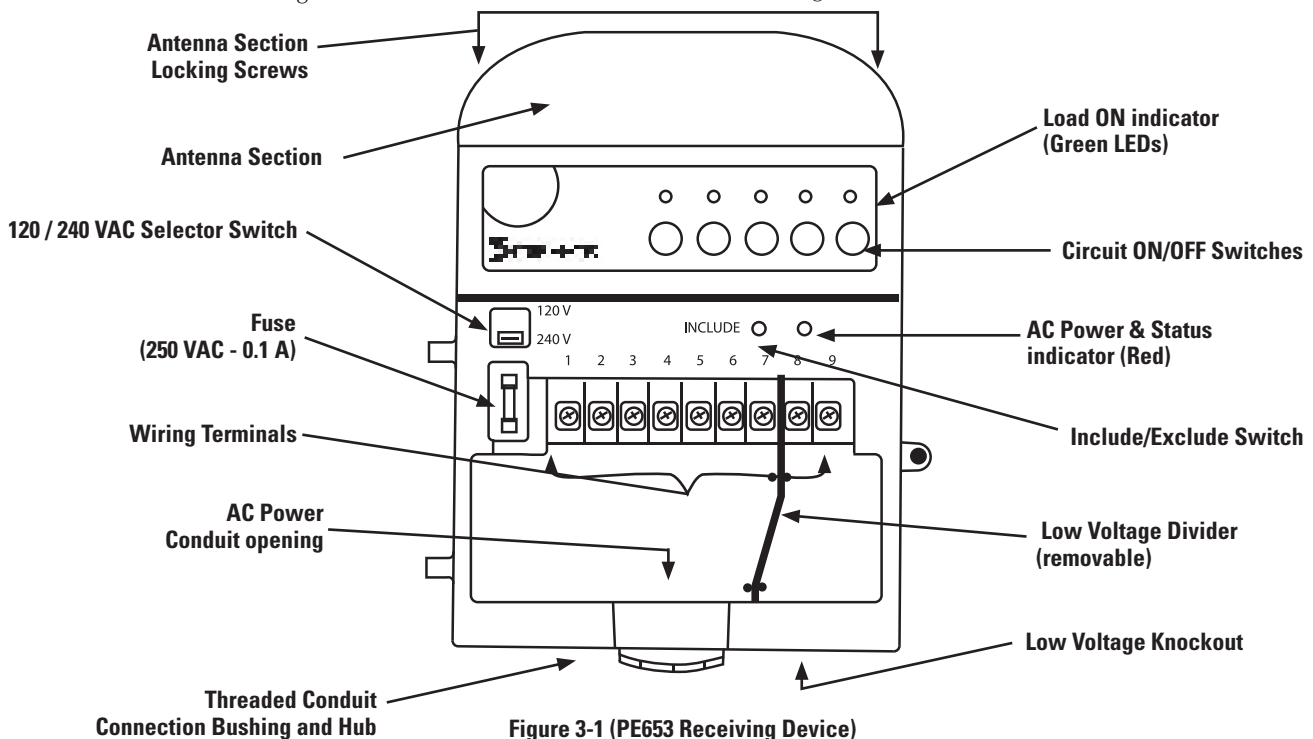


Figure 3-1 (PE653 Receiving Device)

# Wiring Instructions

## Power Connections

- 1-Speed Pump: Must be powered from Terminal 3.
- 2-Speed Pump: Must be powered from Terminal 3 for High-Speed and Terminal 4 for Low-Speed.
- Booster Pump: Must be powered from Terminal 6.
- Actuator Control: Must be powered from Terminal 7.
- Heater Control: Must be Terminals 8 & 9.
- The metal enclosure must be ground bonded in compliance with national, state and local codes.

**Terminal 1 must always be Neutral when using 120 VAC power.**

**Terminal 1 must be L2 when using 240 VAC.**

**Terminal 2 must always be Hot or L1 for both 120 VAC and 240 VAC.**

**Terminal 3 must always be connected to the Hot terminal of the pump.**

**Terminal 3 must always be connected to the HIGH SPEED terminal of a 2-speed pump.**

**Terminal 4 must always be connected to the LOW SPEED terminal of a 2-speed pump when using a 2-speed motor.**

**Terminal 5 is the input supply for both terminals 6 & 7. This terminal is rated at 15 A. maximum.**

**Terminals 6 & 7 are function selectable with a maximum combined rating of 15 A.**

**Terminal 8 is the input supply for terminal 9. The load is rated at 15 A. maximum.**

**Terminals 8 & 9 can be used for low voltage provided the Low Voltage Divider is used to separate the Low Voltage conductors from Line Voltage conductors. Low voltage conductors must exit the cabinet through a separate opening. (See Figure 3-1)**

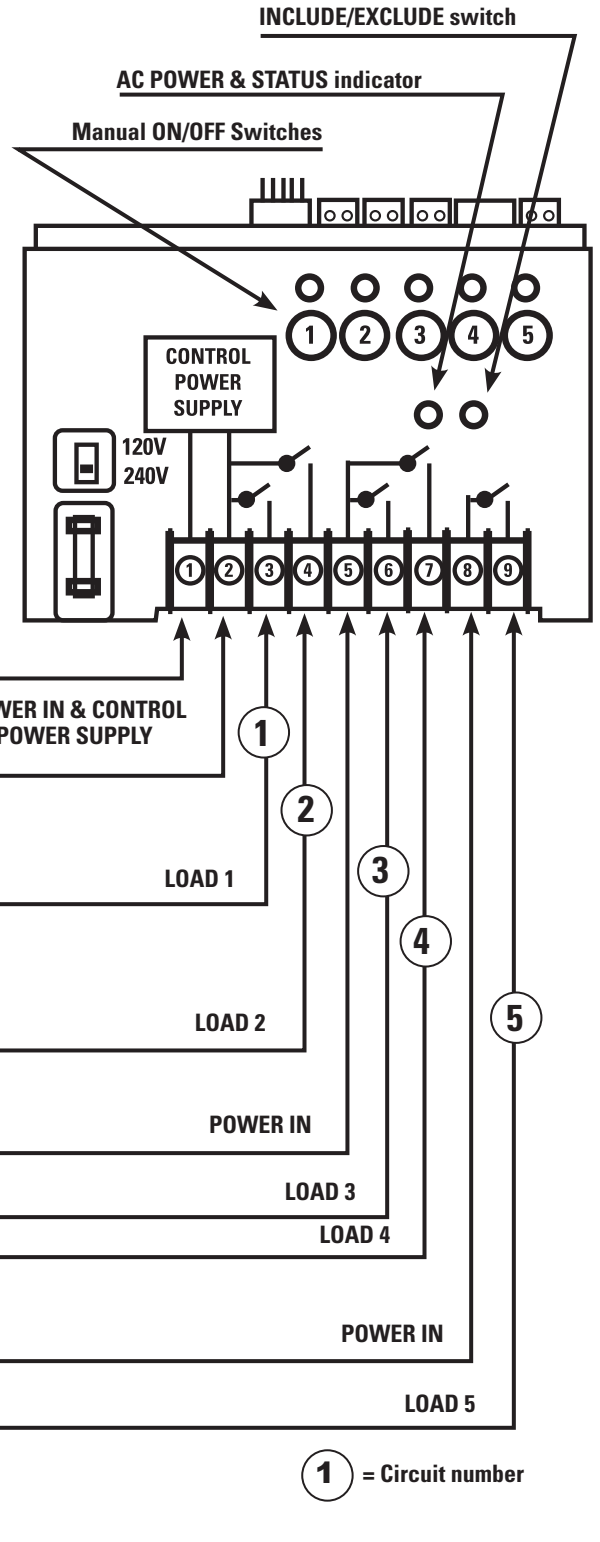
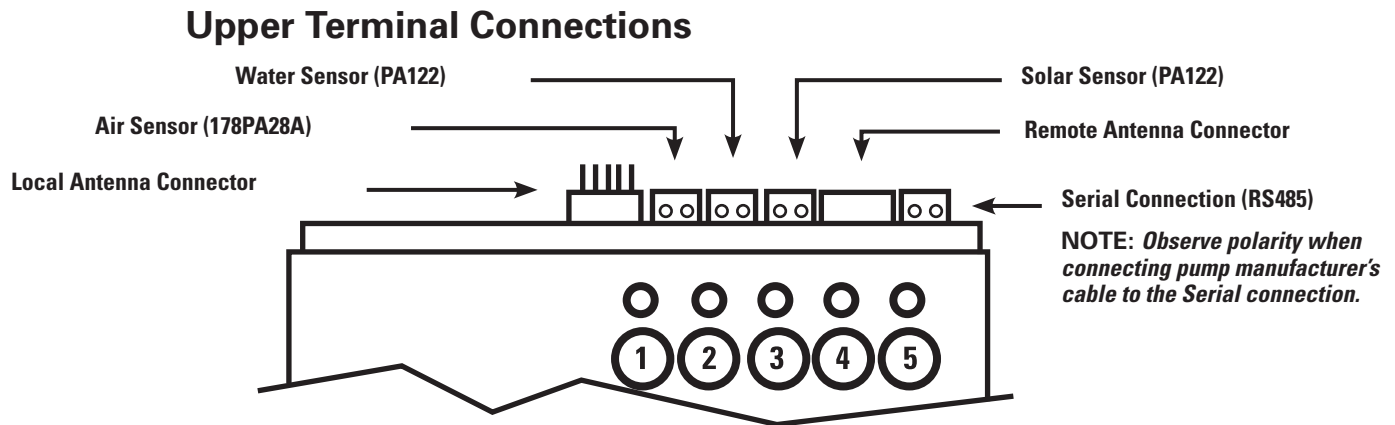


Figure 3-2 PE653 Master Control Center Power Terminal identification



**CAUTION:** The PE653 is a control device and NOT a safety disconnect. A proper sized fused disconnect or breaker of no more than 125 Amp capacity must be provided in the power supply circuit. Proper gauge wire should be based on local code requirements of amperage and wire length.



## Installation Instructions

1. To avoid fire, shock, or death, turn off power at circuit breaker and test that power is off before wiring.
2. Select a location for the installation that is near the pool/spa equipment; at least five (5) feet distance or more from either the pool or spa and at least five (5) feet above ground level. The PE653 must be mounted in a vertical (upright) position on the top of the enclosure.
3. Select the knockouts to be used. Remove the inner 1/2" knockout by inserting a flathead screw driver in the slot and carefully punch the knockout loose and remove the slug. If a 3/4" knockout is required, remove the outer ring with pliers after removing the 1/2" knockout. Smooth the edge with a file if required.
4. Place the metal enclosure in the desired mounting location and mark the three mounting holes. Install the top screw first and then hang the enclosure by the keyhole. Then install the bottom screws, tightening all screws for a secure mounting.
5. Install electrical conduit as needed to comply with all national and local electrical and safety codes.
6. If a low voltage circuit or a heater control circuit is to be used, remove the low voltage knockout from the PE653 enclosure.
7. Install electrical conduit as required by national, state and local codes.
8. Bond the enclosure in accordance with your state and local codes. Where required, connect a No. 8 AWG solid copper wire to the enclosure using Bonding Lug (part number 156T11047A). Connect the bonding wire to an approved earth ground.
9. Identify and install all wires necessary to complete the installation. Allow a length of approximately 18" of each wire at the metal enclosure for required connections of junctions.
10. Connect wiring for circuits as required. Refer to the diagrams in this section for wiring suggestions for specific equipment combinations. All splices and wire nut connections should be in the metal enclosure, **not** in the PE653 enclosure.
11. Check and tighten all connections and circuits.
12. Apply power.



**THE METAL ENCLOSURE MUST BE CLOSED AND SECURED WITH A LOCK OR TY-WRAP.**

## List of Wiring Diagrams

### **Variable-Speed Pumps**

240V Variable-Speed Pump ..... Figure 3-4

### **One-Speed Pumps**

120V 1-Speed Pump ..... Figure 3- 5

120V 1-Speed pump + any 4 120 VAC auxiliary equipment ..... Figure 3- 6

120V 1-Speed pump + 120V Blower or Lights + 120V Booster Pump + 120V Actuator + Heater Figure 3-7

120V 1-Speed pump + 120V Lights + 120V Blower + 120V Actuator + Heater ..... Figure 3-8

240V 1-Speed Pump ..... Figure 3-9

240V 1-Speed pump + any 4 240 VAC auxiliary equipment ..... Figure 3-10

240V 1-Speed pump + 240V Blower + 240V Booster Pump + 240V Actuator + Heater..... Figure 3-11

240V 1-Speed pump + 120V Lights + 120V Blower + 240V Actuator + Heater ..... Figure 3-12

### **Two-Speed Pumps**

240V 2-Speed Pump ..... Figure 3-13

240V 2-Speed pump + any 3 240 VAC auxiliary equipment ..... Figure 3-14

240V 2-Speed pump + any 3 120 VAC auxiliary equipment ..... Figure 3-15

240V 2-Speed pump + 240V Booster Pump + 240V Actuator + Heater ..... Figure 3-16

240V 2-Speed pump + 120V Lights + 240V Blower + Heater..... Figure 3-17

240V 2-Speed pump + 240V Blower + 240V Actuator + Heater..... Figure 3-18

240V 2-Speed pump + 240V Booster pump + 240V Blower + Heater ..... Figure 3-19

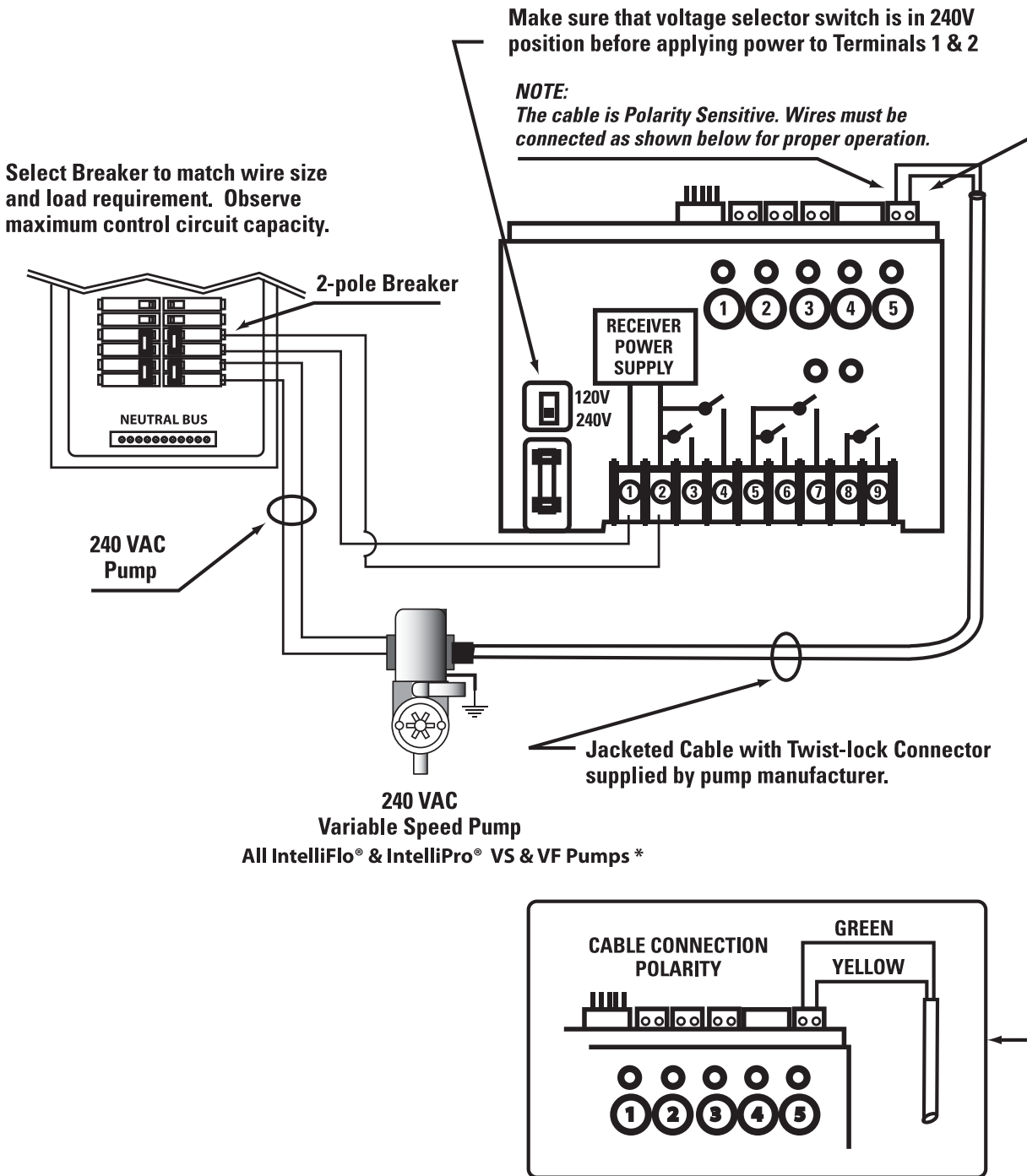
240V 2-Speed pump + 240V Booster pump + 120V Light + Heater..... Figure 3-20

240V 2-Speed pump + 240V Booster pump + other 120 VAC equipment + Heater ..... Figure 3-21



# Variable-Speed Pumps

## 240V Variable-Speed Pump



\* IntelliFlo and IntelliPro are registered trademarks of Pentair Water Pool and Spa, Inc.

Figure 3-4

# 1-Speed Pumps

## 120V 1-speed pump

Select Breaker to match wire size and load requirement. Observe maximum control circuit capacity.

Make sure that voltage selector switch is in 120V position before applying power to Terminals 1 & 2

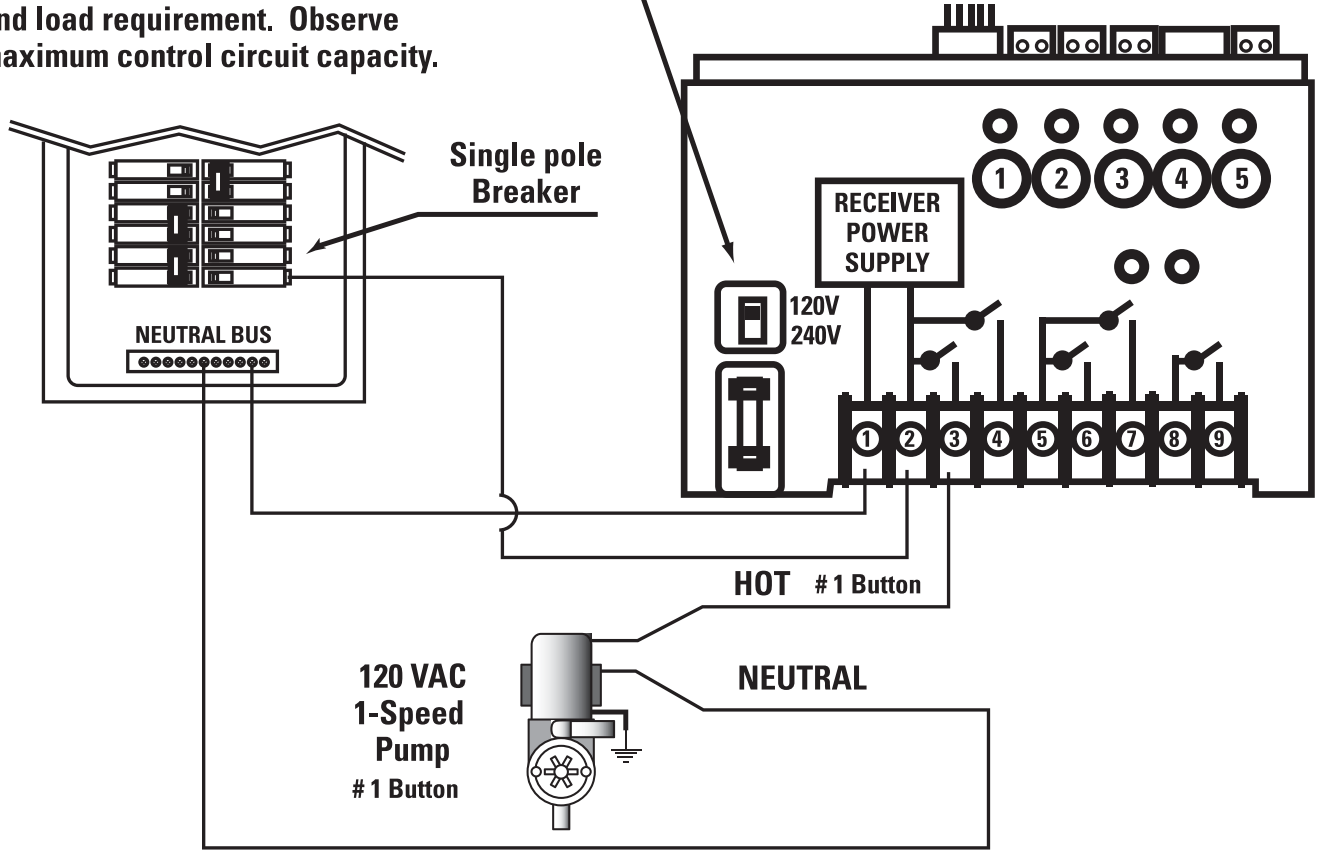


Figure 3-5

### 120V 1-speed pump + any four 120 VAC auxiliary equipment

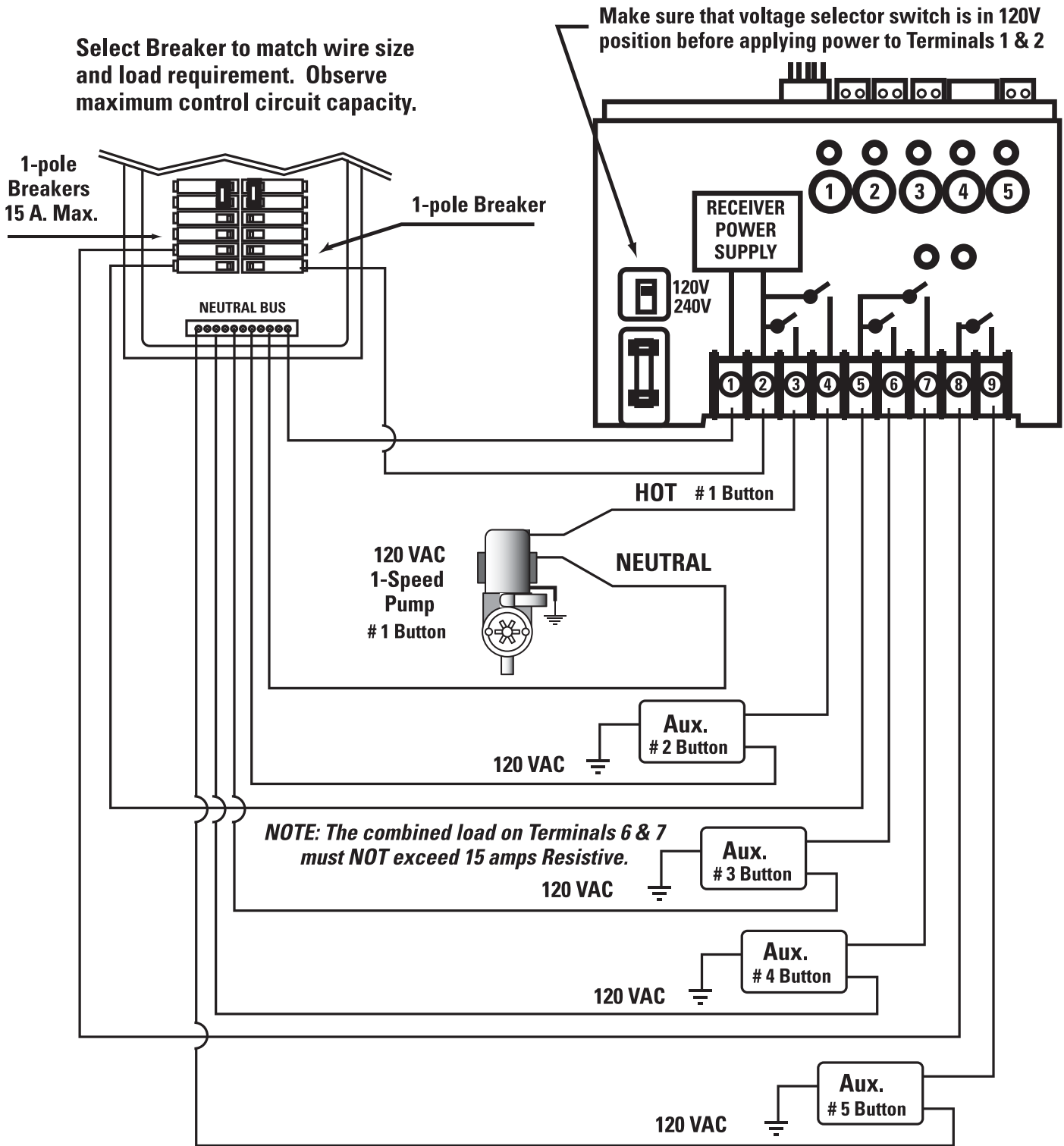


Figure 3-6

## 120V 1-speed pump + 120 VAC blower or lights + 120V booster pump + 120V actuator + heater

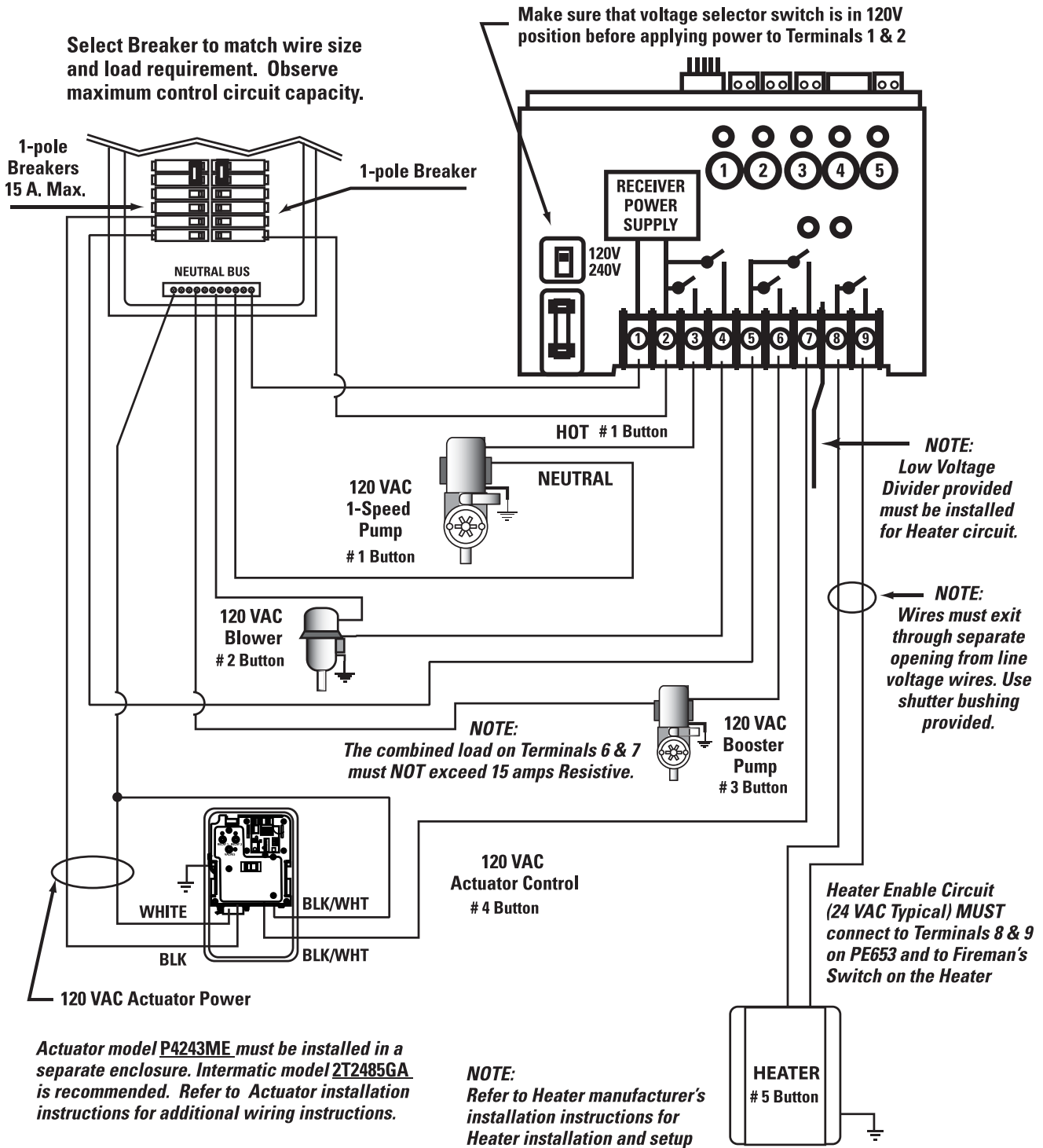


Figure 3-7

# 120V 1-speed pump + 120V blower + 120V lights + 120V actuator + heater

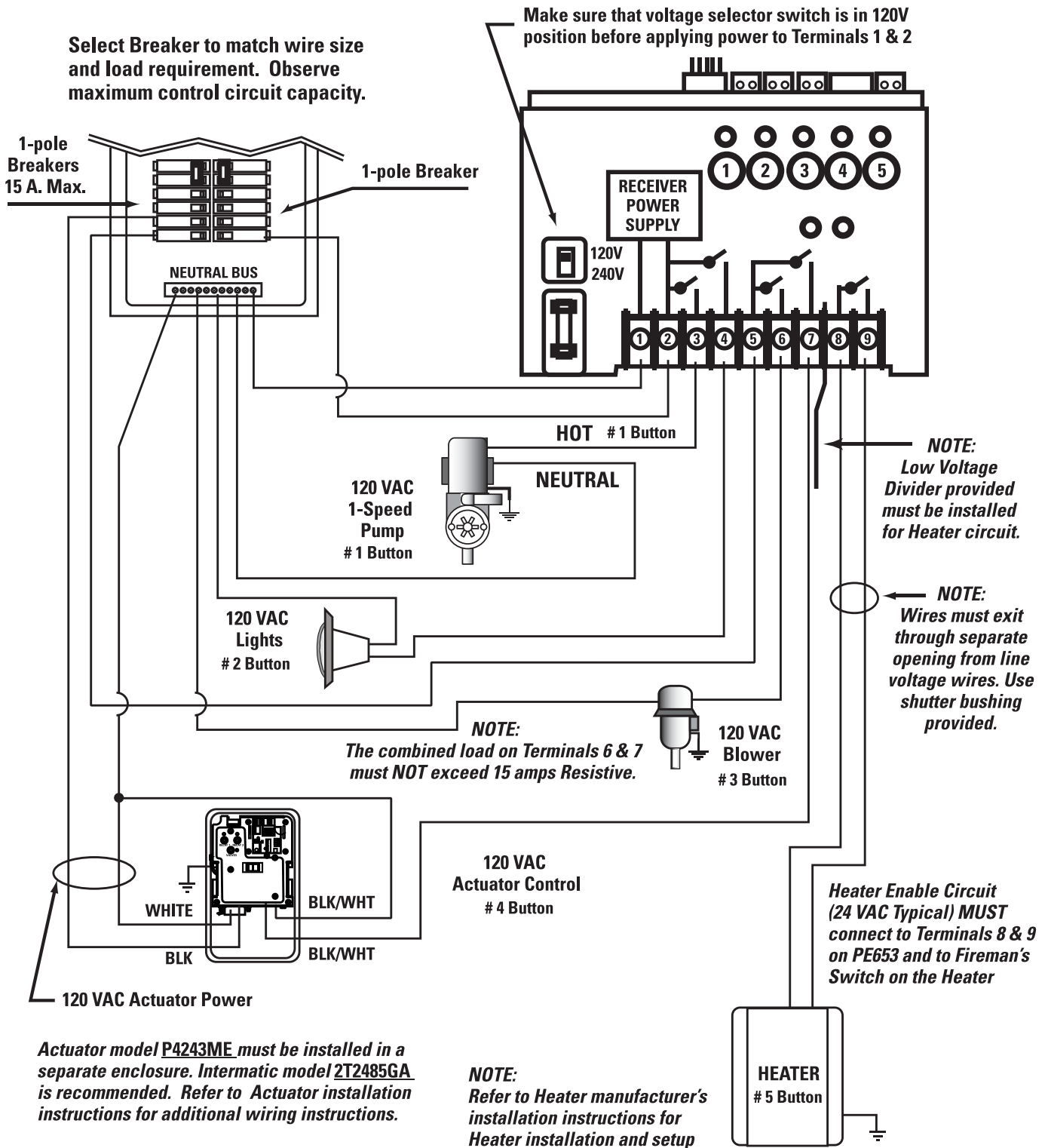


Figure 3-8

# 240V Pumps

## 240V 1-speed pump

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

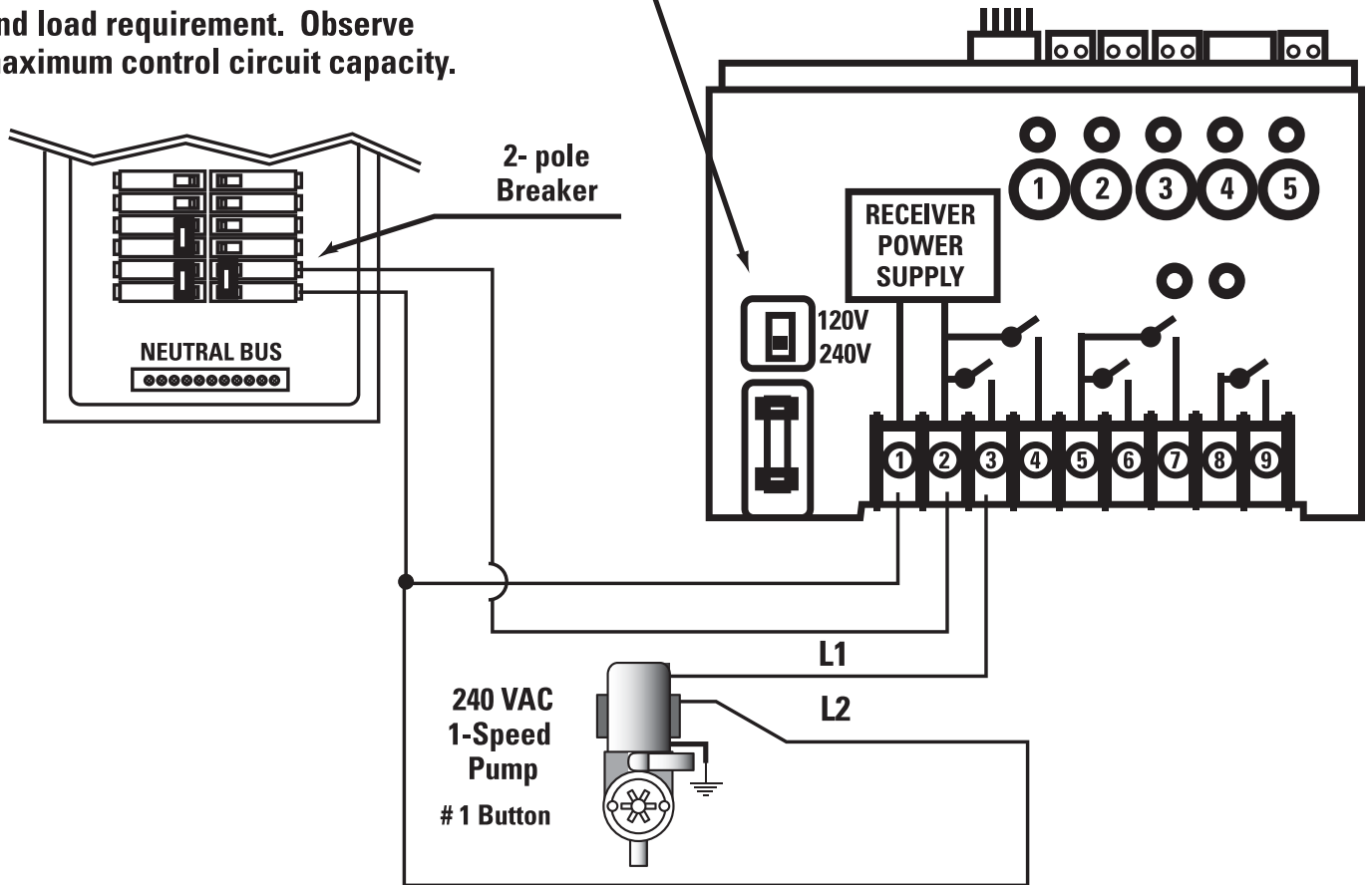


Figure 3-9

### 240V 1-speed pump + any four 240 VAC auxiliary equipment

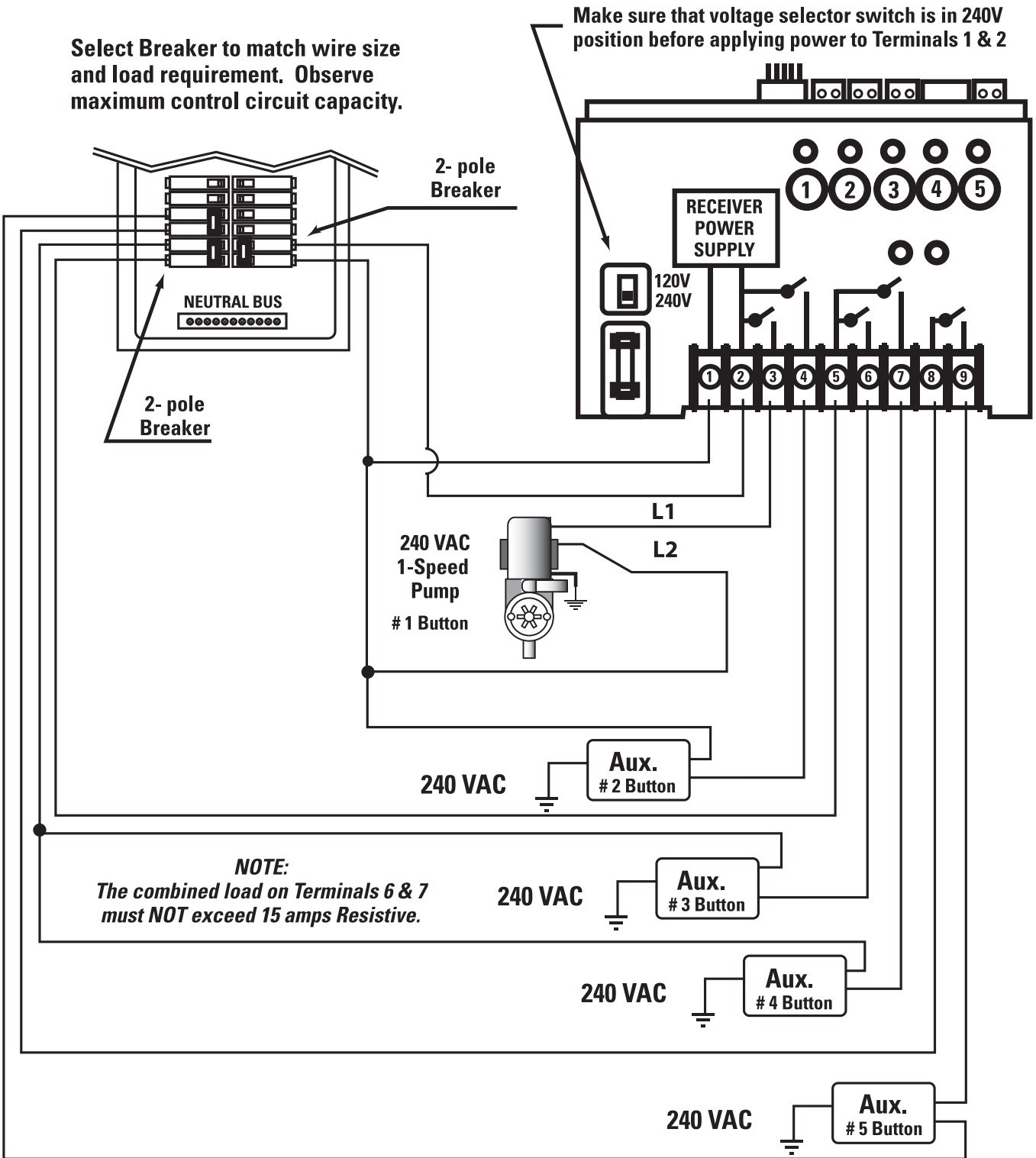
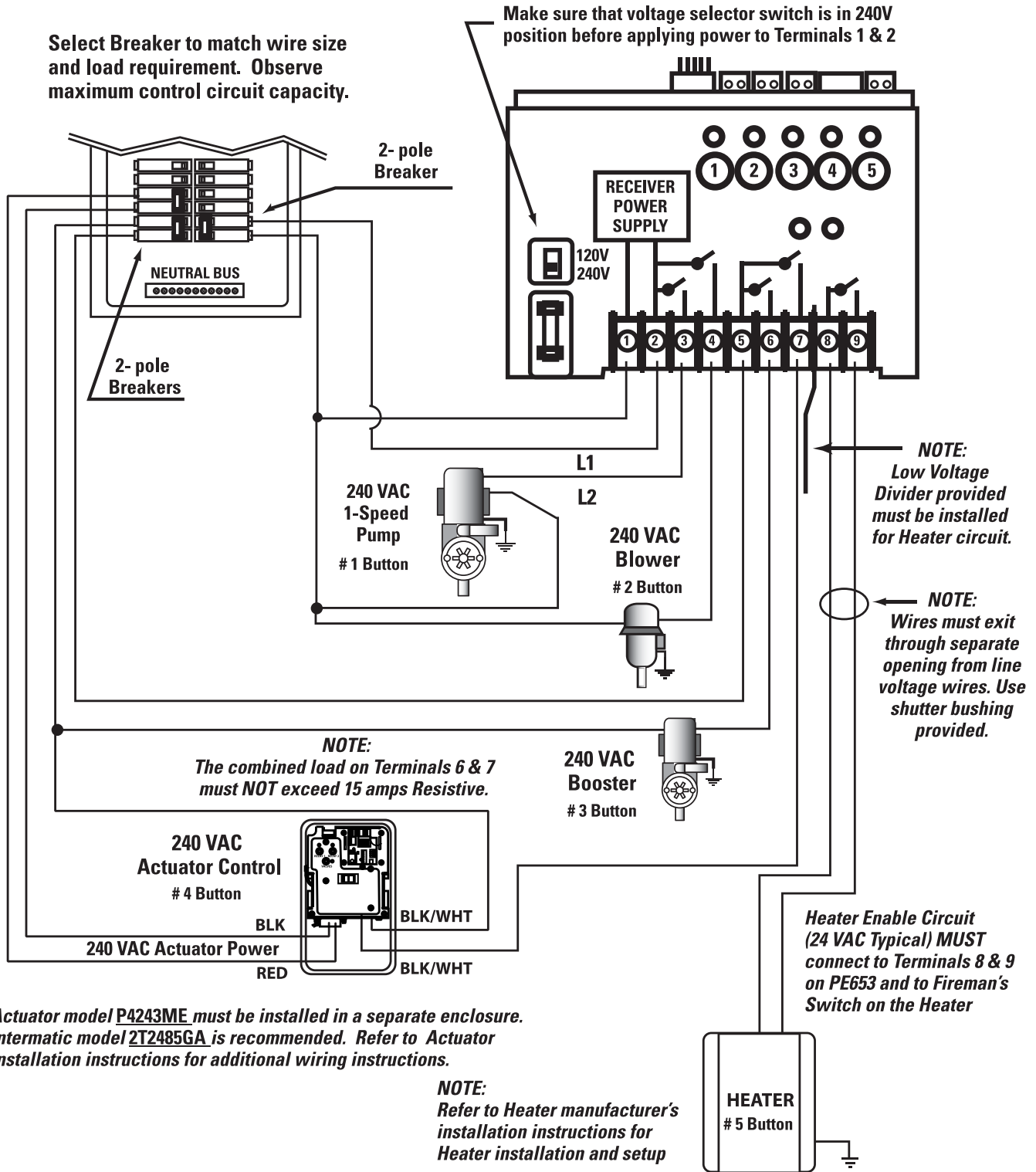


Figure 3-10

## 240V 1-speed pump + 240V blower + 240V booster pump + 240V actuator + heater

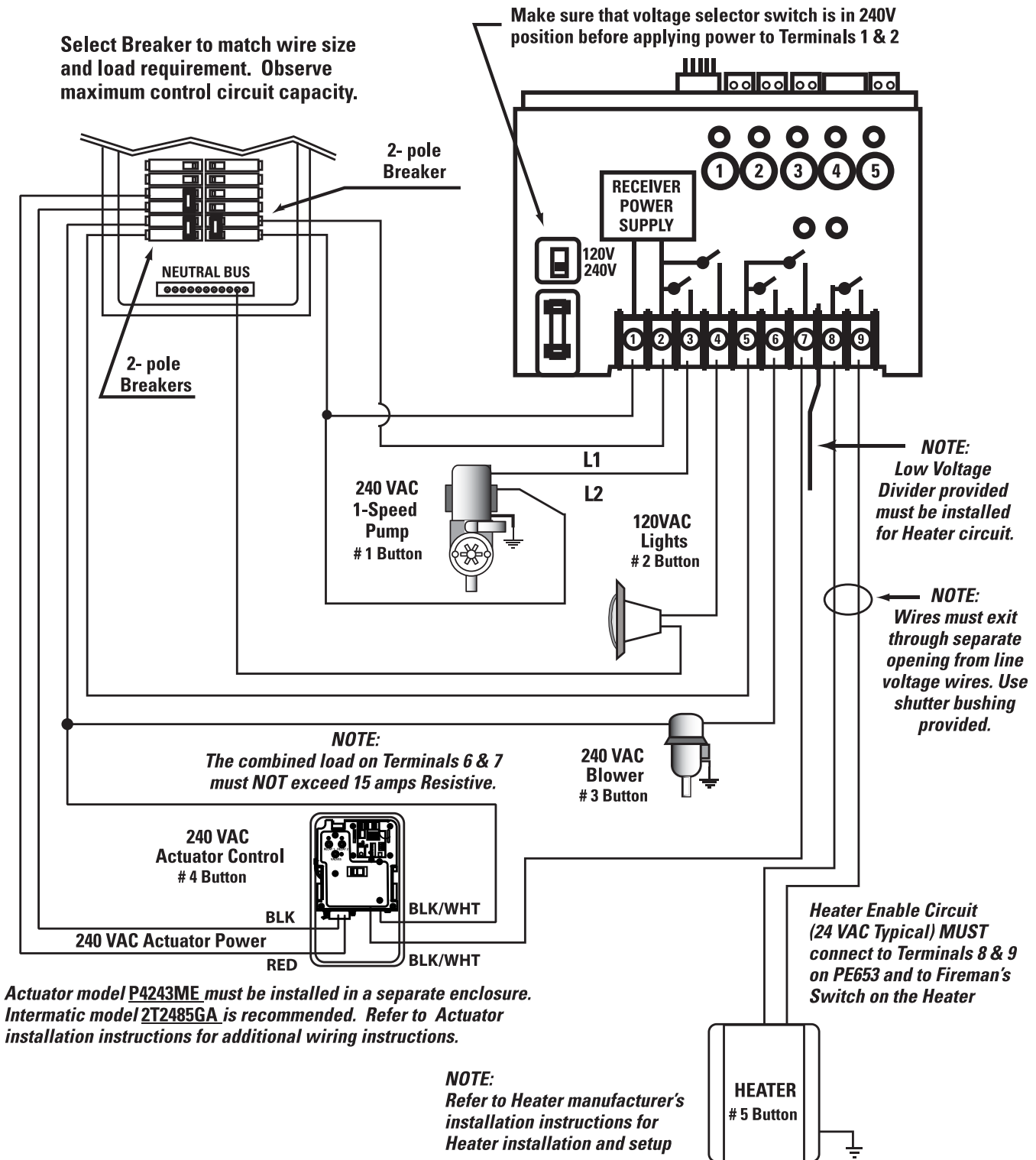


Actuator model **P4243ME** must be installed in a separate enclosure. Intermatic model **2T2485GA** is recommended. Refer to Actuator installation instructions for additional wiring instructions.

Figure 3-11



## 240V 1-speed pump + 120V lights + 120V blower + 240V actuator + 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.

Figure 3-12

### 240V 2-Speed Pump

Select Breaker to match wire size and load requirement. Observe maximum control circuit capacity.

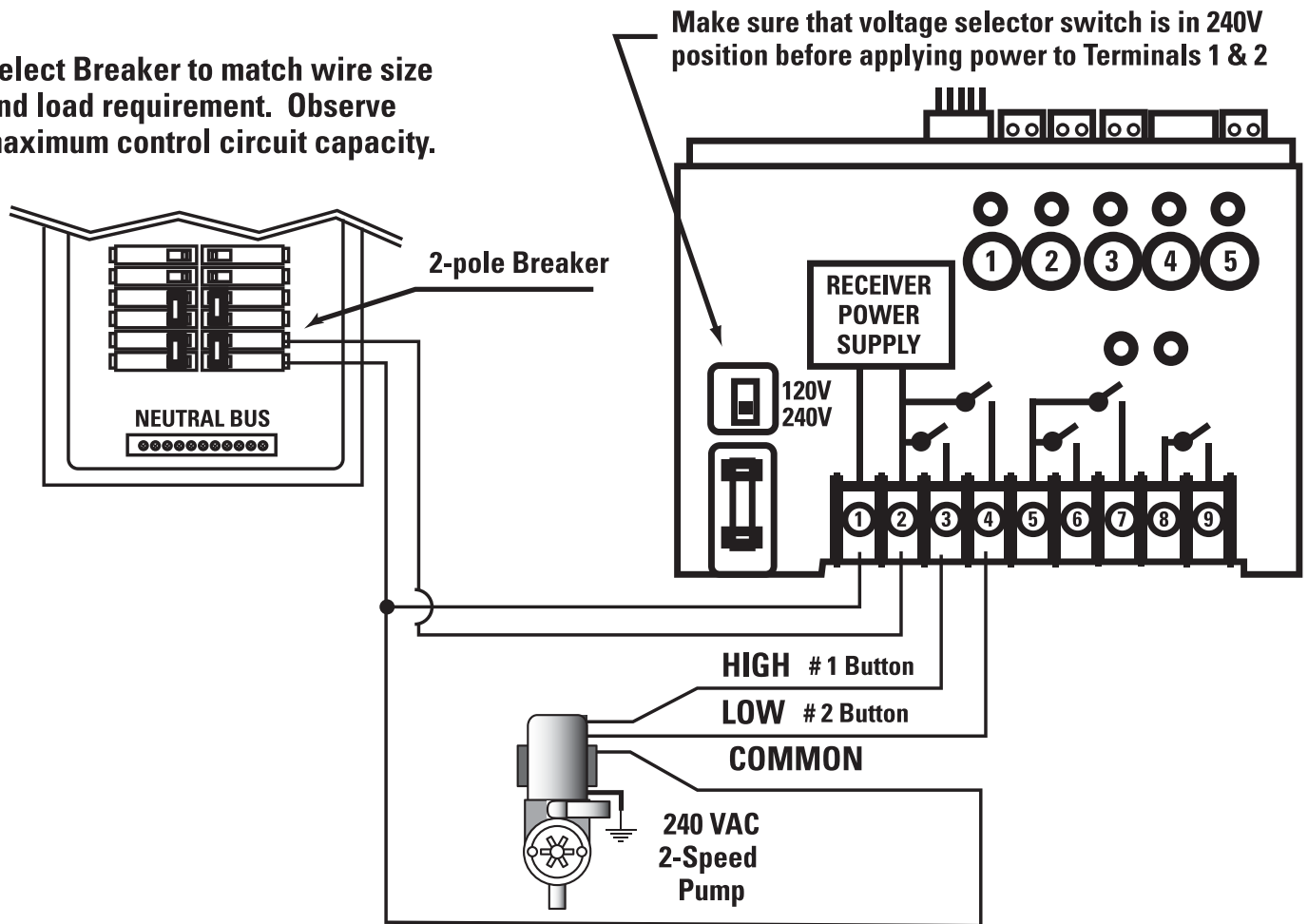


Figure 3-13

### 240V 2-speed pump + any three 240VAC auxiliary equipment

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

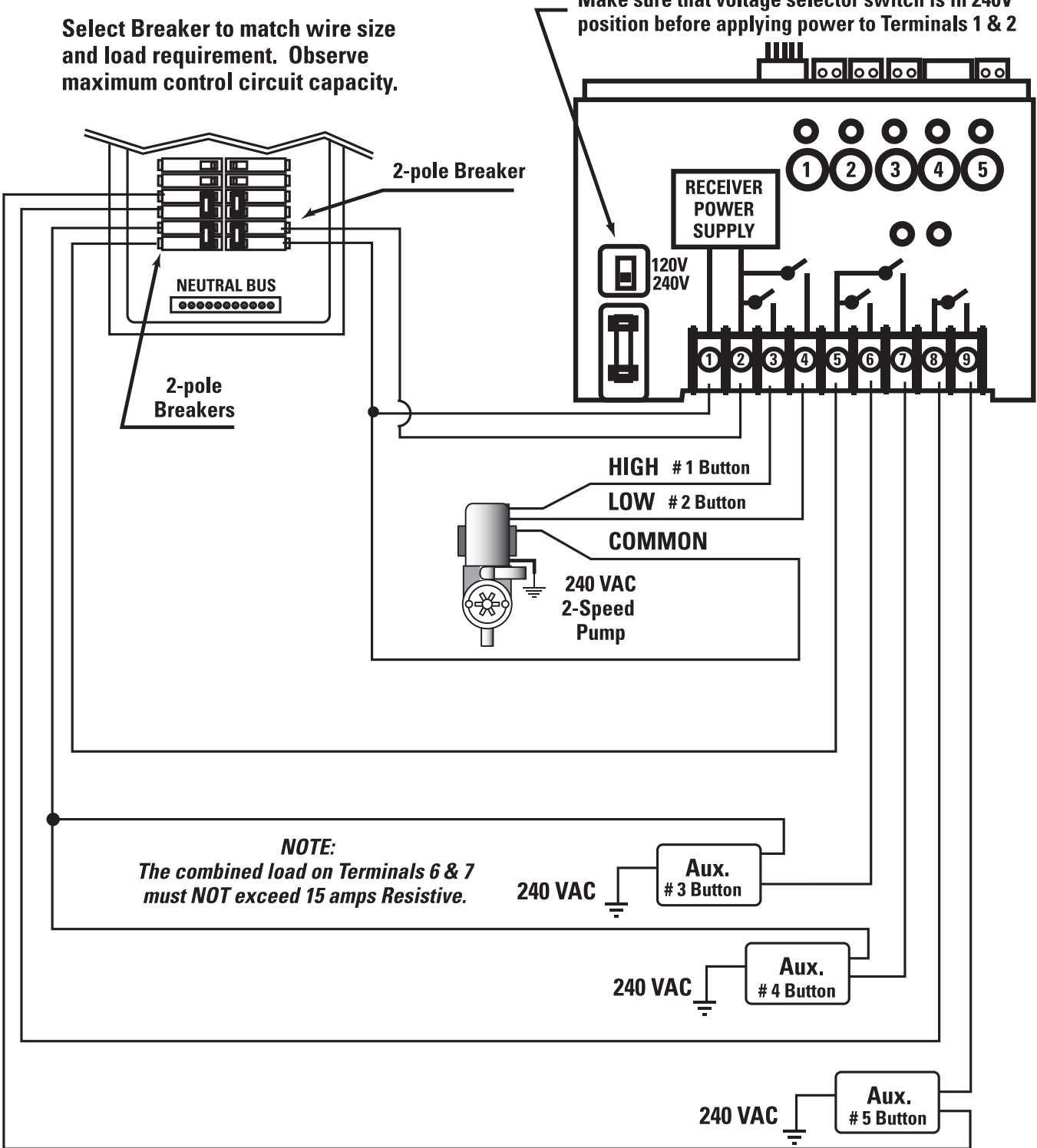


Figure 3-14

### 240V 2-Speed pump + any 3 120 VAC auxiliary equipment

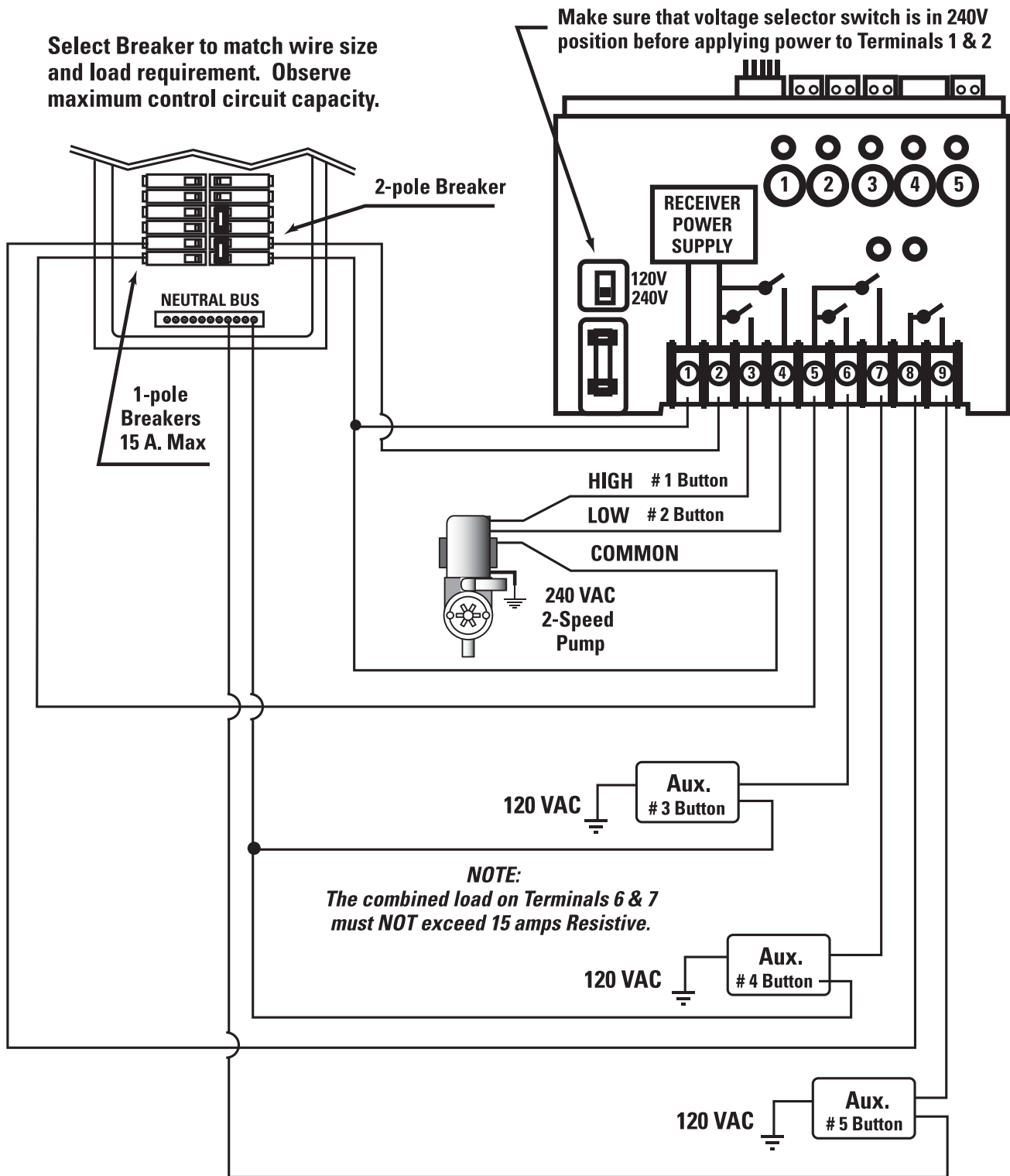


Figure 3-15

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

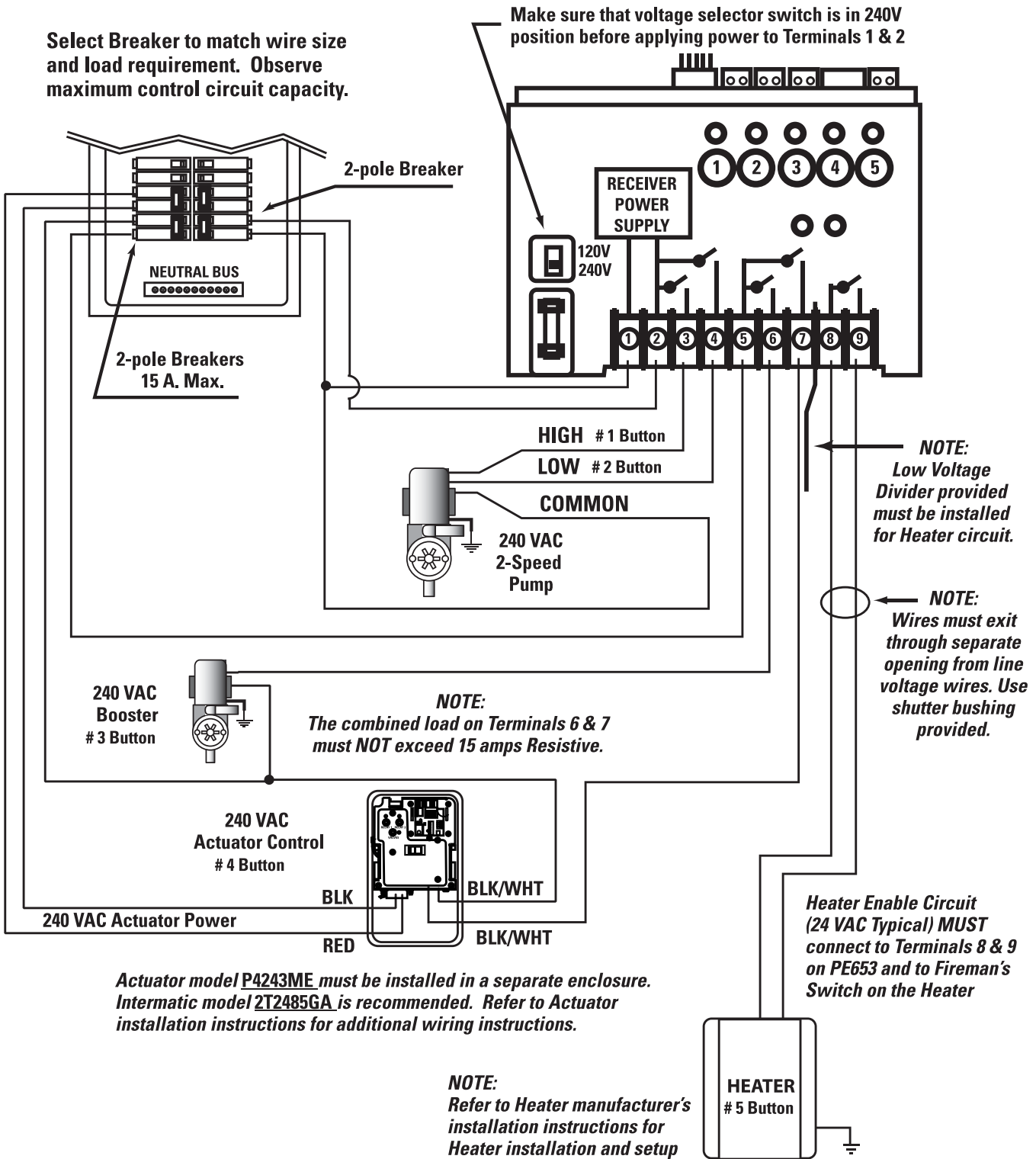


Figure 3-16

## 240V 2-speed pump + 120V lights + 240V blower + heater

Select Breaker to match wire size and load requirement. Observe maximum control circuit capacity.

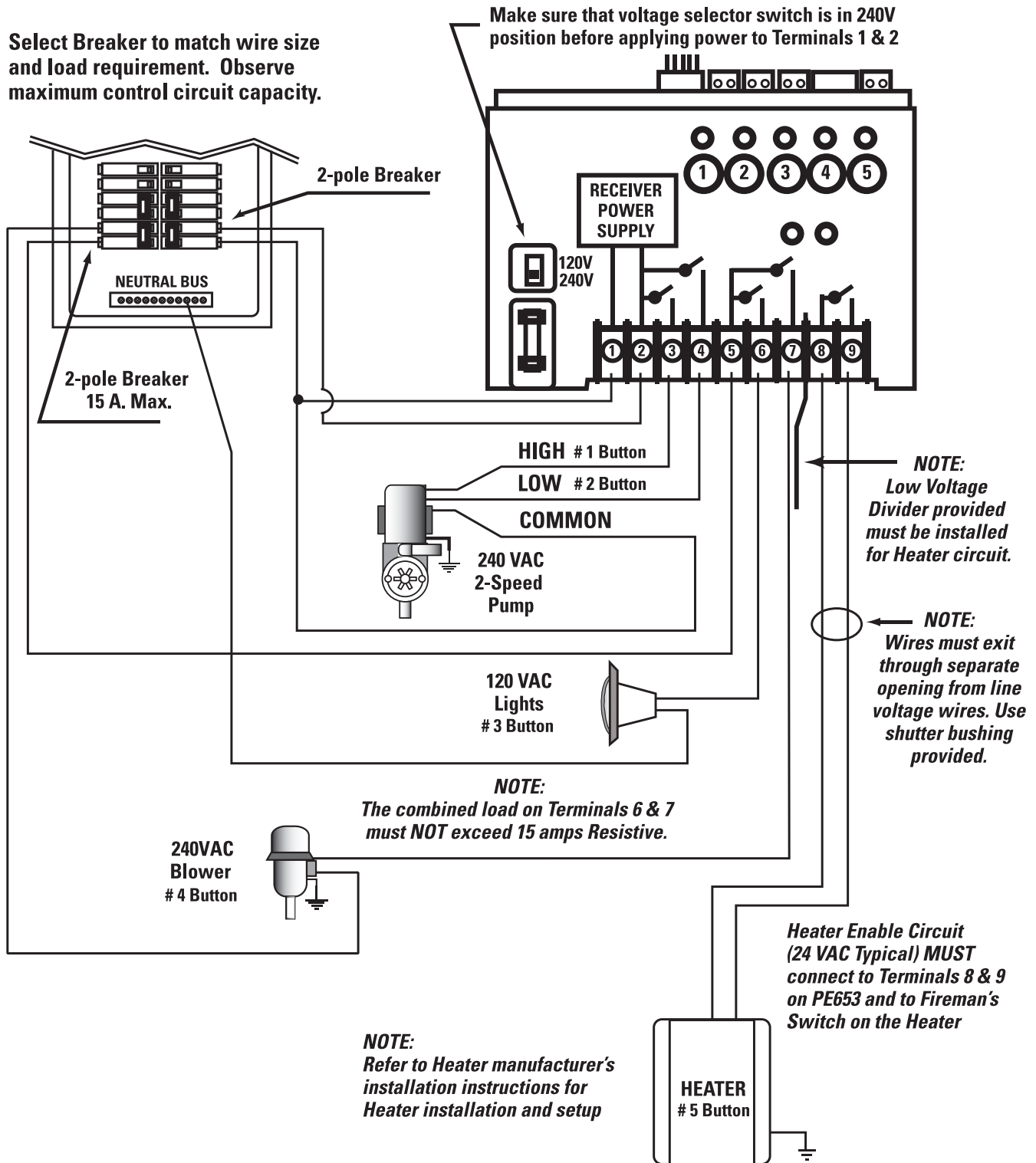


Figure 3-17

## 240V 2-speed pump + 240V blower + 240V actuator + heater

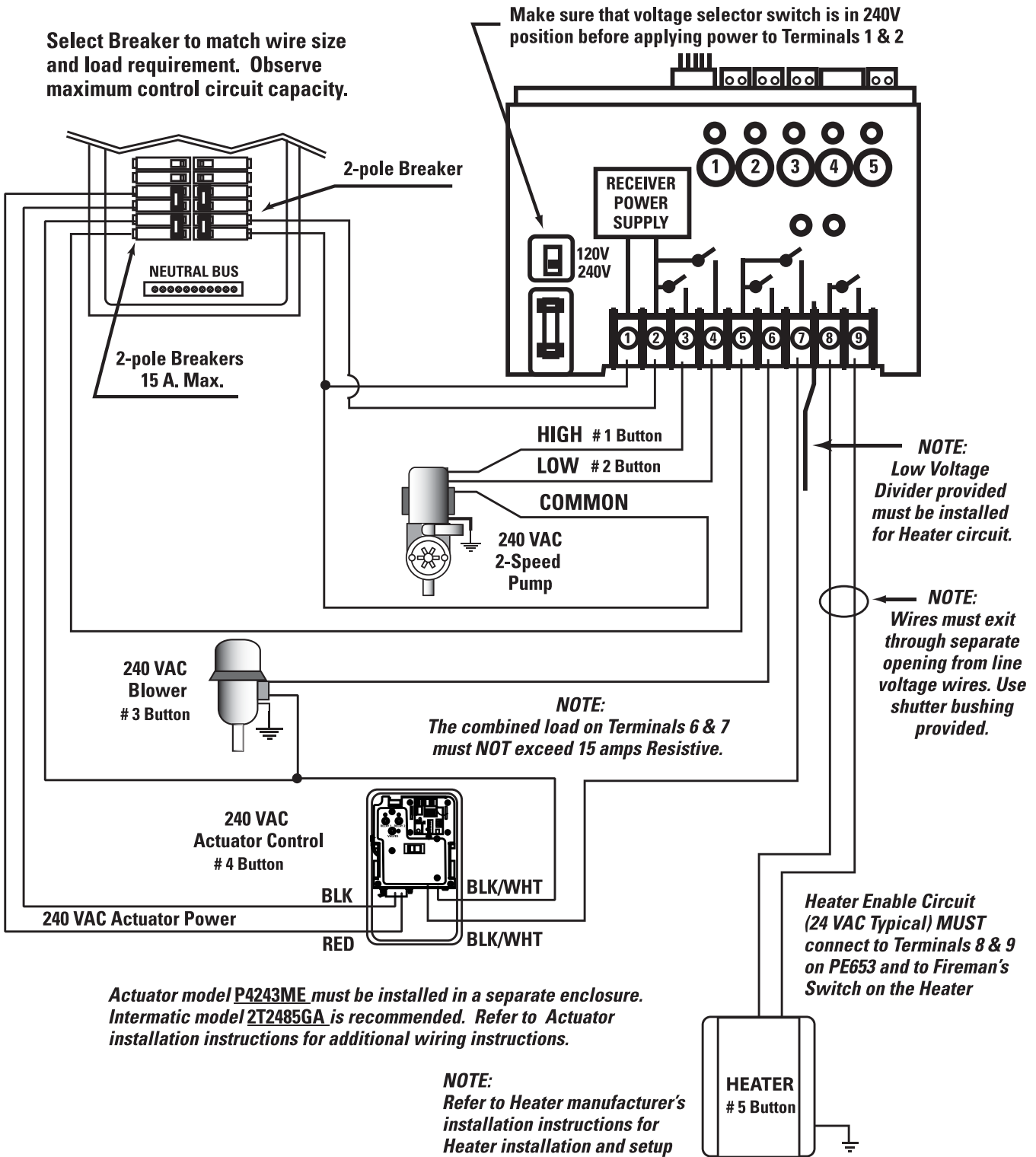


Figure 3-18

## 240V 2-speed pump + 240V booster pump + 240V blower + heater

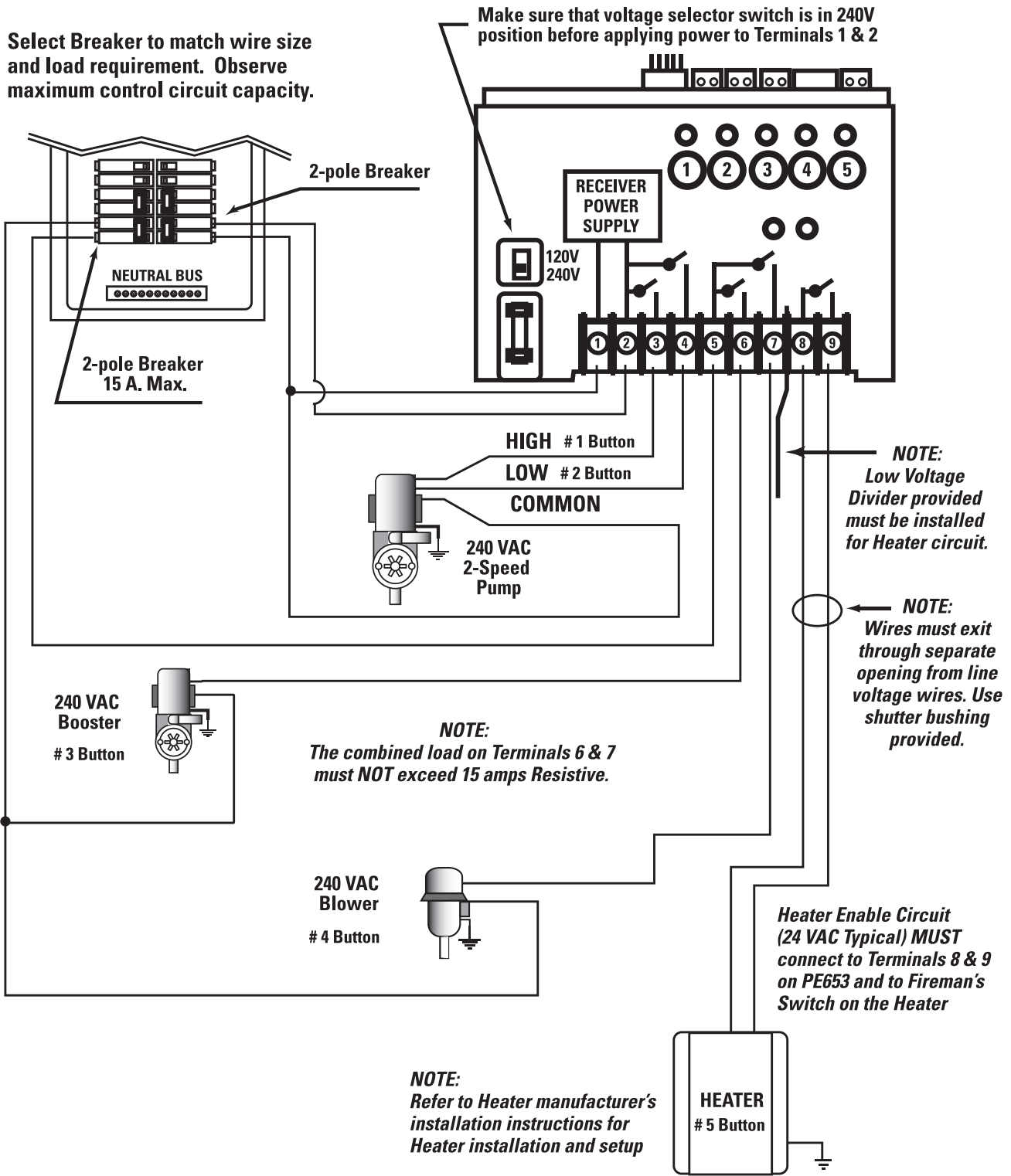


Figure 3-19



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

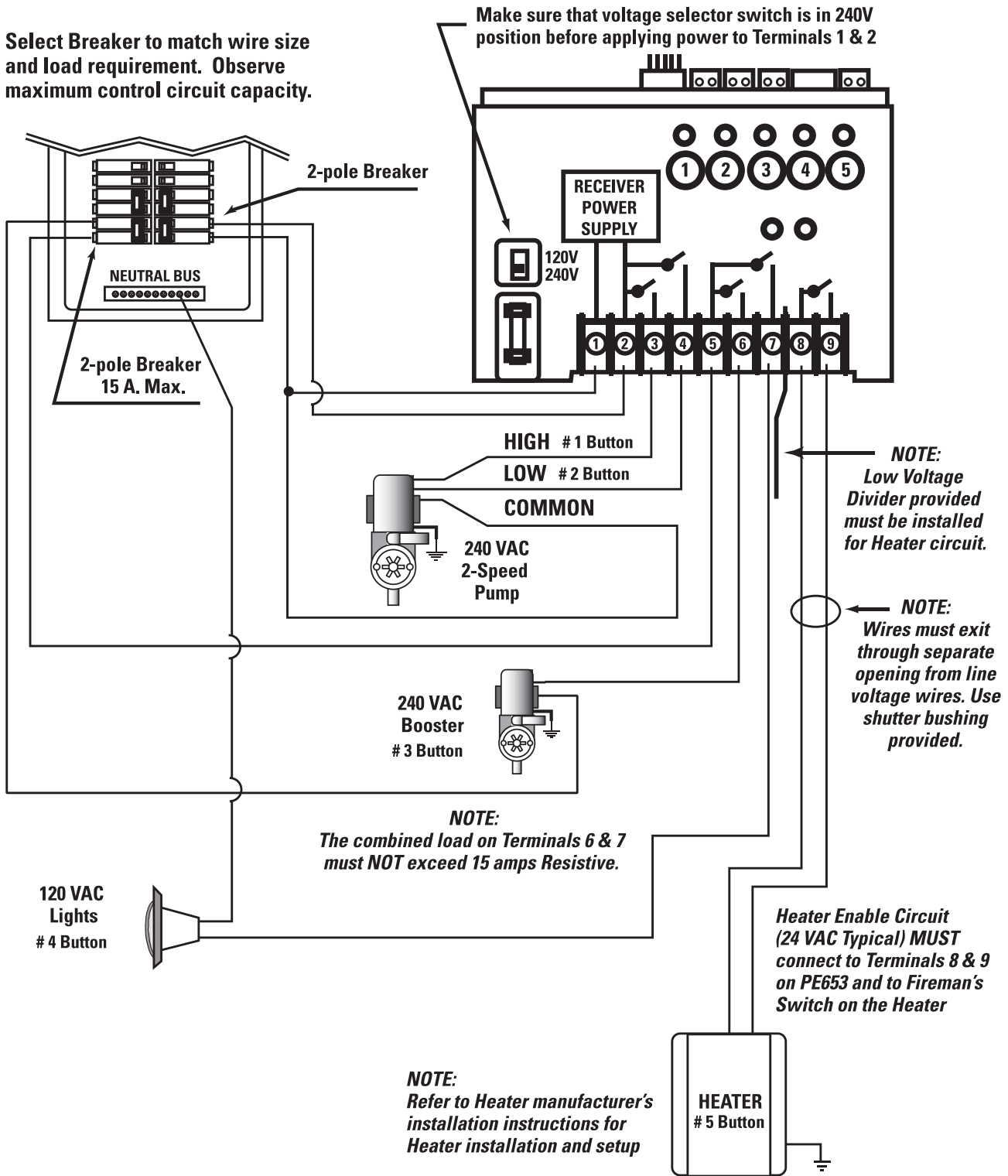


Figure 3-20

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

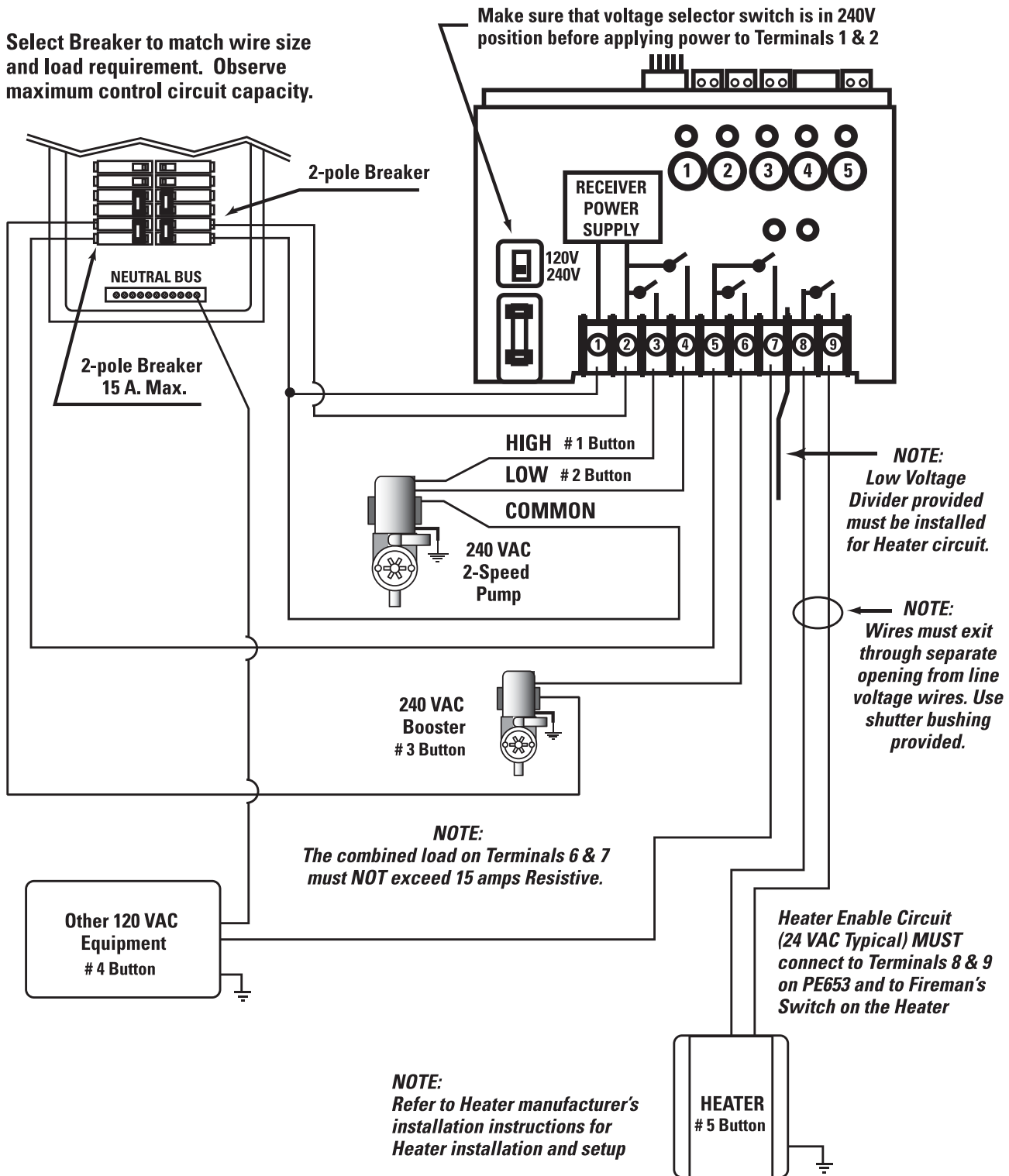


Figure 3-21

## 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.

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.

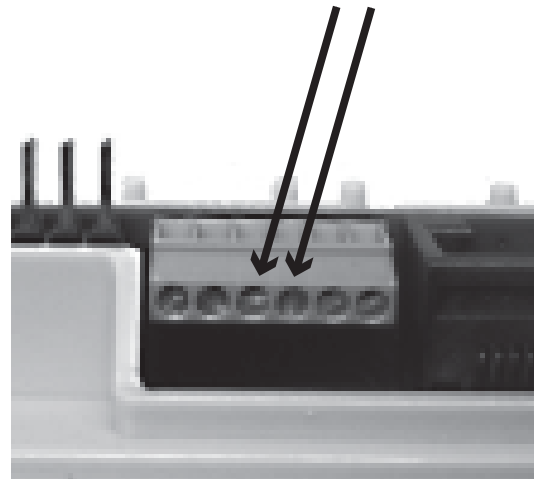


Figure 3-22

### 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.**

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.

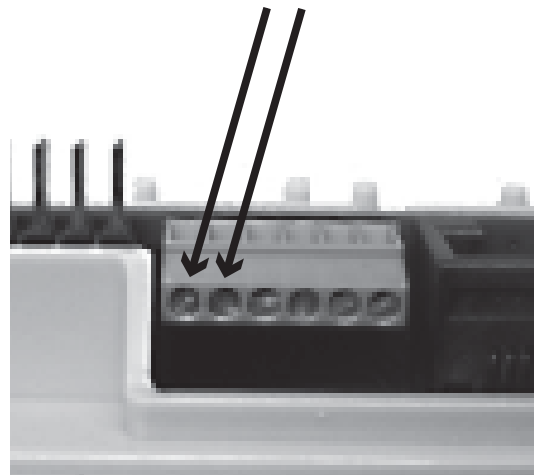


Figure 3-23

## 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.

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.)

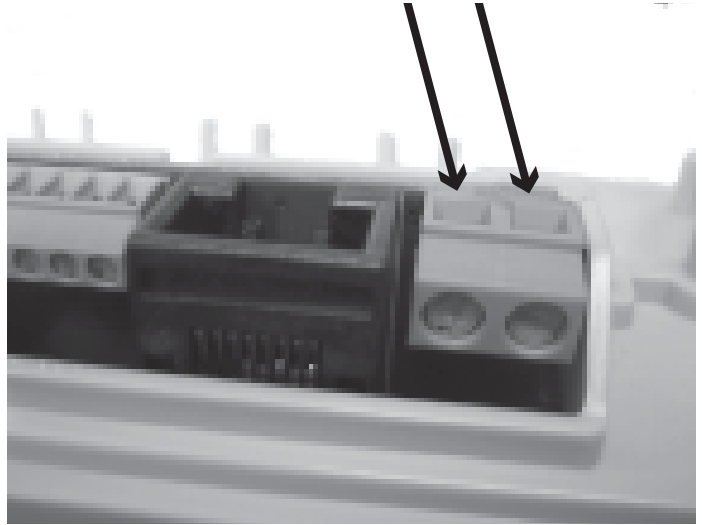


Figure 3-24

## 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.

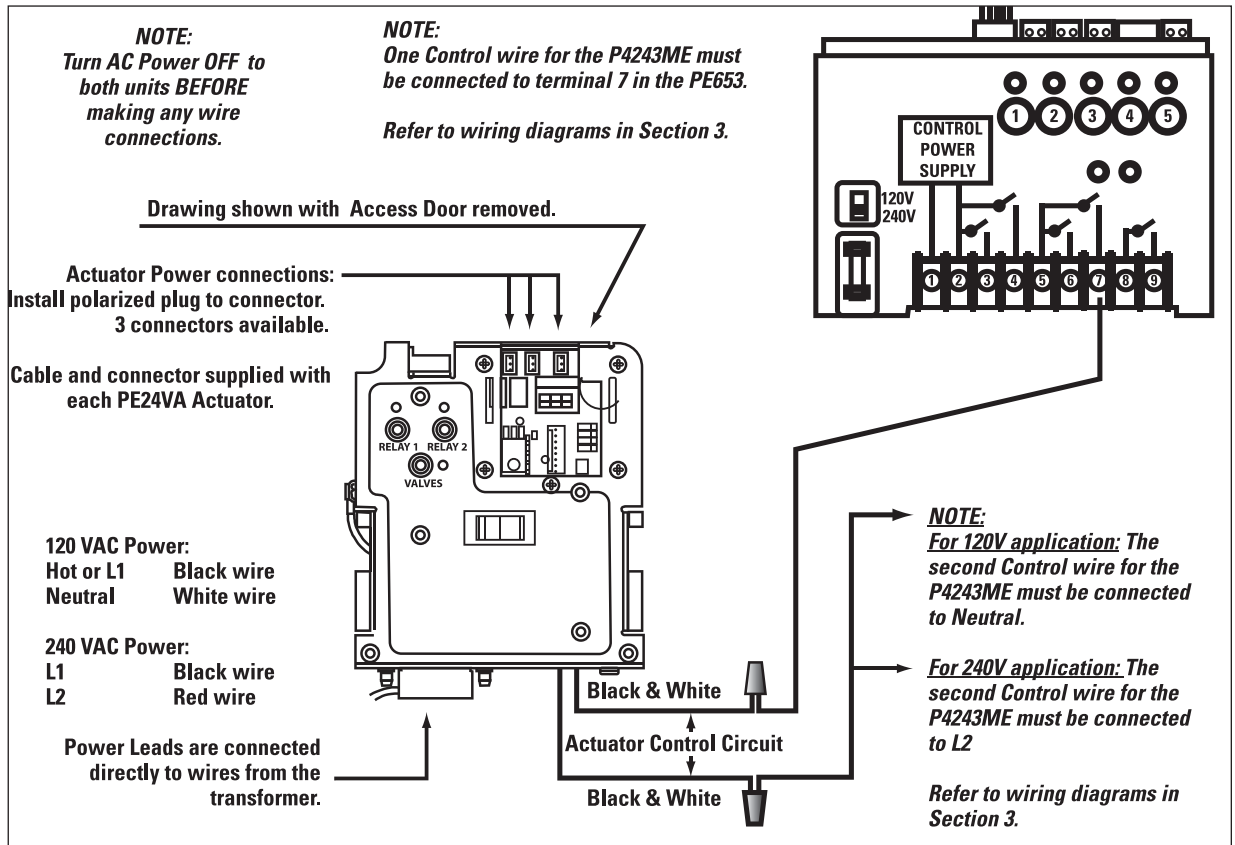


Figure 3-25

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.

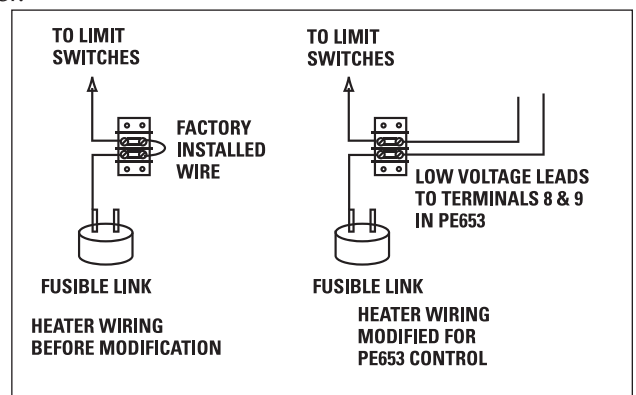


Figure 3-26 Typical Jandy heater wiring connection

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)

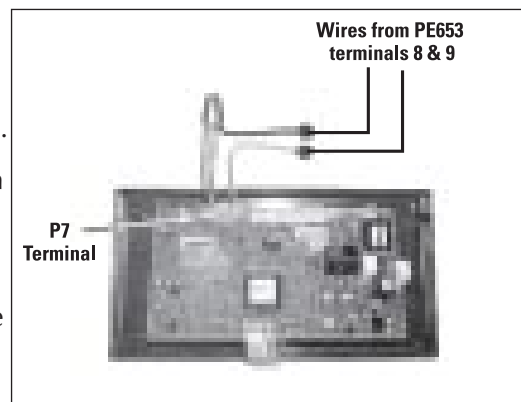


Figure 3-27 — Typical wiring connection for Raypak

### 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.

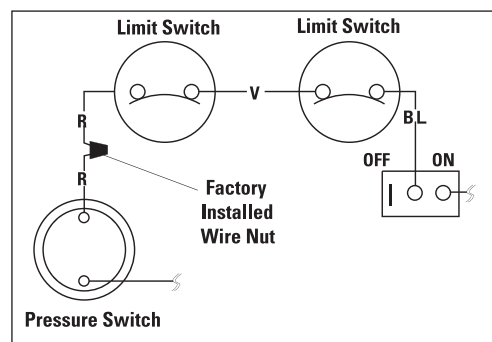


Figure 3-28 — Hayward Heater Wiring Before Modification

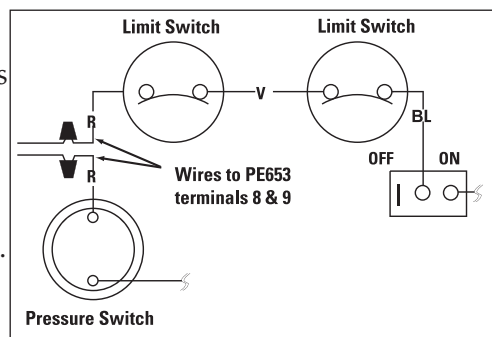
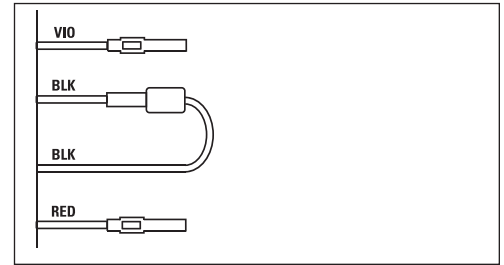


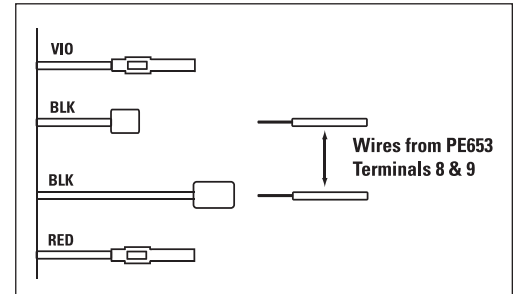
Figure 3-29 — Wiring with PE653 Receiving Device

## 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.

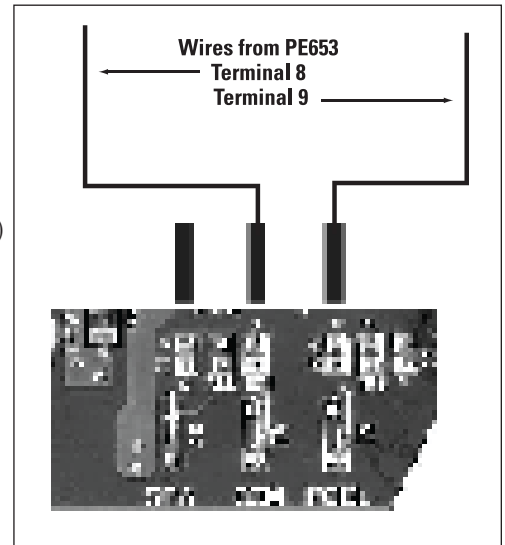


Figure 3-32 — DDTC Control Board

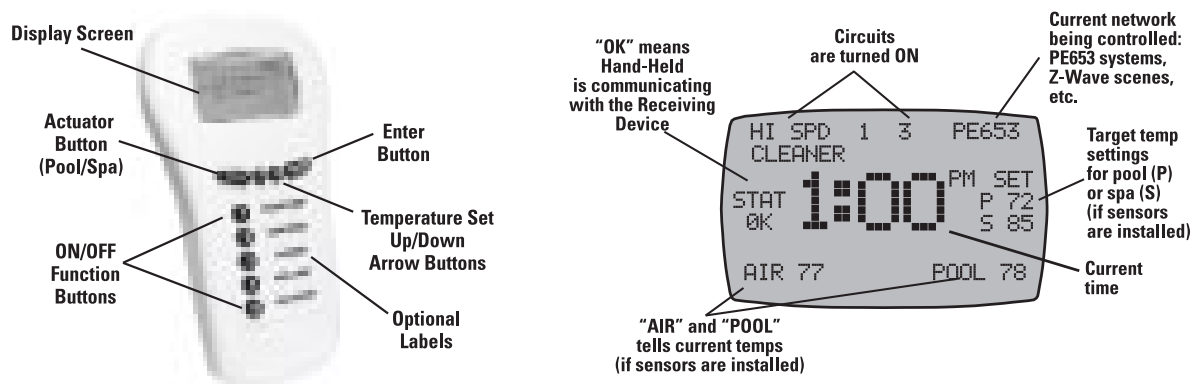


## Section 4:

# 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.

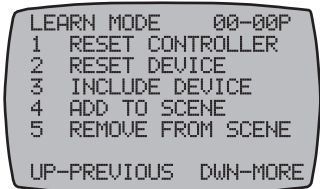
### Deleting Any Existing Programming

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.

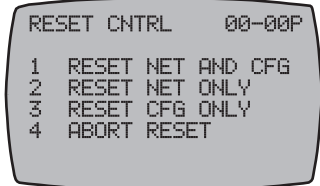
**To Reset the PE953 Hand-Held Controller**

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.

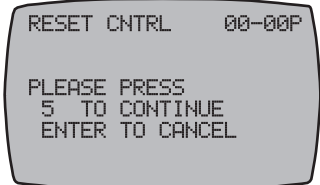


**NOTE:** If you pause in programming for more than 30 seconds, the screen automatically returns to the previous screen.

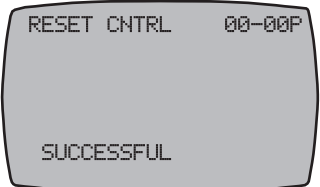
3. Press and release the <1> function button to select **RESET CONTROLLER**. The screen displays four options, as shown.



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.



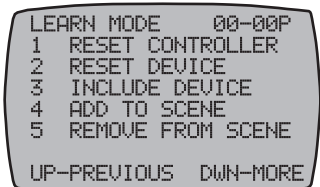
5. Press and release the <5> function button to select **CONTINUE**. If the action is successful, the screen displays the words PLEASE WAIT followed by SUCCESSFUL, as shown.



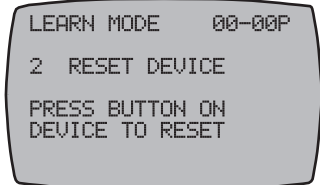
Any pre-existing network or configuration programming in the Hand-Held Controller is now deleted.

**To Reset the PE653 Receiving Device**

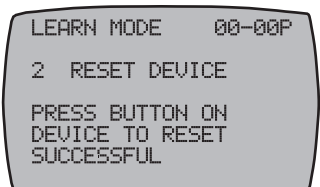
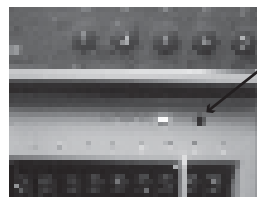
1. Press and release any button on the Hand-Held Controller to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.)
2. Press and hold the <P/S> and <ENTER> buttons at the same time to put the device into programming mode, as shown at the right.



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.

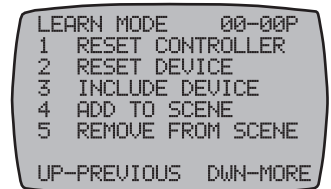
Any existing network or configuration programming in the PE653 Receiving Device is now deleted. The entire system is now at factory reset state and the components are ready to be linked together within a new electronic network.

## Linking the Hand-Held Controller to the PE653 Receiving Device

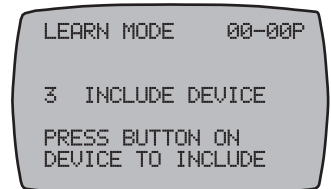
This procedure creates a network connection between the Hand-Held Controller and the PE653 Receiving Device by including the PE653 into the PE953 controller., making it possible to complete the rest of the setup procedure and operate the system.

**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.

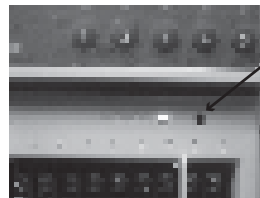
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. When all programming is deleted, the Hand-Held automatically displays the **LEARN MODE** screen, as shown. If the screen is not displaying **LEARN MODE**, press and hold the **<P/S>** and **<ENTER>** buttons 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.



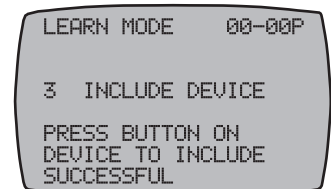
2. Press and release the **<3>** function button to select **INCLUDE DEVICE**. The screen refreshes with instructions to **PRESS BUTTON ON DEVICE TO INCLUDE**, as shown.



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.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

```
PE653 OPTION  00-00P
1  PUMP      1 SPD
2  CALIBRATE TEMPS
3  CLEANER   OFF
4  POOL/SPA  POOL
5  FIREMAN SW  OFF
UP-PREVIOUS  DWN-MORE
```

```
PE653 OPTION  00-00P
1  PUMP      1SPD
```

## 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.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

```
PE653 OPTION  00-00P
1  PUMP      1 SPD
2  CALIBRATE TEMPS
3  CLEANER   OFF
4  POOL/SPA  POOL
5  FIREMAN SW  OFF
UP-PREVIOUS  DWN-MORE
```

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

```

CALIBRATE TEMP 00-00P
1 CALIB POOL 0
2 CALIB AIR 0

UP-PREVIOUS DWN-MORE

```

- 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.*

```

CALIBRATE TEMP 00-00P
1 CALIB POOL 0

```

- 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  $\pm 20^{\circ}\text{F}$ .

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

- 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.*

```

LEARN MODE 00-00P
1 RESET CONTROLLER
2 RESET DEVICE
3 INCLUDE DEVICE
4 ADD TO SCENE
5 REMOVE FROM SCENE

UP-PREVIOUS DWN-MORE

```

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

```

PE653 OPTION 00-00P
1 PUMP 1 SPD
2 CALIBRATE TEMPS
3 CLEANER OFF
4 POOL/SPA POOL
5 FIREMAN SW OFF

UP-PREVIOUS DWN-MORE

```

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

- 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.

```

PE653 OPTION 00-00P
3 CLEANER OFF

```

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

- 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.

```
LEARN MODE 00-00P
1 RESET CONTROLLER
2 RESET DEVICE
3 INCLUDE DEVICE
4 ADD TO SCENE
5 REMOVE FROM SCENE
UP-PREVIOUS DWN-MORE
```

```
PE653 OPTION 00-00P
1 PUMP 1 SPD
2 CALIBRATE TEMPS
3 CLEANER OFF
4 POOL/SPA POOL
5 FIREMAN SW OFF
UP-PREVIOUS DWN-MORE
```

```
PE653 OPTION 00-00P
4. POOL/SPA POOL
```

## 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.

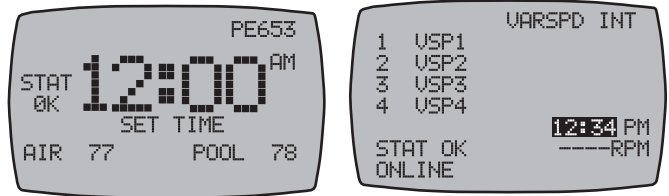
```
LEARN MODE 00-00P
1 RESET CONTROLLER
2 RESET DEVICE
3 INCLUDE DEVICE
4 ADD TO SCENE
5 REMOVE FROM SCENE
UP-PREVIOUS DWN-MORE
```

```
PE653 OPTION 00-00P
1 PUMP 1 SPD
2 CALIBRATE TEMPS
3 CLEANER OFF
4 POOL/SPA POOL
5 FIREMAN SW 1 MIN
UP-PREVIOUS DWN-MORE
```

```
PE653 OPTION 00-00P
5 FIREMAN SW OFF
```

## 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.

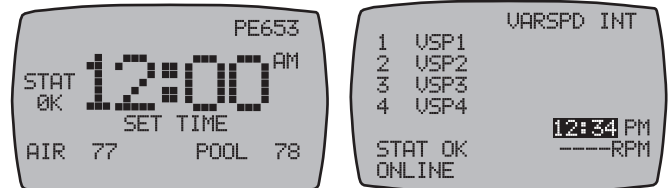
## Setting Up Schedules

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.

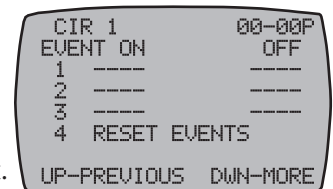
You can set up to three schedules for each PE653 circuit and variable-speed pump speed.

- 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.



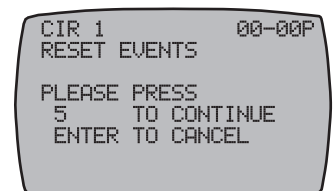
4. Press and release the <P/S> button again. The screen displays the schedules.
5. Press and release the <P/S> button again to cycle through the available circuits or variable-speed pump speeds.
6. Press the <1> function button to select the ON time for the first event.
7. Press the UP or DOWN arrow 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.



- 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.

- 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.

```
LEARN MODE 00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

- 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.

```
FREEZE OPTION 00-00P
1  TEMP      DISABLED
2  PE653 CIRS NONE
3  VSP SPEED NONE
UP-PREVIOUS  DWN-MORE
```

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

```
FREEZE OPTION 00-00P
1  TEMP      DISABLED
```

- 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.

```
FREEZE OPTION 00-00P
SELECT PE653 CIRS
TO ACTIVATE BY
PRESSING BUTTONS
1 THROUGH 5
SELECTED: 1
```

- 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.

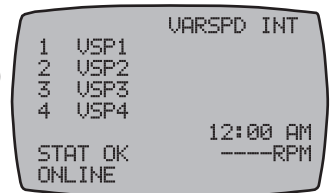
**NOTE:** Other options available will depend on how the system is configured (e.g., fireman enabled or not, booster enabled or not, etc).

- 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.

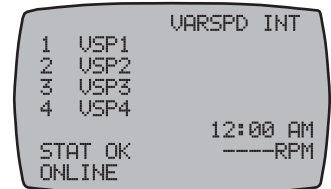


This screen controls the variable speed pump, and can be configured to display the functionalities you have selected for various pump speeds (for example, slowest speed for the cleaner, next faster speed for a booster pump, etc.).

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.

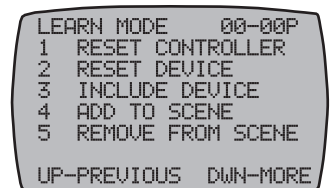
You can change the four variable speed pump speed settings from the factory default values by following these steps on the Hand-Held Controller. Once configured, Buttons <1> through <4> will switch between the variable speeds according to your settings.

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.



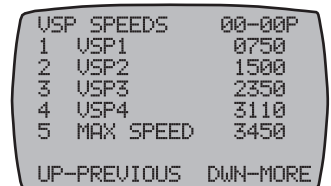
3. Press and hold the <P/S> button first, then press and hold the <ENTER> button within 2 seconds. The LEARN MODE screen is displayed.

**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.

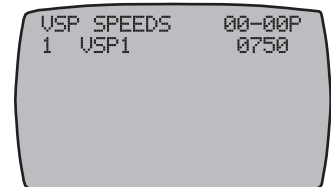


4. Press the **DOWN** arrow button until you see the VSP SPEEDS screen, as shown.

**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).

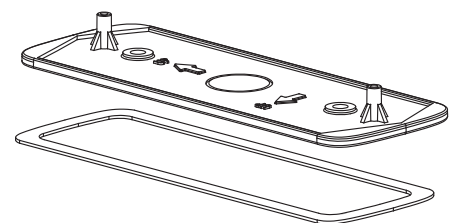
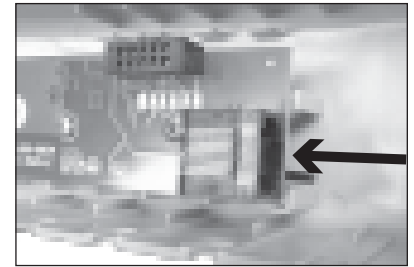
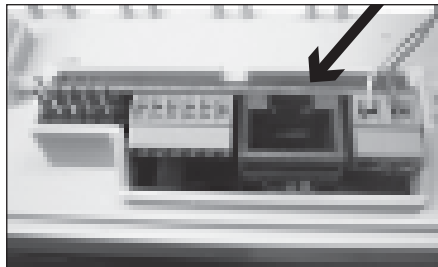
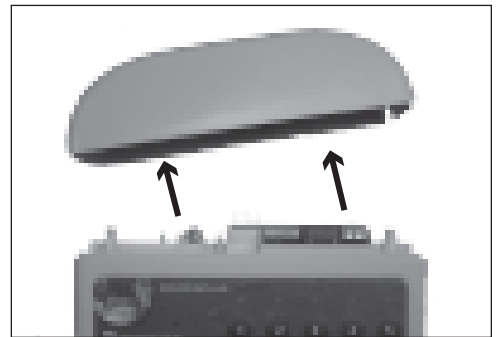
Signal reception between Hand-Held Controllers and the Receiving Device is affected by distance (about 100 feet,) direct line of sight, and by physical obstacles (like brick, wire lath in walls, or steel structures).

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.

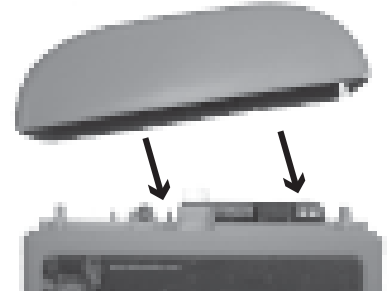
### Moving the Antenna to a Better Location

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.



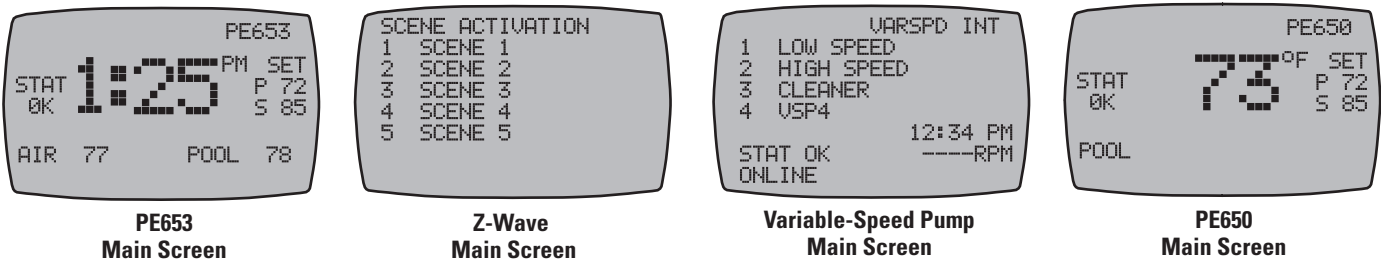
5. Cut out a knock-out for the wire to pass through the cap, then screw the antenna cap to the bracket, using the screws supplied with the remote kit.
6. Cut out a knock-out for the wire to pass through the dummy cap, then screw the dummy cap to the top of the PE653 Receiving Device, using the original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



### 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:

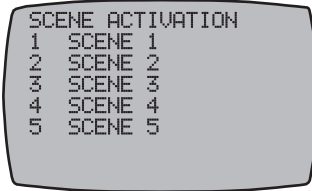
# Everyday Use of the Hand-Held Controller

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

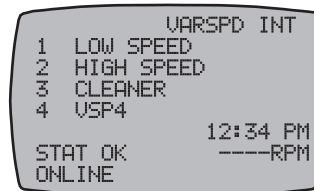
Depending on which components have been installed in the system, there may be several screens available as the primary screen when controlling the system:



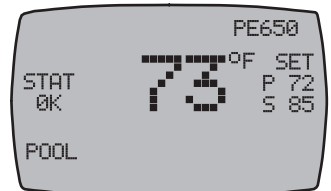
**PE653  
Main Screen**



**Z-Wave  
Main Screen**



**Variable-Speed Pump  
Main Screen**

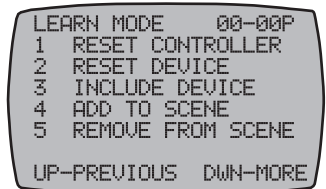


**PE650  
Main Screen**

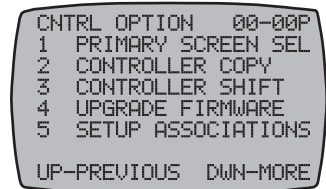
Press the **<ENTER>** button to choose the screen as the primary screen, with the functionality you want to control most frequently, and then proceed with the instructions provided below.

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

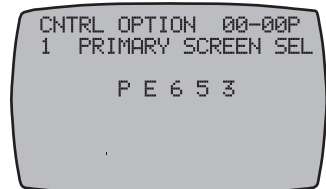
1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the **<P/S>** and **<ENTER>** buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE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

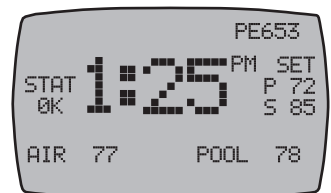
When you press any of these buttons, the appropriate circuit toggles ON or OFF. In addition, when the circuit is ON, the Hand-Held Controller's display shows the circuit number along the top of the screen.

### 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:

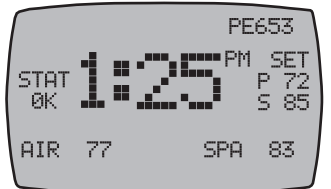
*POOL* if the valve actuator is in pool mode

*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.

- 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
- 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.
- Make sure you are in the mode for which you want to change the target set temperature before continuing to step 3 below.
- 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.
- Release the arrow button when the setting reaches the temperature you want.



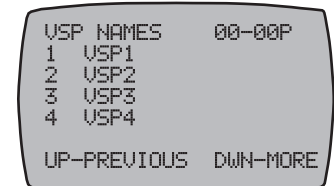
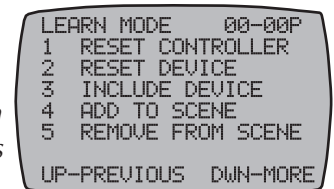
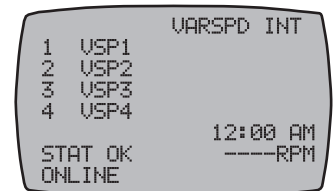
## Controlling a Variable-Speed Pump

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.

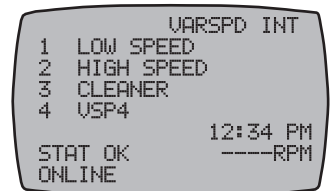
- If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the **<P/S>** and **<ENTER>** buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen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

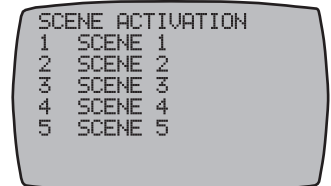


## Controlling Z-Wave Devices

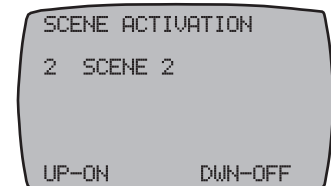
Once you have included Z-Wave devices in the network and have added them to various Scenes, you can control them using the Hand-Held Controller.

**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.



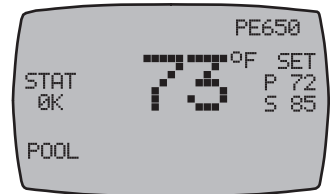
The screen will add the word WORKING followed by SUCCESSFUL when it completes your command, and will then return to the SCENE ACTIVATION screen.

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.

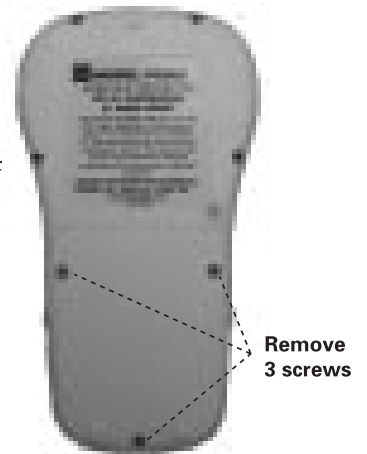
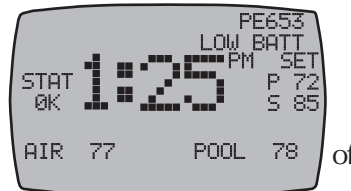
The Hand-Held Controller's display shows the circuit number along the top of the screen.

## Changing Batteries in the Hand-Held Controller

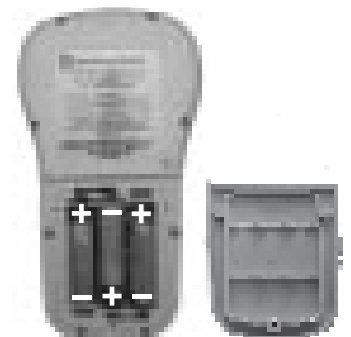
The Hand-Held Controller requires three (3) AA batteries. Battery life is approximately one year in typical use. When the batteries are weak, the screen displays a LOW BATT message shown.

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.**





## **Manually Turning Equipment On and Off**

### ***At the Receiving Device***

For service purposes, the five circuits and / or the pool/spa actuators can be operated manually at the PE653 Receiving Device.

Simply press any of the circuit buttons on the PE653 Receiving Device to toggle between ON and OFF.

Any manual OFF/ON circuit activation performed at the PE653 Receiving Device will be reflected on the screen of the Hand-Held Controller.

## Section 6:

## Advanced Features

The PE953 controller is able to listen to Z-Wave commands while the controller is awake. (For example: requesting the controller to report Version or Manufacturer Specific information.)

To wake up the controller, press any key.

### Configuring Two or More Hand-Held Controllers

Many installations will find it convenient to use two Hand-Held Controllers. Once you have linked and programmed one Hand-Held to the Receiving Device, it's easy to add additional units.

**NOTES:** *The first Hand-Held you link to the Receiving Device is considered the PRIMARY control and all other Hand-Held units are SECONDARY.*

- Only the PRIMARY Controller can be used to add or remove devices from a network in the Intermatic Multi-Wave system.
- SECONDARY controllers cannot add or remove devices from the network in the Intermatic Multi-Wave system — they can only control devices on the network.

You can tell the status of a Hand-Held from the VER (version) code at the top right corner of the display on the programming screens: the letter "P" = PRIMARY; the letter "S" = SECONDARY.

The PRIMARY control must be used to "introduce" or include any additional (SECONDARY) Hand-Held units to the system.

If the PRIMARY Hand-Held must be replaced (due to loss, damage, etc.), you must reprogram from scratch to create a new PRIMARY unit, then reprogram any additional Hand-Helds as SECONDARY controls.

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 to view the CNTRL OPTION screen as shown
3. Press the <2> button to select CONTROLLER COPY.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

```
CNTRL OPTION  00-00P
1  PRIMARY SCREEN SEL
2  CONTROLLER COPY
3  CONTROLLER SHIFT
4  UPGRADE FIRMWARE
5  SETUP ASSOCIATIONS
UP-PREVIOUS  DWN-MORE
```

4. On the Primary Hand-Held used to set up and configure the network, press and release the <3> button to select SEND NET AND CONFG.

```

CNTRL COPY  00-00P
1  SEND NETWORK ONLY
2  RECV NETWORK ONLY
3  SEND NET AND CONFG
4  RECV NET AND CONFG
5  SEND NODE INFO
UP-PREVIOUS  DWN-MORE

```

5. On the new Hand-Held you are adding to the network, follow Steps 1-3, then press and release the <4> button to select RECV NET AND CONFG.

The words INCLUDING DEVICE will appear at the bottom of the primary controller's screen. The screen will briefly display the words SENDING NET INFO, then SENDING SCENE INFO, then SENDING CFG INFO during the transfer of info to the secondary device. After a few seconds the controller will return to the CNTRL COPY screen.

The words WAITING FOR INCLUDE will appear at the bottom of the secondary controller's screen. Upon completion of the info transfer the word SUCCESSFUL will then appear. After a few seconds the controller will return to the Main screen.

6. On the new Hand-Held (secondary) controller, press and hold the <P/S> and then the <ENTER> buttons to return to the LEARN MODE screen. You will notice the screen display will have the following differences:

- The letter "S" will show at the top right corner of the screen following the version number, indicating that it is a secondary control.
- Selections 2 and 3 are now blank. These options are not available on a secondary controller.

```

LEARN MODE  00-00S
1  RESET CONTROLLER

4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE

```

7. Press the down arrow button to display the CNTRL OPTION screen. Notice that items 2, 3 and 5 have been changed to show the options that a secondary remote can perform.
8. Press the <ENTER> button on both controls as necessary to return to the Main screen.

```

CNTRL OPTION 00-00S
1  PRIMARY SCREEN SEL
2  RECV NET ONLY
3  RECV NET AND CONFG
4  UPGRADE FIRMWARE
5  SEND NODE INFO
UP-PREVIOUS  DWN-MORE

```

**NOTE:** Any time you add something new to the network, you must repeat this procedure to copy the new item to all secondary Hand-Held Controllers. Otherwise, the secondary units will not know about the new item(s).

## Changing a Secondary Remote Control into a Primary Control

There are several situations where you might want to create a primary remote control out of a secondary control. For example, an installer might set up similar customer systems using a master Hand-Held Controller (already programmed), and then want to transfer primary status to the customer's remote. The procedure is known as "shifting."

"Controller Shift" swaps the roles of the two Hand Held units involved. The Primary Controller will become a Secondary Controller and the Secondary will become the Primary Controller.

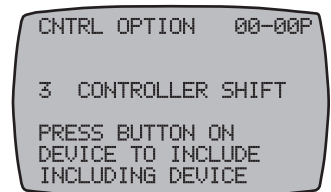
**NOTE:** *There can only be one Primary Controller in the network at a time.*

1. If necessary, press and release any button on both Hand-Held Controllers to wake them from sleep.

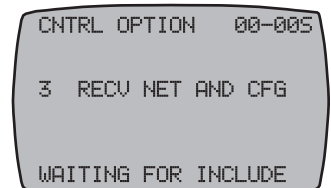
*If the screens on both Hand-Held Controllers are not displaying LEARN MODE, press and hold the <P/S> and <ENTER> buttons at the same time on each to put the devices both into programming mode. You are in programming mode when the LEARN MODE screen is displayed.*

2. Press the **DOWN** arrow button on each Hand-Held Controller to view the CNTRL OPTION screen.

3. On the PRIMARY Hand-Held, press and release the <3> button to select CONTROLLER SHIFT. Once the button is pressed on the controller, it displays PRESS BUTTON ON DEVICE TO INCLUDE INCLUDING DEVICE.



4. On the SECONDARY Hand-Held (the one you are shifting to PRIMARY status), press and release the <3> button to select RECEIVE NET AND CFG.



Both Hand-Helds will restart, and when finished, the screen displays will have several differences:

- The words INCLUDING DEVICE will appear at the bottom of the primary controller's screen. The screen will briefly display the words SENDING NET INFO, then SENDING SCENE INFO, then SENDING CFG INFO during the transfer of info to the secondary device. After a few seconds the controller will return to the CNTRL COPY screen.
- The words WAITING FOR INCLUDE will appear at the bottom of the secondary controller's screen. Upon completion of the info transfer the word SUCCESSFUL will then appear. After a few seconds the controller will return to the Main screen.

Various screens on the two remotes displays only the menu options capable of their primary or secondary status.

5. Press the <ENTER> button on both controls as necessary to return to the Main screen.

## Including the PE953 Controller into a non-Multi-Wave (other manufacturer's) network.

The PE953 is a Z-Wave compliant device that may be included into networks created by other manufacturer's Z-Wave compliant controllers.

To include the PE953 into another manufacturer's controller network:

1. Activate the 3rd party controller's Controller Replication function to transmit network information to the PE953 according to that controller manufacturer's instructions.
2. Press the down button on the PE953 to display the CNTRL OPTION screen. 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.
3. Press the <2> button on the PE953 to display the CNTRL COPY screen.
4. Press the <2> button to receive network information on the PE953. The PE953 will display the words WAITING FOR INCLUDE.

Upon completion, the PE953 will display SUCCESSFUL and will automatically reboot. The PE953 will now function as a secondary remote controller in the 3rd party's network.

To exclude the PE953 from another manufacturer's 3rd party network, follow the instructions *To Reset the PE953 Hand-Held Controller* found on page 42.

**NOTE:** *Secondary remote controllers can be removed from any network without any negative effects to the existing network by performing a controller reset on the secondary remote controller.*

## Section 7:

# Programming for Use with Z-Wave Home Control Devices

Models PE653 5-Circuit Digital Control and PE953 Remote Controller are compatible with Z-Wave enabled networks. Z-Wave enabled devices displaying the Z-Wave logo can be used with the PE653 and PE953 regardless of the manufacturer. Each Z-Wave enabled device is designed to act as a repeater, re-transmitting the RF signal around obstacles and radio dead spots when possible to ensure that messages are received by the intended destination device.

If you would like to add Z-Wave home control devices to your network, you need to include the devices into the network, and then assign them to Scenes for their day-to-day operation.

## Deleting Any Existing Programming

Perform this procedure with each Z-Wave device you plan to include into the network to make sure that any existing programming within these devices is deleted.

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.*

```

LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
  
```

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

```

LEARN MODE  00-00P
2  RESET DEVICE
PRESS BUTTON ON
DEVICE TO RESET
  
```

3. Press the button on the Z-Wave home control device you want to remove from the network (refer to the manufacturer's instructions).

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

```

LEARN MODE  00-00P
2  RESET DEVICE
PRESS BUTTON ON
DEVICE TO RESET
SUCCESSFUL
  
```

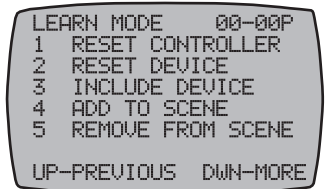
**NOTE:** *If you are seeing the word FAILURE at the bottom of the screen, carefully repeat the procedure. If the problem persists, contact Intermatic Customer Service. For assistance with any non-Intermatic devices, you may need to contact that manufacturer's customer support department.*

4. Repeat this procedure for all other Z-Wave home control devices that are to be part of the network.
5. Press the <ENTER> button if you wish to return to the Main screen.

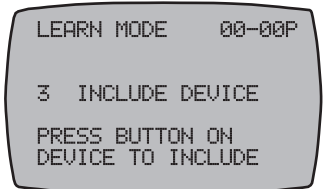
## Including Z-Wave Devices into the Network

This procedure includes Z-Wave devices into a network controlled by the PE953 Hand-Held Controller. The PE953 is pre-configured to operate with the PE653 Receiving Device. The PE953 can also operate as a stand alone Z-Wave remote controller. Z-Wave devices from other manufacturers may be part of the same network as the PE953 and PE653, and depending on supported features, can act as repeaters.

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.*



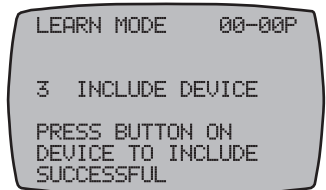
2. Press and release the <3> function button to select **INCLUDE DEVICE**. The screen refreshes with instructions to PRESS BUTTON ON DEVICE TO INCLUDE, as shown.



3. Press the button on the Z-Wave device for including the device in a network (refer to the manufacturer's instructions).

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

**NOTE:** *If the two devices are not successfully linked and you are seeing the word FAILURE at the bottom of the screen, carefully repeat the procedure. If the problem persists, contact Intermatic Customer Service.*



4. Repeat this procedure for all other Z-Wave home control devices that are to be part of the network.
5. Press the <ENTER> button if you wish to return to the Main screen.

## Including the PE653 Receiver onto a non-Multi-Wave remote controller

The PE653 is a Z-Wave compliant device that may be included into networks created by other manufacturer's Z-Wave compliant controllers.

To include the PE653 into another manufacturer's controller:

1. 1. Activate the controller's INCLUDE function according to that manufacturer's instructions.
2. 2. Press and release the INCLUDE button on the PE653.

If the include was successful, the red flashing LED on the PE653 will change to steady ON. (The steady ON LED will flash rapidly whenever another device is communicating with it.)

To exclude the PE653 from another manufacturer's controller:

1. Activate the controller's EXCLUDE function according to that manufacturer's instructions.
2. Press and release the INCLUDE button on the PE653.

If the exclude was successful, the red flashing LED on the PE653 will change from steady ON to slowly flashing ON and OFF.

## Adding Z-Wave Devices to Scenes for Everyday Control

Z-Wave devices must be added to Scenes for the Hand-Held Controller to be able to control them. Scenes are groups of Z-Wave devices that all act together. For example, you may group all outdoor lighting or all upstairs lighting into a single scene, so that the push of one button will turn everything on or off. The Hand-Held Controller can control up to five scenes.

**NOTE:** If a Z-Wave controlled light is on a dimmer switch, you can preset the dimmer level when adding the light to a scene.

Before you can add a device to a scene, it must first be included in the network.

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.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

2. Press the **<4>** button to add a device (already included as part of the network) to the scene. The screen displays *PRESS 1-5 TO CHOOSE A SCENE TO ADD THE DEVICE TO*, as shown:

```
LEARN MODE  00-00P
4  ADD TO SCENE
PRESS 1-5 TO CHOOSE
A SCENE TO ADD THE
DEVICE TO
```

3. Press one of the buttons (**<1>** through **<5>**) for the scene you want the device added to. The screen displays *PRESS BUTTON ON DEVICE TO INCLUDE*, as shown (Scene 4 is used as an example).

```
LEARN MODE  00-00P
4  ADD TO SCENE
PRESS BUTTON ON
DEVICE TO INCLUDE
```

4. Press the button on the Z-Wave device for including the device in a scene (refer to the manufacturer's instructions). The screen displays instructions: *SET DEVICE LEVEL THEN PRESS XX (the scene number you have selected) TO SAVE DEVICE TO SCENE*.

```
LEARN MODE  00-00P
4  ADD TO SCENE
SET DEVICE LEVEL
THEN PRESS 4 TO
SAVE DEVICE TO SCENE
```

5. Set the device level for the item being controlled. There are circumstances where you may want to turn some lights off and others ON when the scene is activated, so set accordingly.

**NOTE:** If the device you want to control is a dimmer switch, preset the dimmer level to the desired brightness at this time.

6. Press the scene control button (button **<4>**, for scene 4, in this example) as instructed. The screen displays *SUCCESSFUL*. The device is now included in the scene, as you have set it.
7. Repeat Steps 4 through 6 for other devices you want to add to the scene, or Steps 2 through 6 to create other scenes as necessary.
8. Press the **<ENTER>** button if you wish to return to the Main screen.



## Renaming a Scene

As supplied, the PE953 screen displays the names of the five scenes as SCENE 1, SCENE 2, etc. You can rename the scenes so they better describe their actual function, making the system easier to use.

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.*

```
LEARN MODE 00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

2. Press the <ENTER> button as necessary to display the Z-Wave user screen, as shown at the right.

```
SCENE ACTIVATION
1  SCENE 1
2  SCENE 2
3  SCENE 3
4  SCENE 4
5  SCENE 5
```

3. Press the **DOWN** button as necessary to reach the Z-Wave Options screen, as shown:

```
Z-WAVE OPTIONS 00-00P
1  SCENE 1
2  SCENE 2
3  SCENE 3
4  SCENE 4
5  SCENE 5
UP-PREVIOUS  DWN-MORE
```

4. Press the number button for the scene you want to rename. The screen shifts to show just that scene name, and highlights the first letter of the name.

```
Z-WAVE OPTIONS 00-00P
2  █ SCENE 2
```

5. 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.
6. When you have selected the right letter or number, press the <P/S> button to move right to the next character.
7. Repeat Steps 6 and 7 until you have completed the renaming.
8. Press the <ENTER> button to save the name and return to the Z-Wave OPTIONS screen as shown above. Press the <ENTER> button as necessary to return to the Main screen.

## Removing Z-Wave Devices from Scenes

If a Z-Wave device is removed from a network for any reason whatsoever, you should go through this procedure to maximize prompt system response. Otherwise, system network configuration will be corrupted and communications between the system devices may be degraded and/or lost since the network will still retain information about the removed device(s).

**NOTE:** If you're reassigning the device to a different scene, first remove it from its existing scene, then include it into the new scene.

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.*

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

2. Press the <5> button to remove a device to the scene. The screen displays PRESS 1-5 TO CHOOSE THE SCENE TO DELETE THE DEVICE FROM, as shown:

```
LEARN MODE  00-00P
5  REMOVE FROM SCENE
PRESS 1-5 TO CHOOSE
THE SCENE TO DELETE
THE DEVICE FROM
```

Press one of the buttons (<1> through <5>) for the scene you want the device removed from. The screen displays PRESS BUTTON ON DEVICE TO BE REMOVED, as shown:

3. Press the button on the Z-Wave device for removing the device from a scene (refer to the manufacturer's instructions). The screen displays WORKING followed by SUCCESSFUL. The device is now removed from the scene.
4. Press the <ENTER> button if you wish to return to the Main screen.

```
LEARN MODE  00-00P
5  REMOVE FROM SCENE
PRESS BUTTON ON
DEVICE TO BE REMOVED
```

## Removing Z-Wave Devices from a Network

If a Z-Wave device from one network is being added to another or is simply being removed from a network it is currently a part of, it should be removed from the first network (by being "reset") before adding it to the second. Otherwise, system network configuration will be corrupted and communications between the system devices may be degraded and/or lost since the network will still retain information about the removed device(s).

1. If necessary, press and release any button on the Hand-Held Controller to wake it from sleep. 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 the <2> button to reset the device. The screen displays PRESS BUTTON ON DEVICE TO RESET, as shown:

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

```
LEARN MODE  00-00P
2  RESET DEVICE
PRESS BUTTON ON
DEVICE TO RESET
```

3. Press the button on the Z-Wave device for resetting the device (refer to the manufacturer’s instructions). The screen displays WORKING followed by SUCCESSFUL. The device is now removed from the network.
4. Press the <ENTER> button if you wish to return to the Main screen.

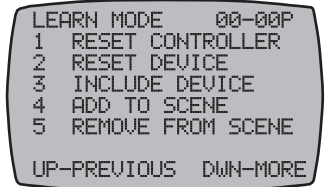
### Setting Up Z-Wave Associations with Capable Devices

An “Association” is a feature supported by certain Z-Wave devices where Z-Wave device other than the PE953 controller can be used to control other Z-Wave devices in the network (e.g., a Z-Wave switch that controls other Z-Wave devices).

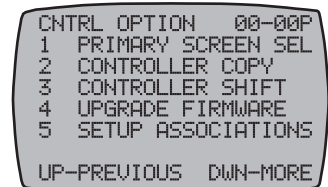
Within a PE653/953 network, setting up an association with one of these Z-Wave devices makes it possible to control Circuit 1 (the filter pump) of the PE653 in an ON/OFF basis along with lighting or other features being controlled by another Z-Wave device, independent of the Hand-Held Controller.

**NOTE:** Before you can create an Association, the capable Z-Wave device must first be included in the network.

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.*



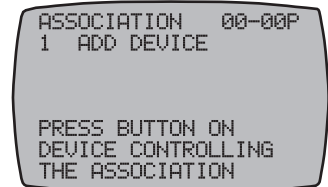
2. Press the **DOWN** button once to display the CNTRL OPTION screen, as shown:



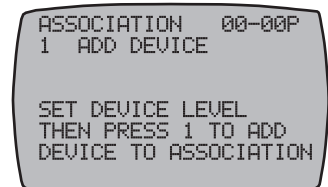
3. Press button <5> to select SETUP ASSOCIATIONS. The screen displays two choices, as shown:



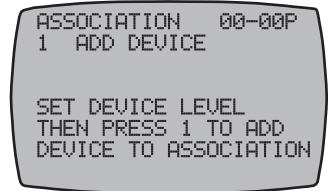
4. Press button <1> to select ADD DEVICE. The screen adds the words: PRESS BUTTON ON THE DEVICE CONTROLLING THE ASSOCIATION as shown. This is the association-capable Z-Wave device you want to use to control the other devices you plan to add to the association.



5. Press the button on the device (the same button used for including the device into a network. Refer to the manufacturer’s instructions.) that will control the association. The screen displays: PRESS THE BUTTON ON THE DEVICE TO ADD TO THE ASSOCIATION.



6. Now press the button on a device that will be controlled as part of the association. The screen displays SET DEVICE LEVEL THEN PRESS 1 TO ADD THE DEVICE TO THE ASSOCIATION.
7. Set the device to what you want "ON" to be for the item being controlled. There are circumstances where you may want to turn some lights off and others ON when the scene is activated, so set accordingly.



**NOTE:** *If controlling a light on a dimmer switch, preset the dimmer level to the desired brightness at this time.*

8. Press button <1> as instructed. The screen adds the word SUCCESSFUL. The device is now included in the association. An association now exists between the association-capable device and devices in the association (including the PE653 if it is included in the association.)

**NOTE:** *Only circuit 1 of the PE653 can be controlled via association. Repeat as necessary to add other devices to the association.*

9. Press the <ENTER> button if you wish to return to the Main screen.
10. You can now control all the devices in the association with the association-capable controller. You don't need the hand held.

## Removing Z-Wave Devices from an Association

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** button as needed to reach the CNTRL OPTION screen, as shown:
3. Press button <5> to select SETUP ASSOCIATIONS. The screen displays two choices, as shown:
4. Press button <2> to select REMOVE DEVICE. the screen displays: PRESS THE BUTTON ON THE DEVICE CONTROLLING THE ASSOCIATION.
5. Press the button on the device (the same button used for including the device into a network. Refer to the manufacturer's instructions.) The screen adds the words: PRESS THE BUTTON ON THE DEVICE TO BE REMOVED FROM THE ASSOCIATION.
6. Press the button on the Z-Wave device (the same button used for including the device into a network. Refer to the manufacturer's instructions) to be removed from the association. The screen adds the word SUCCESSFUL. The device is now removed from the association.
7. Repeat as necessary to remove other devices from the association.
8. Press the <ENTER> button if you wish to return to the Main screen.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

```
CNTRL OPTION  00-00P
1  PRIMARY SCREEN SEL
2  CONTROLLER COPY
3  CONTROLLER SHIFT
4  UPGRADE FIRMWARE
5  SETUP ASSOCIATIONS
UP-PREVIOUS  DWN-MORE
```

```
ASSOCIATION  00-00P
1  ADD DEVICE
2  REMOVE DEVICE
UP-PREVIOUS  DWN-MORE
```

```
ASSOCIATION  00-00P
2  REMOVE DEVICE
PRESS BUTTON ON
DEVICE CONTROLLING
THE ASSOCIATION
```

```
ASSOCIATION  00-00P
2  REMOVE DEVICE
PRESS BUTTON ON
DEVICE TO BE REMOVED
FROM THE ASSOCIATION
```

## Section 8:

# Using the PE953 with the PE650 Receiving Device

It's possible to control a PE650 network with the newer, more advanced PE953 Hand-Held Controller Control.

## Linking the PE953 Hand-Held Controller with the PE650 Receiving Device

This procedure creates a network between the Hand-Held Controller and the PE650 Receiving Device, making it possible to complete the rest of the setup procedure and operate the system.

**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, then try replacing the batteries in the Hand-Held. 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. 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.

```
LEARN MODE  00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

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. Press the black button on the base of the antenna of the PE650.

```
LEARN MODE  00-00P
3  INCLUDE DEVICE
PRESS BUTTON ON
DEVICE TO INCLUDE
```

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

**NOTE:** If the two devices are not successfully linked and you are seeing the word *FAILURE* at the bottom of the screen, carefully repeat the procedure. If the problem persists, contact Intermatic Customer Service.

```
LEARN MODE  00-00P
3  INCLUDE DEVICE
PRESS BUTTON ON
DEVICE TO INCLUDE
SUCCESSFUL
```

4. Press the **<ENTER>** button if you wish to return to the Main screen.

The circuits wired in the PE650 network (up to five) can now be controlled ON/OFF with the five function buttons on the PE953 Hand-Held Controller.

## Section 9:

# Checking Out and Verifying the System

After you have completed installation and programming, make sure the system is working OK by completing the procedures listed below. Later on, if problems develop in using the system, going over these same procedures will help you troubleshoot the problem.

This section will help you with procedures to:

- Verify that display on the PE953 Hand-Held Controller is operational and showing the correct time of day.
- Verify that the PE653 Device is operational and working.
- Verify that the PE953 Hand-Held Controller is communicating with the PE653 Device
- Verify that the PE953 Hand-Held Controller will communicate with the PE653 Device from everywhere on your property.
- Verify that the (POOL/SPA switch on the PE953 Hand-Held Controller activates the Motorized Valve Actuators (if installed)
- Verify that the Heater is responding to commands from the PE953 Hand-Held Controller.

<b>What to do</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
Verify that display on the PE953 Hand-Held Controller is operational and showing the correct time of day.	Press and release any button on the Hand-Held Controller to wake it from sleep.	Refer to <i>Section 4: Programming the PE953 Hand-Held Controller</i> on page 41.
	Check the batteries	<ol style="list-style-type: none"> <li>1. Use a small Phillips screwdriver to remove the three screws on the back of the unit, as indicated. (See page 56.)</li> <li>2. Verify that the batteries are good or replace them with three new AA batteries.</li> </ol> <p><b>NOTE:</b> Be sure to re-install the gasket correctly to maintain the watertight seal.</p>
	Set the correct time of day.	<ol style="list-style-type: none"> <li>1. Press and hold the <b>P/S</b> button until the screen displays SET TIME under the time display.</li> <li>2. Use the <b>Up/Down Arrow</b> buttons to set the correct time.</li> <li>3. Press the <b>ENTER</b> Key to return to the main PE653 main screen.</li> </ol> <p>Refer to page 46 for additional help.</p>
	Contact Intermatic support services.	

<b>What to do</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
Verify that the PE653 Device is operational and working.	Verify that power is ON to the PE653 Device.	<ol style="list-style-type: none"> <li>1. Turn the main circuit breaker that feeds the panel to the ON position.</li> <li>2. Use a voltmeter to verify that voltage is present at terminals 1 &amp; 2.</li> </ol>
	Verify the Voltage Selector Switch is in the proper position.	Voltage Selection Switch should be in the 120V or 240V position corresponding to the voltage reading observed in Step 2 above.
	Verify that the F1 Fuse is not blown.	<ol style="list-style-type: none"> <li>1. Turn OFF the power to the PE653 Device.</li> <li>2. Remove the fuse and test with an ohmmeter or fuse tester.</li> <li>3. Replace the fuse if good or install a new fuse.</li> <li>4. Turn the power to the PE653 Device ON.</li> </ol>
	Verify that each circuit is operational.	<ol style="list-style-type: none"> <li>1. Press the ON switch for Circuit #1.</li> <li>2. Verify that the Load ON indicator for Circuit #1 is ON.</li> <li>3. Press the ON switch for Circuit #2.</li> <li>4. Verify that the Load ON indicator for Circuit #2 is ON.</li> <li>5. Press the ON switch for Circuit #3.</li> <li>6. Verify that the Load ON indicator for Circuit #3 is ON.</li> <li>7. Press the ON switch for Circuit #4.</li> <li>8. Verify that the Load ON indicator for Circuit #4 is ON.</li> <li>9. Press the ON switch for Circuit #5</li> <li>10. Verify that the Load ON indicator for Circuit #5 is ON.</li> <li>11. Turn OFF all Circuits.</li> </ol>
	Verify that the electrical wiring for each load is correct.	Refer to the appropriate wiring diagram in Section 3, starting on page 13.

<b>What to do</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
Verify that the PE953 Hand-Held Controller is communicating with the PE653 Device	Test communications between the PE953 and the PE653.	<ol style="list-style-type: none"> <li>1. Press and release any button on the Hand-Held Controller to wake it from sleep.</li> <li>2. Press the number 1 switch on the PE953.</li> <li>3. Verify that Circuit #1 turns ON.</li> <li>4. Press the number 1 switch again to turn OFF.</li> <li>5. Press the number 2 switch on the PE953.</li> <li>6. Verify that Circuit #2 turns ON.</li> <li>7. Press the number 2 switch again to turn OFF.</li> <li>8. Repeat for all 5 circuits.</li> </ol>
	Review Section 4: <i>Programming the PE953 Hand-Held Controller</i> starting on page 41.	Refer to page 43: <i>Linking the Hand-Held Controller to the PE653 Receiving Device.</i>



<b>What to do</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
Verify that the PE953 Hand-Held Controller will communicate with the PE653 Device from everywhere on your property.	Review the Section covering "Testing Z-Wave Reception" starting on page 50.	<ol style="list-style-type: none"> <li>1. Carry the PE953 Hand-Held Controller to several parts of the area from which commands might be sent to the PE653 Device.</li> <li>2. Test the reception by turning connected equipment ON and OFF.</li> <li>3. Note if the PE653 Device fails to respond immediately to any of the commands sent.</li> <li>4. If commands are missed, follow the instructions for "Moving the Antenna to a Better Location" starting on page 50.</li> </ol>

<b>What to do</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
Verify that the (POOL/SPA switch on the PE953 Hand-Held Controller activates the Motorized Valve Actuators (if installed)	Verify that the PE953 Hand-Held Controller is configured for BOTH (Pool and Spa)	<ol style="list-style-type: none"> <li>1. If necessary, press and release any button on the Hand-Held controller to wake it from sleep.</li> <li>2. Look for the word POOL at the lower right part of the PE953 screen (refer to illustration on page 4).</li> <li>3. If either POOL or SPA is observed, press and release the <b>P/S</b> button on the PE953.</li> <li>4. Verify that the word POOL switches to SPA and back to POOL each time that the <b>P/S</b> button is pressed.</li> <li>5. Verify that the water flows to the Pool when POOL is shown in the screen.</li> <li>6. Verify that the water flows to the SPA when SPA is shown in the screen.</li> </ol>
	Correct the Motorized Valve Actuator Synchronization if the water flow is incorrect.	Refer to Section 3: <i>Motorized Valve Actuator Connection and Synchronization</i> starting on page 36.

<b><i>What to do</i></b>	<b><i>If it doesn't work</i></b>	<b><i>Reference/Procedure</i></b>
Verify that the Heater is responding to commands from the PE953 Hand-Held Controller.	Test the heater response.	<ol style="list-style-type: none"> <li>1. If necessary, press and release any button on the Hand-Held controller to wake it from sleep.</li> <li>2. Make sure that the PE953 screen displays "POOL" or "SPA" in the lower right hand corner. Make sure that a temperature is displayed next to the words "POOL" or "SPA". Refer to the illustration on page 41.</li> <li>3. Set either the POOL or SPA temperature to five degrees (5°) higher than the current reading. Refer to Setting Pool and Spa Temperatures starting on page 54 of this manual.</li> <li>4. Turn the pump ON.</li> </ol>
	Verify that the thermostat in the heater is set for "high" or "maximum."	Refer to the manufacturer's installation instructions.
	Verify that all wiring connections are correct and that all terminals and splices are secure.	<ol style="list-style-type: none"> <li>1. Refer to the appropriate wiring diagram with heater connection information starting on page 16 of this manual.</li> <li>2. Refer to <i>Fireman's Switch Connections</i> starting on page 37 in Section 3.</li> <li>3. Find the Wiring Diagram that is the most like your installation.</li> <li>4. Verify that the system is wired according to the diagram.</li> <li>5. Refer to the manufacturer's installation instructions if your heater is not shown in this manual.</li> </ol>

## Section 10:

# Troubleshooting

After you have completed installation and programming, make sure the system is working OK by completing the procedures listed below. Later on, if problems develop in using the system, going over these same procedures will help you troubleshoot the problem.

This section will help you troubleshoot the following problems:

- The system appears to work, the LED's turn ON and OFF but the power circuits and attached equipment will not turn ON.
- The 2-speed pump will not operate in 2-Speed mode.
- High speed and low speed circuits turn ON together when the pump is turned ON.
- The circuit breaker for the pump trips every time that the Pump turns ON.
- The heater will not turn ON.
- The heater turns OFF but gets very hot after the pump turns OFF.
- Water or moisture is visible inside the screen of the Hand-Held Controller.
- The Hand-Held Controller appears to be "LOCKED UP".
- The PE653 Device appears to be "LOCKED UP".

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The system appears to work, the LED's turn ON and OFF but the power circuits and attached equipment will not turn ON	Verify that the voltage is correct at the PE653 power terminals.	<ol style="list-style-type: none"> <li>1. Check the voltage at terminals #1 and #2 on the PE653 using a meter.</li> <li>2. Verify that the Voltage Selector is in the correct position: either 120 V or 240 V depending upon the voltage observed at terminals #1 and #2.</li> </ol> <p><b>CAUTION:</b> If a 2-speed pump or other 240 VAC equipment is being used in the system, the voltage must be 240 VAC.</p> <p><b>NOTE:</b> The PE653 will appear to function correctly, LED's will turn ON and it will communicate with the PE953 Hand Held Controller but the power relays will turn on when 120 VAC is supplied to a 240 VAC system.</p>

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The 2-speed pump will not operate in 2-Speed mode	Verify that all wiring connections are correct and that all terminals and splices are secure.	<ol style="list-style-type: none"> <li>1. Refer to the Wiring Instructions in Section 3.</li> <li>2. Find the Wiring Diagram that is the most like the installation starting on page 16.</li> <li>3. Verify that the system is wired according to the diagram.</li> </ol>
	Verify that the correct voltage is present at terminals 1 and 2.	<ol style="list-style-type: none"> <li>1. Use a meter and verify voltage output from the breaker (should be 240 VAC).</li> <li>2. Use a meter to verify that the voltage at terminals 1 and 2 is 240 VAC.</li> <li>3. Turn ON circuit #1 on the PE653 using either the Hand-Held controller or the Circuit ON/OFF switch on the PE653.</li> <li>4. Use a meter and verify voltage at pump terminals. <p><b>NOTE:</b> L2 must return to the second pole on the breaker for 240 VAC to be present.</p> </li> <li>5. Verify that terminal 3 on the PE653 is connected to the 'HIGH' speed terminal at the pump.</li> <li>6. Verify that terminal 4 on the PE653 is connected to the 'LOW' speed terminal at the pump.</li> <li>7. Verify that the 'COMMON' terminal at the pump is connected to L2 at the breaker panel.</li> </ol>
	Verify that your system is configured for a 2-speed pump.	<ol style="list-style-type: none"> <li>8. Refer to "Configuring for a 1-Speed or 2-Speed Pump" starting on page 44.</li> </ol>
Contact your pump service company for assistance with the pump.		

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
High speed and low speed circuits 1 & 2) turn ON together when the pump is turned ON.	Confirm that the system is programmed for a 2-speed pump.	<ol style="list-style-type: none"> <li>1. Press any release any button on the PE953 Hand-held Controller to wake it up.</li> <li>2. Verify that the PPE953 displays "HI SPD 1" or "LO SPD 2" in the upper left hand corner of the screen.</li> <li>3. Refer to the illustration on page 41.</li> </ol>
	Reprogram for 2-speed pump operation.	Refer to "Configuring for a 1-Speed or 2-Speed Pump" starting on page 44.

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The circuit breaker for the pump trips every time that the Pump turns ON.	Confirm that the system is programmed for a 2-speed pump.	<ol style="list-style-type: none"> <li>1. Press any release any button on the PE953 Hand-held Controller to wake it up.</li> <li>2. Verify that the PPE953 displays “HI SPD 1” or “LO SPD 2” in the upper left hand corner of the screen.</li> <li>3. Refer to the illustration on page 41 of this manual</li> </ol>
	Check the wiring for a 2-speed pump.	<ol style="list-style-type: none"> <li>1. Verify that the wire from circuit #1 (PE653 terminal #3) is connected to the High Speed connection of the pump.</li> <li>2. Verify that the wire from circuit #2 (PE653 terminal #4) is connected to the Low Speed connection of the pump.</li> </ol>
	Confirm that the controls in the heater are turned ON	<ol style="list-style-type: none"> <li>1. Verify that the Common connection of the pump is connected to L2 at the Panel circuit breaker.</li> <li>2. Verify that the 2-pole breaker feeding the PE653 and the Pump is sized correctly.</li> </ol>

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The heater will not turn ON.	Go to the Checking Out and Verifying section above.	<ol style="list-style-type: none"> <li>1. Press any release any button on the Hand-held Controller to wake it up.</li> <li>2. Note the POOL temperature.  <i><b>NOTE:</b> The temperature will be shown to the right of the word POOL in the bottom right of the PE953 screen.</i></li> <li>3. Use the Temperature Set UP arrow to make the Target temperature setting at least five degrees (5°) higher than the current temperature.</li> <li>4. Turn ON the pump.</li> <li>5. Find and follow the instructions in “Verify that the Heater is responding to commands from the PE953 Hand-Held Controller” printed earlier in this section.</li> </ol>

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The heater turns OFF but gets very hot after the pump turns OFF.	Verify that the heater has a proper “Time Interval” programmed for cool down.	<p>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.</p> <p>Refer to “Configuring the Fireman’s Switch Time Interval” starting on page 46 in this manual.</p>

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The heater turns OFF but gets very hot after the pump turns OFF.	Verify that the heater has a proper "Time Interval" programmed for cool down.	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. Refer to "Configuring the Fireman's Switch Time Interval" starting on page 46 in this manual.

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
The System will not respond to commands from the Hand-Held Controller	Verify that the Antenna section is properly installed on the top portion	If the Antenna section has been removed for installation of any type of wiring connection, check the following. <ol style="list-style-type: none"> <li>1. Wires are properly wired and routed through the knockouts in the antenna cover.</li> <li>2. Verify that all of the local antenna connector pins on the PE653 art straight and properly inserting into the plug on the Antenna section.</li> <li>3. Verify that the Antenna Section is completely seated on the PE653 housing.</li> <li>4. Refer to the "Testing Z-Wave Reception" section starting on page 50.</li> </ol>

<b>Problem</b>	<b>What to do</b>	<b>Reference/Procedure</b>
Water or moisture is visible inside the screen of the Hand-Held Controller.	Dry out the Hand-Held Controller.	<ol style="list-style-type: none"> <li>1. Remove the battery cover on the rear of the PE953 Hand Held Controller. Refer to page 57 for instructions.</li> <li>2. Gently drain any water remaining in the Hand-Held Controller.</li> <li>3. Place the Hand-Held Controller in a well ventilated area to dry. <b>CAUTION:</b> Do not place in direct sunlight.</li> <li>4. Insert new batteries when all traces of moisture are gone from the screen. <b>NOTE:</b> Be sure to re-install the gasket correctly to create a water-tight seal. Refer to page 57 for instructions.</li> <li>5. If required, follow programming instructions starting on page 41.</li> </ol>

<b>Problem</b>	<b>If it doesn't work</b>	<b>Reference/Procedure</b>
The Hand-Held Controller appears to be "LOCKED UP".	Power down the Controller to reset.	<ol style="list-style-type: none"> <li>1. Remove the batteries from the PE953 Hand-Held Controller.</li> <li>2. Allow 15 seconds before replacing the batteries. Refer to page 57 for instructions. <b>NOTE:</b> Be sure to re-install the gasket correctly to create a water-tight seal. Refer to page 57 in this manual for instructions.</li> <li>3. If required, follow programming instructions starting on page 41.</li> </ol>

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<b><i>Problem</i></b>	<b><i>What to do</i></b>	<b><i>Reference/Procedure</i></b>
The PE653 Device appears to be 'LOCKED UP'.	Power down the PE653 device to reset.	<ol style="list-style-type: none"><li>1. Turn OFF the AC power to the PE653 by turning OFF the breaker that feeds terminals 1 &amp; 2 on the device.</li><li>2. Turn the AC power back ON.</li><li>3. Refer to the "Checking Out and Verifying the System" section on page 71.</li></ol>

## Section 11:

# Appendix

## Glossary of Z-Wave Terminology

**Device** — Any Z-Wave module, controller, or software that represents an item within a Z-Wave network.

**Exclusion** — The process of resetting, removing, or deleting a device from a Z-Wave network.

**Inclusion** — The process of adding a device to a Z-Wave network.

**Module** — Typically refers to any Intermatic HomeSettings product that is controlled with a remote controller.

**Network** — All Z-Wave devices controlled by the remote controllers operating in the same system. Each network has its own unique identification code to help ensure that no one else can accidentally control your system.

**Primary Controller** — The controller used to set up your devices or network. This can be a tabletop or handheld remote controller or it can be software.

***NOTE:** In the Intermatic Pool & Spa system, only the Primary Controller can be used to add or remove devices from a network.*

**Repeater** — A device through which a signal is routed in order to allow that signal to reach the intended target device.

**Replication** — The process of sending or receiving network information from one Z-Wave controller to another.

**Scene** — Scenes can include one or more devices in your network, allowing each of them to be turned on or off or set to a different level (i.e., degree of brightness) with the press of a button, or based on a schedule.

**Schedule** — A timer-based event in the software that will activate a scene or turn a zone ON/OFF at a specified time of day, or at sunrise or sunset.

**Secondary Controller** — A controller containing network information about other devices within the network, included into the network by the Primary Controller. In the Intermatic Pool & Spa system, secondary controllers cannot add or remove devices from the network.



## FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **NOTICE**

Changes or modifications not expressly approved by Intermatic Inc. could void the user's authority to operate the equipment.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website [www.hc-sc.gc.ca/rpb](http://www.hc-sc.gc.ca/rpb).

Section 12:

# Warranty

## ONE YEAR LIMITED WARRANTY

If, within one (1) year from the date of purchase, this product fails due to defect in material or workmanship, Intermatic Incorporated will repair or replace it, as its sole option, free of charge. This warranty is extended to the original household purchaser only and is not transferable. This warranty does not apply to: (a) damage to units caused by accident, dropping, or abuse in handling, acts of God, or any negligent use; (b) units which have been subject to unauthorized repair, opened, taken apart, or otherwise modified; (c) units not used in accordance with instructions; (d) damages exceeding the cost of the product; (e) sealed lamps and/or lamp bulbs, LEDs, and batteries; (f) the finish on any portion of the product, such as surface and/or weathering, as this is considered normal wear and tear; (g) transit damage, initial installation costs, removal costs, or reinstallation costs.

INTERMATIC INCORPORATED WILL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY MODIFIED TO EXIST ONLY AS CONTAINED IN THIS LIMITED WARRANTY, AND SHALL BE OF THE SAME DURATION AS THE WARRANTY PERIOD STATE ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON THE DURATION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

This warranty service is available by either (a) returning the product to the dealer from whom the unit was purchased, or (b) mailing the product, along with proof of purchase, postage prepaid, to the authorized service center listed below. This warranty is made by: Intermatic Incorporated/ After Sales Service/7777 Winn Rd., Spring Grove, IL 60081-7000 <<http://intermatic.com>>. Please be sure to wrap the product securely to avoid shipping damage.

*Because of our commitment to continuing research and improvements, Intermatic Incorporated reserves the right to make changes, without notice, in the specifications and material contained herein, and shall not be responsible for any damages, direct or consequential, caused by reliance on the material presented.*

## WARRANTY REGISTRATION

Owner's Name \_\_\_\_\_ Signature \_\_\_\_\_

Street Address \_\_\_\_\_ Date of Purchase \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone \_\_\_\_\_

Authorized Dealer \_\_\_\_\_ Sales Rep \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone \_\_\_\_\_

How did you hear about our product? (Please check all that apply.)

Pool Store Employee     Pool Builder     Pool Service     Direct Mail Ad     In-Store Display  
 Friend/Relative     Magazine     Newspaper     Radio     TV     Catalog     Other: \_\_\_\_\_

To activate your warranty, please return this portion to:



**Intermatic, Inc.**  
**7777 Winn Road**  
**Spring Grove, IL 60081**  
**or by FAX: 815-675-7055**





Intermatic, Inc.  
7777 Winn Road  
Spring Grove, Illinois 60081-9698

[www.intermatic.com](http://www.intermatic.com)  
Intermatic Customer Service: 815-675-7000  
(8 a.m. through 4:30 p.m. CT, Monday through Friday)