

# SolarTouch™

## Solar Controller System

### Installation and User's Guide



**OPERATION**

**Menu:** Press to access menu and scroll through options.

**Less/More:** Press arrows to lower or raise target temperature. Move cursor up/down to adjust setting within menus.

**Enter:** Press to select a menu item. Save a setting.

**Disable and Re-Enable SolarTouch system:**  
Press and hold Enter for three seconds.

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Rainproof (TYPE 3) Control Panel for indoor or outdoor use. Suitable for swimming pool/spa applications.

  
E324942

For supply connections use No. 14 to 18 AWG conductors suitable for at least 60 °C (140 °F).

**ELECTRICAL RATINGS:**  
**INPUT POWER:** 120 VAC, 4 AMP or 240 VAC, 2 AMP - 50/60 Hz.  
 CONNECT TO ONE SOURCE ONLY. SEE AC WIRING DIAGRAM INSIDE ENCLOSURE.  
**OUTPUTS:**  
**LOW VOLTAGE:** 24 VAC, .85 AMP  
**HIGH VOLTAGE:** ISOLATED DRY CONTACT - MAXIMUM 240 VAC, 50/60 HZ, 10 AMP PER RELAY CONTACT OUTPUT.



**Solar control system**

**⚠ WARNING! HIGH VOLTAGE**  
BE SURE TO DISCONNECT POWER BEFORE SERVICING POOL EQUIPMENT OR REMOVING THIS PANEL.

PRESS HERE      TO REMOVE FRONT PANEL      PRESS HERE

**IMPORTANT SAFETY INSTRUCTIONS**  
**READ AND FOLLOW ALL INSTRUCTIONS**  
**SAVE THESE INSTRUCTIONS**

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## IMPORTANT WARNING AND SAFETY INSTRUCTIONS

**WARNING** Most states and local codes regulate the construction, installation, and operation of public pools and spas, and the construction of residential pools and spas. It is important to comply with these codes, many of which directly regulate the installation and use of this product. Consult your local building and health codes for more information.



**IMPORTANT NOTICE - Attention Installer:** This Installation and User's Guide ("Guide") contains important information about the installation, operation and safe use of this underwater pool and spa light. This Guide should be given to the owner and/or operator of this equipment.

**WARNING** Before installing this product, read and follow all warning notices and instructions in this Guide. Failure to follow warnings and instructions can result in severe injury, death, or property damage. Call (800) 831-7133 for additional free copies of these instructions. Please refer to [www.pentairpool.com](http://www.pentairpool.com) for more information related to this products.



**WARNING** Be sure that the pool or spa meets the requirements of the current National Electrical Code (N.E.C.) Article 680-22 and all local codes and ordinances. A licensed or certified electrician must install the electrical system to meet or exceed those requirements before the underwater light is installed.



When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:



### IMPORTANT SAFETY INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS. READ AND FOLLOW ALL INSTRUCTIONS.

Before attempting installation or service, be sure the source AC power to the Controller is switched OFF at the circuit breaker located at the house.

- **DANGER! RISK OF ELECTRIC SHOCK, WHICH CAN RESULT IN SERIOUS INJURY OR DEATH.** Before attempting installation or service, be sure the source AC power to the Controller is switched OFF at the circuit breaker located at the house.
- Grounding (earth bonding) is required. The Controller should be installed by a qualified professional.
- Read Safety Precautions and Important Instructions (page iii). Before attempting any electrical wiring, be sure to read and follow Safety Instructions. Wiring should only be performed by a qualified professional.



**WARNING** Risk of Electric Shock. Install at least 5 feet (1.5 m) from inside wall of pool using nonmetallic plumbing.

## IMPORTANT WARNING AND SAFETY INSTRUCTIONS

**⚠ WARNING**

To reduce the risk of injury, do not permit children to use this product.

**⚠ WARNING**

A wire connector is provided on this unit to connect a minimum 8 AWG (8.4 mm<sup>2</sup>) solid copper conductor between this unit and any metal equipment, metal enclosures of electrical equipment, metal water pipe, or conduit within 5 feet (1.5 m) of the unit.

**⚠ CAUTION**

CONNECT ONLY TO A CIRCUIT PROTECTED BY A CLASS A GROUND FAULT CIRCUIT INTERRUPTER.  
USE COPPER CONDUCTORS ONLY



For Canadian C-UL (CNL) Clause 5.3.4 of C22.2 No. 218.1-M89.

**READ AND FOLLOW ALL INSTRUCTIONS.**

**A green-colored terminal or a terminal marked G, GR, Ground, Grounding, or the symbol is located inside the supply terminal box or compartment. To reduce the risk of electric shock, this terminal must be connected to the grounding means provided in the electric supply service panel with a continuous copper wire equivalent in size to the circuit conductors supplying this equipment.**

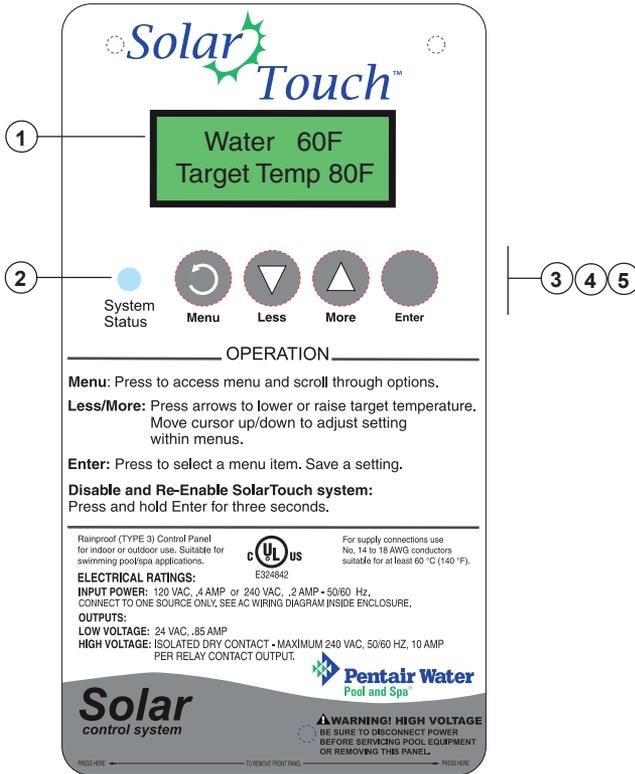
## Introduction

The SolarTouch solar controller system consists of a four button controller, a valve actuator, a diverter valve and two temperature sensors (used for water and solar). The controller maximizes available solar heat by monitoring the temperature of both the solar collectors and the pool water. When the pool requires heating, and the solar collectors are in energy-receiving mode, the controller automatically diverts the water flowing between the pool's filter and gas heater or heat pump and circulates the water through the solar collectors. There, the water is heated to a target temperature, or until there is no more solar energy is available. The SolarTouch solar controller supports IntelliFlo® and IntelliPro® pumps. For more information, see page 10.

## General Features

- **View Current Water and Solar Temperature:** In normal operating mode the main screen displays the current WATER temperature and the HEATING or COOLING target temperature.
- **Easy Temperature Adjustment Controls:** From the SolarTouch solar controller control panel you can easily adjust the desired target temperature setting from the Heating and Cooling menus. To adjust the water target temperature, press the Less (Down arrow) button or More (Up arrow) button to lower or raise the set temperature to the desired level. Press the Enter button to toggle between the current Water and Solar temperature.
- **Nocturnal Cooling:** The SolarTouch solar controller provides automatic nocturnal (nighttime) cooling during night time hours for pools that overheat in hot climates. When enabled, SolarTouch circulates relatively warmer pool water to the collector panels when the collector temperature and the pool temperature is hotter than the high limit setting. This process cools the pool water over time. Circulation will stop when the collector temperature is 2° (default) less than the pool temperature or the pool temperature is cooler than the high limit setting. For more information, see page 7.
- **Freeze Control (Advanced Menu):** When the water temperature and the solar sensor temperature fall below 40° F (4° C), the pool/spa water is automatically circulated through the system to prevent freezing. When the solar temperature sensor and the water sensor reaches 42° F (6° C) freeze protection will stop. In mild climates, freeze protection can prevent equipment damage. In climates where prolonged freezing temperatures occur, freeze protection is not recommended. In the event of a power failure, pool equipment is not protected against freezing conditions. For more information, see page 7.

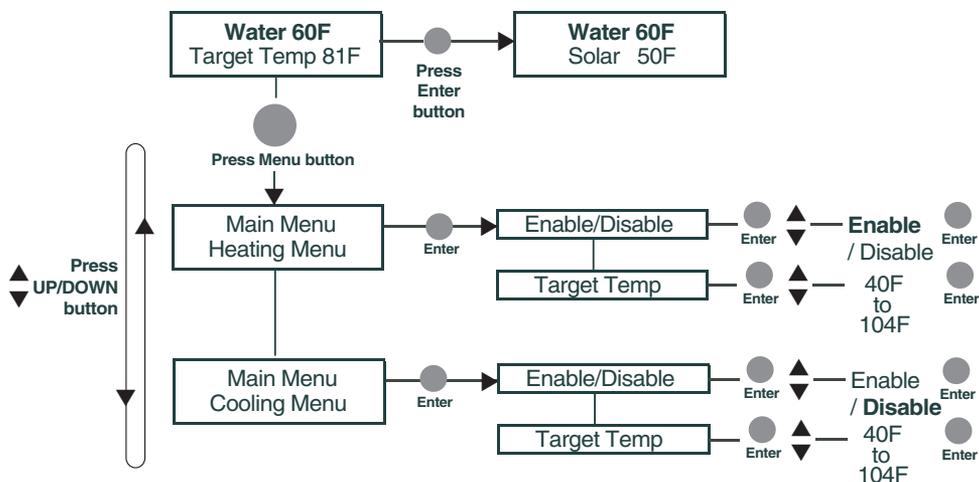
## SolarTouch Control Panel



- 1** **Liquid Crystal Display (LCD):** The system LCD displays backlighting for easy viewing of the menu items and status messages. Each button press will light the display. When an event message is displayed, the backlight will also be on.
- 2** **System Status LED indicator:** When indicator is green, the system is running normally. If indicator is red an error occurred. See page 10 for error conditions.
- 3** **Menu Button:** Access Main Menu and exit menus. Press and hold this button to access the Advanced Menu. Scroll through menu options. While in a menu or sub-menu, access a previous menu level or item. If no menu activity is detected after 30 seconds, the main screen is displayed. All menu settings are permanently saved and retained even after the unit is power off.
- 4** **Less / More buttons:** Lower or Raise target water temperature. Move cursor Up/Down to adjust menu setting within menus.
- 5** **Enter button:** Select a menu item and save a menu setting. Press this button to view Solar water set point temperature setting. The display will automatically revert back to the monitoring water and solar temperatures after 30 seconds from the last selection. **Note: Press and hold the Enter button to disable Heating, Cooling and Freeze Protect (display shows “SolarTouch Disabled”). Press and hold the Enter button again to enable SolarTouch.**

## Using the SolarTouch Control Buttons

### SolarTouch Main Menu



### Using the Enter Button to Disable/Enable SolarTouch System

For service purposes, the SolarTouch solar system can disable Heating, Cooling and Freeze Protect. **Press and hold the Enter button** to disable the system. The display shows "SolarTouch Disabled". Press and hold the Enter button again to enable the SolarTouch system.

### SolarTouch Main Status Screens

In normal operating mode the main screen displays the current WATER temperature and the HEATING or COOLING temperature. Press the Enter button to toggle between the current Water and Solar temperature.

Example: The following screens show SolarTouch in normal operating mode. The water temperature is 60°F (16°C), solar heating is on and the target temperature is 80F (see Heating Menu page 3).



Example: The following screens show SolarTouch in monitoring mode. The water temperature is 80°F (27°C), heating is enabled, cooling is disabled (default) and freeze protection is Off (disabled) and the target temperature is 80°F (27°C) (see Heating Menu page 3).



Press the **Enter** button to view current solar temperatures.

## Temperature Control

From the SolarTouch control panel you can set the desired target temperature setting. After the target temperature is reached, the solar system will automatically switched off after the target temperature is reached and/or when solar energy is no longer available.

### Adjusting the Water/Solar Temperature Setting (see Main Menu on page 3)

To adjust the water target temperature, press the **Less (Down arrow) button** or **More (Up arrow) button** to lower or raise the set temperature to the desired level. The water temperature can be adjusted from 40° F to 104° F (4° C to 40° C). This allows the solar system to heat the water up to the target temperature.



Less (Down arrow) button - More (Up arrow) button

## Normal Operating Mode

In normal operating mode the main screen displays the current WATER temperature and the HEATING or COOLING target temperature. Press the Enter button to toggle between the current Water and Solar temperature. Degree units are displayed in either Fahrenheit or Celsius (see Advanced menu, page 5).

Based on the current solar and water temperatures, SolarTouch operates automatically to control water through the solar collectors. "Target Temp" is displayed on the main screen indicating SolarTouch is in normal operating mode. This mode will automatically switch the system on whenever solar energy is available. SolarTouch will heat the pool or spa (rotate the valve to solar position and turn on a booster pump) when solar heat is available and the "Target Temp" is set higher than the water temperature. The solar roof sensor must be 6° higher than the water temperature. The pump must be ON for a few minutes for operation. When the roof sensor and the water temperature are within 2°, solar heat will switch off. The solar temperature start and stop differential settings are factory set at 6° and 2°. These differential settings are adjustable in the **Advanced Menu** settings. Refer to your solar service professional for the optimum setting.

*Note: For more Information about daily pool filtering schedules and time clock override see page 12.*

# SolarTouch Menus

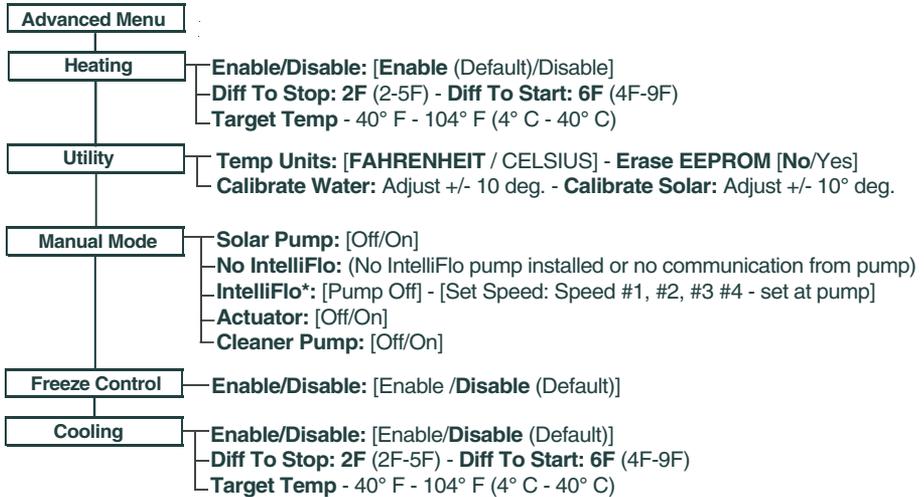
## Main Menu

Use the **Main Menu** for everyday solar operating features and the **Advanced Menu** for solar utility settings. To access the Main Menu, press the MENU button. The Main Menu items are as follow:



## Advanced Menu

To access the Advanced Menu, press hold and release the MENU button. The Advanced Menu items are as follow:



Note: (\*) Only displays is IntelliFlo pump is connected and communicating with SolarTouch.

## Heating

The SolarTouch system can heat the pool/spa by circulating water through the solar panels. Heating must be enabled in the Heating Menu. The initial default setting is “Enabled.” To start and stop solar water heating, adjust the start (default 6°) and stop (default 2°) temperature differential settings.

The Heating Menu settings are as follows:

Menu Item	Action
Enable/Disable	Enables or disables Heating.
Target Temp	The desired pool/spa temperature.
Diff To Start * (4°F - 9°F)	The minimum temperature difference to start Heating.
Diff To Stop * (2°F - 5°F)	The temperature difference at which Heating will stop.

(\* available in Advanced Menu)

Heating will start when both the “Diff To Start” condition is met and the water temperature is below the Target Temp. Heating will continue until either the temperature difference reaches the “Diff To Stop” or the water temperature reaches .8°F above the Target Temp. If needed, you can adjust the start (default 6°) and stop (default 2°) temperature differential settings to adjust when to start and stop solar water heating.

**When Heating turns ON;** the Solar Pump Relay and Valve Actuator are activated (ON). After five minutes the Cleaner Pump Relay will turn on.

- **IntelliFlo pump installed:** If an IntelliFlo pump is detected, it will be set to **Speed #2** (1500 RPM default speed for all IntelliFlo and IntelliPro pumps except for IntelliFlo VF (Press Manual button on pump to set RPM and GPM speeds. See the IntelliFlo VF manual (P/N 350075).

**When Heating turns OFF;** the Solar Pump Relay and Valve Actuator are turned off. The Cleaner Relay remains on.

- **IntelliFlo pump installed:** If an IntelliFlo pump is detected, it will go to stand-alone mode (may take up to two minutes). The pump is not being controlled by SolarTouch at this time.

## Cooling

The SolarTouch system can cool the pool/spa by circulating water through the solar panels when the solar controller is at a lower temperature than the pool/spa water (typically at night). Cooling must be enabled in the Cooling Menu. The default setting is “Disabled.” To start and stop cooling, adjust the start (default 6°) and stop (default 2°) temperature differential settings.

The Cooling Menu settings are as follows:

Menu Item	Action
Enable/Disable	Enables or disables Cooling.
Target Temp	The desired pool/spa temperature.
Diff To Start * (4°F - 9°F)	The minimum temperature difference to start Cooling.
Diff To Stop * (2°F - 5°F)	The temperature difference at which Cooling will stop.

(\* available in Advanced Menu)

*Continue to page 7.*

**Cooling turns ON;** when the water temperature is above the target temperature then cooling will be turned on and the Solar Pump Relay and Valve Actuator are activated (ON). After five minutes the Cleaner Pump Relay will turn on.

- **IntelliFlo pump installed:** If an IntelliFlo pump is detected, it will be set to **Speed #2.** (1500 RPM default speed for all IntelliFlo and IntelliPro pumps except for IntelliFlo VF (Press Manual button on pump to set RPM and GPM speeds. See the IntelliFlo VF manual (P/N 350075).

**Cooling turns OFF;** when the water temperature is below the target temperature the Solar Pump Relay and Valve Actuator are turned OFF. The Cleaner Relay remains on.

- **IntelliFlo pump installed:** If an IntelliFlo pump is detected, it will go to stand-alone mode (may take up to two minutes). The pump is not being controlled by SolarTouch at this time.

**Nocturnal Cooling:** SolarTouch provides automatic nocturnal cooling for pools in hot climates that overheat. Water circulates through the system when the collector temperature and the pool temperature is hotter than the target temperature setting. Circulation will stop when the collector temperature is 2° (Default) less than the pool temperature or when the pool temperature is cooler than the target temperature setting.

## Freeze Protect

When the water or solar sensor temperature falls to 40°F (4°C) or below, the pool/spa water is automatically circulated through the system to prevent freezing. When the temperature in the solar collector reaches 42°F (6°C) and above, freeze protection will stop. The initial default setting is “Disabled”. Freeze Protect will continue until both temperatures reach at least 42°F (6°C). The Freeze Menu settings are as follows:

Advanced Menu Item	Action
<b>Enabled/Disabled (Disabled default)</b>	<b>Enables or disables Freeze Protection.</b> Enable/Disable Freeze Protect Freeze Protect will start when either the water or solar temperature reaches 40°F (4°C) or below. Freeze Protect will continue until both temperatures reach at least 42°F (6°C).

**When Freeze Protect is turned ON;** the Solar Pump Relay and Valve Actuator are activated (ON). If an IntelliFlo pump is detected, it will be set to **Speed #3.** After five minutes the Cleaner Pump Relay is turned on.

**When Freeze Protect is turned OFF;** the Solar Pump Relay and Valve Actuator are turned off. If an IntelliFlo pump is detected, it will go to stand-alone mode (may take up to two minutes). The pump is not being controlled by SolarTouch at this time.

## Manual Mode

Manual mode is useful for setup or service purposes. Manual mode menu settings will override existing SolarTouch system settings. After you exit the Manual mode menu all previous system settings will resume. **Note: While in the Manual mode menu, the system will stay in Manual Mode until you manually exit back to the Advanced Menu.** In Manual Mode the SolarTouch relays can be manually controlled. Manual Mode is only available in the Advanced Menu. Any changes made to settings while in Manual Mode will not affect previously saved settings.

The Manual Mode Menu settings are as follows:

Menu Item	Action
Solar Pump	On / Off
Cleaner Pump	On / Off
Actuator	On / Off
IntelliFlo*	Pump Off / Speed #1 / Speed #2 / Speed #3 / Speed #4

(\* IntelliFlo will only be displayed if an IntelliFlo pump is detected.

**Note: For IntelliFlo SolarTouch connections, see page 18.**

Each relay remains in the state it was in when entering Manual Mode until it is manually changed. While in manual mode, each relay will stay in any state set by the user as long as they stay in Manual Mode.

**SolarTouch Relays:** When exiting Manual Mode, all relays are **turned off**, and then set to the previously save settings.

**SolarTouch Sensors:** If both sensors are open or shorted and Freeze Protect is enabled, Freeze Protect will automatically be switched on.

**Cleaning your pool:** Turn SolarTouch OFF while manually vacuuming your pool/spa.

## Default Settings (Erase EEPROM)

The SolarTouch factory default setting can be reset from the Erase EEPROM menu. To access the Erase EEPROM menu go to: **Advanced Manu > Utility Menu > Erase EEPROM > Erase EEPROM? (No/Yes)**

The default settings are as follows:

Function	Setting
Heating	Enabled
Cooling	Disabled
Freeze	Disabled
Start Diff.	6°F (-15.5 C°)
Stop Diff.	2°F (-16.6° C)
Target Heating	80°F (26° C)
Target Cooling	90°F (32° C)

## Calibrating Sensors

### Control Panel LED indicator

To adjust the calibration of the pool water and solar collector sensor go to:

**Advanced Menu > Utility Menu > Calibrate Water or Calibrate Sensor**

Use the Up or Down arrow button to adjust the calibration of the sensor.

The sensor can be adjusted up to 10° (plus or minus). As you adjust the degree off-set value the corresponding temperature will also be adjusted.

**Calibrate Water**  
70F Adj +0

The Water sensor adjustment range is:  
**Adj +0 (70F) to +10 (+80F) or to -10 (60F)**

**Calibrate Solar**  
80F Adj +0

The Solar sensor adjustment range is:  
**Adj +0 (80F) to +10 (+90F) or to -10 (70F)**

**Note:** The solar roof sensor must be 6° higher than the water temperature. The pump must be ON for a few minutes for operation. When the roof sensor and the water temperature are within 2°, solar heat will switch off. This differential setting is adjustable in the Heating and Cooling menu “Diff To Start” and “Diff To Stop” setting in the Advanced Menu. Adjusting the differential will effect the performance of your solar system. See you solar professional for the optimum setting.

## Troubleshooting

### Pool/Spa is not warm during sunny conditions

- Check SolarTouch “Target temperature,” it may be set too low?
- Check time clock settings are set to the best sunshine hours of the day.
- Solar Actuator Valve may be turned OFF?
- The pool filter may be dirty or clogged. Check the filter PSI and flow strength at pool outlets.
- Pump speed may need to be increased to pump water through system.
- Possible pool/spa water heat loss during nighttime. Might need a pool cover to prevent heat loss.
- Not enough solar collectors. Add an additional solar collector.

### Bubbles in your pool/spa water

- Clean filter: Check filter pressure with solar off then on. If the pressure is high (30 pounds or more) and does not increase with solar on, the filter needs cleaning.
- Check pool skimmer and pump basket for debris.

### SolarTouch valve actuator is not switching positions or producing noise

- Replace fuse 1A5 (1.5 A) on SolarTouch controller circuit board if necessary (see page 18).

*Note: For SolarTouch ERROR conditions, see page 10.*

## Error Conditions

### Error Conditions

When the control panel LED indicator is red, a sensor error has occurred. The control panel LCD will display the error message if either or both of the sensors are shorted or open. If the water or solar temperature sensor is shorted or open, heating and cooling will stop and not restart until the condition is corrected. *Note: The control panel menus can be accessed but will not affect the error condition.*

If one or both of the sensors is shorted or open and Freeze Protect is enabled, Freeze Protect will turn on.

### Error Messages

The sensor error messages are as follows:

#### IF FREEZE MODE IS DISABLED



System  
Status

#### IF FREEZE MODE IS ENABLED

Water Sensor Shorted	← The water sensor reads over maximum temperature >390°F (199°C).	→ Water S Shorted Freeze Protect.
Solar Sensor Shorted	← The solar sensor reads over maximum temperature >390°F (199°C).	→ Solar S Shorted Freeze Protect.
Both Sensors Shorted	← Both temperature sensors read over maximum temperature >390°F (199°C).	→ Sensors Shorted Freeze Protect.
Water Sensor Open	← The water temperature sensor circuit is open or disconnected.	→ Water S Open Freeze Protect.
Solar Sensor Open	← The solar temperature sensor circuit is open or disconnected.	→ Solar S Open Freeze Protect.
Both Sensors Open	← Both temperature sensor circuits are open or disconnected.	→ Sensors Open Freeze Protect.

## IntelliFlo & IntelliPro Pumps

### Using IntelliFlo & IntelliPro Pumps with SolarTouch Solar Controller

The SolarTouch Controller communicates with the IntelliFlo pump via a two-conductor RS-485 communication cable (P/N 350122) which is connected to the COM port on the SolarTouch Controller circuit board (see wiring diagram on page 18). If an IntelliFlo or IntelliPro VS 3050 or 4x160 pump is being used as the main solar pump, an external automatic time clock is required to set the daily pool/spa filtering schedules. It is recommended to use a time clock that can be programmed in 15 minute increments for multiple ON/OFF times. However, it's not necessary to use a time clock when using an IntelliFlo or IntelliPro Variable Speed, IntelliFlo VF, or IntelliFlo or IntelliPro VS+SVRS pump. These pumps have built in scheduling features. For more information about IntelliFlo and IntelliPro pumps, visit [www.pentairpool.com](http://www.pentairpool.com).

### Adjusting IntelliFlo or IntelliPro Pump Preset Speeds

Be sure the pump is powered on and the green power LED is on. *Note: SolarTouch supports one IntelliFlo or IntelliPro pump assigned to pump ADDRESS 1. Note: The IntelliFlo pump must be in "Running" mode to communicate with the SolarTouch controller.*

#### To adjust one of the four preset (default) pump speeds:

The following describes how to adjust IntelliFlo and IntelliPro pump speeds.

The pump models include:

IntelliFlo & IntelliPro Variable Speed Programmable

IntelliFlo & IntelliPro VS 3050

IntelliFlo 4x160

IntelliFlo & IntelliPro VS+SVRS

IntelliFlo VF

1. Press the desired **speed button (1- 4)** to select the preset pump speed. When the selected speed button is pressed, the LED is on. The pump preset buttons and speeds are: **Speed button #1, 750 RPM. #2, 1500 RPM. #3, 2350 RPM and #4, 3110 RPM.**
2. Press the **Start** button. The pump will ramp to the selected preset speed.
3. Adjusting the pump speed while the pump is running, **Press the Up/Down button** to increase or decrease the pump speed. To save the adjusted speed, Press and hold down a Speed Button for three (3) seconds to save speed to the button or press the **Enter button** to save the speed.

## SolarTouch Auxiliary Outputs (solar pump, booster pump, cleaner and time clock)

**Solar Filter pump:** The pool solar (filter) pump is controlled externally by the time clock, which ensures the filter pump is running before the booster pump switches on.

**Booster pump:** To increase water flow through the collector array, a high voltage booster pump can be used in addition to the main filter pump.

- Pump output on the SolarTouch controller circuit board is on whenever solar heat is available and off whenever solar heat is *not* available.
- Booster pump is on whenever solar heat is available and off whenever solar heat is *not* available
- Cleaner: The cleaner is off for five minutes whenever solar heat, cooling or freeze turns on.

## Pool Cleaner Protection

Recommended for use in pool systems which utilize a “booster pump” pool cleaner. This feature automatically turns off the pool cleaner pump for a five (5) minutes whenever solar is initiated. This will protect the pump from damage caused by air in the solar panels at system start-up.

**High voltage relay output, as a booster pump control:** The SolarTouch solar controller control panel can control a high voltage booster pump in addition to the normal low voltage solar valve. The high voltage relay contacts are isolated so that the booster pump can be run on a separate circuit. For more information, see page 18.

**High voltage relay output, as a time clock override:** The SolarTouch solar controller can be used to override a filter pump timer. This feature is important if re-circulate freeze protection or nocturnal cooling functions are being used. Also, this function can be used on systems that should operate whenever solar heat is available, regardless of the timer settings. For more information, see page 18.

**Low voltage output: Solar Valve Connector:** The SolarTouch solar controller can control a single solar valve, which diverts water depending on the temperature of the water and the settings. There are two three pin valve actuator connectors provided on the SolarTouch circuit board. Select either connector to be used for the desired direction of the valve (pool or spa). For more information, see page 18.

**Time clock pool daily filtering override:** When using single or two speed pump, or an IntelliFlo or IntelliPro VS 3050 and 4x16 pump, for daily pool filtering schedules SolarTouch requires the pump to be connected to an external 24 hour time clock. In order to override the daily pool filtering schedules, a two-pole timer or two-pole relay for switching the pump on or off is required.

**CAUTION!** All of the electrical wiring methods and materials used to complete the electrical installation of the pool/spa system must be in accordance with the National Electrical Code or the Canadian Electric Code, as well as any local electrical codes in effect at the time of installation.

**Using IntelliFlo or IntelliPro pumps for daily filtering:** When using an IntelliFlo or IntelliPro Variable Speed or IntelliFlo VF pump connected to SolarTouch, an external 24 hour time clock for daily pool filtering is *not required*. These pumps have built-in programs to schedule daily pool filtering.

## High Voltage Connections



**WARNING** BEFORE OPENING THE FRONT PANEL OF THE SOLARTOUCH TO ACCESS THE HIGH VOLTAGE COMPARTMENT AND LOW VOLTAGE COMPARTMENT, SWITCH THE MAIN POWER OFF INTO THE HOME AT THE MAIN CIRCUIT BREAKER BOX, AND SWITCH OFF THE MAIN POWER TO THE CONTROLLER.



**WARNING** INSTALL ALL ELECTRICAL CONTROLS AT EQUIPMENT PAD, SUCH AS ON/OFF SWITCHES, TIMERS, AND CONTROL SYSTEMS, ETC. TO ALLOW THE OPERATION (STARTUP, SHUT-DOWN, OR SERVICING) OF ANY PUMP OR FILTER SO THE USER DOES NOT PLACE ANY PORTION OF HIS/HER BODY OVER OR NEAR THE PUMP STRAINER LID, FILTER LID OR VALVE CLOSURES. THIS INSTALLATION SHOULD ALLOW THE USER ENOUGH SPACE TO STAND CLEAR OF THE FILTER AND PUMP DURING SYSTEM START-UP, SHUT DOWN OR SERVICING OF THE SYSTEM FILTER.

### SolarTouch Controller Enclosure Location

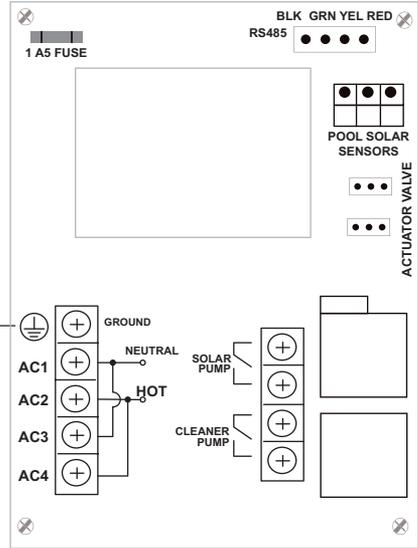
Before installing the Controller enclosure read the following guidelines:

- Switch OFF AC power at the main circuit breaker panel, located at the house before high and low voltage connection to the Controller.
- AC power for the Controller must be provided from the main circuit breaker panel located at the house.
- All electrical equipment must be installed at least five (5) feet from pool and/or spa, and comply with all national, state, and local codes.
- Install the Controller no less than five (5) feet from pool or spa near to the pumps, heater, valves, and sensors. Mount the Controller outside or inside a pool equipment house or other enclosure.
- Before choosing the final location for the Controller, consider the length of the wires and valve wires that have to be connected to the enclosure. Make sure to consider cable lengths for the sensors to the Controller location. The water temperature sensor cable is 20 feet long.
- Mount the Controller on a flat vertical surface or wall so that the conduit knockouts are located at the bottom of the enclosure. Upper and lower brackets are provided to mount the Controller to a vertical surface.
- DO NOT mount the Controller horizontally. Water can enter the conduit knockouts and cause damage to the system and an electrical shock hazard.
- Consider the Controller location when routing the conduit carrying the AC power to the Controller, and the conduit that will be run to the high voltage equipment.
- Allow for unobstructed access to the front of the Controller for the owner or service personnel.
- The Controller provides grounding a screw terminal for grounding all equipment. All equipment including the Controller must be bonded to earth ground.
- Always use the two knockouts located on the **bottom-left for high voltage wiring**, and the two knockouts located on the **bottom-right for the low voltage wiring** (sensors and communication) in order to keep the high voltage and low voltage separate in the enclosure.

## Grounding and Bonding to the Controller

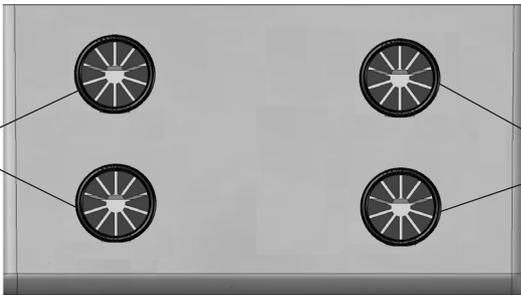
Connect a ground wire from the primary electrical panel to the Controller ground bus bar. Also ground each piece of high voltage (120 VAC or 240 VAC) equipment that is connected to the Controller relays. The Controller must also be connected to the pool bonding system using an 8 AWG (minimum) wire. An earth terminal for bonding is provided on the grounding bus bar inside the Controller. For input AC wiring information, see page 17.

**Grounding Terminal  
(for main AC  
ground wire)**



HIGH VOLTAGE SIDE      LOW VOLTAGE SIDE

For AC input  
Power  
Conductors



Bottom of SolarTouch Controller Enclosure

For low voltage  
conductors  
1" Grommet for  
low voltage  
wires  
(solar collector  
and pool/spa  
water  
temperature  
sensors,  
motorized  
valves)

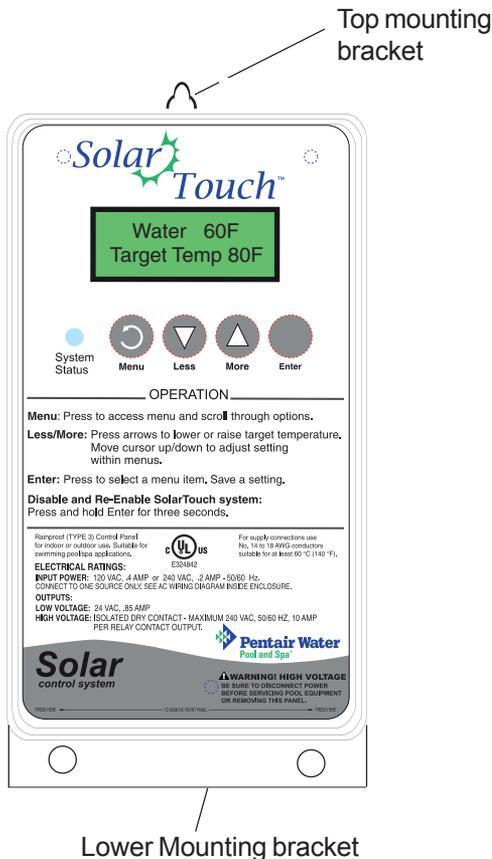
## Mounting the Controller

The Controller can be mounted on a flat vertical surface, such as a wall or post.

**Note:** Select a convenient location to mount the Controller and be sure the location is greater than five (5) feet from the pool or spa and no further than 15 feet from the pool/spa valve.

To mount the SolarTouch Controller Enclosure:

1. Position the enclosure against the vertical flat surface. If wall anchors are being used, support the enclosure in position (horizontally level and square) against the surface and mark the bracket hole pattern on the wall.
2. Secure the enclosure with three (3) screws in the mounting bracket holes. If using wall anchors, use 3/16" drill and set the anchors and secure the enclosure with screws.



## Installing Conduit and Wire to the Enclosure

- Use No.14 minimum to No.6 maximum AWG for power relay circuits depending on the power requirement. Be sure to follow all regulation safety codes for the number and size of conductors that can be installed in various sizes of conduit.
- Supply circuit must be protected by suitable circuit breaker.
- To avoid obstruction into the Controller, when using electrical conduit complete the installation of the conduit before concrete is poured. Also, underground conduit should be positioned in well compacted soil. Ensure that all conduit joints are well sealed and watertight.



**WARNING!** When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:



**IMPORTANT SAFETY INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS. READ AND FOLLOW ALL INSTRUCTIONS.**

- **DANGER! RISK OF ELECTRIC SHOCK, WHICH CAN RESULT IN SERIOUS INJURY OR DEATH.** Before attempting installation or service, be sure the source AC power to the Controller is switched OFF at the circuit breaker located at the house.
- Grounding (earth bonding) is required. The Controller should be installed by a qualified professional.
- Read Safety Precautions and Important Instructions (page iii). Before attempting any electrical wiring, be sure to read and follow Safety Instructions. Wiring should only be performed by a qualified professional.

**TO AVOID AN ELECTRICAL HAZARD** - Do not connect the power source conductors to the Controller until all electrical connections for all equipment (heaters, pumps, motorized valves, and lights etc.) have been completed.

- Follow manufactures instructions when installing and testing of ground fault circuit breakers (GFCB) and interrupters (GFCI).
- For the main AC power conduit, it is recommended to use the 3/4" conduit knockout located directly under the enclosure.
- Use the 1" grommet low voltage opening located on the lower right side of the SolarTouch controller enclosure for the temperature sensor wires. For connection information (see page 18).



**CAUTION** All of the electrical wiring methods and materials used to complete the electrical installation of the pool/spa system must be in accordance with the National Electrical Code or the Canadian Electric Code, as well as any local electrical codes in effect at the time of installation.



**CAUTION** All electrical materials used for the Controller installation must be accomplished by, or be under the direct supervision of a qualified electrician.

## Transformer AC Power Connections

### High Voltage Wiring

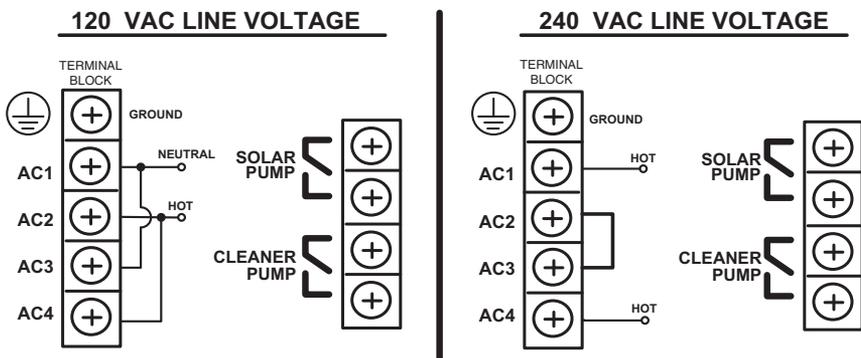
The high voltage wiring section is located inside the SolarTouch Controller enclosure on the right side. The SolarTouch Controller can be connected either to 120 VAC or 220 VAC. The Controller should be wired to receive continuous power (connect directly to sub-panel).

- Use three (3) conductors For the AC power wire into the SolarTouch Controller enclosure from the main circuit breaker at the house, use a three conductor cable. Follow manufactures instructions when installing and testing of ground fault circuit breakers (GFCB) and interrupters (GFCI).

Connect input AC wires to the Controller transformer wires as follows:

- 120 VAC .4 AMP:** Connect the neutral conductor to AC1. Connect the LINE conductor to AC2. Jumper AC1 and AC3 together and AC2 and AC4 together. One wire must be connected to the ground screw terminal.
- 220 VAC .2 AMP:** Connect the neutral conductor to AC4. Connect the LINE conductor to AC1. Jumper AC2 and AC3 together. One wire must be connected to the ground screw terminal.

## AC WIRING DIAGRAM

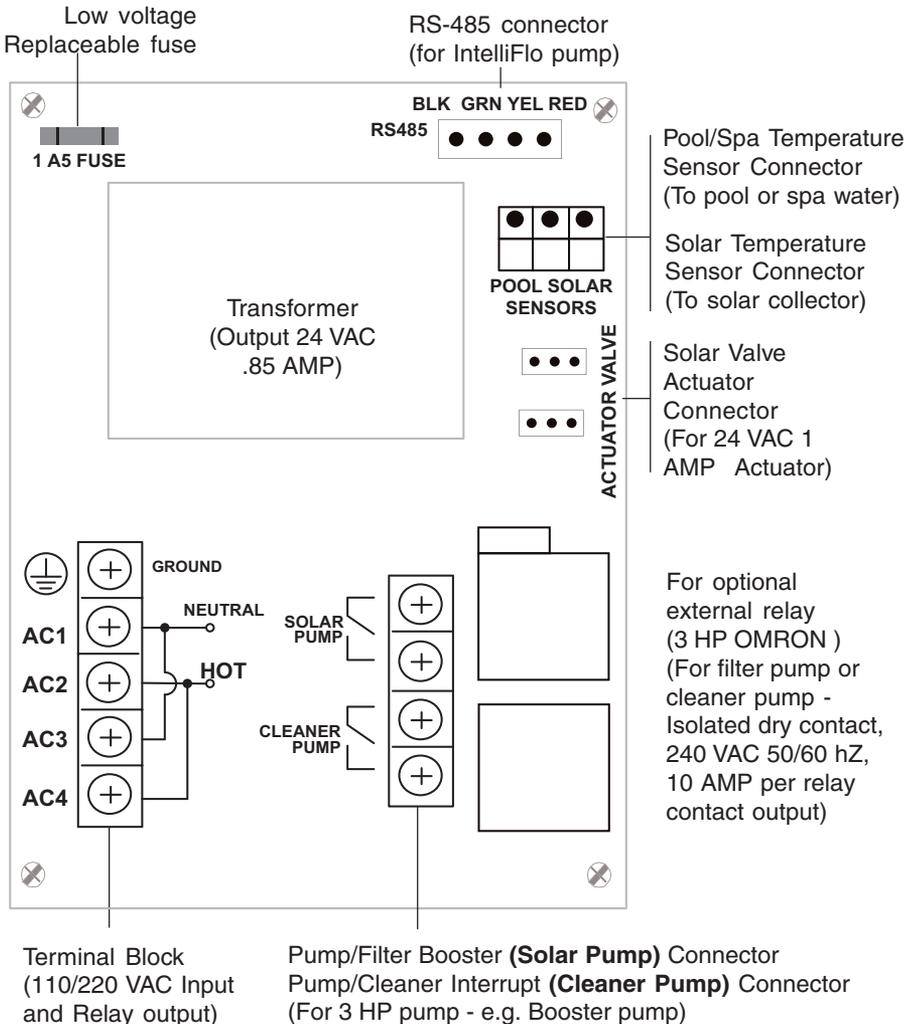


## Controller Circuit Board Connections

The Controller circuit board is mounted onto the back of the enclosure. The circuit provides the voltage connections to switch the filter/booster pump, cleaner pump, solar valve actuators, connections for temperature sensors and connections for communication with an IntelliFlo pump (RS485).

### Equipment Power

- It is recommended to connect the filter pump relay to an independent circuit breaker. Follow manufactures instructions when installing and testing of ground fault circuit breakers (GFCB) and interrupters (GFCI).



## Solar System Installation

- To ensure maximum flow of water through the solar panels, a solar booster pump may need to be added if panels are installed at a very high elevation. Please review your filter pump specifications.
- It is recommended that the solar panels are mounted in a way that gravity will allow draining whenever the filter pump is not on.
- For systems with glazed panels, damage can occur from overheating if the filter pump is still running after the solar has turned off. To enable glazed panels to automatically drain whenever the solar turns off (even if the filter pump is still running), a 1/2" motorized solar drain valve should be plumbed from the solar feed line, through a check valve, to a zero psi point (such as pool fill line or jet air intake).

## SolarTouch Solar System Start-Up

1. Switch power on to the SolarTouch solar controller. Set the "Target Temperature" to a "high" temperature to find the ideal water temperature setting after the pool/spa warms up. Normally it takes up to days of warm sunshine weather for the pool to achieve the target temperature.
2. Set the filter pump time clock to turn on at 10:00 AM, when the sun directly hits on the collectors and to turn off at 5:00 PM, when the sun no longer hits the collectors. *Note: Remember to turn SolarTouch OFF before back washing your filter. Wait 20 minutes after the filter back washing has been completed before turning ON SolarTouch.*
2. If pool cleaner protection has been added to the system, the pool cleaner pump motor should be activated whenever the pool cleaner timer is on. Momentarily turn pool cleaner on and off to check the motor is operating correctly.
3. Check that Solar Valve is in "solar bypass" position, diverting water away from solar panels. If Solar Valve is staged incorrectly (diverting water to the solar panels), reverse switch on back of Valve Actuator (change from ON1 to ON2, or vice-versa). The Valve Actuator will automatically rotate to the correct position.
4. The system is now ready to be operated as desired.

## Installing and Connecting Temperature Sensors

### Water Temperature Sensor

To install the water sensor:

1. Select a convenient location to mount the water sensor in the plumbing system between the filter pump and filter. Drill a 5/16" diameter hole in one side of the pipe,
2. Insert tip of sensor into the hole. Use the band clamp to secure the sensor to the pipe. Tighten the clamp just enough so that the o-ring begins to flatten. Do not overtighten. Fasten the cable to the plumbing with cable ties.
3. Run 22-gauge two-conductor cable (included) between the sensor circuit board. Route the wire up through the grommet on the bottom of the enclosure to the SolarTouch circuit board (see page 18).
4. At the SolarTouch enclosure, cut off the excess wire and the strip conductors ¼ inch. Insert the sensor wires into the **WATER SENSOR** screw terminals (**JP1 Pool**) on right-side of the SolarTouch circuit board (see page 18). *Note: There are three screw terminals; use the middle screw terminal to share with one of the solar sensor wires.*

### Solar Temperature Sensor

Run a two-conductor cable between the sensor and the controller. The maximum sensor cable length is 300 ft (90 m) from the controller enclosure.

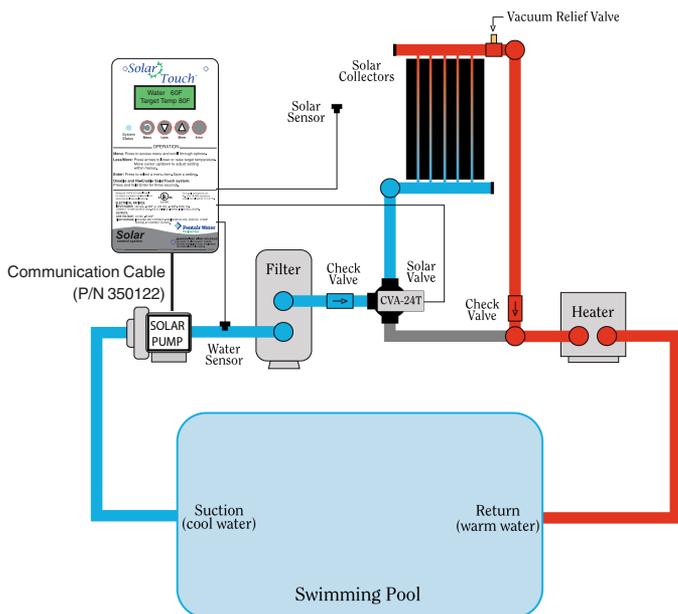
To install the solar sensor:

1. Mount the sensor on a flat surface, with the same exposure to sun as the solar collectors (next to the collectors is recommended) or any sunny location. Do not let the sensor touch the panels. **WARNING: DO NOT DRILL HOLE AND CLAMP SENSOR INTO SOLAR PIPE.** For glazed panels, install the sensor between collector and glazing.
2. If necessary, splice a two-conductor extension wire to the sensor. Run two-conductor cable between the sensor and the controller enclosure. Use waterproof connectors to connect the sensor to the cable. Use twisted pair 20 AWG outdoor rated sensor wiring and be sure the wire connections are protected from the environment. Use shielded cable for long runs (300 ft. (90 m) total wire length maximum) or runs near other electrical wiring.
3. Run 22-gauge two-conductor cable (included) between the sensor circuit board. Route the wire up through the grommet on the bottom of the enclosure to the SolarTouch circuit board (see page 18).
4. At the SolarTouch enclosure, cut off the excess wire and the strip conductors ¼ inch. Insert the sensor wires into the **SOLAR SENSOR** screw terminals (**JP1 Solar**) on right-side of the SolarTouch circuit board (see page 18). *Note: There are three screw terminals; use the middle screw terminal to share with one of the water sensor wires.*

## Solar Hydraulics System

Plumb the solar system in accordance with recommended hydraulics shown below.

- 2" diameter plumbing is advised to ensure maximum flow of water through the solar panels. A solar booster pump should be added if panels are installed at a very high elevation.
- It is recommended that the solar panels are mounted in a way that gravity will allow draining whenever the filter pump is not on.
- For systems with glazed panels, damage can occur from overheating if the filter pump is still running after the solar has turned off. To enable glazed panels to automatically drain whenever the solar turns off (even if the filter pump is still running), a 1/2" motorized solar drain valve should be plumbed from the solar feed line, through a check valve, to a zero psi point (such as pool fill line or jet air intake).



## Temperature vs. Resistance Data

Solar systems use 10k ohm thermistor sensors. When the solar sensor is disconnected from the SolarTouch Controller system, the sensor will read 10k ohm ww at 77° F (25°C). Refer to the following table for the resistance at other temperatures. An accurate reading should give a temperature setting that is accurate to  $\pm 0.2^{\circ}$  C from 0 to 70 ° C.

Temp (°C)	Temp (°F)	Resistance (Ω)
-50	-58	669,500
-45	-49	471,500
-40	-40	336,200
-35	-31	242,500
-37	-35	280,100
-34	-30	234,100
-32	-25	196,300
-29	-20	165,100
-30	-22	176,800
-26	-15	139,300
-25	-13	130,300
-23	-10	118,000
-21	-5	100,200
-20	-4	97,000
-18	0	85,350
-15	5	72,910
-12	10	62,480
-9	15	53,640
-10	14	55,300
-7	20	46,230
-5	23	42,300
-4	25	39,910
-1	30	34,560
0	32	32,600
2	35	30,000
5	40	26,100
5	41	25,400
7	45	22,760
10	50	19,900
13	55	17,440
15	59	15,700
16	60	15,310
18	65	13,480
20	68	12,500
21	70	11,880
24	75	10,500

Temp (°C)	Temp (°F)	Resistance (Ω)
25	77	10,000
27	80	9,298
29	85	8,250
30	86	8,056
32	90	7,331
35	95	6,530
38	100	5,826
40	104	5,326
41	105	5,209
43	110	4,663
45	113	4,367
46	115	4,182
49	120	3,757
50	122	3,602
52	125	3,381
54	130	3,047
55	131	2,985
57	135	2,750
60	140	2,487
63	145	2,251
65	149	2,083
66	150	2,041
68	155	1,854
70	158	1,752
71	160	1,686
74	165	1,535
75	167	1,480
77	170	1,400
79	175	1,278
80	176	1,256
82	180	1,168
85	185	1,071
88	190	980
90	194	916
91	195	900
93	200	827

Temp (°C)	Temp (°F)	Resistance (Ω)
95	203	787
96	205	761
99	210	701
100	212	679
102	215	646
104	220	596
105	221	587
107	225	552
110	230	510
113	235	472
115	239	444
116	240	438
120	248	389
125	257	341
130	266	300
135	275	264
140	284	234
145	293	208
150	302	185

## SolarTouch Solar Controller Power Specifications

### Power:

120VAC, 0.4A 50/60 Hz

240VAC, 0.2A 50/60 Hz

### Output:

24VAC (for solar actuator valve)

High Voltage isolated contacts

10A @ 120VAC/ 240VAC

## SolarTouch Package Contents

SolarTouch kit with solar valve (P/N 521592)

- SolarTouch Controller - QTY 1
- CVA-24T Valve Actuator (P/N 263045) - QTY 1
- Solar valve (P/N 263047) - QTY 1
- 10k ohm Temperature Sensor kit  
- 20 ft. water, solar 40 inches) - QTY 1

SolarTouch kit with non-solar valve (P/N 521632)

- SolarTouch Controller - QTY 1
- CVA-24T Valve Actuator (P/N 263045) - QTY 1
- Non Solar valve (P/N 263026) - QTY 1
- 10k ohm Temperature Sensor kit  
- 20 ft. water, solar 40 inches) - QTY 1

## SolarTouch Replacement Parts

- P/N 521516 – Enclosure Door Replacement Kit
- P/N 521604 – Control Panel Replacement Kit (Faceplate & Control Board)
- P/N 521605 – Power Replacement Kit (Power Board & Ribbon Cable)



**SAVE THESE INSTRUCTIONS**



P/N 521591 Rev A