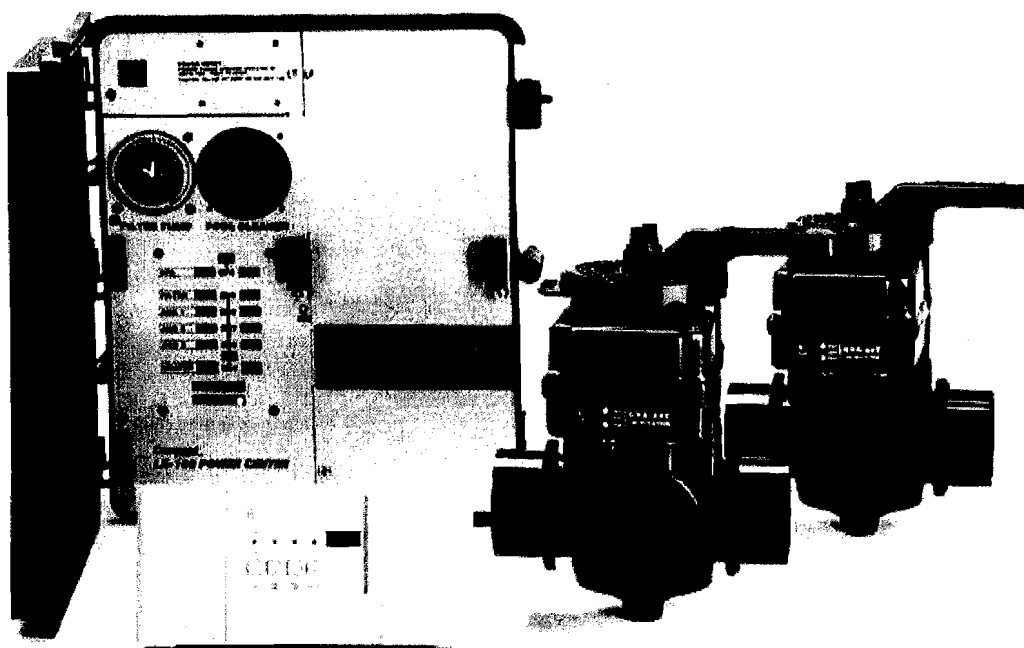


CP-100 POOL/SPA CONTROL SYSTEM INSTALLATION AND OWNERS MANUAL



 **Pentair** *Pool Products™*
Because reliability matters most

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INSTALLATION MANUAL

CP-100 POOL-SPA CONTROL SYSTEM

IMPORTANT SAFETY INSTRUCTIONS

All wiring must be performed by a qualified electrician.

Basic safety precautions and local codes should always be followed when installing and using this electrical equipment.

READ AND FOLLOW ALL INSTRUCTIONS.

WARNING: To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

SAVE THESE INSTRUCTIONS.

SYSTEM INCLUDES

CP100 Controller.

LX100 Power Center or **LX100L** Load Center.

CVA24T Valve Actuators, P/N 263045 (2qty).

TS5L Water Temperature Sensor.

2COND Hook-up Cable (25ft spool).

6COND Communication Cable (2qty 150ft spools).

Modular Connectors for Communication Cable.

Mounting Hardware for CP-100.

TOOLS REQUIRED

3/16" dia. Drill (for mounting CP-100 Controller).

5/16" dia. Drill (for mounting TS-5L Water Temperature Sensor).

Crimping Tool for mounting Modular Connectors to Communication Cable (**model TOOL-6**)

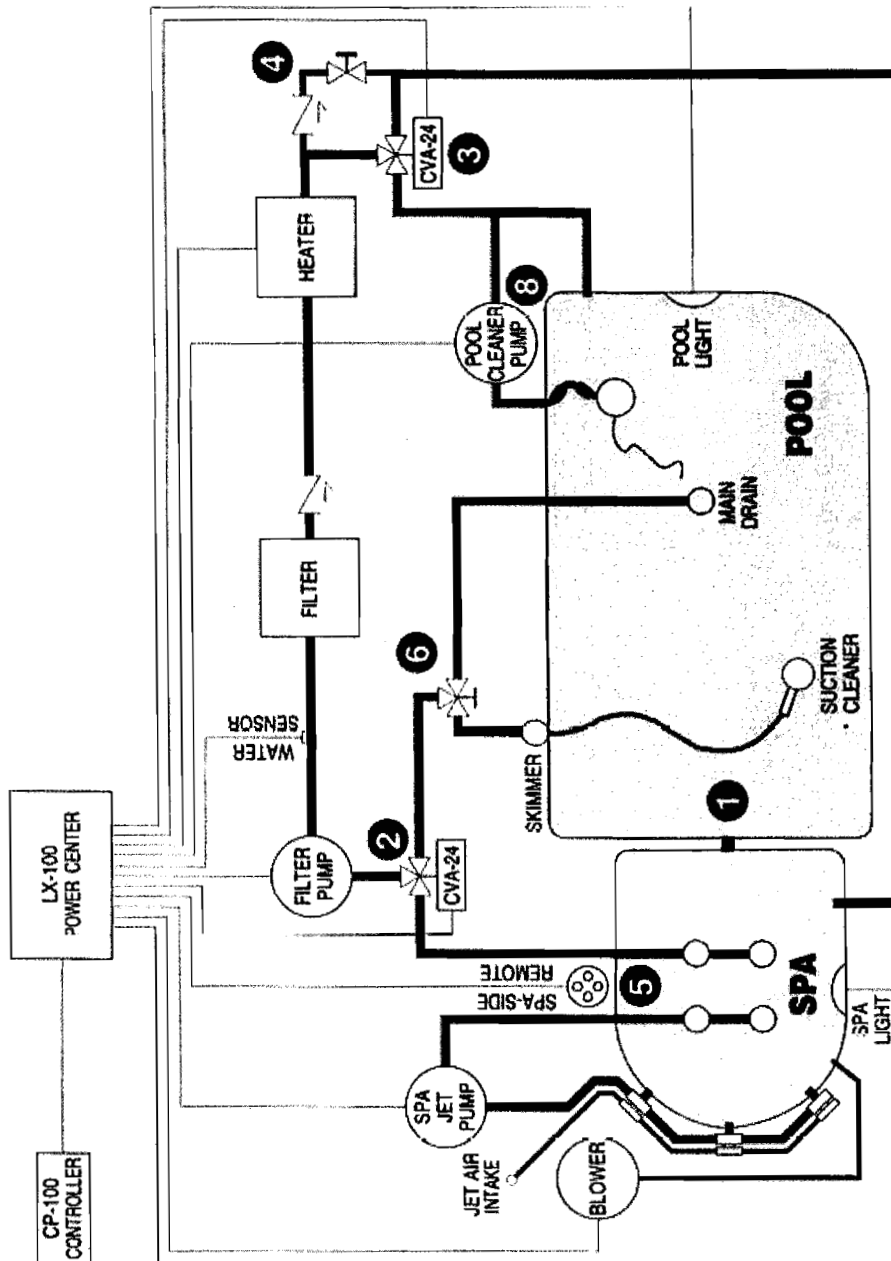
EQUIPMENT LOCATION

With the exception of the Spa-side Remote Control (which is UL listed for installation right at the tile-line of the spa), all equipment must be located five feet or more from the water's edge.

1. **LX-100 Power Center** at the equipment site.
2. **CP-100 Controller** inside the house or other weather-protected area.
3. **CVA-24 Valve Actuators** at valves to be motorized.
4. **TS-5L Water Temperature Sensor** at the filter pump.
5. **Spa-side Remote Control** (optional) at spa wall or decking.

RECOMMENDED HYDRAULIC SCHEMATIC

Refer for "PLUMBING REQUIREMENTS" on page 3



PLUMBING REQUIREMENTS

Plumb system in accordance with "RECOMMENDED HYDRAULIC SCHEMATIC" on page 2, local codes and the following guidelines.

Bring all lines back to the equipment pad.

1. **Spa should be at or above the level of the pool.**
If spa is attached to pool, provide a dam between the two bodies of water to allow spa overflow into pool. If spa is not attached to pool, an overflow, sufficient in size to carry full pump-flow, must be installed at water level in the spa.
2. Plumb a three-port **Intake Valve** on the suction-side of the filter pump, so that center port of valve is connected to the pump inlet.
Connect spa suction to one side of Intake Valve, and pool suction to the other side.
3. Plumb a three-port **Return Valve** on the return-side of the heater, so that return water will enter valve through the center port.
Connect spa return to one side of Return Valve, and pool return to the other side.
4. A ½" spa make-up line (incorporating a ½" manual gate or ball valve and, for elevated spas, a ½" check valve) may be provided to bypass the pool return line. This will enable some of the chemically-balanced water from the pool to cycle through the spa. The manual valve will allow the amount of bypass to be adjusted.
5. If the spa is to be constructed in concrete, special provision should be made at this time for the installation of the **Spa-side Remote Control**.
Select a convenient location in the deck or above water level in the spa wall (where the Spa-side Remote will not be submerged by the spa water), and install a 6" to 12" length of 1-½" pvc pipe to provide a receptacle for the Spa-side Remote. The pipe should be level and protrude beyond the finished surface of the spa. It will be cut back at a later date.
Reduce pipe size down to ½" or ¾" conduit, and run to proposed LX-100 location at equipment pad. Use sweep elbows for turns.
The Spa-side Remote will not be installed until spa construction is complete.
6. For systems which incorporate a skimmer, it is possible to balance the amount of suction between the skimmer and main drain for maintenance purposes.
This is easily accomplished by installing a manual three-port mixing valve at the suction line. Plumb one port to the skimmer and the other to the main drain.
7. If a "non-booster pump" pressure-side pool cleaner is being used, plumb a manual three-port valve between the filter pump and filter, with the third port plumbed to the pool cleaner line, and install a motorized two-port **Pool Cleaner Valve** at this line. The motorized valve will automatically open whenever the Control System activates the pool cleaner.
8. If a booster pump pool cleaner is being used, plumb the booster pump so that its suction-side is connected to the pool return, after the heater and as close to the ground as practical.

LX-100 POWER CENTER

Select a convenient location to mount the LX-100 Power Center. Ensure that the location is greater than 5 feet from the water's edge and no further than 15 feet from any motorized valves (otherwise Valve Actuator cables will need to be extended).

Mount the LX-100 on a flat surface using appropriate screws through the three external mounting points located on the side of the enclosure. **Do not drill and mount from inside the enclosure.**

Loosen LOCK SCREW of hinged faceplate in left-side of LX-100, and swing open to expose the low-voltage compartment. All low-voltage connections are made to the circuit board, in accordance with wiring diagram located inside door.

The high-voltage wiring compartment is located behind service panel in right-side of LX-100.

HIGH VOLTAGE WIRING

GENERAL

At the equipment site, install an electrical sub-panel with separate breakers for each load.

Circuit breakers should be readily accessible to the spa user, but installed at least 5 feet from the water's edge.

Make sure that the motor(s) on the equipment have built-in thermal protection.

At the LX-100, remove the service panel (at left) to expose the high-voltage compartment, and knock-out the appropriate holes at bottom of enclosure to facilitate conduit mounting. Screw terminals are provided for high-voltage connections.

SYSTEM POWER

Provide a separate circuit breaker to power the system. Either 115 or 230VAC can be used (115V is preferable). System draws less than 1-Amp. The breaker will open all ungrounded supply conductors to comply with section 422-20 of the National Electrical Code, ANSI/NFPA 70-1987.

Run appropriate wires from circuit breaker to high-voltage compartment of LX-100, and connect to top terminal block in accordance with wiring label, which is marked **SYSTEM POWER**.

Install two jumper wires for 115V, or one jumper for 230V, according to wiring label.

EQUIPMENT POWER

Provide independent circuit breakers for R1 (FLTR), R2 (AUX1), R3 (AUX2) and R4 (AUX3).

Run appropriate wires from breakers to high-voltage compartment of LX-100, and connect to LINE1 and LINE2 screw terminals at each terminal block.

Connect pumps and other high-voltage equipment to LOAD1 and LOAD2 terminals.

Each individual terminal block can be wired for either 115V or 230VAC.

Note: For 115V equipment, only half of the terminal block will be used (ie: LINE1 and LOAD1).

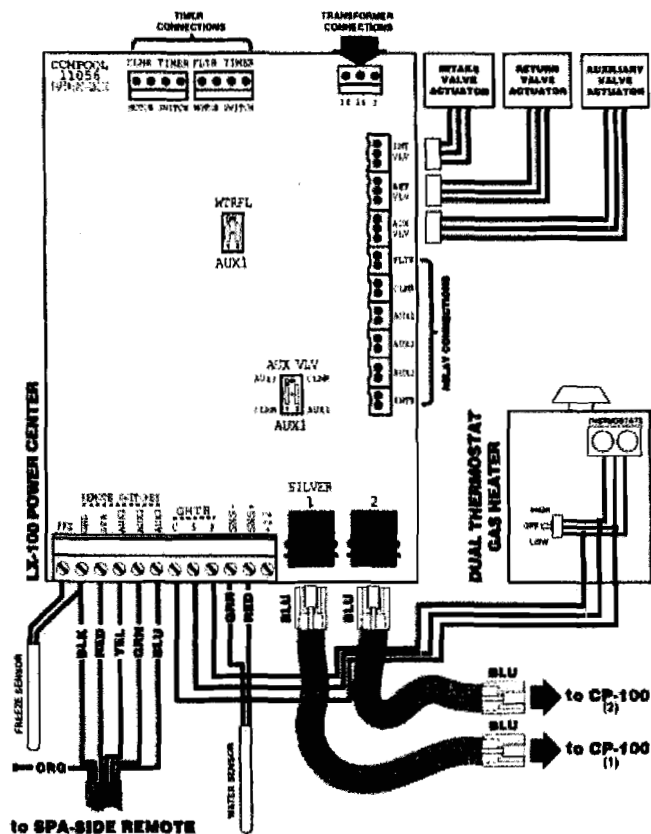
LOW VOLTAGE CABLES

Install cable between the low voltage compartment of the LX-100 Power Center and the various pieces of equipment. Provide plastic or metallic conduit where cables run underground, through concrete, etc.

Note: Never install low voltage and high voltage wires in the same conduit. It is advisable to maintain a minimum distance of 12" between parallel runs of low voltage and AC current-carrying wires.

1. 2 qty. separate 150 foot spools of 6-conductor 26 AWG communication cable are provided (one black and one silver) to connect to the CP-100 Controller.
Note: Cable lubricant must be used when pulling these cables through the conduit.
2. 25 feet of 2-conductor 22 AWG cable is provided to connect the Water Temperature Sensor.
3. CVA-24 Valve Actuators are provided with 15 feet of 3-conductor cable.
4. The optional Spa-side Remote Control is provided with necessary cable attached.

LOW VOLTAGE WIRING



CP-100 INDOOR CONTROLLER

Select a convenient location inside the house or other weather-protected area to mount the CP-100 Controller. The overall width of the Controller (with doors open) is 11-½". The location of the 6-conductor communication cables (on the centerline of the enclosure) should therefore be at least 5-¼" from any door jamb, wall corner or other obstacle.

Remove backplate from Controller. Temporarily pull cables through large hole in backplate, and position backplate on surface of wall. Make sure that backplate is level and that "TOP" nomenclature is oriented correctly, and mark the three mounting points on the surface of the wall. With the backplate removed from the wall, drill 3/16" diameter holes and insert mounting anchors (included) into the three holes. Pull cables through large hole in backplate, and use the three 1-¼" screws to mount backplate to wall.

Use the **Crimping Tool (model TOOL-6)** to attach modular connectors at each end of both cables. See **USING THE CRIMPING TOOL**, below.

At the CP-100 Controller, plug the silver cable (with modular connector attached) into the circuit board at **Socket #1 (SILVER)**, and plug the black cable into **Socket #2**.

Use the four ½" screws (included) to mount CP-100 Controller to the backplate.

At the LX-100 Power Center, plug the silver cable (with modular connector attached) into the circuit board at **Socket #1 (SILVER)**, and plug the black cable into **Socket #2**.

USING THE CRIMPING TOOL

Make sure that the end of the cable is cut square (not diagonally).

Insert the cable between the stripper blades of the tool until it touches the stop. Squeeze the handles and pull the tool, making sure that the cable stays perpendicular to it. If this is done correctly, the outer jacket of the cable will be removed without damaging the insulation on the individual conductors.

Place a modular connector in the holder portion of the tool so that the front of the connector is against the stop and the gold contacts face the crimper. Orient the prepared cable so that the blue conductor is closest to the tool handles, and insert cable into connector. Make certain that the conductors are flush with the tip of the connector and directly under the gold contacts. Squeeze the handles firmly to set the contacts and secure the cable.

Note: It is important that the orientation (blue conductor closest to tool handles) is identical at all four cable ends.



VALVE ACTUATORS

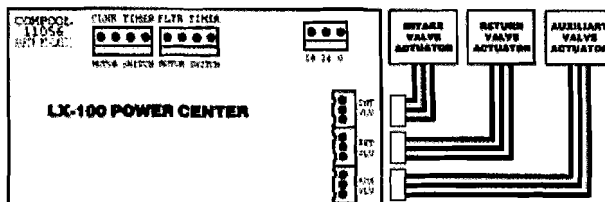
Remove knob, handle and four screws from cap of valve(s) to be motorized, and use the four mounting screws provided to mount Valve Actuator(s) to valve(s).

Run cables to low-voltage wiring compartment of LX-100, and plug into circuit board at the appropriate Valve Socket:

Plug intake (suction) valve into **INT VLV Socket**.

Plug return valve into **RET VLV Socket**.

Plug auxiliary valve (if applicable) into **AUX VLV Socket**.



WATER TEMPERATURE SENSOR

Select a convenient location to mount the **Temperature Sensor (model TS-5L)** in the plumbing system (after the intake valve, and before the heater).

Drill a 5/16" diameter hole in the pipe, and insert the Sensor.

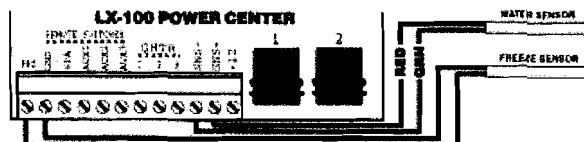
Use a screwdriver to open the hose clamp (included). Position clamp over the Sensor, and gently tighten around the pipe. **Caution: Overtightening of clamp can cause deformation of o-ring seal.**

Run 2-conductor cable (25 ft. is included with Installation Hardware package) between Sensor location and low-voltage compartment of LX-100 Power Center.

At the Sensor, pay attention to color coding (green conductor connects to green; red conductor connects to red), and use 2 of the crimp connectors (included) to provide waterproof connections.

Before making connections, cut-off uninsulated wire (conductors should not be stripped). Push the two wires to be connected into the small holes at one end of each connector, and squeeze the cylinder with a pair of pliers.

At the LX-100, strip insulation of both conductors 1/4", and connect to circuit board at **SNS-** and **SNS+ Screw Terminals**. Pay attention color-coding (green conductor connects to SNS-; red conductor connects to SNS+).



HEATER CONNECTIONS

DUAL THERMOSTAT GAS HEATER

Inside the gas heater, connect three 18 AWG wires in parallel with the heater toggle switch.

Do not disconnect or bypass the flow, pressure or high limit switches.

Place the heater toggle switch in the "OFF" position, and set the thermostats to desired pool and spa temperatures.

Run the three wires to low-voltage compartment of LX-100 Power Center.

Strip insulation ¼", and connect to circuit board at **GHTR Screw Terminals**, in accordance with wiring diagram located inside the LX-100 cover:

Connect "High" of heater thermostat to **Terminal #S**.

Connect "Low" of heater thermostat to **Terminal #P**.

Connect "Common" of heater thermostat to **Terminal #C**.

SINGLE THERMOSTAT GAS HEATER/HEAT PUMP

Inside the heater, connect two 18 AWG wires in series with the heater circuitry.

Do not disconnect or bypass the flow, pressure or high limit switches.

Place the heater toggle switch in the "ON" position, and set the thermostat to the desired temperature.

Run the two wires to low-voltage compartment of LX-100 Power/Load Center.

Strip insulation ¼", and connect to **GHTR Screw Terminals** at **Terminals #P** and **#C**.

Make a jumper wire and connect **Terminals #P** and **#S** together.

ELECTRIC HEATER

For systems which utilize an electric heater, a **20-Amp Relay Kit (model RLYLX)** should be added at the LX-100 Power/Load Center.

Install **RL-LX** in accordance with instructions provided, and plug onto circuit board at the **EHTR relay socket**.

The relay is capable of controlling an electric heater (rated up to 3KVA), or the magnetic contactor of a larger electric heater.

Inside the heater, connect two 14 AWG wires in series with the heater thermostat circuitry. Place the heater toggle switch in the "ON" position, and set the thermostat to the desired temperature.

Run the two wires to the high-voltage compartment of the LX-100 Power/Load Center, and connect to **LINE1** and **LOAD1** terminals of the electric heater relay.

SYSTEM OPTIONS

SPA-SIDE REMOTE CONTROL

The optional Spa-side Remote Control is a double-insulated device which is UL-listed for installation within 5 feet of the water's edge. It is typically installed at the tile-line of the spa wall (above water level), or in the deck within arm's reach of the spa.

If the Spa-side Remote is to be installed into the wall of a gunite spa, provision should be made while the spa is being plumbed. See "RECOMMENDED HYDRAULIC SCHEMATIC" on page 2.

When the spa construction is completed, cut back the 1-½" dia. pvc receptacle flush with the spa wall finish or surface of deck. See Fig. 1.

Screw Mounting Adapter onto Spa-side Remote, and finger-tighten. **Do not use wrench.**

Thread cable through conduit to low-voltage compartment of LX-100 Power Center.

Carefully glue Mounting Adapter into 1-½" pvc receptacle using pvc cement. For aesthetic purposes, it is suggested that the Spa-side Remote be installed with the red pushbutton in the 12 o'clock position. See Fig. 2.

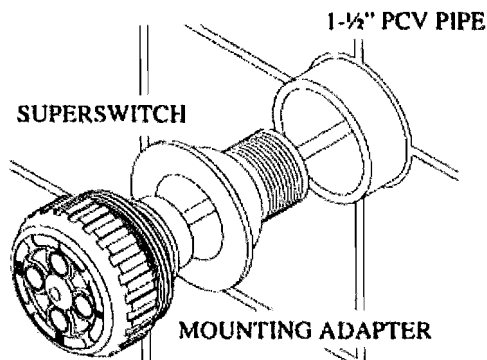


Fig. 1

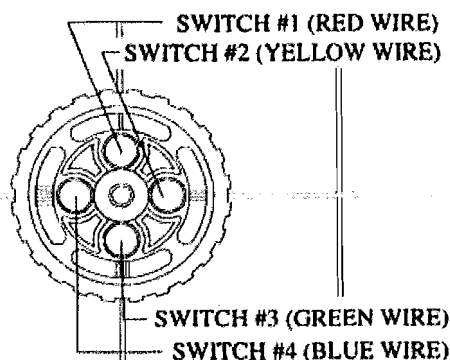


Fig. 2

At the LX-100, identify the 6-conductor cable from the Spa-side Remote, and cut-off excess cable as necessary. Strip insulation of each conductor ¼", and connect to **REMOTE SWITCHES Screw Terminals** at bottom of circuit board in accordance with wiring diagram:

Black conductor (Switch Common) to **GND screw terminal**.

Red conductor (Red Pushbutton) to **SPA screw terminal**.

Yellow conductor (Yellow Pushbutton) to **AUX1 screw terminal**.

Green conductor (Green Pushbutton) to **AUX2 screw terminal**.

Blue conductor (Blue Pushbutton) to **AUX3 screw terminal**.

There is no connection for the orange conductor.

A set of adhesive labels is provided for custom identification of individual Spa-side Remote pushbuttons. Use a pair of fine-tip tweezers to carefully adhere the appropriate label at each button.

POOL CLEANER

For systems which incorporate a booster pump pool cleaner, it is possible to add a mechanical time clock for programming the daily cleaning cycles.

Install **24-Hour Time Clock (model TMR-LX)** into LX-100 faceplate at the **POOL CLEANER** location, and plug into top of circuit board at **CLNR TIMER socket**, in accordance with instructions provided.

Install a **20-Amp Relay Kit (model RLY-LX)** at the LX-100 Power Center in accordance with instructions provided, and plug into circuit board at **CLNR relay socket**.

AUXILIARY VALVE

It is possible to add a **Valve Actuator (model CVA-24)** to the system to motorize a two-port or three-port valve for a custom hydraulic feature (such as a pool cleaner, fountain, waterfall, etc.). The Valve Actuator can be activated from either the pool cleaner or auxiliary 3 circuit.

Remove knob, handle and four screws from cap of valve to be motorized, and use the four mounting screws provided to mount Valve Actuator to valve. Run cable to low-voltage compartment of LX-100, and plug into circuit board at **AUX VLV Valve Socket**.

Identify the 2-position **AUX VLV Program Switch**, which is located at bottom right of LX-100 circuit board, and use the corner of a small screwdriver or other blunt instrument to adjust the Switch accordingly:

1. To activate valve from the pool cleaner circuit, turn **Switch #1 ON** and **Switch #2 OFF**.
2. To activate valve from the auxiliary 3 circuit, turn **Switch #1 OFF** and **Switch #2 ON**.

SPA WATERFALL CONTROL

For systems where spa water level is higher than that of the pool, it is possible to use the auxiliary 1 circuit to rotate the return valve to spa return position, thus creating an overflow (waterfall effect) from the spa into the pool. This feature will cease whenever the spa is being circulated.

To enable this feature, it is necessary to adjust the 2-position **WTRFL-AUX1 Program Switch**, which is located at center right of LX-100 circuit board. Use the corner of a small screwdriver or other blunt instrument to slide **Switch #1** and **Switch #2** to the ON position.

FREEZE PROTECTION

A **Recirculating Freeze Sensor (model FPS-C)** may be added to the system. It will protect the plumbing and equipment from possible freeze damage by running the filter pump whenever the temperature falls to approx. 41°F.

Install FPS-C in accordance with instructions provided, and connect to LX-100 circuit board at **FRZ** and **GND** screw terminals.

An **Auxiliary Freeze Sensor (model FPS-AUX)** may also be added to the system to activate auxiliary equipment (such as a jet pump) during potential freezing conditions.

Install FPS-AUX in accordance with instructions provided.

Note: It is advisable to inspect and test Freeze Sensors at least once a year, preferably prior to the onset of the freezing season. Testing can be done by immersing Sensor in ice water.

SYSTEM START-UP

Apply power to the system.

At the Power Center, verify that the **POWER ON status light** is illuminated, and make sure that all of the **Service Switches** are in the "AUTO" position.

If the status light is not on, check the 3 amp circuit breaker which is located above the faceplate. If the circuit breaker has tripped (indicated by a white tab), push to reset.

At the Indoor Controller, verify that there is a **TEMPERATURE Display** and check that the **EQUIPMENT STATUS INDICATORS** are functioning when the **Pushbuttons** are activated.

If there is no status display, check the connections at each end of the communication cables very carefully.

If necessary, crimp new modular connectors to the cables.

If the **TEMPERATURE Display** indicates three dashes (- - -) or a very high temperature (400 degrees or more), check the connections to the Temperature Sensor.

At the Indoor Controller, press appropriate **Pushbutton(s)** so that none of the **EQUIPMENT STATUS INDICATORS** are illuminated.

At the Intake and Return Valves, flip toggle switch on rear of Actuator(s) between "ON1" and "ON2" positions as necessary so that valves have rotated to pool circulation.

At the Power Center, verify that the **FILTER PUMP Time Clock** is operating.

To set the time of day, rotate the dial in a clockwise direction until the hours and minutes line up with the white arrow at eight o'clock position on clock face.

To program daily operating cycle(s), depress the desired number of sections around the perimeter of the dial by pushing towards the center. For each section depressed, the filter pump will operate for 15 minutes.

If the system has a **POOL CLEANER Time Clock**, verify that it is operating, and check that it also activates the filter pump when the **FILTER PUMP Time Clock** is not programmed on.

At the Power Center, slide the **SPA Service Switch** to "FILL", "DRAIN" and back to "AUTO" position, and verify that the Valve Actuators are rotating accordingly.

If one of the Valve Actuators is 180 degrees out of phase, flip toggle switch on rear of Actuator between "ON1" and "ON2" position.

At the Power Center, verify that the filter pump is being activated from the "ON" and "OFF" positions of the **FILTER Service Switch**.

Verify that the auxiliary equipment is being activated from the "ON" and "OFF" positions of the **AUX1, AUX2 and AUX3 Service Switches**.

Slide **FILTER Service Switch** to the "ON" position and the **HEATER Service Switch** to the "SPA & POOL" position, and verify that the heater has fired.

If the heater doesn't fire, check the controls inside the heater and also the wiring connections.

At the Power Center, return the **HEATER Service Switch** to the "SPA ONLY" position and all the other **Service Switches** to the "AUTO" position.

At the Indoor Controller, press **Pushbutton #S** to turn the spa on.
Verify that the Valve Actuators have rotated to spa circulation, the filter pump has been activated and the heater has fired.

Press **Pushbuttons #1, #2 and #3**, and check that appropriate equipment is being activated.

A set of adhesive labels is provided for custom identification of equipment.
Use a pair of fine-tip tweezers to adhere the appropriate label(s) below the **Pushbutton(s)** on the Indoor Controller.

Calibration of the **TEMPERATURE Display** has been preset at the factory. However, fine adjustment can be accomplished if necessary.
Insert a small flat-blade screwdriver through the **ADJUST hole** which is located behind the right door of the Indoor Controller, and rotate the Adjustment Screw accordingly.

The system is now ready to be operated as desired.

OWNER'S MANUAL

CP-100 POOL-SPA CONTROL SYSTEM

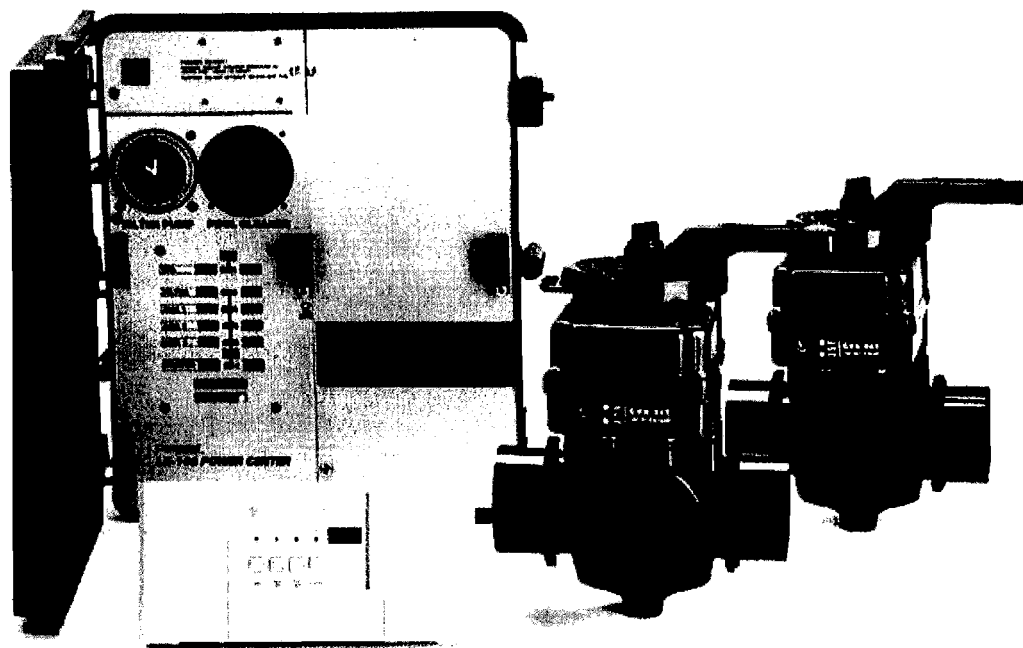
IMPORTANT SAFETY INSTRUCTIONS

When operating or servicing this electrical equipment, basic safety precautions should always be observed, including the following:

READ AND FOLLOW ALL INSTRUCTIONS.

WARNING: To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

SAVE THESE INSTRUCTIONS.



INTRODUCTION

The CP-100 is an electronic control system which is designed to coordinate and operate all of the equipment associated with your swimming pool and spa.

The system is comprised of three principle components:

1. **Indoor Controller.**
2. **Power Center.**
3. **Motorized Valves (2qty).**

The **Controller** provides pushbutton control of the equipment from the convenience of your home; the **Power Center** automatically controls the timing of your filter pump and pool cleaner (if applicable) and provides easy maintenance for your Pool Serviceperson; and the **Motorized Valves** switch the filter and heater from pool to spa.

Additionally, the Control System incorporates important safety features which protect your pool equipment from accidental damage.

Your system may also include additional Remote Controls and special options which further add to the convenience, safety and economy of operating your pool equipment.

SAFETY FEATURES

HEATER PROTECTION

A built-in electronic delay circuit automatically runs the filter pump for an additional 5 minutes whenever the spa is turned off. This feature enables the heater to cool down, so that the heat exchanger and plumbing are not damaged from overheating.

POOL CLEANER PROTECTION

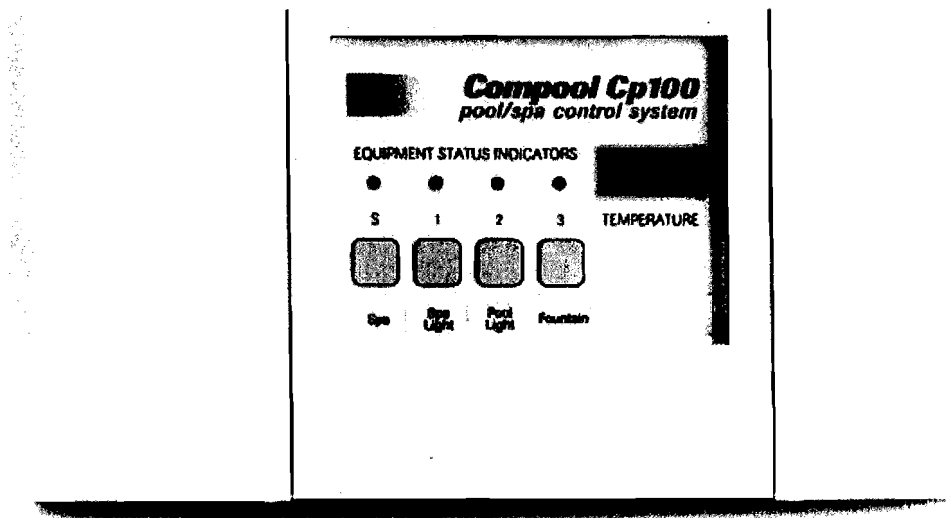
If your system incorporates an automatic pool cleaner, it will have been plumbed in conjunction with the filter pump so that it must have water circulation in order to operate.

The CP-100 incorporates the following protection features against possible pump damage if there is no water circulation:

1. The filter pump will automatically be activated whenever the pool cleaner is running, even if the filter pump isn't programmed on.
2. Your pool cleaner will automatically be switched off whenever water is being circulated to the Spa.

INDOOR CONTROLLER

Installed in a convenient location inside your house, the Controller gives you fingertip control of all the equipment associated with your swimming pool and spa



Equipment Pushbuttons #S, #1, #2 and #3

Four Pushbuttons are provided for activating the various pieces of equipment. Your Pool Builder should have custom-labeled each Pushbutton for your specific application.

EQUIPMENT STATUS INDICATORS

Status Lights are located above each Pushbutton. The presence of a light indicates that the equipment is running. The absence of a light indicates that equipment is turned off.

TEMPERATURE Display

A digital display indicates the precise water temperature. Spa temperature is displayed during spa circulation, and pool temperature is displayed during pool circulation.

Note: The filter pump must be running to provide accurate temperature display.

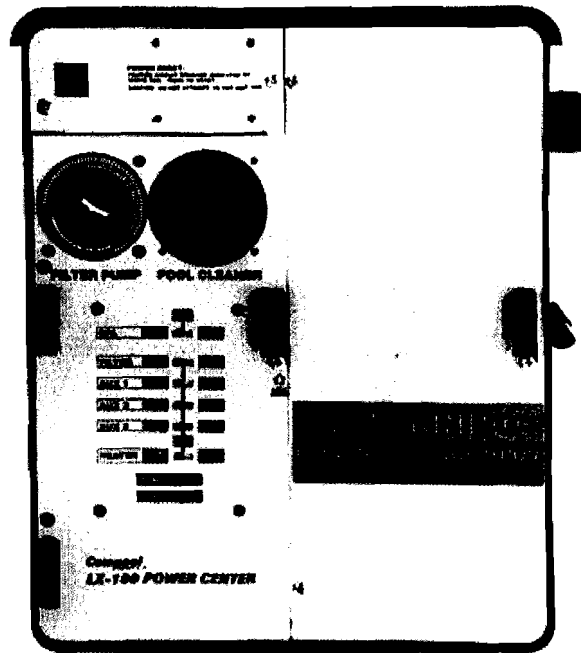
USING YOUR SPA

To turn your spa on, simply press **Pushbutton #S**.

The motorized valves will rotate to spa circulation, the filter pump will turn on and the heater will fire. The **TEMPERATURE Display** will let you know when the spa is ready for use.

POWER CENTER

Located in close proximity to your pool equipment, the Power Center houses mechanical time clocks for your filter pump and pool cleaner (if applicable), and manual switches for your Pool Serviceperson.



FILTER PUMP and POOL CLEANER Time Clocks

Check with your Pool Builder or Service Company as to the amount of time required to provide efficient filtration and cleaning of your pool.

To set the correct time of day, rotate the Dial(s) in a clockwise direction until the hours and minutes line up with the white arrow at eight o'clock position on clock face.

Pay particular attention to the AM and PM sections of the Dial(s).

To program the daily filtration or cleaning cycle(s), depress the desired number of sections around the perimeter of the Dial(s) by pushing towards the center. For each section depressed, the equipment will operate for 15 minutes.

NOTE: A built-in protection circuit automatically activates the filter pump whenever the pool cleaner is running, even if the FILTER PUMP Time Clock is not programmed on. This safeguards against possible damage to the pool cleaner pump when there is no water circulation.

SPA Service Switch

For normal system operation, keep this Switch in the "AUTO" position.
The "FILL" and "DRAIN" positions are used when cleaning the spa.

FILTER Service Switch

For normal system operation keep this Switch in the "AUTO" position.
The "OFF" and "ON" positions allow your Pool Serviceperson to override the **FILTER PUMP Time Clock** without altering the program.

CAUTION: If your system incorporates a **POOL CLEANER Time Clock**, pump damage will occur if the pool cleaner is activated while the **FILTER Service Switch** is in the **OFF** position.

AUX1, AUX2 and AUX3 Service Switches

For normal system operation, keep these Switches in the "AUTO" position.
The "OFF" and "ON" positions override the Indoor Controller, and provide convenient manual control at the equipment site.

HEATER Switch

The "SPA ONLY" position will enable heating only when the spa is being circulated.
The "OFF" position will disable the heater.
The "SPA & POOL" position will enable heating whenever the spa or pool is being circulated.

For Dual Thermostat Heaters: At the heater set pool and spa thermostats to desired temperatures. Verify at the heater that the 3-position "ON/OFF" switch was set to "OFF" during installation.

For Single Thermostat Heaters: To heat the spa only set the spa temperature at the heater and set the LX-100 Power/Load Center Heater switch to "SPA ONLY". If pool heating is desired, it is necessary to turn the heater thermostat down to **pool temperature** and set the LX-100 Power/Load Center Heater switch to "SPA & POOL".

Verify at the heater that the "ON/OFF" switch was set to "ON" during installation.
The "SPA ONLY" position will enable heating only when the Spa is being circulated.
The "OFF position" will disable the heater.
The "SPA & POOL position" will enable heating whenever the filter pump is running.

PUMP DELAY Status Light

A built-in electronic delay circuit will automatically run the filter pump for an additional 4 minutes whenever the Spa is turned off. This enables the heater to cool down, so that the heat exchanger and plumbing are not damaged from overheating.
The **PUMP DELAY Light** indicates that the delay is in effect.

POWER ON Status Light

Indicates that power has been connected to the system.
If this light is not on, consult your Pool Serviceperson.

MOTORIZED VALVES

Your control system is designed to activate two motorized valves, which automatically rotate between pool and spa circulation whenever **Pushbutton #S (SPA)** is activated at the Indoor Controller. These valves are also activated from the "FILL" and "DRAIN" positions of the **SPA Service Switch** at the Power Center.

An additional motorized valve may have been installed for a custom hydraulic application, such as a fountain or waterfall, or (in lieu of a booster pump) to activate your pool cleaner.

A toggle switch is located on the rear of each Valve Actuator. This switch is used by the Pool Builder to set the correct valve rotation direction.

DO NOT ADJUST THIS SWITCH POSITION.



SYSTEM OPTIONS

SPA-SIDE REMOTE CONTROL

A 4-button waterproof Remote Control may have been installed into the wall of your spa. This will enable you to control the equipment while sitting in your spa.

Your Pool Builder should have custom-labeled each button for your specific application.

The **RED Button** duplicates **Pushbutton #5** at the Indoor Controller (activates the spa circulation).

The **YELLOW Button** duplicates **Pushbutton #1** at the Indoor Controller.

The **GREEN Button** duplicates **Pushbutton #2** at the Indoor Controller.

The **BLUE Button** duplicates **Pushbutton #3** at the Indoor Controller.



SPA WATERFALL CONTROL

If your spa water level is elevated above that of the pool, your Pool Builder may have incorporated a spa waterfall (spillway) feature.

With this feature, you can use **Pushbutton #1** at the Indoor Controller (and the **YELLOW Button** at the Spa-side Remote) to circulate the pool water back to the spa, creating an overflow (waterfall effect) from the spa to the pool. The waterfall effect will cease whenever you are circulating the spa.

FREEZE PROTECTION

A Freeze Sensor may have been added to your Control System. This will protect the plumbing and equipment from freeze damage by running the filter pump whenever the temperature falls to approx. 41°F.

Freeze Sensors may have also been added to activate auxiliary equipment (such as a jet pump or fountain) during potential freezing conditions.

MAINTENANCE

CLEANING THE SPA

For cleaning or maintenance purposes, it is possible to use the Control System to automatically empty your Spa and then to refill with clean water from the Pool.

At the Power Center:

1. Set the **SPA Service Switch** to "DRAIN" position.
2. Set the **FILTER Service Switch** to the "ON" position. The Spa will begin to drain into the Pool.
3. Before the Spa has completely drained, set the **FILTER Service Switch** to the "OFF" position. Do not drain the Spa completely or prime will be lost.
4. When cleaning or spa maintenance is complete, set the **SPA Service Switch** to the "FILL" position and the **FILTER Service Switch** to the "ON" position. The Spa will begin to fill with clean water from the Pool.
5. When the water level in the Spa has returned to normal, return the **SPA Service Switch** and the **FILTER Service Switch** to the "AUTO" position.

CAUTION: Do not leave the equipment unattended when draining or filling the Spa.

WINTERIZING THE SYSTEM

During the winter season, it is possible to partially drain your Swimming Pool and disable the pool equipment, but still be able to use your Spa.

Consult a qualified Service Company to drain the Pool and protect the plumbing from freeze damage.

The following procedure will disable the pool equipment:

1. At the Indoor Controller, press **Pushbutton #S** (to turn the Spa on).
2. At the motorized valves, flip toggle switch on rear of Valve Actuators to the "OFF" position.
3. At the Indoor Controller, press **Pushbutton #S** (to turn the Spa off).
4. At the Power Center, set the **FILTER Service Switch** to the "OFF" position (to disable the Time Clock) or, if daily Spa filtration is required, leave the **FILTER Service Switch** in the "AUTO" position and program the **FILTER PUMP Time Clock** accordingly.

If your Control System incorporates a Recirculating Freeze Sensor, it may not be necessary to have the Swimming Pool drained. It is however recommended that all Freeze Sensors be tested by an authorized Serviceperson before the onset of the winter season.

Testing can be accomplished by placing the Sensor in a glass of ice water, and turning the **FILTER Service Switch** to the "OFF" position. If the Sensor is functioning correctly, the filter pump should turn on within ten minutes. This test should also be conducted on any Auxiliary Freeze Sensors which may have been added for the jet pump or auxiliary equipment.

TROUBLE-SHOOTING

Your Control System is designed to provide years of trouble-free pool and spa enjoyment. However, if at any time your System should behave erratically, consult the following Check List, which should help to alleviate any problems caused by operator error. If you are still unable to solve your particular symptom, refer the situation to a qualified Pool Service Company.

GENERAL

1. Check all circuit breakers at electrical sub-panel.
2. At the Power Center, ensure that all the **Service Switches** are in the "AUTO" position.

NOTHING OPERATES

1. Check 3-amp circuit breaker which is located above **FILTER PUMP Time Clock** in Power Center. Tripped circuit breaker is indicated by a white tab. Push to reset.
2. If circuit breaker continues to trip, refer to a qualified Service Company.

FILTER PUMP DOES NOT OPERATE

1. At the Power Center, check that the **FILTER PUMP Time Clock** is programmed on.
2. Turn the **FILTER Service Switch** to the "ON" position. If the pump still doesn't operate, consult a qualified Service Company.

FILTER PUMP DOES NOT TURN OFF

1. At the Power Center, check that the **FILTER Service Switch** is not in the "ON" position.
2. Check that the **PUMP DELAY Status Light** is not on, indicating that the System is running its 4-minute cool down cycle.
3. Check that the **POOL CLEANER Time Clock** is not programmed on, automatically forcing the filter pump on.
4. Turn the **FILTER Service Switch** to the "OFF" position. If the pump continues to run, consult a qualified Service Company.

POOL CLEANER DOES NOT OPERATE

1. At the Power Center, check that the **POOL CLEANER Time Clock** is programmed on.
2. At the Indoor Controller, make sure that **Pushbutton #S (SPA)** is not turned on.
3. Pool cleaner pump may require servicing.

HEATER DOES NOT OPERATE

1. Make sure that filter pump is running.
2. Check heater thermostat setting and pilot light (if applicable).
3. Check filter pressure. If filter is clogged, the heater may not be getting sufficient water flow.
4. Heater may require servicing.

SPA WATER LEVEL DROPS

1. At the Power Center, check that the **SPA Service Switch** is in the "AUTO" position.
2. Check that Motorized Valves rotate in both directions by adjusting toggle switch on the rear of each Valve Actuators. Remember to return switches to their original position after testing.
3. A "check valve" in the system may be leaking. Refer to a qualified Service Company.

For questions, repairs, replacement parts, or information on possible Authorized Service Centers within your vicinity call:

Pentair Pool Products ~ 800-831-7133

Or visit us on the Internet at www.pentairpool.com



Because reliability matters most