

 Pool Pilot®
COMMANDER

PPC10
Pool/Spa Control System



AUTOPILOT
SALT CHLORINE GENERATORS

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.*



WARNING: *Failure to heed the following may result in permanent injury or death: Risk of electric shock – Disconnect all AC power when insatalling or servicing this system.*



- 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

Important Safety Instructions	2
Section 1: System Overview	8
Additional Detail on Key Components	9
Handheld Controller (PPC-REM).....	9
24-Volt Valve Actuator (PPC-ACT).....	9
Water Temperature Sensor (PPC-WTR)	9
Optional — Freeze (Air Temperature) Sensor (PPC-AIR).....	9
24-Volt Valve/Pump Switch (PPC-ACTC)	10
24-Volt Valve/Pump Swtich with Enclosure (PPC-ACTE).....	10
80 Amp Bus PE Outdoor Enclosure (PPC-80CP)	10
Section 2: Plumbing Examples	11
For Pool and Spa Combo Installations	11
For Booster Pump Pool Cleaner Installations.....	11
For Non-Booster Pump Pool Cleaner Installations.....	12
For Separate Pool and Spa Combo Installations	12
Section 3: Installing and Wiring the PPC-CON Receiving Device	13
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
Heater Connection	37
Connection for AquaCal Heat Pump	37
Connection for Jandy Heaters	38
Connection for Raypak Heaters	39
Connection for Hayward Heaters	39
Connection for Pentair Heater	40
Connection for Sta-Rite / Pentair Heater with DDTC	40
Section 4: Programming the PPC-REM Handheld Controller	41
Overview	41
Creating a Network Connection between the Handheld Controller and the PPC-CON Receiving Device	41
Deleting Any Existing Programming	41
Linking the Handheld Controller to the PPC-CON 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 Heater Control and 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
Sample Schedule Planning Sheet	52
Schedule Planning Worksheet	53
Sample Schedule Planning Sheet for Variable Speed Pump	54
Schedule Planning Worksheet for Variable Speed Pump	55
Section 5: Everyday Use of the Handheld Controller	56
Setting the Default Primary Screen	56
Controlling the PPC-CON Receiving Device	57
Operating Programmed Functions	57
Changing between Pool and Spa	57

- Setting Pool and Spa Temperatures..... 58
- Controlling a Variable-Speed Pump 58
 - Naming the Speeds 58
 - Changing Pump Speeds..... 59
- Controlling Z-Wave Devices 59
- Changing Batteries in the Handheld Controller 60
 - Manually Turning Equipment On and Off 60

- Section 6 : Advanced Features 61**
 - Configuring Two or More Handheld Controllers..... 61
 - Changing a Secondary Remote Control into a Primary Control 63
 - Including the PPC-REM Controller into a non-Commander (other manufacturer’s) network..... 64

- Section 7 : Programming for Use with Z-Wave Home Control Devices 65**
 - Deleting Any Existing Programming 65
 - Including Z-Wave Devices into the Network..... 66
 - Including the PPC-CON Receiver onto a non-Commander remote controller..... 66
 - Adding Z-Wave Devices to Scenes for Everyday Control 67
 - Renaming a Scene 68
 - Removing Z-Wave Devices from Scenes 69
 - Removing Z-Wave Devices from a Network..... 69
 - Setting Up Z-Wave Associations with Capable Devices 70
 - Removing Z-Wave Devices from an Association 72

- Section 8: Checking Out and Verifying the System..... 73**

- Section 9: Troubleshooting..... 77**

- Section 10: Appendix 81**
 - Glossary of Z-Wave Terminology..... 81
 - FCC Statement 82

- Section 11: Warranty Registration 83**

Section 1:

System Overview

The AutoPilot Pool Pilot Commander PPC10 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 Commander PPC10 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.

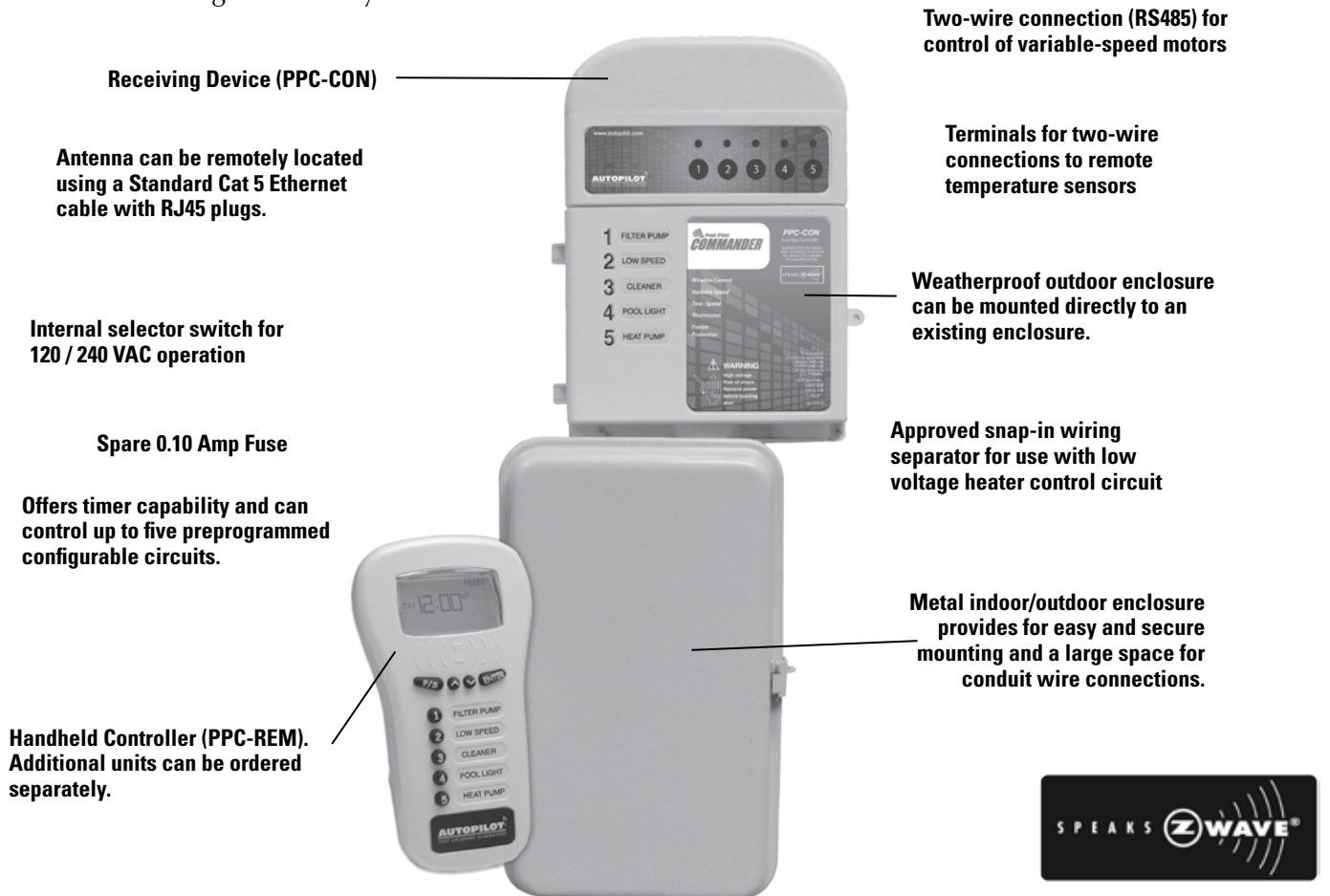


Figure 1-1

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

Additional Detail on Key Components

Handheld Controller (*PPC-REM*)



The main function of the Handheld Controller is to transmit user commands to the PPC-CON 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 PPC-REM prevent unauthorized use of the system by neighboring systems.

24-Volt Valve Actuator (*PPC-ACT*)



Designed with quality in mind, AutoPilot'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 (*PPC-WTR*)



The AutoPilot Water Sensor (*PPC-WTR*) 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.

Optional — Freeze (Air Temperature) Sensor (*PPC-AIR*)



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

24-Volt Valve/Pump Switch (*PPC-ACTC*)



Designed as part of the Commander system and for aftermarket and retrofit applications, the PPC-ACTC unit snaps into almost any Intermatic enclosure and controls the 24 volt supply for up to three valve actuators. For this installation, if an enclosure must be added, we recommend PPC-CASE.

- 120 or 208-240 input voltage
- Controls up to three valve actuators
- Agency approval – CSA/C-US
- Valve Actuator Supply: 24VAC 40VA

24-Volt Valve/Pump Switch with Enclosure (*PPC-ACTE*)



PPC-ACTE includes the PPC-ACTC with a raintight enclosure for new installations or those that do not have an existing Intermatic timeclock housing already in place.

- 120 or 208-240 input voltage
- Controls up to three valve actuators
- Agency approval – CSA/C-US
- Valve Actuator Supply: 24VAC 40VA

80 Amp Bus PE Outdoor Enclosure (*PPC-80CP*)



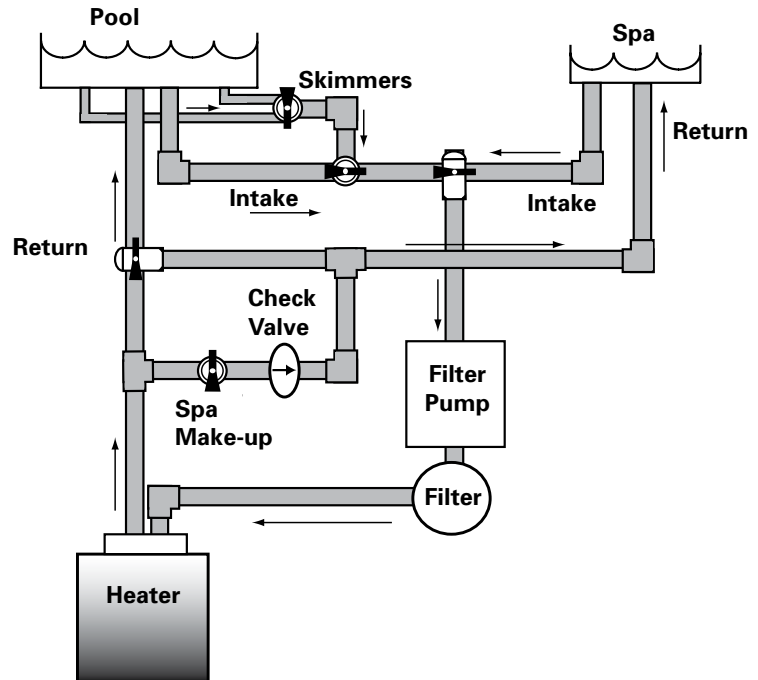
One empty 22"x14"x4.25" PE Outdoor Enclosure with 80 Amp Bus. The PPC-ACTC can be mounted inside this enclosure and can house 8 circuit breakers.

Section 2:

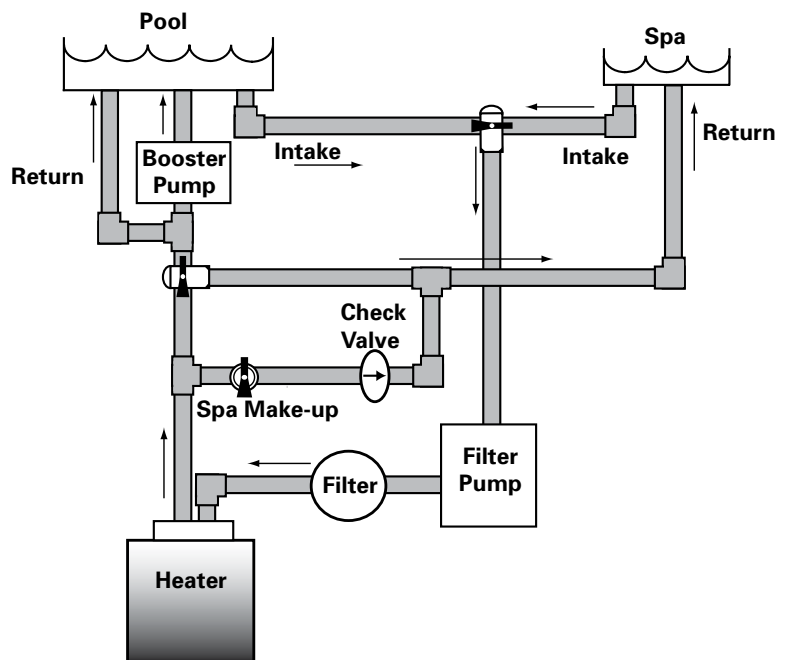
Plumbing Examples

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.

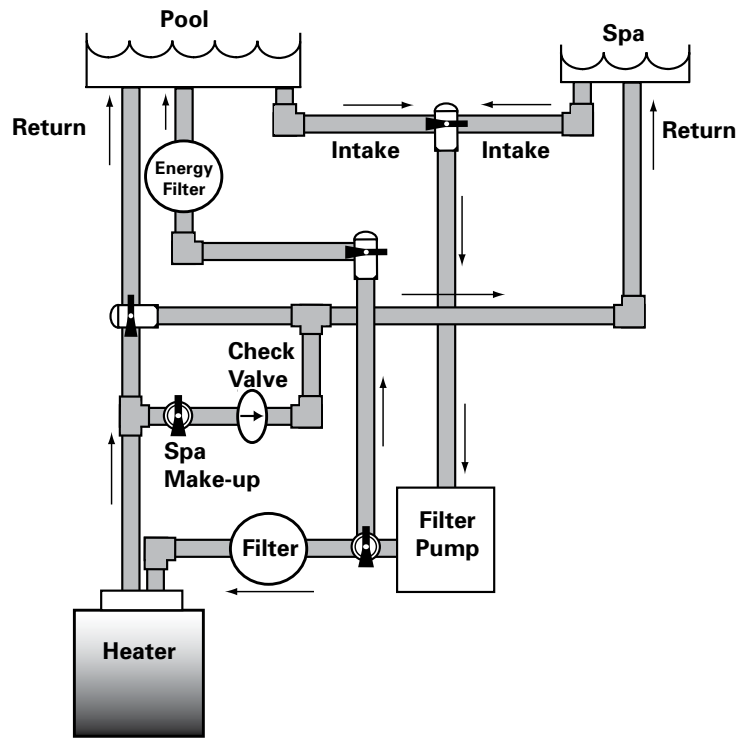
For Pool and Spa Combo Installations



For Booster Pump Pool Cleaner Installations

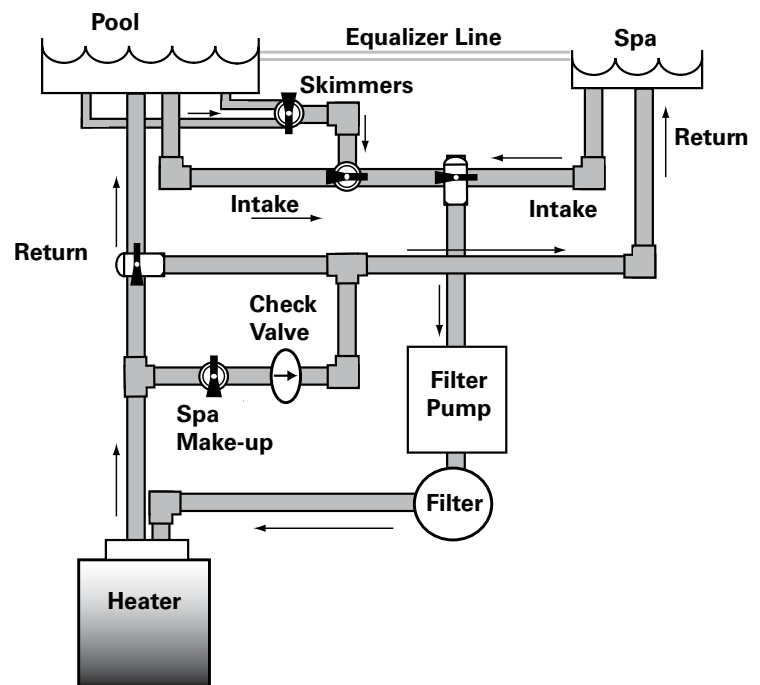


For Non-Booster Pump Pool Cleaner Installations



For Separate Pool and Spa Combo Installations

If you do not have an overflow spa, you must always include an equalizer line to prevent the possibility of pumping the pool into the spa.



Section 3:

Installing and Wiring the PPC-CON 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

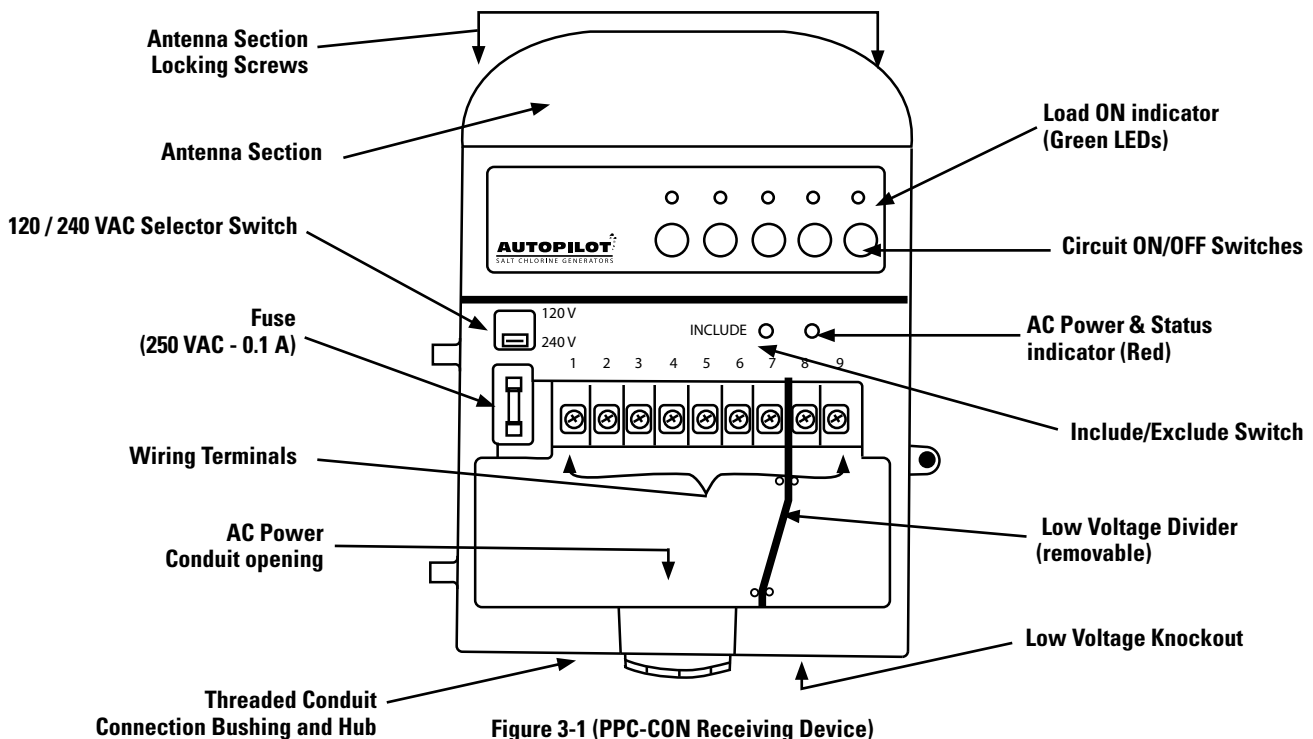


Figure 3-1 (PPC-CON Receiving Device)

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)

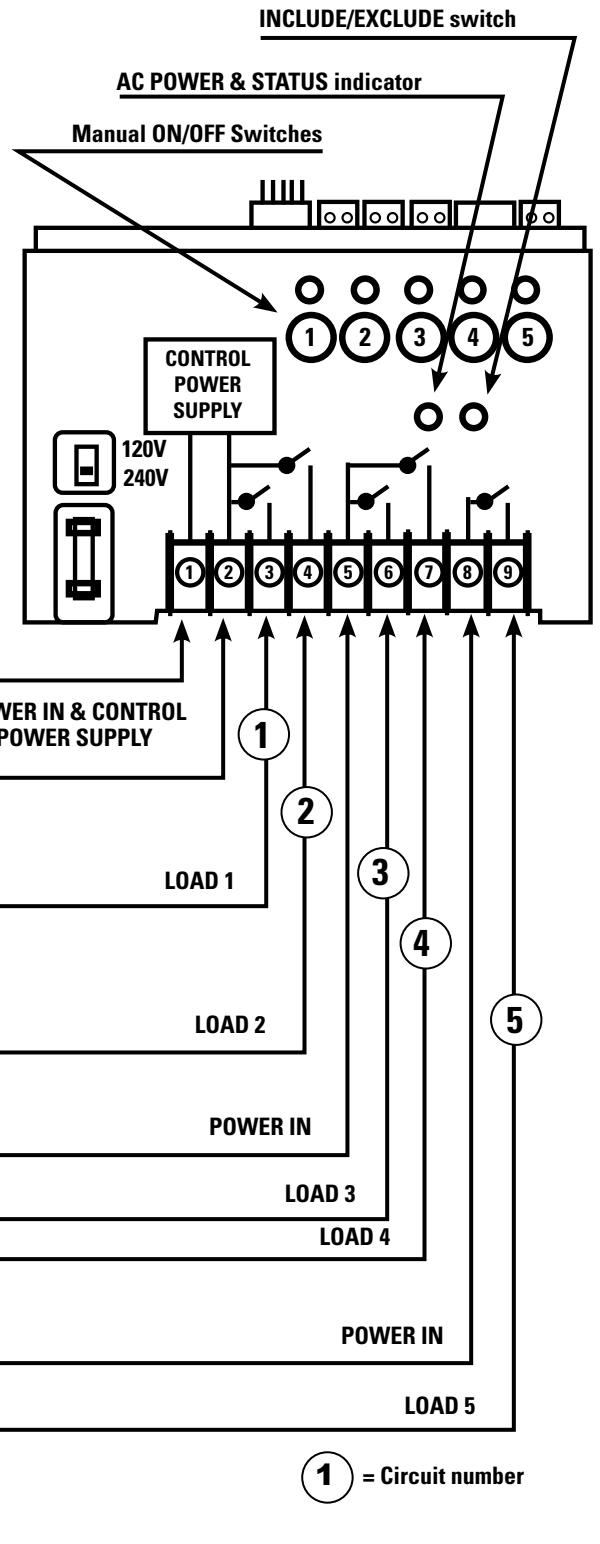
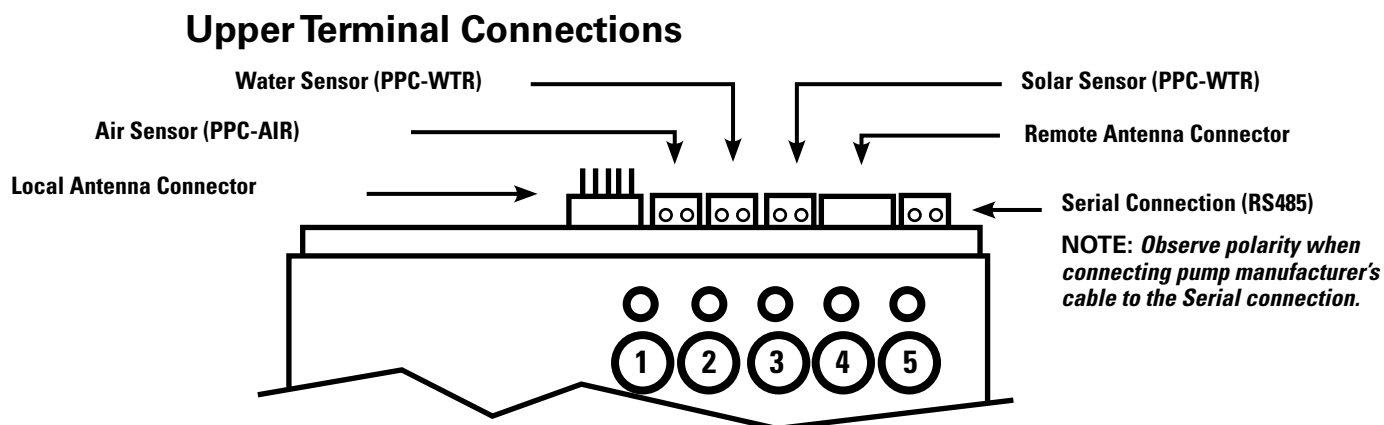


Figure 3-2 PPC-CON Master Control Center Power Terminal identification



CAUTION: The PPC-CON 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 PPC-CON 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 PPC-CON 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 (Intermatic 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 PPC-CON 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

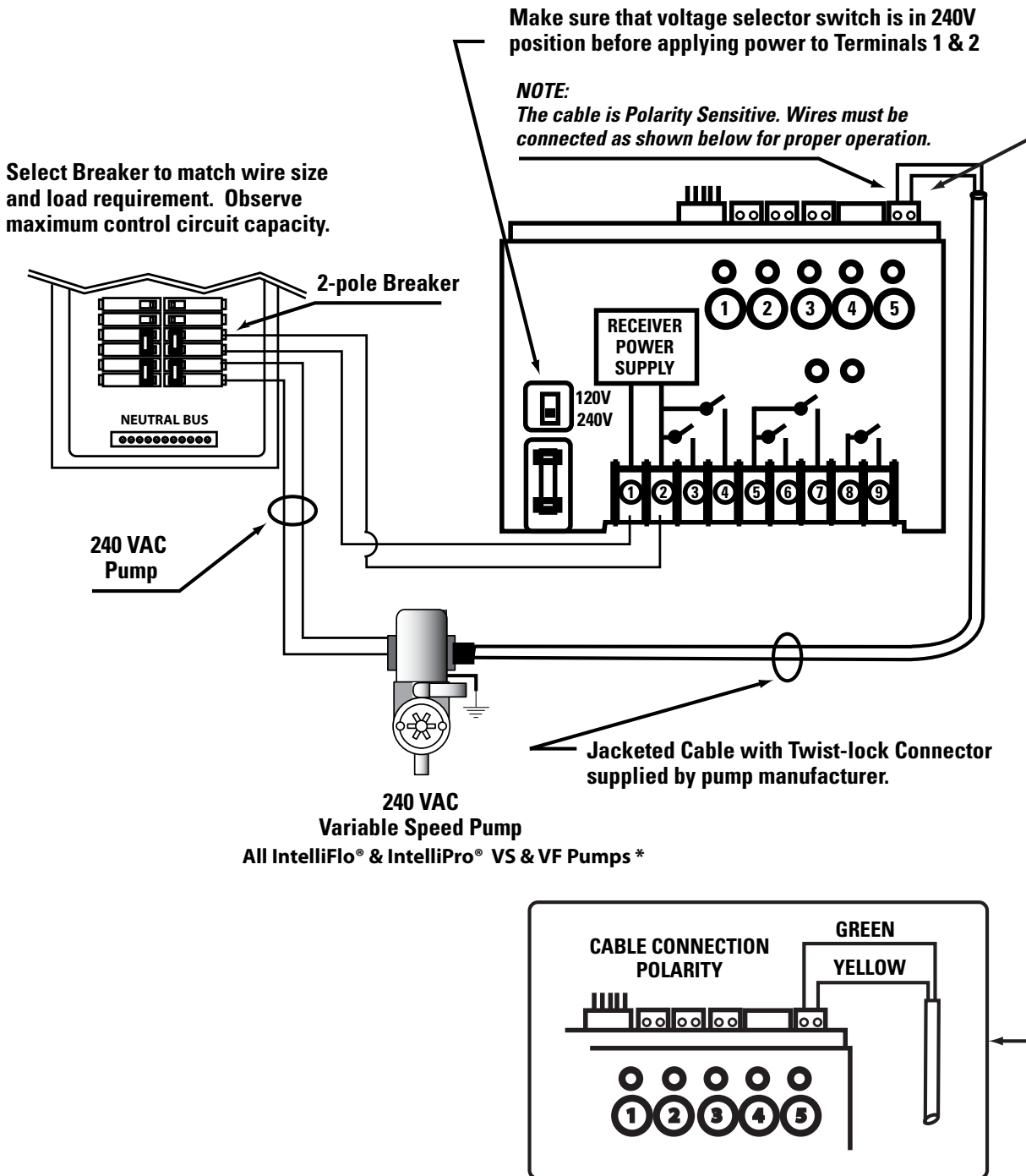
240V 2-Speed pump + 240V Booster pump + 240V Blower + Heater Figure 3-19

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.

1-Speed Pumps

Figure 3-4

120V 1-speed pump

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

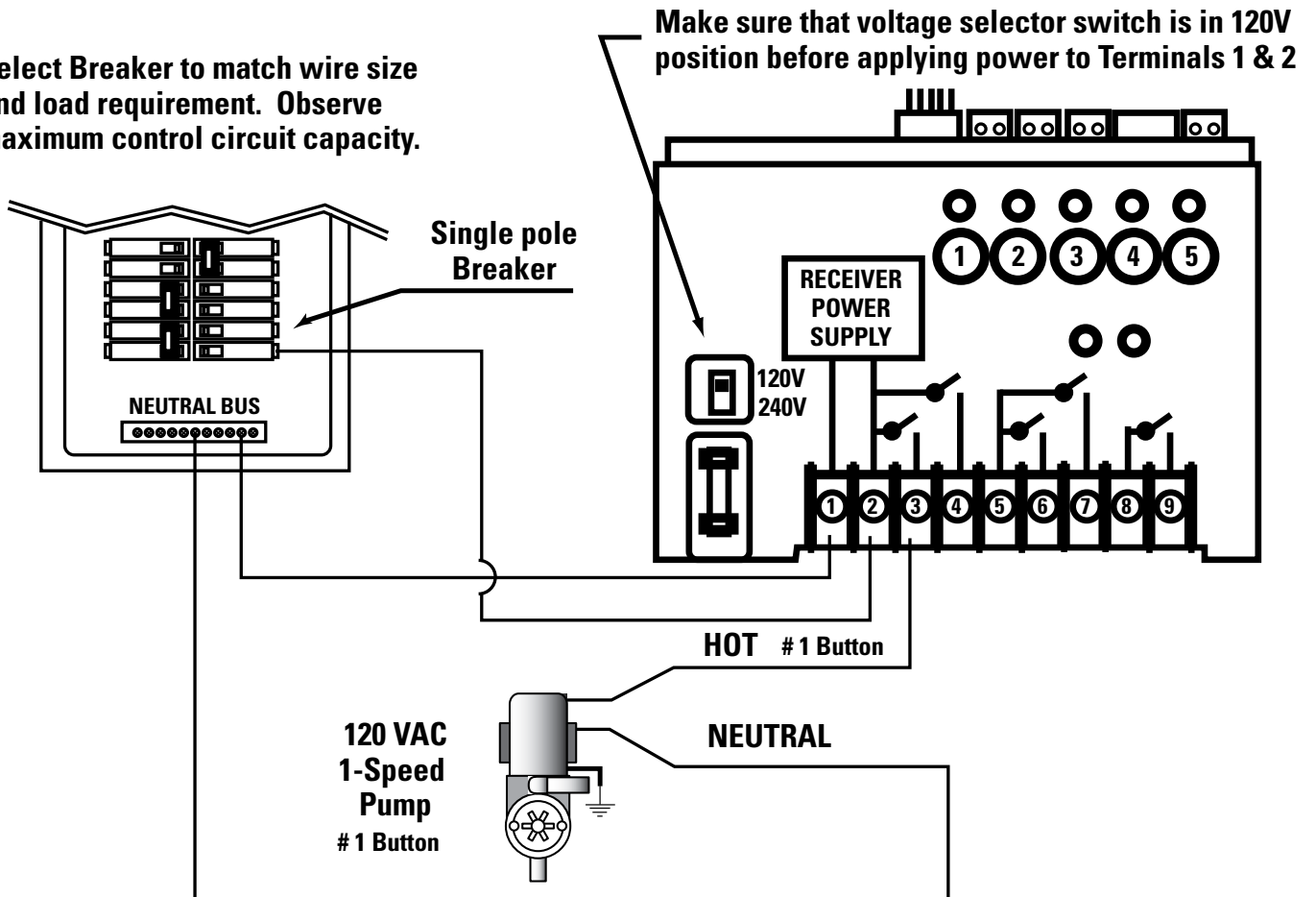


Figure 3-5

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

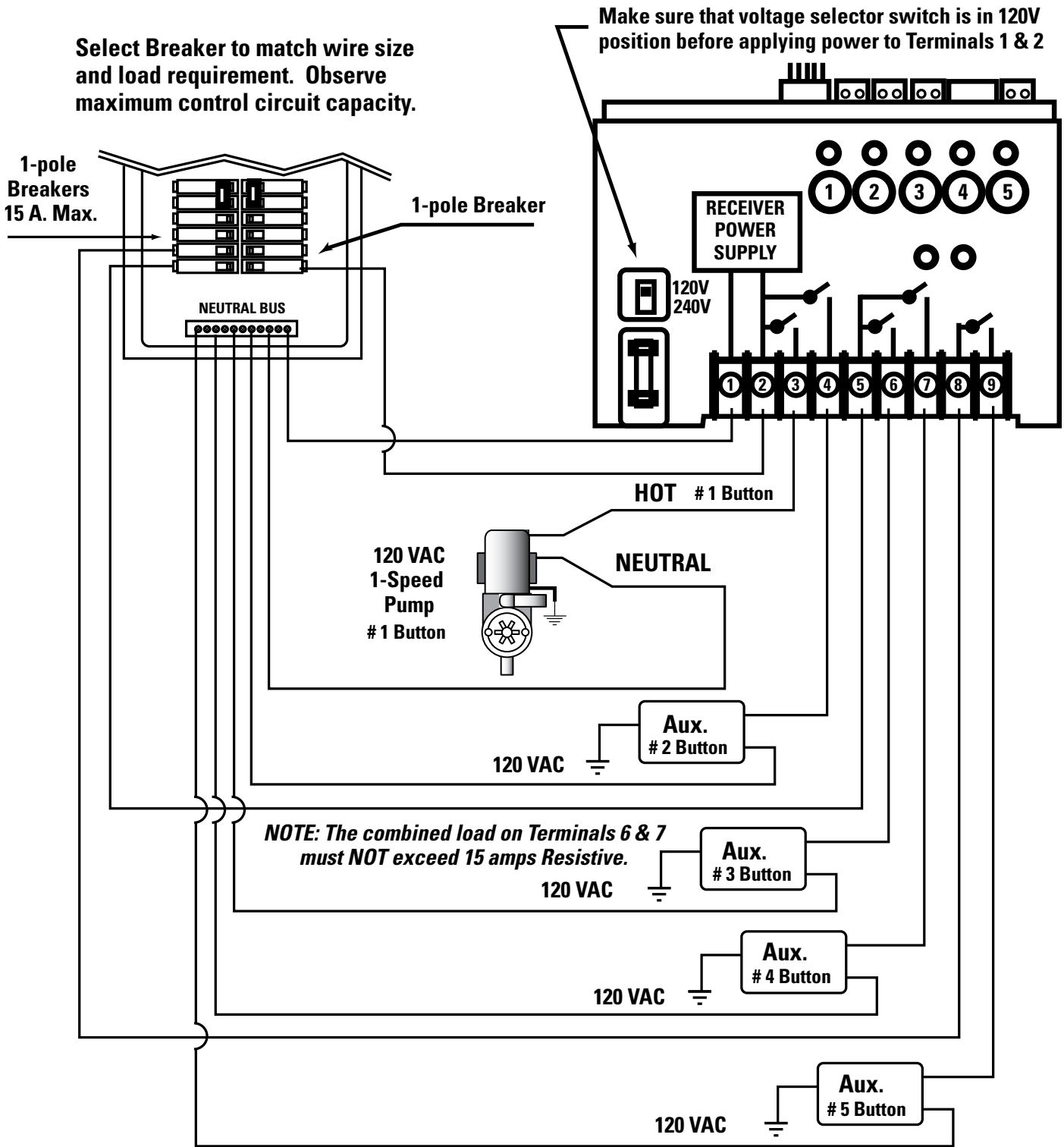


Figure 3-6

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

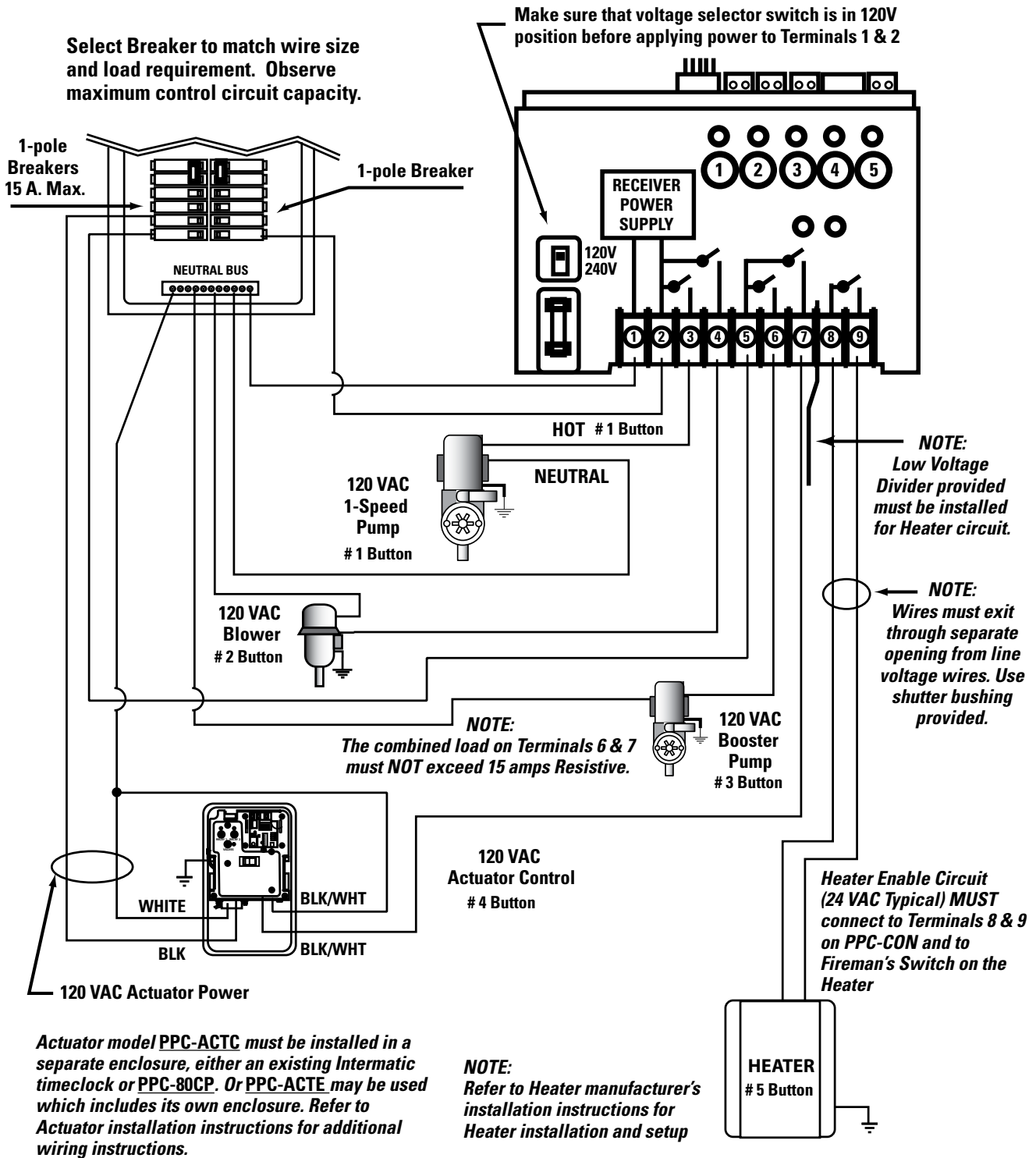


Figure 3-7

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

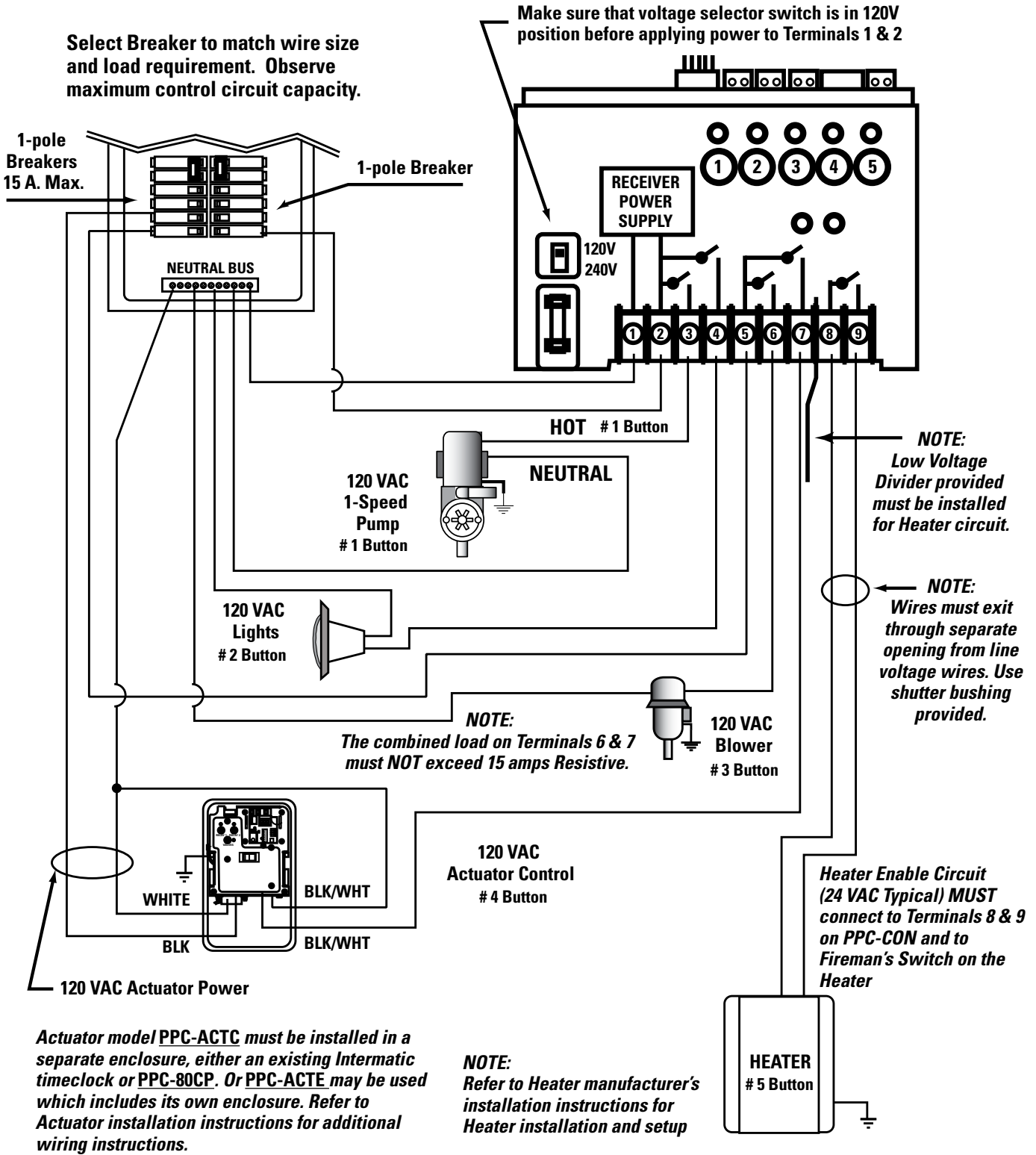


Figure 3-8

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

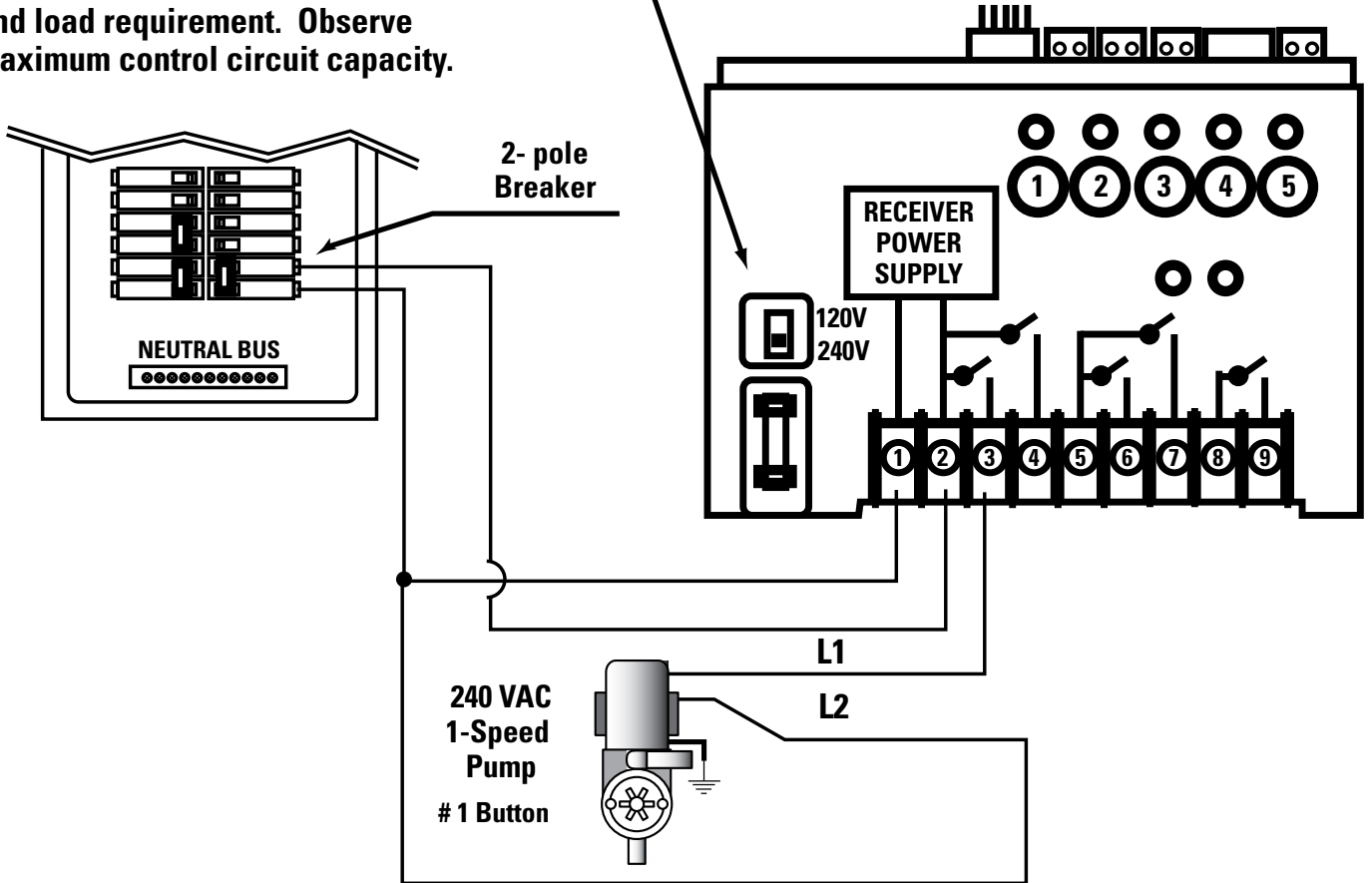


Figure 3-9

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

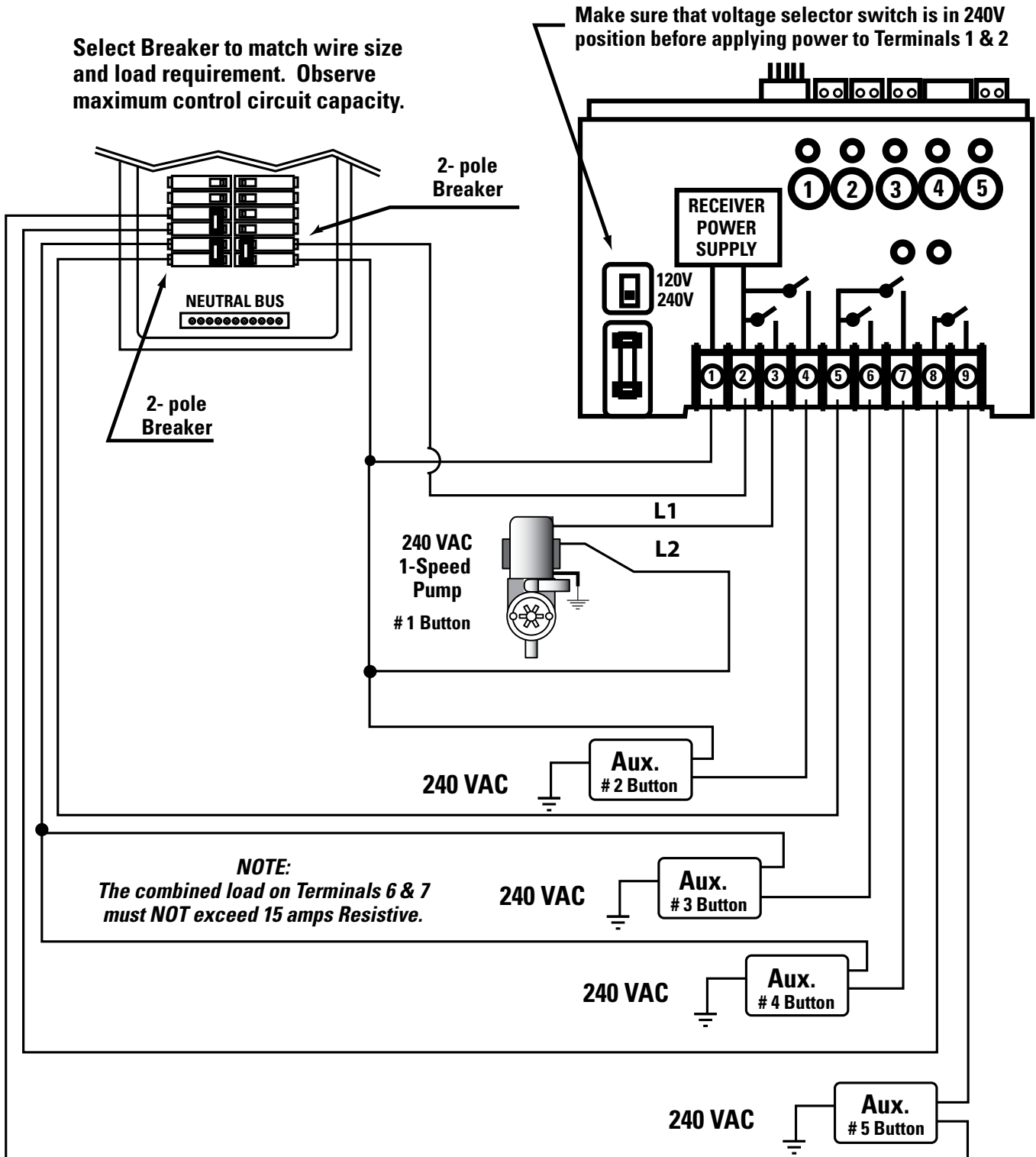


Figure 3-10

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

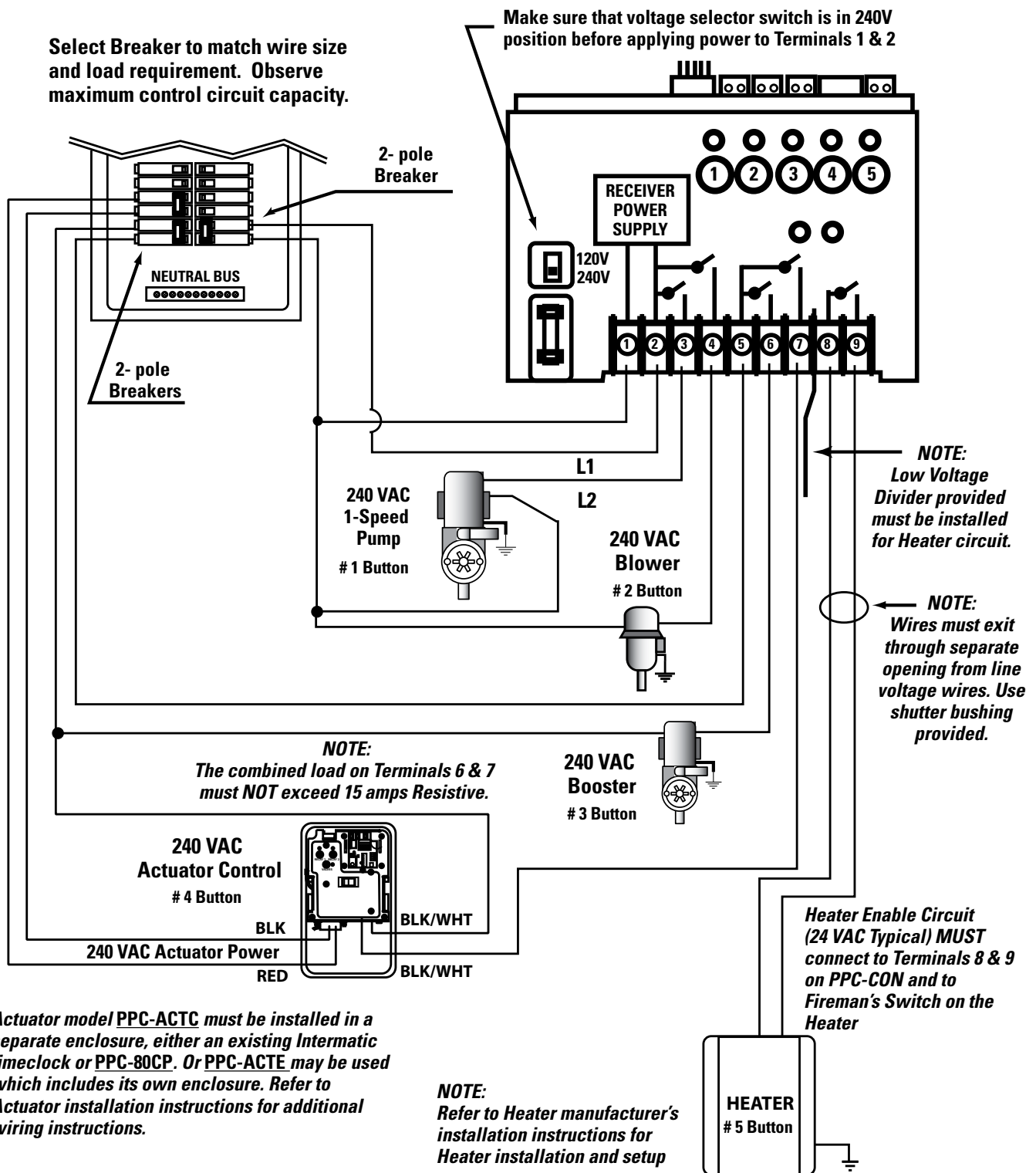
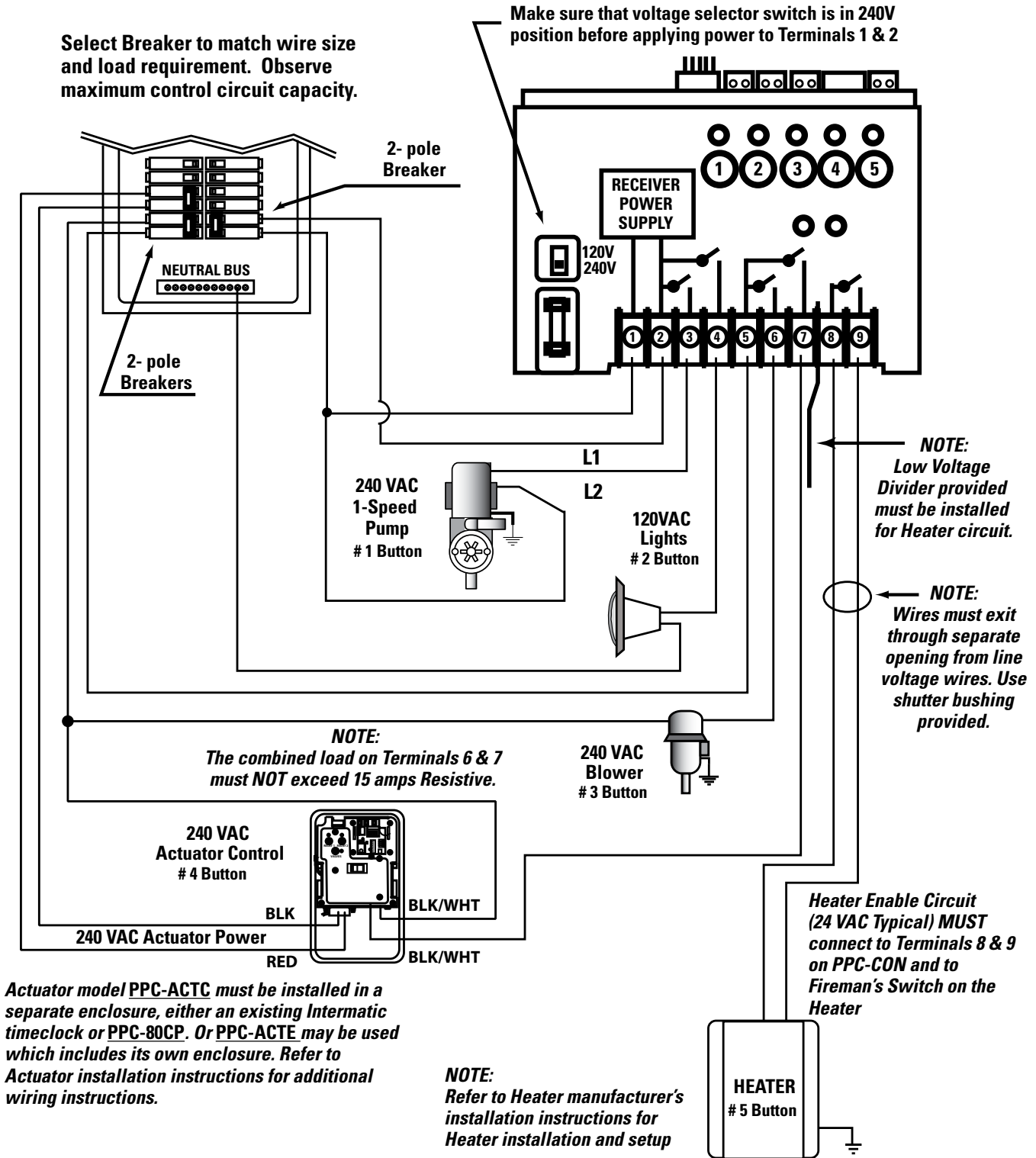


Figure 3-11

240V 1-speed pump + 120V lights + 120V blower + 240V actuator + heater



Actuator model PPC-ACTC must be installed in a separate enclosure, either an existing Intermatic timeclock or PPC-80CP. Or PPC-ACTE may be used which includes its own enclosure. 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.

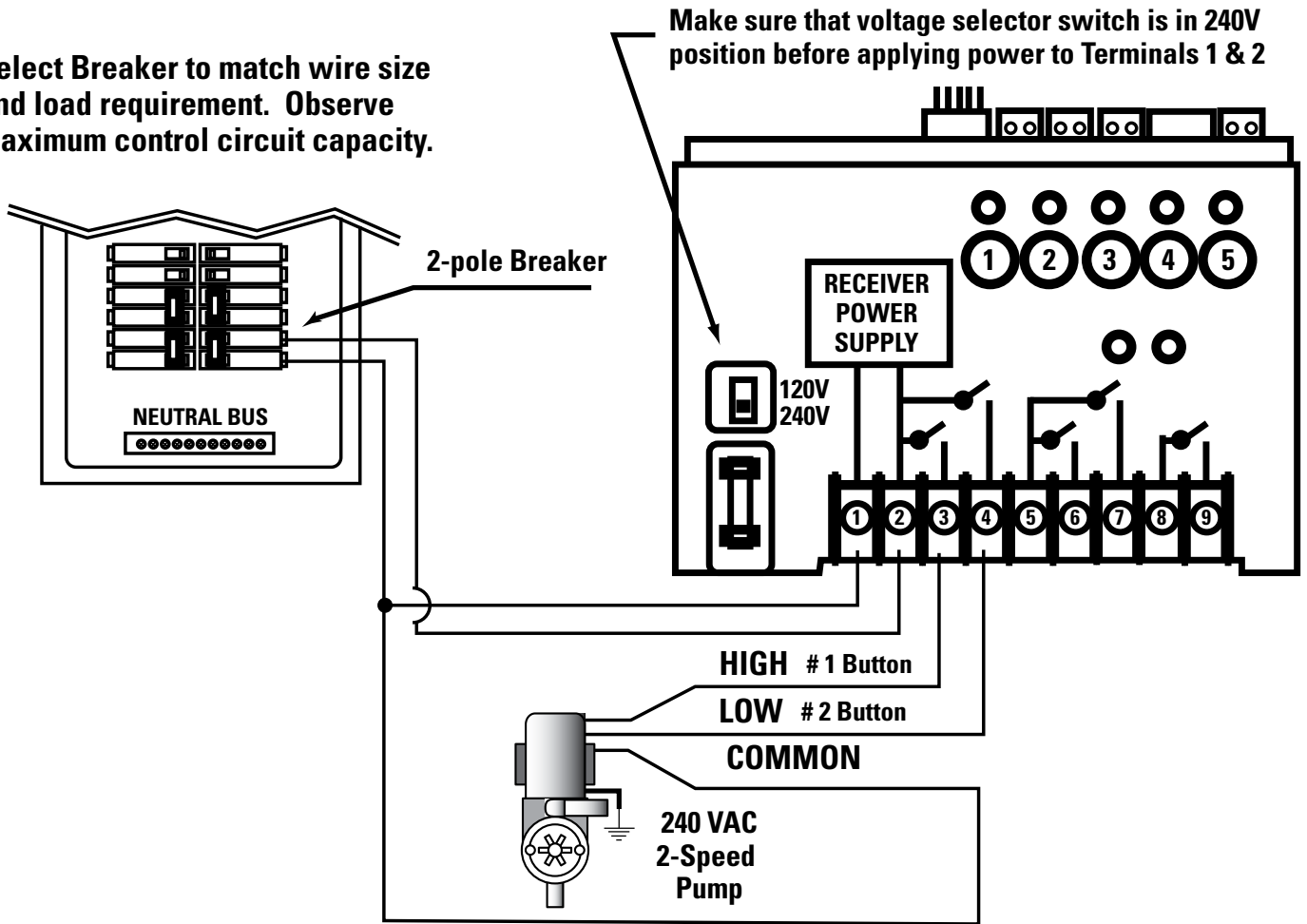


Figure 3-13

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

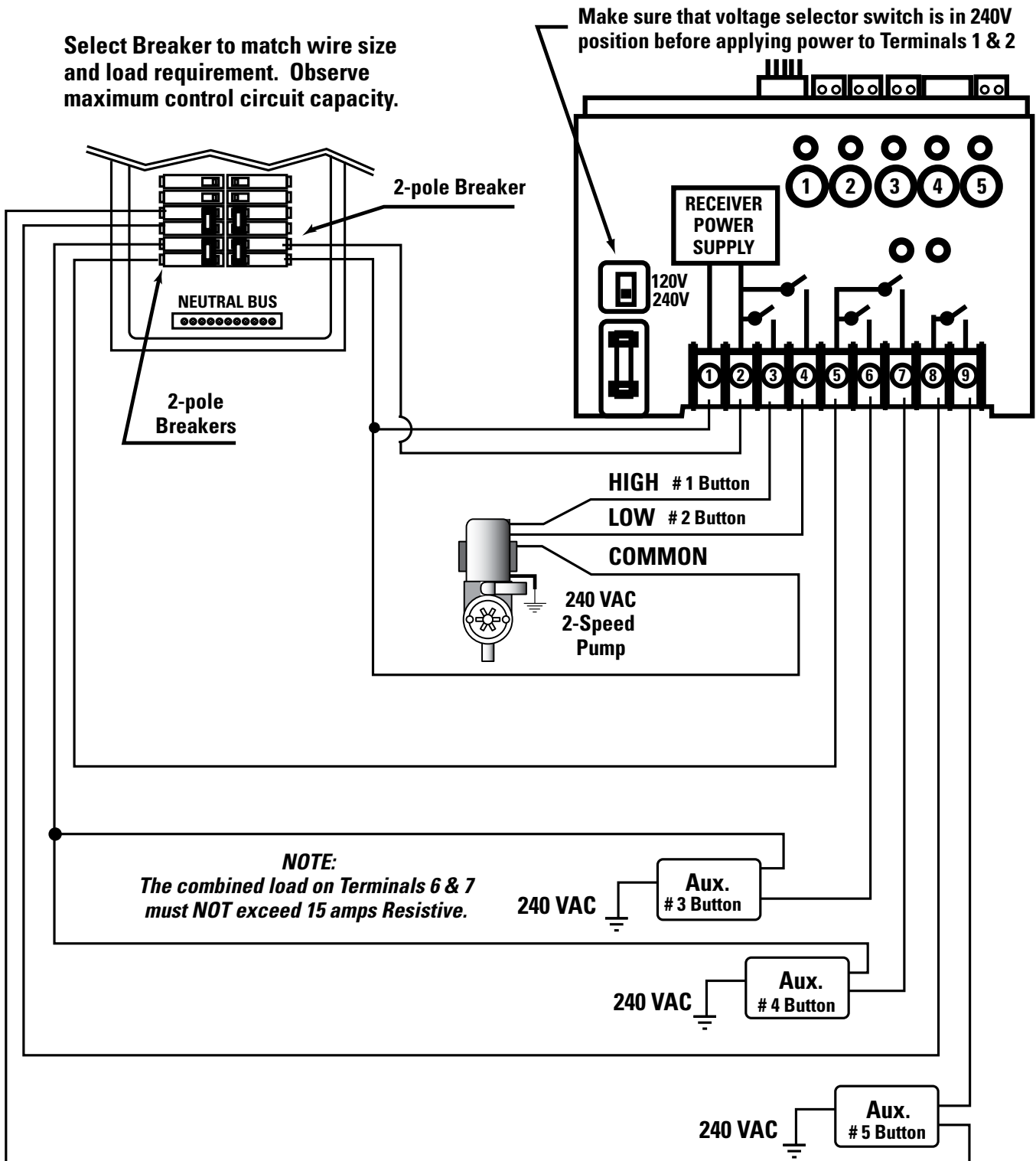


Figure 3-14

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

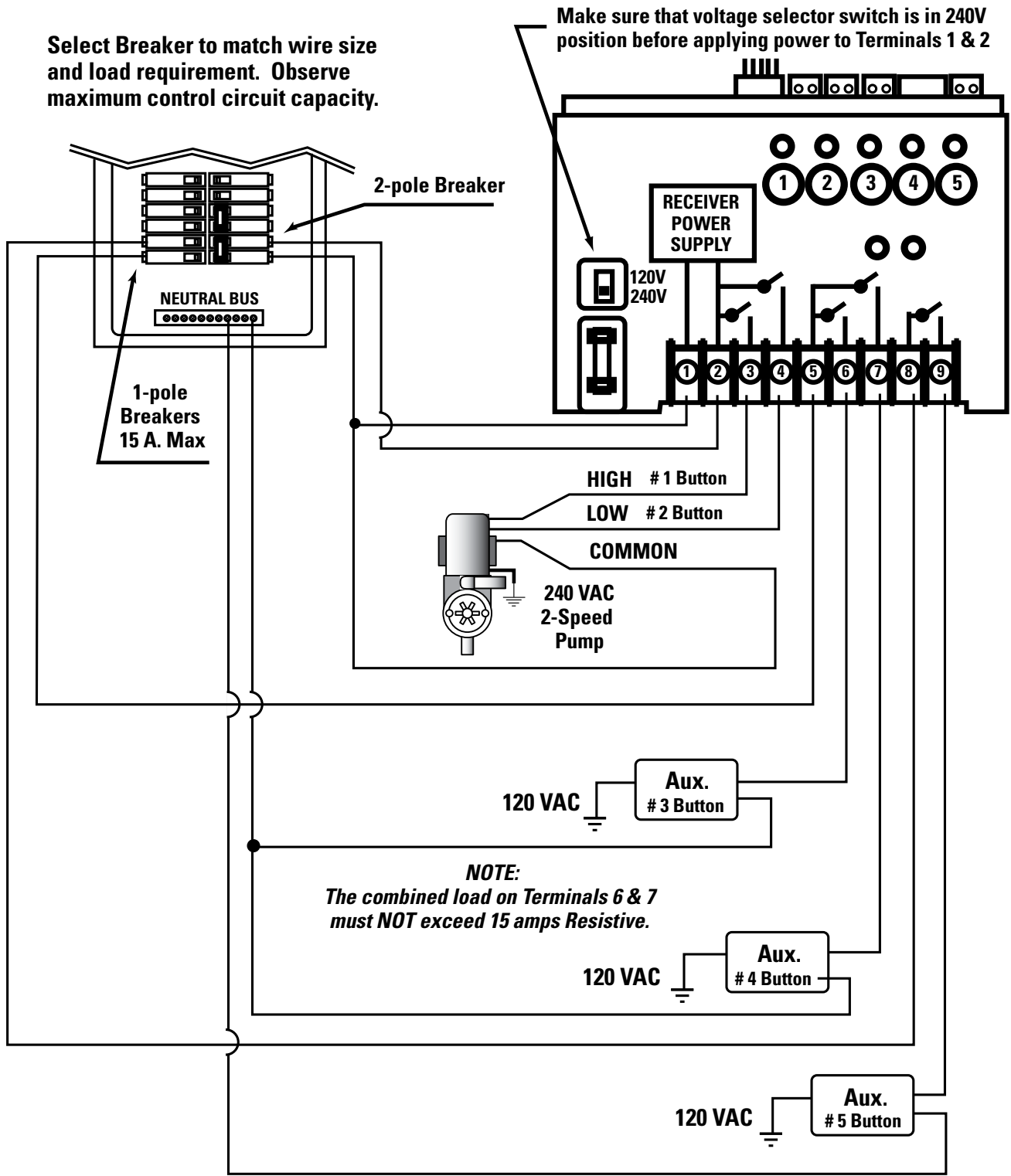
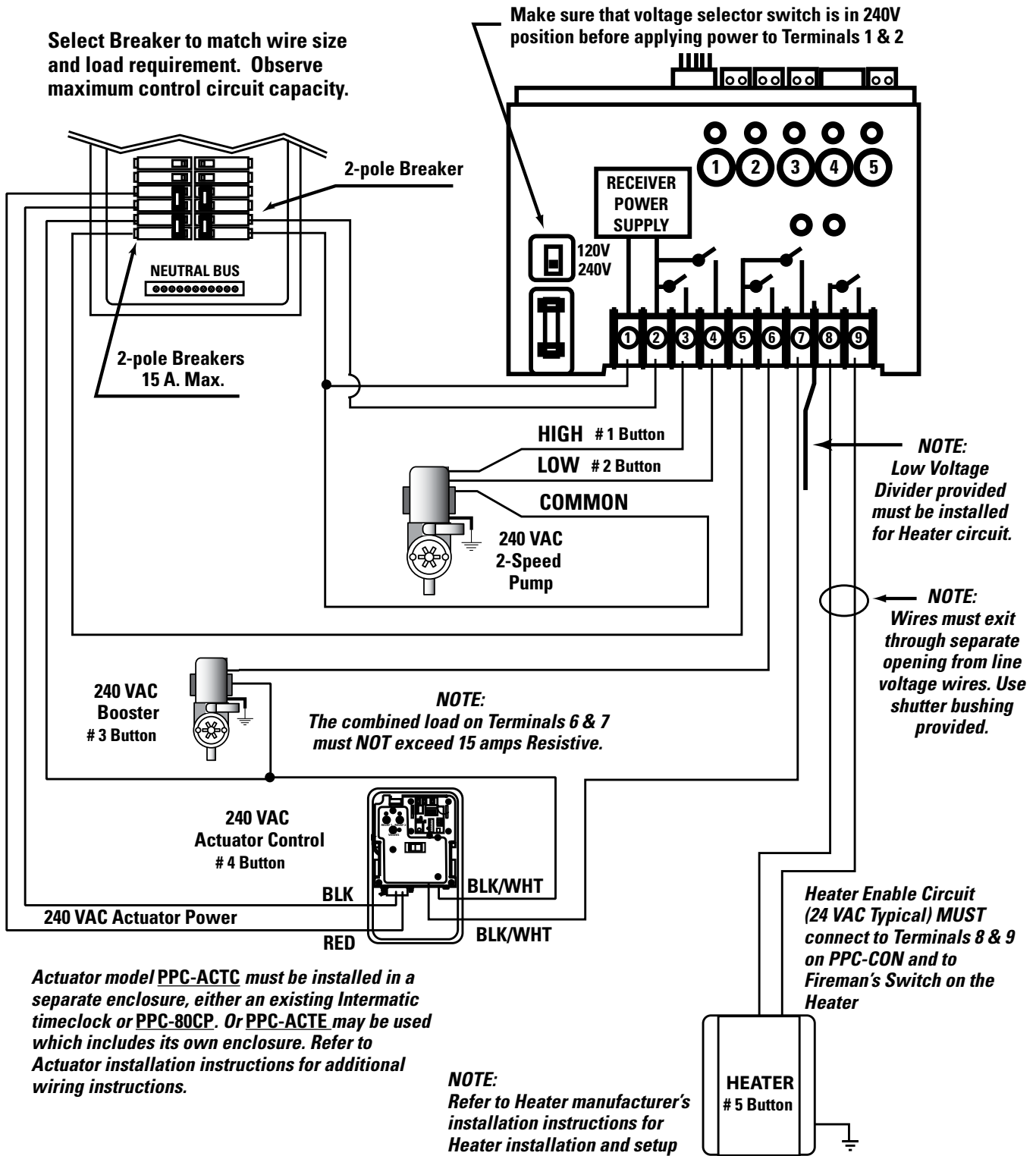


Figure 3-15

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



Actuator model PPC-ACTC must be installed in a separate enclosure, either an existing Intermatic timeclock or PPC-80CP. Or PPC-ACTE may be used which includes its own enclosure. Refer to Actuator installation instructions for additional wiring instructions.

Figure 3-16

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

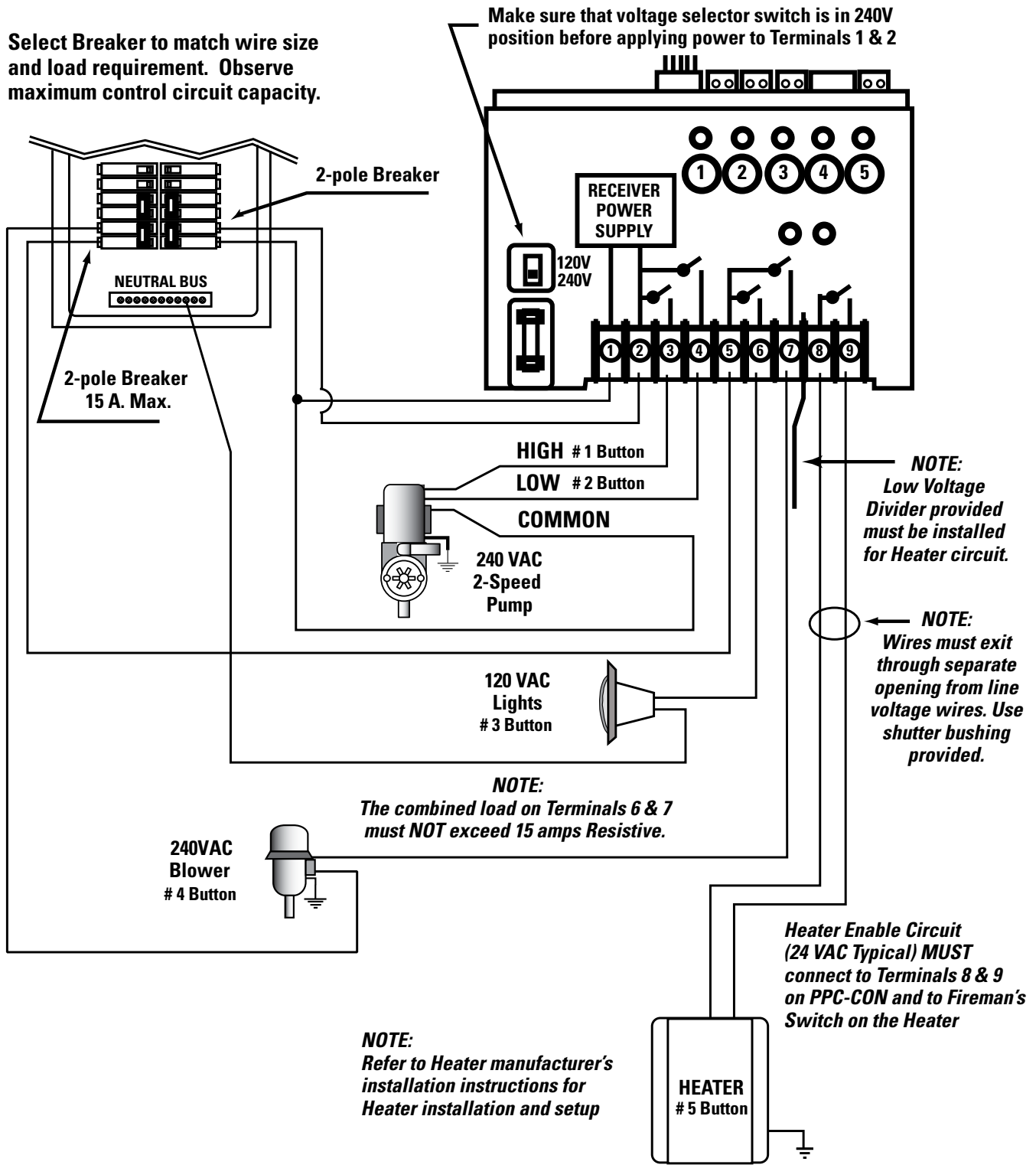


Figure 3-17

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

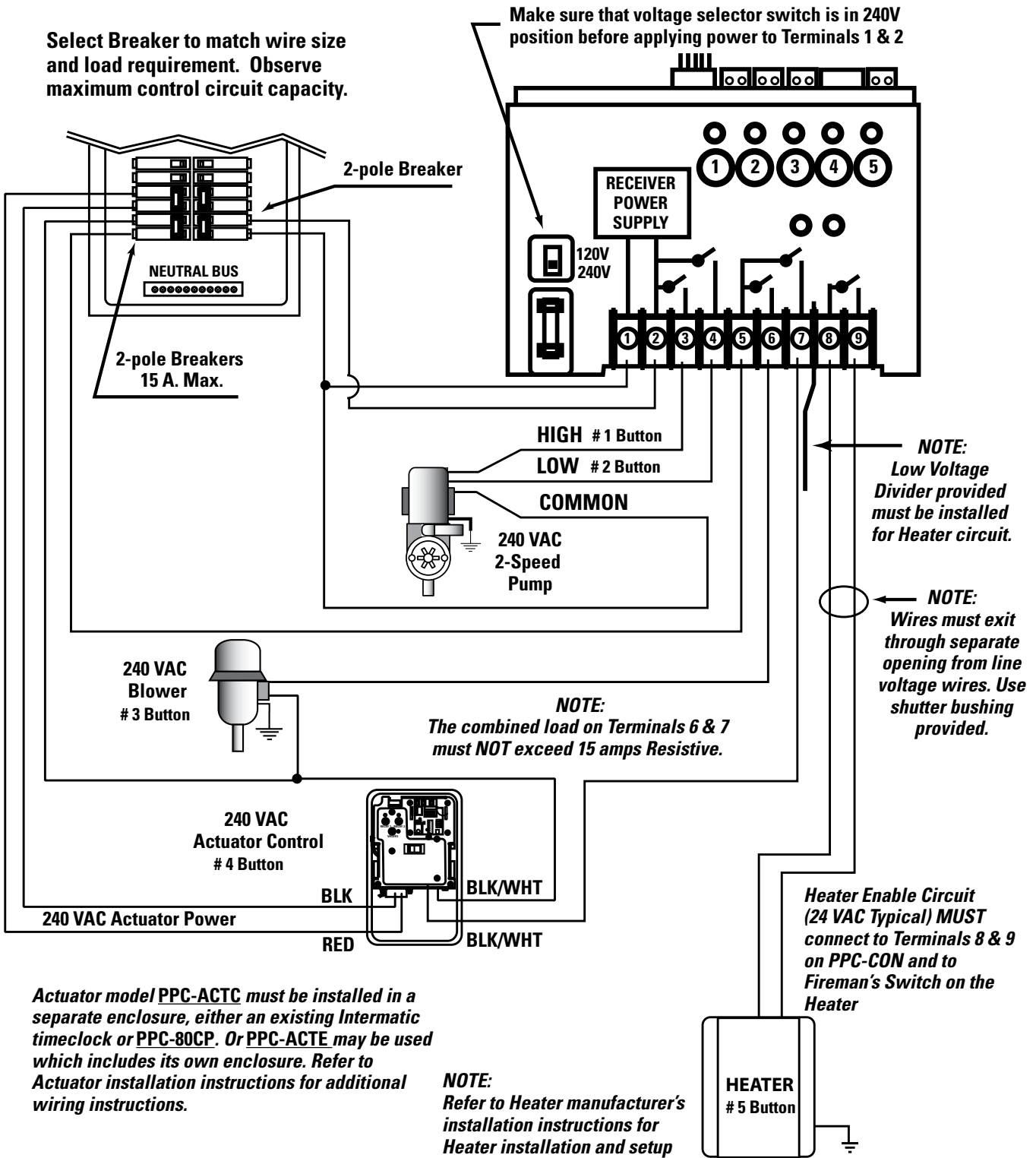


Figure 3-18

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

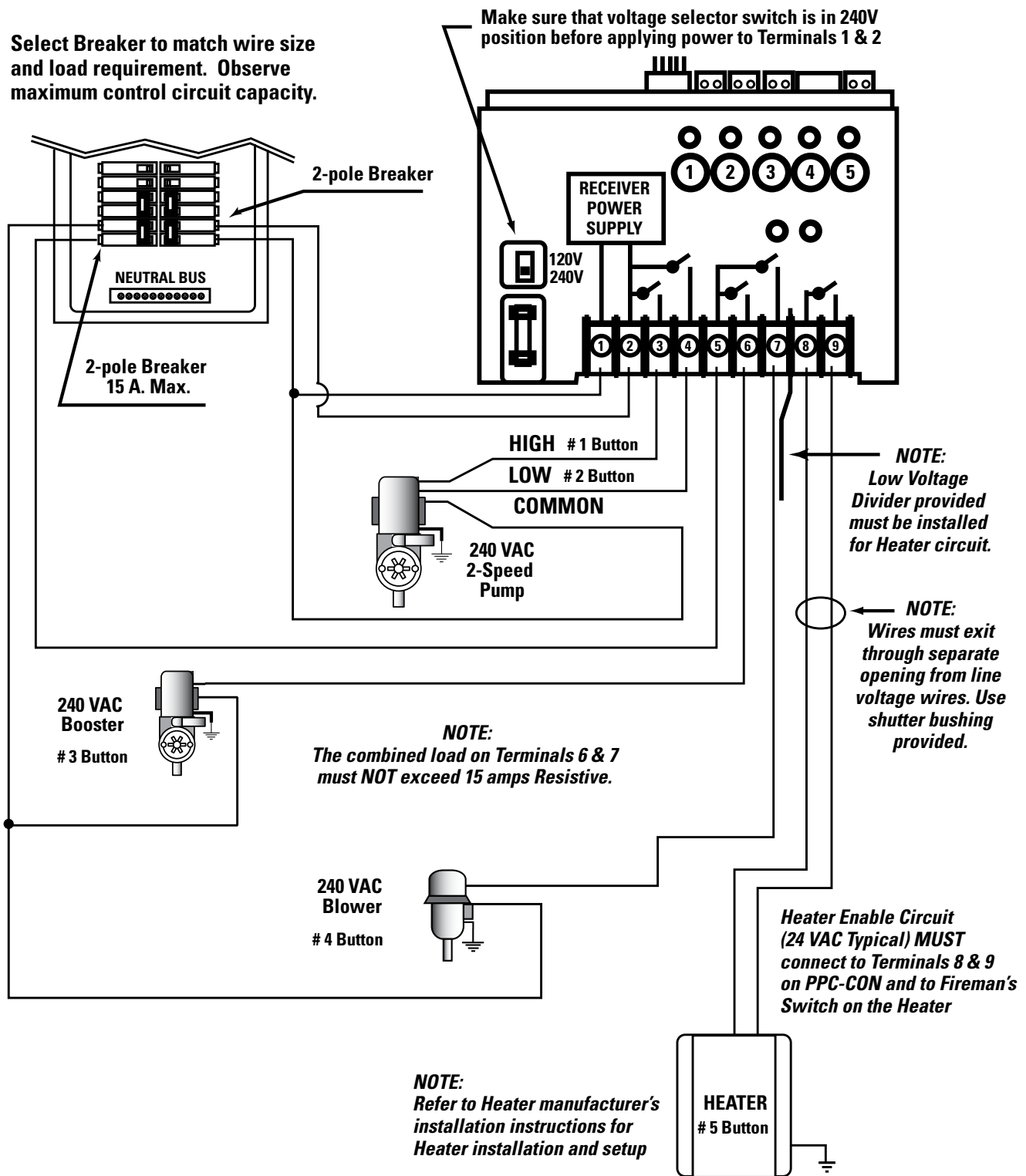


Figure 3-19

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

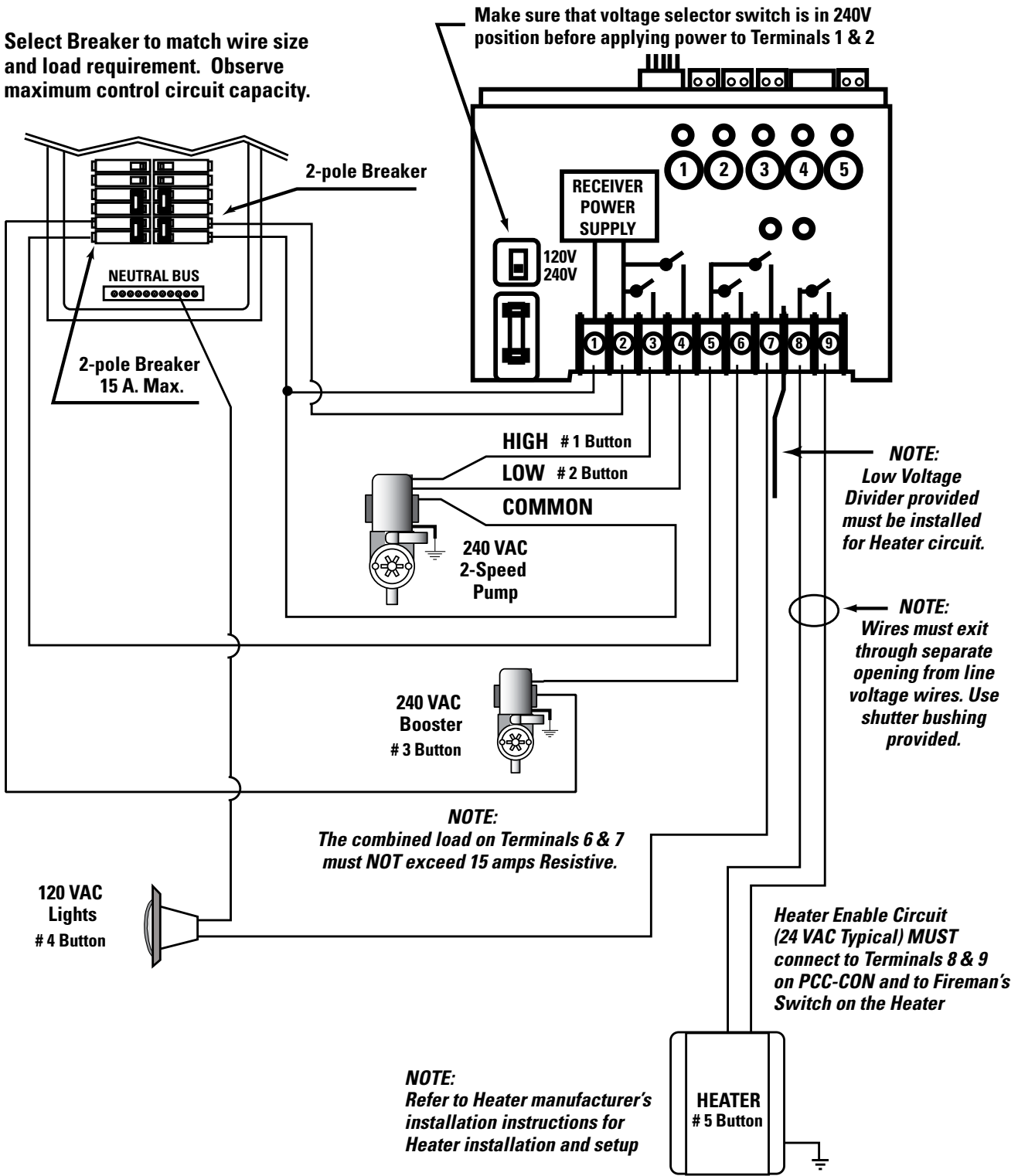


Figure 3-20

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

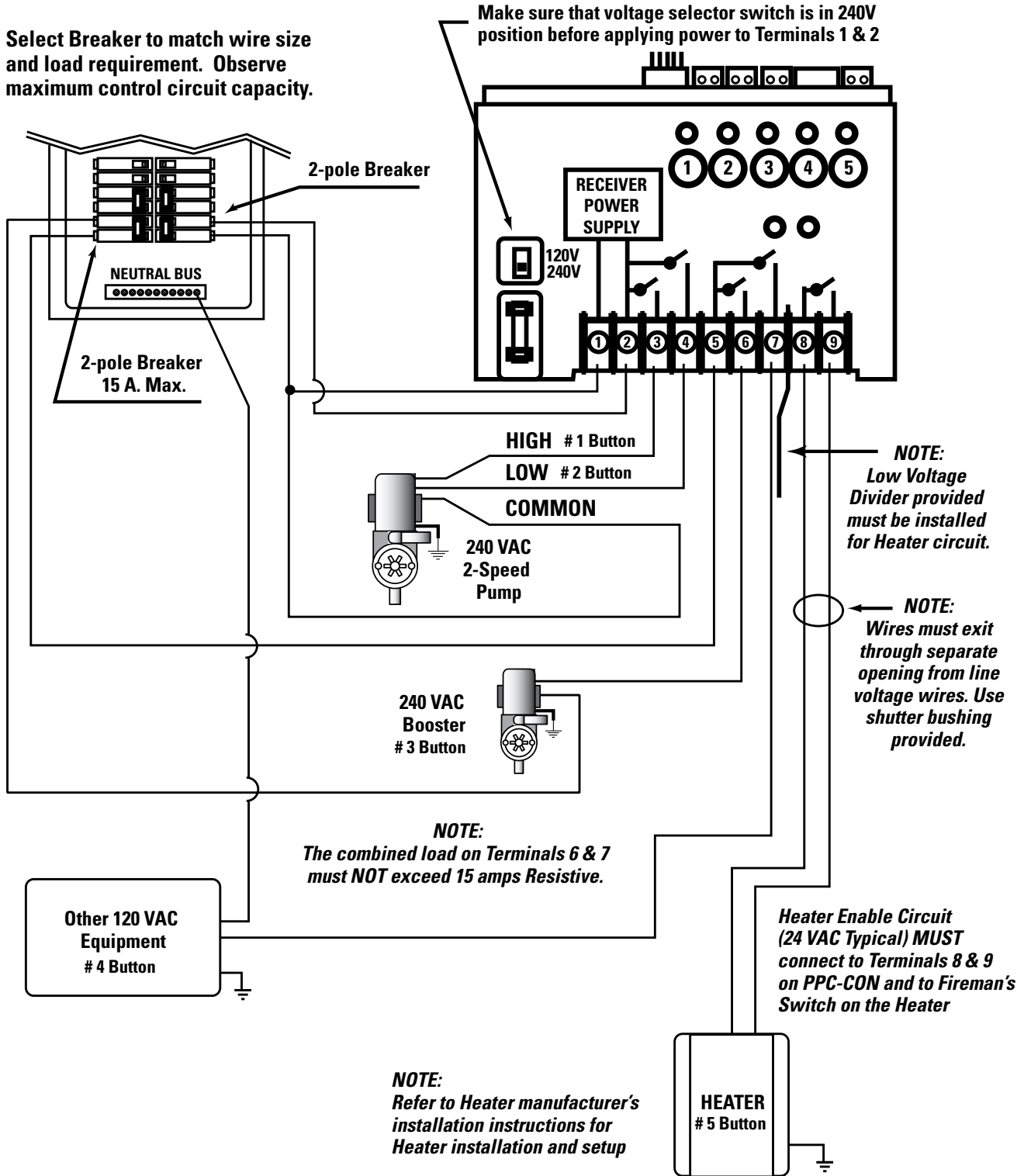


Figure 3-21

Low-Voltage Wiring

Water Temperature Sensor

The Commander Control System comes equipped with a Water Temperature Sensor (PPC-WTR). 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 AutoPilot 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. 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.

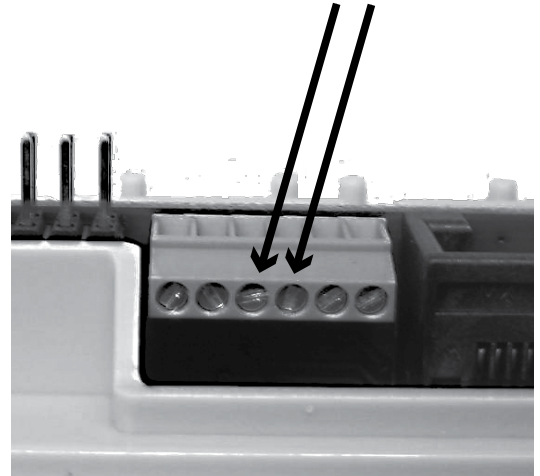


Figure 3-22

Freeze/Air Temperature Sensor

The Commander Control System uses an optional Freeze /Air Temperature Sensor (PPC-AIR) 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 AutoPilot 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 PPC-CON, 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.

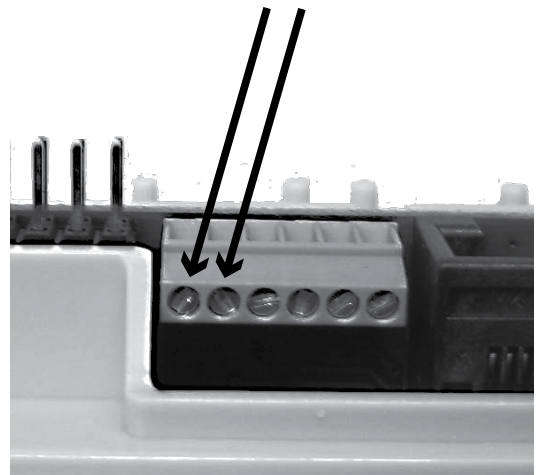


Figure 3-23

Communications to a Variable-Speed Pump

If the Commander system includes a variable-speed pump, you must wire the pump's communications cable to the PPC-CON 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 PPC-CON. (Use the color code shown in Figure 3-4 on page 17.)

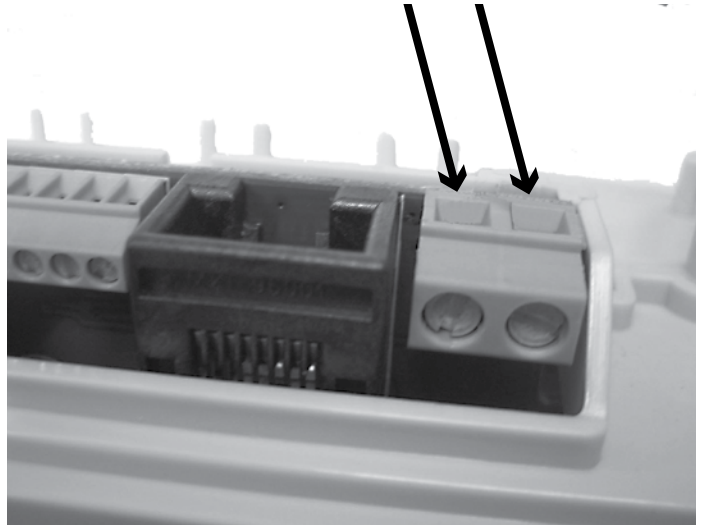


Figure 3-24

Motorized Valve Actuator Connection and Synchronizing

The Commander Control System is capable of controlling Motorized Valve Actuators using Model PPC-ACTC Valve/Pump Switch Mechanism. When used, the PPC-ACTC must be installed in an enclosure that is separate from the PPC10 system. The PPC-ACTC is prompted to position the 24 volt motorized actuators when the P/S (Pool / Spa) button is pushed on the PPC-REM Handheld Transmitter.

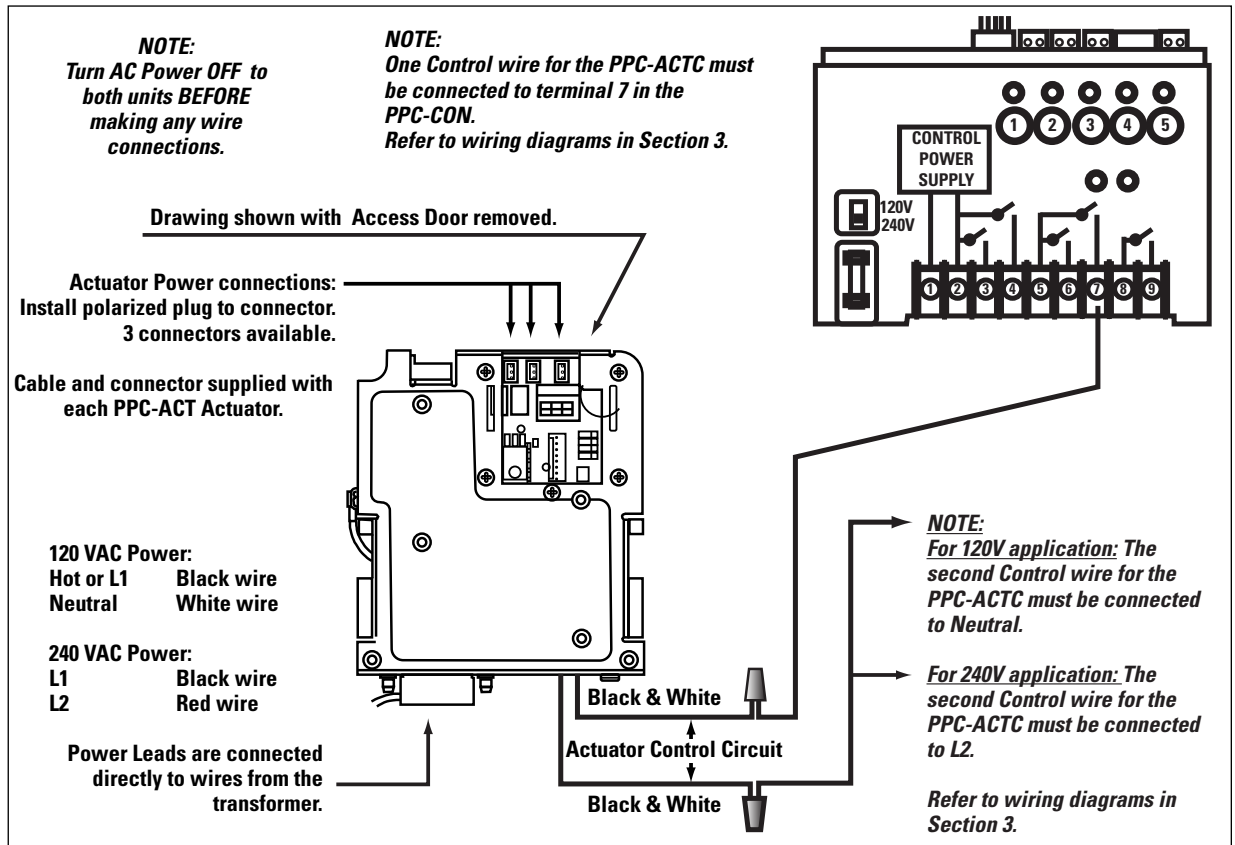


Figure 3-25

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 PPC-ACTC. All power to both units must be turned OFF when connecting the black and white actuator control leads to the PPC-CON (see Figure 3-25). Refer to the installation and wiring directions for the PPC-ACTC Actuator Control and PPC-ACT Actuators for additional instructions for each unit. Remove power from the PPC-ACTC and the Commander Receiving Device.

1. Attach the valve actuators (PPC-ACT) to the water valves. (See instructions included with actuators).
2. Run the actuator cable(s) to the PPC-ACTC control through the low voltage raceway.
3. Remove the access door at the top right of the PPC-ACTC mechanism.
4. Insert the three-pin connector of the motorized valve actuator to any of the three available connectors on the PPC-ACTC circuit board.
5. Connect 120 or 240 VAC power leads to the correct colored wires of the PPC-ACTC transformer (see Figure 3-25).
6. Connect the two Actuator Control wire leads as shown above Figure 3-25.
7. Apply power to both the PPC-CON and the PPC-ACTC 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 of the actuator 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.

Heater Connection

The AutoPilot Commander Control System is capable of controlling most heat pumps or fossil fuel or gas heaters in the market today. Circuit number 5 in the PPC-CON 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.

Heat Pump Connection

Connection for AquaCal Heat Pump

1. Run low voltage wires (#18 gauge minimum) from terminals 8 and 9 in the PPC-CON through the low voltage knock out and to the heater.
2. Make sure that the low voltage divider is securely installed in the PPC-CON.
3. Locate microprocessor PC board inside heat pump electrical controls enclosure.

4. Connect wiring from the PPC-CON low-voltage heater control terminals 8 & 9 to heat pump microprocessor board options terminal block; use terminals: "Y" and "Z" (See Figure 3-26).
5. Reestablish electrical power and water flow to heater.
6. Turn "POOL" thermostat to OFF position by pressing and holding the "DOWN" key on heater control panel (set temperature below 60-degrees). Then press "POOL/SPA" key once to select SPA thermostat. Set SPA thermostat to OFF position by pressing and holding "DOWN" key on heater control panel (set temperature below 60-degrees).
7. Simultaneously press and hold "UP" and "Down" keys until "CF1" is displayed.
8. While "CF1" is displayed, press POOL/SPA key repeatedly until "LOC" is displayed. Now press "UP" key repeatedly, until "050" is displayed.
9. Press POOL/SPA key repeatedly until "JAO" is displayed. Press "UP" key repeatedly until "2" is displayed. WAIT...press no other buttons/keys.
10. After a delay of approximately 25-seconds, water temperature will display. The external controller-to-heater interface is now ready to test and operate.

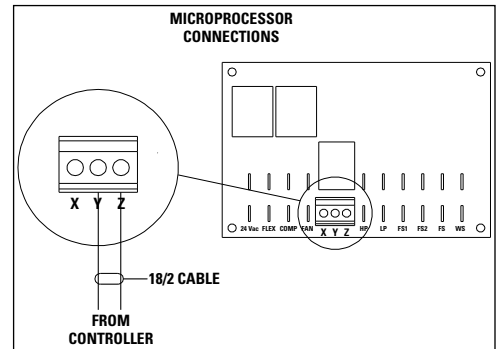


Figure 3-26 —
Typical AquaCal heat pump wiring connection

NOTE: Heat Pumps that have cooling capabilities cannot be controlled by the PPC-CON to operate the heat pump in cooling mode.

Fossil Fuel or Gas Heater Connections (Fireman's Switch)

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 PPC-CON and route them through the low voltage knockout.
2. Make sure that the low voltage divider is securely installed.
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.

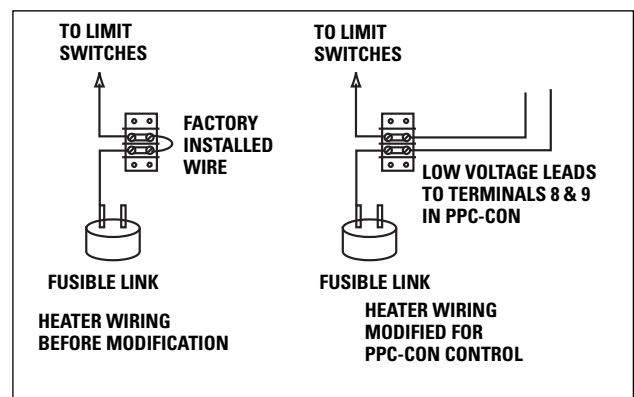


Figure 3-27 — Typical Jandy heater wiring connection

- 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

- Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PPC-CON.
- Route the wires through the low voltage knockout in the PPC-CON enclosure.
- Make sure that the Low Voltage Divider is in place.
- Connect the orange/black wire and the black/orange wire to the wire from terminal 8 in the PPC-CON.
- Connect the yellow/black wire to the wire from terminal 9 in the PPC-CON (see Figure 3-28).

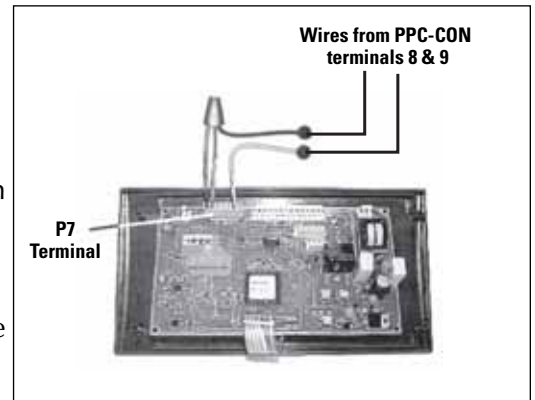


Figure 3-28 — Typical wiring connection for Raypak

Connection for Hayward Heaters

- Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PPC-CON.
- Route the wires through the low voltage knockout in the PPC-CON enclosure.
- Make sure that the Low Voltage Divider is in place.
- Remove heater service door.
- Remove factory-installed wire nut between two (2) red wires labeled "CONNECTION FOR FIELD INSTALLED CONTROL SWITCH" (see Figure 3-29).
- Wire nut the two (2) heater wires from PPC-CON terminals 8 and 9 to the two (2) red wires of the heater (see Figure 3-30).
- Do not disconnect high limit or pressure switches.
- Set the thermostat selector switch to ON, HIGH, or SPA.
- Set the heater thermostat(s) to maximum.

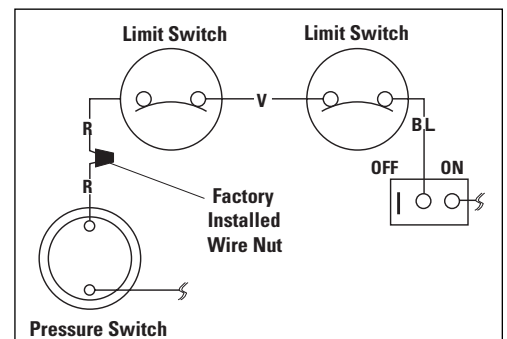


Figure 3-29 —
Hayward Heater Wiring Before Modification

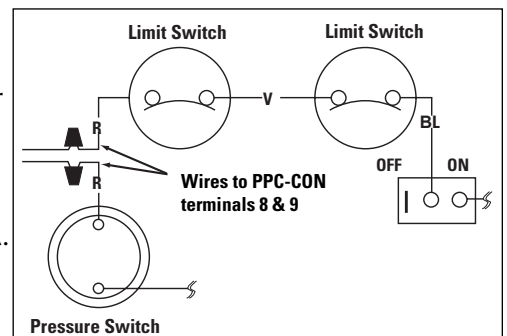
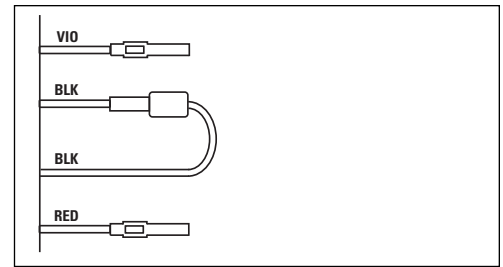


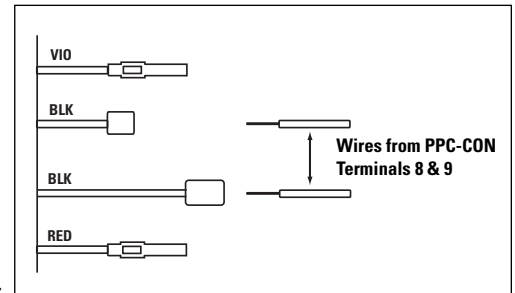
Figure 3-30 —
Wiring with PPC-CON Receiving Device

Connection for Pentair Heater

1. Connect two #14 gauge wires, designed for use in hot environments, to terminals 8 and 9 in the PPC-CON.
2. Route the wires through the low voltage knockout in the PPC-CON 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 3-31).
6. Connect the wires from terminals 8 and 9 to the two black wires on the heater (see Figure 3-32).
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 AutoPilot PPC-CON to a Pentair Heater, Pentair requires that you install the low voltage thermostat wires in conduit separate from ANY line voltage wires.



**Figure 3-31 —
Pentair Heater wiring before modification**



**Figure 3-32 —
Pentair Heater wiring connected to PPC-CON**

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 PPC-CON.
2. Route the wires through the low voltage knockout in the PPC-CON 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 PPC-CON terminal 8 to the "COM" terminal on the DDTC board (see figure 3-33).
7. Connect the wire lead from PPC-CON terminal 9 to the "POOL" terminal on the DDTC board.
8. With the "POWER" and "PRESSURE" lights 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.

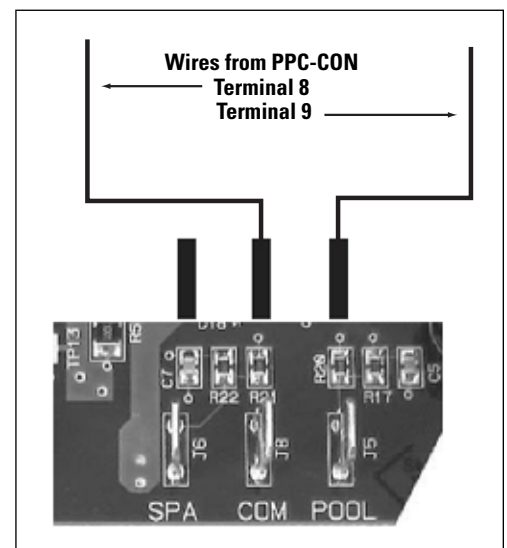


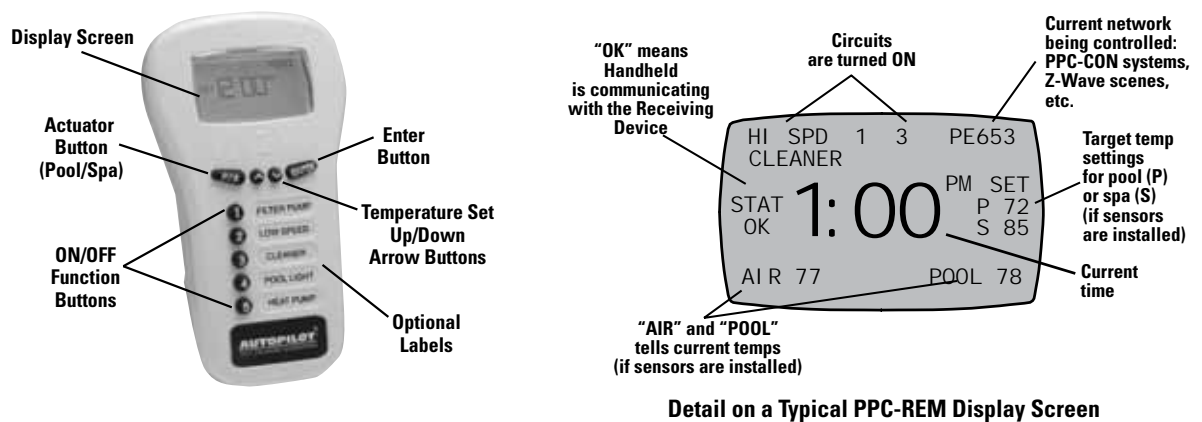
Figure 3-33 — DDTC Control Board

Section 4:

Programming the PPC-REM Handheld Controller

Overview

The Handheld Controller (*PPC-REM*) 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.



Creating a Network Connection between the Handheld Controller and the PPC-CON Receiving Device

When you've finished physical installation and wiring and have enabled power to the Receiving Device, you need to "include" the Handheld Controller with the PPC-CON Receiving Device to create a network connection. This is a two step process: first, delete any programming that might exist in the Handheld 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.

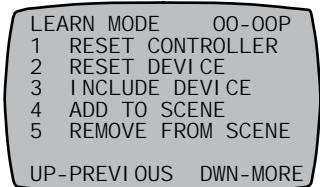
Deleting Any Existing Programming

This procedure deletes any existing network and configuration programming within the Handheld Controller and PPC-CON 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 Handheld. If the problem persists, contact AutoPilot Customer Service.

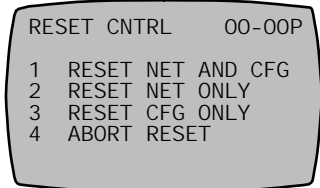
To Reset the PPC-REM Handheld Controller

1. Press and release any button on the Handheld 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.

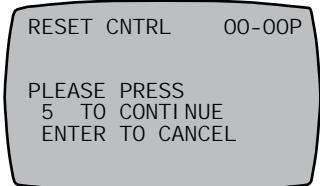


NOTE: If you pause in programming for more than 30 seconds, the screen automatically returns to the previous screen.

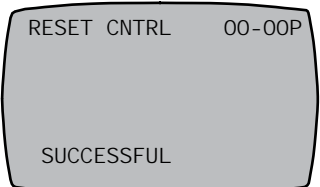
3. Press and release the <1> function button to select **RESET CONTROLLER**. The screen displays four options, as shown.



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 Handheld Controller. The screen requests confirmation, as shown.



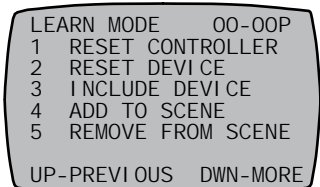
5. Press and release the <5> function button to select **CONTINUE**. If the action is successful, the screen displays the words PLEASE WAIT followed by SUCCESSFUL, as shown.



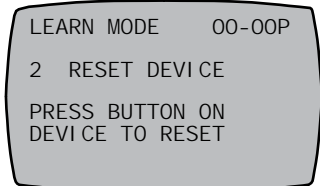
Any pre-existing network or configuration programming in the Handheld Controller is now deleted.

To Reset the PPC-CON Receiving Device

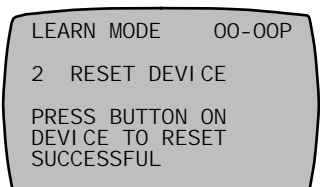
1. Press and release any button on the Handheld Controller to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.)
2. Press and hold the <P/S> and <ENTER> buttons at the same time to put the device into programming mode, as shown at the right.



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.

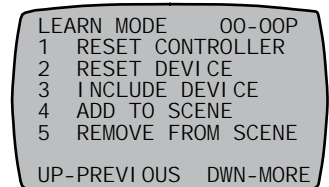
Any existing network or configuration programming in the PPC-CON Receiving Device is now deleted. The entire system is now at factory reset state and the components are ready to be linked together within a new electronic network.

Linking the Handheld Controller to the PPC-CON Receiving Device

This procedure creates a network connection between the Handheld Controller and the PPC-CON Receiving Device by including the PPC-CON into the PPC-REM 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 Handheld Controller. If the problem persists, contact AutoPilot Customer Service.

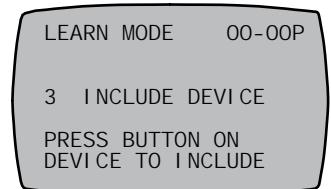
1. If necessary, press and release any button on the Handheld Controller to wake it from sleep. When all programming is deleted, the Handheld automatically displays the **LEARN MODE** screen, as shown. If the screen is not displaying **LEARN MODE**, press and hold the **<P/S>** and **<ENTER>** buttons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



```

LEARN MODE    00-00P
1  RESET CONTROLLER
2  RESET DEVI CE
3  I NCLUDE DEVI CE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVI OUS  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.



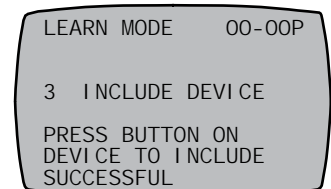
```

LEARN MODE    00-00P
3  I NCLUDE DEVI CE
PRESS BUTTON ON
DEVICE TO I NCLUDE
  
```

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**).



```

LEARN MODE    00-00P
3  I NCLUDE DEVI CE
PRESS BUTTON ON
DEVICE TO I NCLUDE
SUCCESSFUL
  
```

NOTE: If the PPC-CON 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 Handheld Controller to the PPC-CON Receiving Device*. If the problem persists, contact AutoPilot 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 Handheld Controller.

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

- Button <1> selects High speed
- Button <2> selects Low speed, when configured for a two-speed pump

1. If necessary, press and release any button on the Handheld 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 **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

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

PE653 OPTION	00-00P
1	PUMP 1SPD

4. Press the **UP** or **DOWN** arrow button to change from 1SPD to 2SPD, then press the <ENTER> button. The screen adds the word **SUCCESSFUL**, then returns to the programming screen.

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

Calibrating Pool, Spa and Air Temperature Settings

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

1. If necessary, press and release any button on the Handheld 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 **DOWN** arrow as necessary to view 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

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

```

CALI BRATE TEMP 00-OOP
1 CALI B POOL 0
2 CALI B AIR 0

UP-PREVI OUS DWN-MORE

```

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

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

```

CALI BRATE TEMP 00-OOP
1 CALI B POOL 0

```

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

NOTE: You can set the temperature offset by $\pm 20^{\circ}\text{F}$.

6. Press the <ENTER> button to save your changes. The screen adds the word **SUCCESSFUL**, then returns to Step 4.
7. Press the <ENTER> button again as necessary to return to the Main screen.

Configuring for a Booster (Cleaner) Pump

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

1. If necessary, press and release any button on the Handheld 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-OOP
1 RESET CONTROLLER
2 RESET DEVI CE
3 I NCLUDE DEVI CE
4 ADD TO SCENE
5 REMOVE FROM SCENE

UP-PREVI OUS DWN-MORE

```

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

```

PE653 OPTI ON 00-OOP
1 PUMP 1 SPD
2 CALI BRATE TEMPS
3 CLEANER OFF
4 POOL/SPA POOL
5 FI REMAN SW OFF

UP-PREVI OUS DWN-MORE

```

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

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

```

PE653 OPTI ON 00-OOP
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.

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

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

1. If necessary, press and release any button on the Handheld 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 Heater Control and 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. The time should be set to 0 for heat pumps unless directed otherwise by the manufacturer.

Set this interval using the Handheld Controller.

1. If necessary, press and release any button on the Handheld 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.

```
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
```

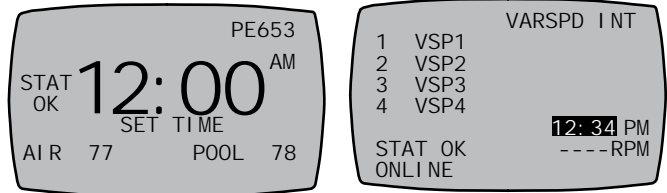
NOTE: The **FIREMAN SW** must be set to **ON** and the time interval set to **0** for HEAT PUMP applications. Otherwise, Control Connections on the PPC-CON Circuit 5 pins 8 &

9 will not be assigned for heater control and pool and spa set points will not be available on the Handheld Controller (PPC-REM) screen.

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

Setting the Time of Day

This procedure sets the clock displayed on the Handheld'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.

NOTE: The time may need to be reset after an extended power interruption to the PPC-CON.

Setting Up Schedules

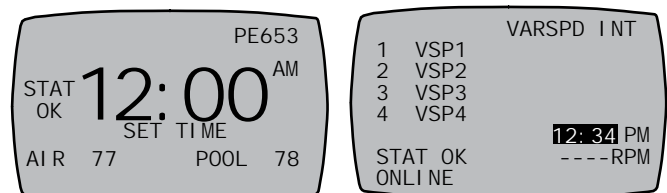
Schedules are timer-based events that can be set to turn ON/OFF a PPC-CON circuit or a variable-speed pump speed at a specified time.

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

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

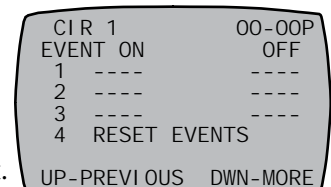
1. If necessary, press and release any button on the Handheld Controller to wake it from sleep.
2. If necessary, press the <ENTER> button to display either the PE653 or VARSPD INT screen.

3. Press and hold the <P/S> button. The PE653 screen adds the words SET TIME beneath the time display, while the VARSPD INT screen highlights the time (as shown). Release the <P/S> button.



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

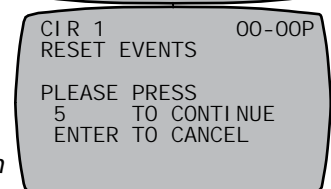
5. Press and release the <P/S> button again to cycle through the available circuits or variable-speed pump speeds.



6. Press the <1> function button to select the ON time for the first event.

7. Press the UP or DOWN arrow button to scroll and set the time.

8. Press the <1> function button again to advance to setting the OFF time for the first event.



NOTE: If you want to reset a time, you can press the <1> function button again to toggle between ON and OFF.

9. Again, press the **UP** or **DOWN** arrow button to set the time.
10. Press the **<2>** function button to select the ON time for the second event, and repeat Steps 7 through 9 to set the times.

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

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

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

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

Configuring the Freeze Temperature (optional)

If the system has an optional AutoPilot Freeze Sensor (PPC-AIR), you can set the temperature where the heater turns on to protect the pool.

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

```
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
```

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 CIR S NONE
3  VSP SPEED NONE
UP-PREVIOUS  DWN-MORE
```

3. Press and release the **<1>** function button to select **TEMP**. The screen refreshes, as shown.
4. Press the **UP** or **DOWN** arrow button to change from **DISABLED** to the temperature you want (the valid selectable range is from 34°F to 44°F), then press the **<ENTER>** button. The screen displays the word **SUCCESSFUL**, then returns to *FREEZE OPTION* screen.
5. Next, press and release the **<2>** function button to select the circuit(s) you want to turn on when the freeze temperature is reached. The screen refreshes, as shown.
6. Press the appropriate button(s) for the circuit on the Handheld Controller, then press the **<ENTER>** button.

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

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

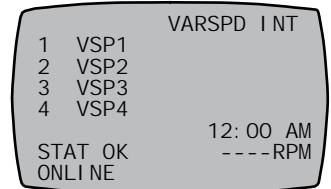
- If you have a single-speed pump, press and release the **<1>** function button.
- If you have a two-speed pump, press and release the **<1>** function button to circulate water and prevent freezing with the high speed, or the **<2>** function button to circulate with the low-speed.
- If you have a 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 Handheld Controller can be toggled between the PE653 screen and this variable speed control screen (VARSPD INT) by pressing and releasing the <ENTER> button.

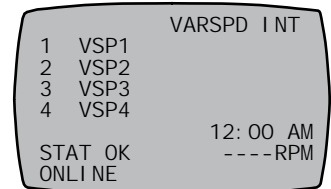


This screen controls the variable speed pump, and can be configured to display the functionalities you have selected for various pump speeds (for example, slowest speed for the cleaner, next faster speed for a booster pump, etc.).

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

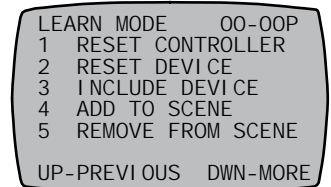
You can change the four variable speed pump speed settings from the factory default values by following these steps on the Handheld Controller. Once configured, Buttons <1> through <4> will switch between the variable speeds according to your settings.

- If necessary, press and release any button on the Handheld Controller to wake it from sleep.
- Press and release the <ENTER> button until the variable speed screen VARSPD INT is shown.



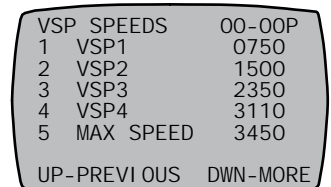
- Press and hold the <P/S> button first, then press and hold the <ENTER> button within 2 seconds. The LEARN MODE screen is displayed.

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.



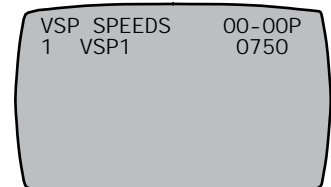
- Press the **DOWN** arrow button until you see the VSP SPEEDS screen, as shown.

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



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

- Press the **UP** or **DOWN** arrow button to raise or lower the speed setting. Press <ENTER> when desired speed is reached.



- Repeat Steps 5 and 6 to set speeds for button <2> through <5>.

- Press the <ENTER> button again to return to the VARSPD INT screen.

Testing Z-Wave Reception

At the heart of the Commander system is Z-Wave wireless technology. Test reception by walking around the yard with the Handheld Controller and look on the screen to see if there are any areas where STAT OK changes to STAT (which means the Handheld 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).

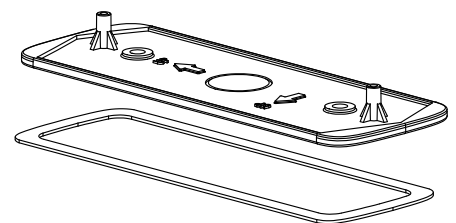
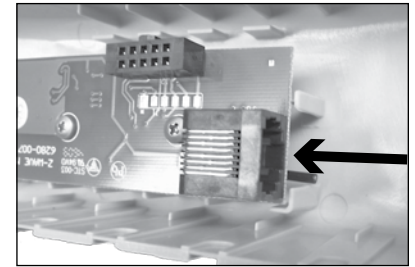
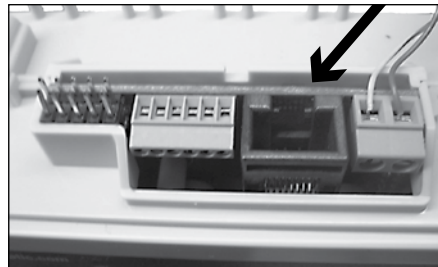
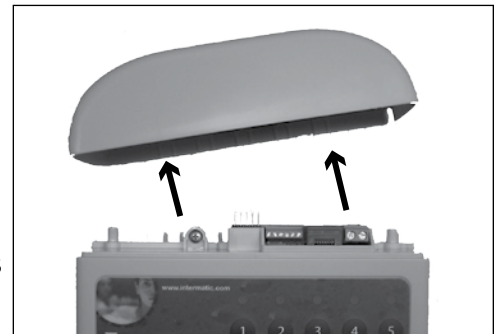
Signal reception between Handheld Controllers and the Receiving Device is affected by distance (about 100 feet,) direct line of sight, and by physical obstacles (like brick, wire lath in walls, or steel structures).

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 Handheld 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.

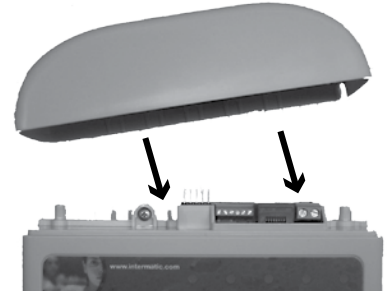
Moving the Antenna to a Better Location

The removable top of the PPC-CON enclosure contains the system's antenna.

1. Remove the two screws used to attach the antenna cover to the PPC-CON and remove the antenna enclosure by pulling it straight away from the main body of the PPC-CON 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 Handheld Controller.
3. Connect the antenna to the PPC-CON 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.



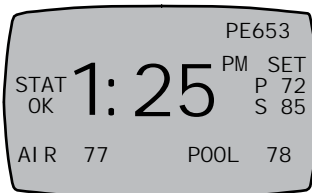
5. Cut out a knock-out for the wire to pass through the cap, then screw the antenna cap to the bracket, using the screws supplied with the remote kit.
6. Cut out a knock-out for the wire to pass through the dummy cap, then screw the dummy cap to the top of the PPC-CON Receiving Device, using the original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



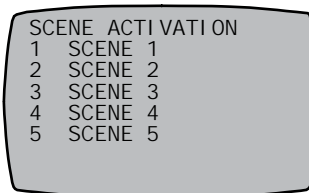
Labeling the Handheld Controller

AutoPilot provides a sheet of peel-and-stick labels to use in identifying the five buttons on the Handheld 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 AquaCal AutoPilot, Inc., at 727-823-5642.*

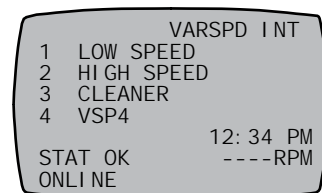
Depending on which components have been installed in the system, you have several choices for which screen you want to use as the default primary screen (displayed when the Handheld Controller awakes from sleep). This decision may determine which labels you might want to apply to the Handheld Controller.



**PE653
Main Screen**



**Z-Wave
Main Screen**



**Variable-Speed Pump
Main Screen**

Labeling for the PE653 Screen

If you set the PE653 screen as the primary screen, the five buttons on the Handheld 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.

Sample of Schedule Planning Sheet

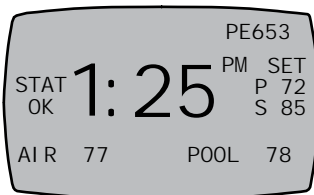
Electrical Circuit	Circuit 1 <i>High Speed Circulation pump</i>		Circuit 2 <i>Low Speed Circulation pump</i>		Circuit 3 <i>Cleaner pump</i>		Circuit 4 <i>To Actuator Controller (On = Spa Mode) Off = Pool Mode</i>		Circuit 5 <i>Heater Thermostat</i>	
	Event #	Time	Event #	Time	Event #	Time	Event #	Time	Event #	Time
Scheduled Events										
<i>Normal Pool Filtration - 8 hrs.</i>	1	On	8:00am	On		On		On		On
		Off	10:10am	Off		Off		Off		Off
<i>Cleaner Pump - 2 hrs. (10 minutes allowed on HIGH before cleaner for priming)</i>		On		On		On	8:10am	On		On
		Off		Off		Off	10:10am	Off		Off
<i>Revert to Low Speed Filtration</i>		On		On		On		On		On
		Off		Off		Off		Off		Off
<i>Prime Pump</i>	2	On	5:00pm	On	10:10am	On		On		On
		Off	5:10pm	Off	4:00pm	Off		Off		Off
<i>Rotate valves to SPA mode</i>		On		On		On		On		On
		Off		Off		Off		Off		Off
<i>Turn on SPA - low speed</i>		On		On	5:10pm	On		On	5:00pm	On
		Off		Off	11:10pm	Off		Off	11:00pm	Off

Section 5:

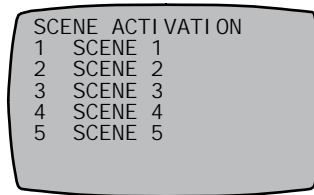
Everyday Use of the Handheld Controller

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

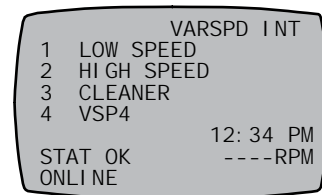
Depending on which components have been installed in the system, there may be several screens available as the primary screen when controlling the system:



**PE653
Main Screen**



**Z-Wave
Main Screen**



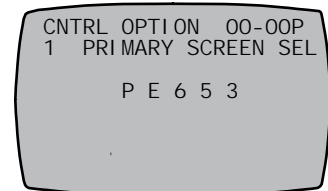
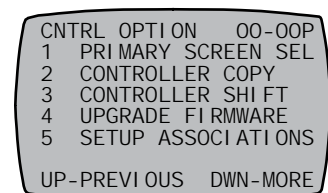
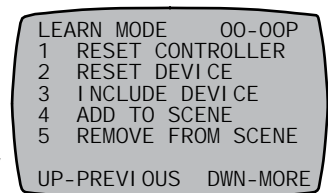
**Variable-Speed Pump
Main Screen**

Press the **<ENTER>** button to toggle between the primary screens.

Setting the Default Primary Screen

You can choose any one of the screens above to be the default primary screen displayed when you wake up the Handheld Controller by following these instructions:

1. If necessary, press and release any button on the Handheld 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) or ZWAVE.
5. Press the **<ENTER>** button to save your choice.

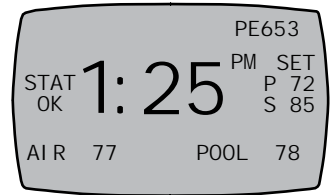


The next time you wake the Handheld Controller from sleep, it will awaken to the screen you have selected. Press the **<ENTER>** button as necessary to toggle to other main screens.

Controlling the PPC-CON Receiving Device

To control settings configured with the PPC-CON Receiving Device

1. Press and release any button on the Handheld 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 Handheld Controller operates the five circuits in the PPC-CON Receiving Device.

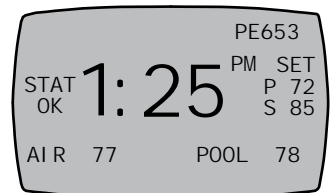
When you press any of these buttons, the appropriate circuit toggles ON or OFF. In addition, when the circuit is ON, the Handheld Controller's display shows the circuit number along the top of the screen.

Changing between Pool and Spa

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

1. Press and release any button on the Handheld 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 Handheld Controller Screen displays the current mode for the system — in this example it is *POOL*. The screen will indicate:

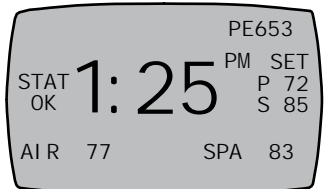
POOL if the valve actuator is in pool mode

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 Handheld Controller Screen shows the current time of day.



Setting Pool and Spa Temperatures

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

- You can view the target temperature on the right side of the Handheld 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 4.
- Press the **<UP>** or **<DOWN>** arrow buttons to raise or lower the setting to the desired temperature. You can hold the button down and the value will automatically change.
- Release the arrow button when the setting reaches the temperature you want.



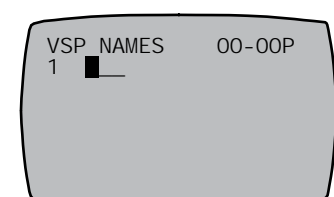
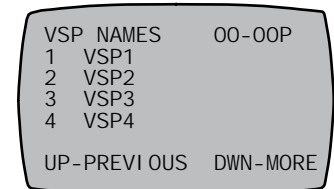
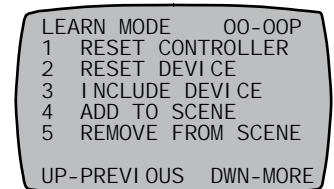
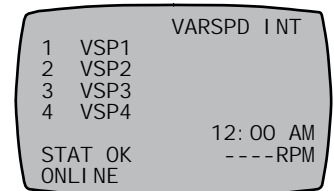
Controlling a Variable-Speed Pump

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.

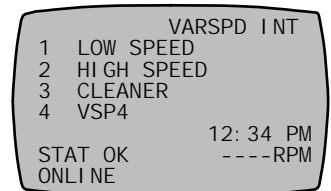
- Begin with the VARSPD INT screen
- If necessary, press and release any button on the Handheld Controller to wake it from sleep.
 - Press the **<ENTER>** button as necessary to display the VARSPD INT screen, as shown at right.
 - Press and hold the **<P/S>** and **<ENTER>** buttons at the same time 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.



7. When you have selected the right letter or number, press the <P/S> button to move right to the next character.
8. Repeat Steps 6 and 7 until you have completed the renaming.
9. Press the <ENTER> button to save the name and return to Step 4 above. Repeat the procedure to name the other speeds.
10. 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 Handheld 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.

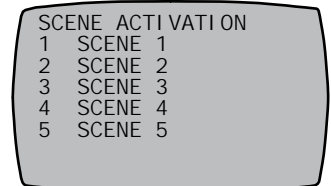


Controlling Z-Wave Devices

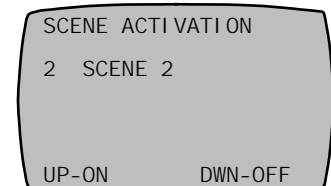
Once you have included Z-Wave devices in the network and have added them to various Scenes, you can control them using the Handheld Controller.

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 Handheld 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.

Changing Batteries in the Handheld Controller

The Handheld Controller requires three (3) AA batteries. Battery life is approximately one year in typical use. When the batteries are weak, the screen displays the 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 PPC-CON Receiving Device.

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

Any manual OFF/ON circuit activation performed at the PPC-CON Receiving Device will be reflected on the screen of the Handheld Controller.

Section 6:

Advanced Features

The PPC-REM 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 Handheld Controllers

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

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

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

You can tell the status of a Handheld 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) Handheld units to the system.

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

1. If necessary, press and release any button on the Handheld 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-OOP
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVICE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVIOUS  DWN-MORE
```

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

4. On the Primary Handheld used to set up and configure the network, press and release the <3> button to select SEND NET AND CFG.

```

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

```

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

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 Handheld (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 CFG
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 Handheld 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 Handheld 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.

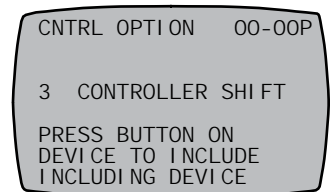
NOTE: *There can only be one Primary Controller in the network at a time.*

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

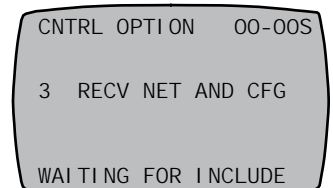
If the screens on both Handheld Controllers are not displaying LEARN MODE, press and hold the <P/S> and <ENTER> buttons at the same time on each to put the devices both into programming mode. You are in programming mode when the LEARN MODE screen is displayed.

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

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



Both Handhelds 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 PPC-REM Controller into a non-Commander (other manufacturer's) network.

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

To include the PPC-REM into another manufacturer's controller network:

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

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

To exclude the PPC-REM from another manufacturer's 3rd party network, follow the instructions *To Reset the PPC-REM Handheld 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

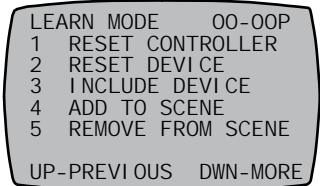
Models PPC-CON 5-Circuit Digital Control and PPC-REM Remote Controller are compatible with Z-Wave enabled networks. Z-Wave enabled devices displaying the Z-Wave logo can be used with the PPC-CON and PPC-REM regardless of the manufacturer. Each Z-Wave enabled device is designed to act as a repeater, re-transmitting 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.

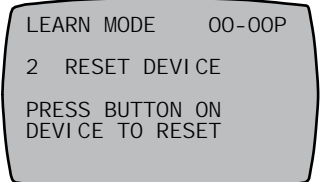
1. If necessary, press and release any button on the Handheld Controller to wake it from sleep. *If the screen is not displaying LEARN MODE, press and hold the <P/S> and <ENTER> buttons at the same time to put the device into programming mode. You are in programming mode when the LEARN MODE screen is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



```

LEARN MODE      00-00P
1  RESET CONTROLLER
2  RESET DEVICE
3  INCLUDE DEVI CE
4  ADD TO SCENE
5  REMOVE FROM SCENE
UP-PREVI OUS   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.



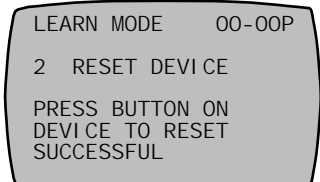
```

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 AutoPilot Customer Service. For assistance with any non-AutoPilot 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 PPC-REM Handheld Controller. The PPC-REM is pre-configured to operate with the PPC-CON Receiving Device. The PPC-REM 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 PPC-REM and PPC-CON, and depending on supported features, can act as repeaters.

1. If necessary, press and release any button on the Handheld 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 DEVI CE
3  I NCLUDE DEVI CE
4  ADD TO SCENE
5  REMOVE FROM SCENE

UP-PREVI OUS  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.

```

LEARN MODE    00-00P

3  I NCLUDE DEVI CE

PRESS BUTTON ON
DEVI CE TO I NCLUDE
  
```

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.

```

LEARN MODE    00-00P

3  I NCLUDE DEVI CE

PRESS BUTTON ON
DEVI CE TO I NCLUDE
SUCCESSFUL
  
```

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 AutoPilot 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 PPC-CON Receiver onto a non-Commander remote controller

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

To include the PPC-CON into another manufacturer's controller:

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

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

To exclude the PPC-CON 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 PPC-CON.

If the exclude was successful, the red flashing LED on the PPC-CON 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 Handheld 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 Handheld 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 Handheld 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.

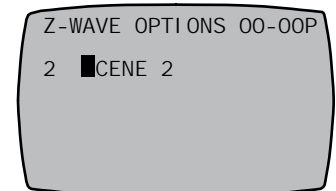
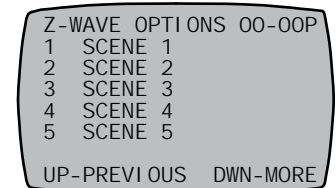
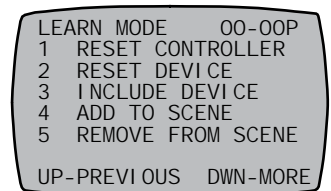
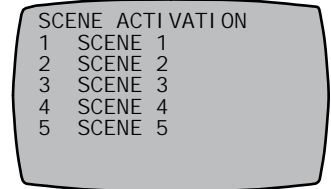
NOTE: If the device you want to control is a dimmer switch, preset the dimmer level to the desired brightness at this time.

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 PPC-REM 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.

- Begin with the SCENE ACTIVATION screen
1. If necessary, press and release any button on the Handheld Controller to wake it from sleep.
 2. Press the **<ENTER>** button as necessary to display the SCENE ACTIVATION screen, as shown at the right.
 3. 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.
 4. Press the **DOWN** button as necessary to reach the Z-Wave Options screen, as shown:
 5. 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.
 6. 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.
 7. When you have selected the right letter or number, press the **<P/S>** button to move right to the next character.
 8. Repeat Steps 5 through 7 until you have completed the renaming.
 9. 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 Handheld 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.

```

LEARN MODE    00-00P
5  REMOVE FROM SCENE

PRESS BUTTON ON
DEVICE TO BE REMOVED
  
```

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

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 Handheld Controller to wake it from sleep. The Handheld 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.*

```

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 <2> button to reset the device. The screen displays PRESS BUTTON ON DEVICE TO RESET, as shown:

```

LEARN MODE    00-00P
2  RESET DEVICE

PRESS BUTTON ON
DEVICE TO RESET
  
```

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

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

- If necessary, press and release any button on the Handheld 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** button once to display the CNTRL OPTION screen, as shown:

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

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

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

- 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.

```
ASSOCIATION 00-00P
1 ADD DEVICE

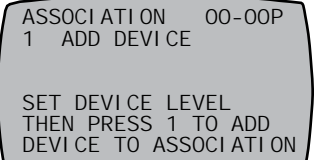
PRESS BUTTON ON
DEVICE CONTROLLING
THE ASSOCIATION
```

- 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.

```
ASSOCIATION 00-00P
1 ADD DEVICE

SET DEVICE LEVEL
THEN PRESS 1 TO ADD
DEVICE TO 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.



ASSOCIATION 00-00P
1 ADD DEVICE

SET DEVICE LEVEL
THEN PRESS 1 TO ADD
DEVICE TO ASSOCIATION

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 PPC-CON if it is included in the association.)

NOTE: *Only circuit 1 of the PPC-CON 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 Handheld.

Removing Z-Wave Devices from an Association

1. If necessary, press and release any button on the Handheld 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-PREVI OUS  DWN-MORE
```

```
CNTRL OPTION 00-00P
1  PRIMARY SCREEN SEL
2  CONTROLLER COPY
3  CONTROLLER SHI FT
4  UPGRADE FIR MWARE
5  SETUP ASSOCI ATIONS
UP-PREVI OUS  DWN-MORE
```

```
ASSOCI ATI ON 00-00P
1  ADD DEVI CE
2  REMOVE DEVI CE
UP-PREVI OUS  DWN-MORE
```

```
ASSOCI ATI ON 00-00P
2  REMOVE DEVI CE
PRESS BUTTON ON
DEVI CE CONTROLLI NG
THE ASSOCI ATION
```

```
ASSOCI ATI ON 00-00P
2  REMOVE DEVI CE
PRESS BUTTON ON
DEVI CE TO BE REMOVED
FROM THE ASSOCI ATION
```


Section 8:

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

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

What to do	If it doesn't work	Reference/Procedure
Verify that the PPC-CON Device is operational and working.	Verify that power is ON to the PPC-CON Device.	<ol style="list-style-type: none"> 1. Turn the main circuit breaker that feeds the panel to the ON position. 2. Use a voltmeter to verify that voltage is present at terminals 1 & 2.
	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"> 1. Turn OFF the power to the PPC-CON Device. 2. Remove the fuse and test with an ohmmeter or fuse tester. 3. Replace the fuse if good or install a new fuse. 4. Turn the power to the PPC-CON Device ON.
	Verify that each circuit is operational.	<ol style="list-style-type: none"> 1. Press the ON switch for Circuit #1. 2. Verify that the Load ON indicator for Circuit #1 is ON. 3. Press the ON switch for Circuit #2. 4. Verify that the Load ON indicator for Circuit #2 is ON. 5. Press the ON switch for Circuit #3. 6. Verify that the Load ON indicator for Circuit #3 is ON. 7. Press the ON switch for Circuit #4. 8. Verify that the Load ON indicator for Circuit #4 is ON. 9. Press the ON switch for Circuit #5. 10. Verify that the Load ON indicator for Circuit #5 is ON. 11. Turn OFF all Circuits.
	Verify that the electrical wiring for each load is correct.	Refer to the appropriate wiring diagram in Section 3, starting on page 13.

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

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

What to do	If it doesn't work	Reference/Procedure
Verify that the (POOL/ SPA switch on the PPC-REM Handheld Controller activates the Motorized Valve Actuators (if installed).	Verify that the PPC-REM Handheld Controller is configured for BOTH (Pool and Spa).	<ol style="list-style-type: none"> 1. If necessary, press and release any button on the Handheld Controller to wake it from sleep. 2. Look for the word POOL at the lower right part of the PPC-REM screen (refer to illustration on page 41). 3. If either POOL or SPA is observed, press and release the P/S button on the PPC-REM. 4. Verify that the word POOL switches to SPA and back to POOL each time that the P/S button is pressed. 5. Verify that the water flows to the Pool when POOL is shown in the screen. 6. Verify that the water flows to the SPA when SPA is shown in the screen.
	Correct the Motorized Valve Actuator Synchronization if the water flow is incorrect.	Refer to Section 3: <i>Motorized Valve Actuator Connection and Synchronizing</i> starting on page 36.

What to do	If it doesn't work	Reference/Procedure
Verify that the Heater is responding to commands from the PPC-REM Handheld Controller.	Test the heater response.	<ol style="list-style-type: none"> 1. If necessary, press and release any button on the Handheld controller to wake it from sleep. 2. Make sure that the PPC-REM 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. 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. 4. Turn the pump ON.
	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"> 1. Refer to the appropriate wiring diagram with heater connection information starting on page 16 of this manual. 2. Refer to <i>Fireman's Switch Connections</i> starting on page 37 in Section 3. 3. Find the Wiring Diagram that is the most like your installation. 4. Verify that the system is wired according to the diagram. 5. Refer to the manufacturer's installation instructions if your heater is not shown in this manual.

Section 9:

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 Handheld Controller.
- The Handheld Controller appears to be "LOCKED UP".
- The PPC-CON Device appears to be "LOCKED UP".

Problem	What to do	Reference/Procedure
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 PPC-CON power terminals.	<ol style="list-style-type: none"> 1. Check the voltage at terminals #1 and #2 on the PPC-CON using a meter. 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. <p>CAUTION: If a 2-speed pump or other 240 VAC equipment is being used in the system, the voltage must be 240 VAC.</p> <p>NOTE: The PPC-CON will appear to function correctly, LED's will turn ON and it will communicate with the PPC-REM Handheld Controller but the power relays will turn on when 120 VAC is supplied to a 240 VAC system.</p>

Problem	What to do	Reference/Procedure
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"> 1. Refer to the Wiring Instructions in Section 3. 2. Find the Wiring Diagram that is the most like the installation starting on page 16. 3. Verify that the system is wired according to the diagram.
	Verify that the correct voltage is present at terminals 1 and 2.	<ol style="list-style-type: none"> 1. Use a meter and verify voltage output from the breaker (should be 240 VAC). 2. Use a meter to verify that the voltage at terminals 1 and 2 is 240 VAC. 3. Turn ON circuit #1 on the PPC-CON using either the Handheld Controller or the Circuit ON/OFF switch on the PPC-CON. 4. Use a meter and verify voltage at pump terminals. <p>NOTE: L2 must return to the second pole on the breaker for 240 VAC to be present.</p> 5. Verify that terminal 3 on the PPC-CON is connected to the 'HIGH' speed terminal at the pump. 6. Verify that terminal 4 on the PPC-CON is connected to the 'LOW' speed terminal at the pump. 7. Verify that the 'COMMON' terminal at the pump is connected to L2 at the breaker panel.
	Verify that your system is configured for a 2-speed pump.	<ol style="list-style-type: none"> 8. Refer to "Configuring for a 1-Speed or 2-Speed Pump" starting on page 44.
Contact your pump service company for assistance with the pump.		

Problem	What to do	Reference/Procedure
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"> 1. Press and release any button on the PPC-REM Handheld Controller to wake it up. 2. Verify that the PPC-REM displays "HI SPD 1" or "LO SPD 2" in the upper left hand corner of the screen. 3. Refer to the illustration on page 41.
	Reprogram for 2-speed pump operation.	Refer to "Configuring for a 1-Speed or 2-Speed Pump" starting on page 44.

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

Problem	What to do	Reference/Procedure
The heater will not turn ON.	Go to Section 8: Checking Out and Verifying the System..	<ol style="list-style-type: none"> 1. Press and release any button on the Handheld Controller to wake it up. 2. Note the POOL temperature. <i>NOTE: The temperature will be shown to the right of the word POOL in the bottom right of the PPC-REM screen.</i> 3. Use the Temperature Set UP arrow to make the Target temperature setting at least five degrees (5°) higher than the current temperature. 4. Turn ON the pump. 5. Find and follow the instructions in "Verify that the Heater is responding to commands from the PPC-REM Handheld Controller" in Section 8.

Problem	What to do	Reference/Procedure
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>

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

Problem	What to do	Reference/Procedure
Water or moisture is visible inside the screen of the Handheld Controller.	Dry out the Handheld Controller.	<ol style="list-style-type: none"> 1. Remove the battery cover on the rear of the PPC-REM Handheld Controller. Refer to page 56 for instructions. 2. Gently drain any water remaining in the Handheld Controller. 3. Place the Handheld Controller in a well ventilated area to dry. <p>CAUTION: Do not place in direct sunlight.</p> 4. Insert new batteries when all traces of moisture are gone from the screen. <p>NOTE: Be sure to re-install the gasket correctly to create a water-tight seal. Refer to page 56 for instructions.</p> 5. If required, follow programming instructions starting on page 41.

Problem	If it doesn't work	Reference/Procedure
The Handheld Controller appears to be "LOCKED UP".	Power down the Controller to reset.	<ol style="list-style-type: none"> 1. Remove the batteries from the PPC-REM Handheld Controller. 2. Allow 15 seconds before replacing the batteries. Refer to page 56 for instructions. <p>NOTE: Be sure to re-install the gasket correctly to create a water-tight seal. Refer to page 56 in this manual for instructions.</p> 3. If required, follow programming instructions starting on page 41.

Problem	What to do	Reference/Procedure
The PPC-CON Device appears to be "LOCKED UP".	Power down the PPC-CON device to reset.	<ol style="list-style-type: none"> 1. Turn OFF the AC power to the PPC-CON by turning OFF the breaker that feeds terminals 1 & 2 on the device. 2. Turn the AC power back ON. 3. Refer to the "Checking Out and Verifying the System" section on page 69.

Section 10:

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.

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 AutoPilot 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 AutoPilot 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 AquaCal AutoPilot, 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.

Section 11:

Warranty Registration



Pool Pilot Commander Product Registration

You can register your product by:

- Completing this form and mailing to AquaCal AutoPilot, Attention: TRAC

OR

- Registering online at www.autopilot.com

Customer Information

Name			
Address	City	State	Zip
Phone	Email		

Where did you purchase your product?

Name			
Address	City	State	Zip
Phone	Email		
Date Purchased			

New Product Information

Model Number
Serial Number

Please return to:
AquaCal AutoPilot, Inc.
Attn: TRAC
2737 24th Street North
St. Petersburg, FL 33713

LTM0207 Rev 1 6/2/10

AUTOPILOT[®]

SALT CHLORINE GENERATORS

AquaCal AutoPilot, Inc.
2737 24th Street North
St. Petersburg, FL 33713
autopilot.com