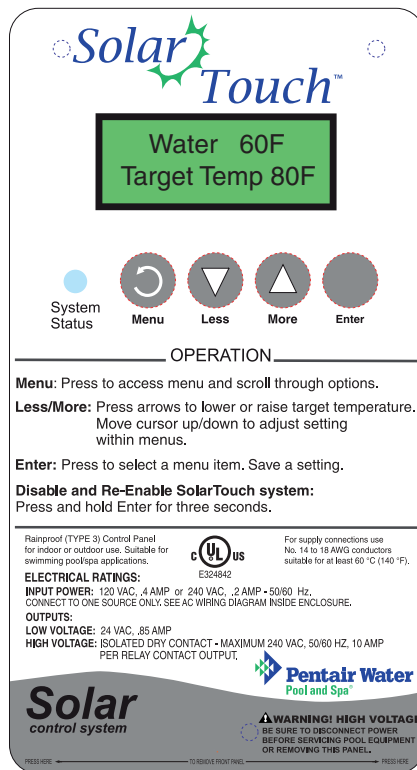


SolarTouch™

Solar Controller System

Installation and User's Guide



IMPORTANT SAFETY INSTRUCTIONS
READ AND FOLLOW ALL INSTRUCTIONS
SAVE THESE INSTRUCTIONS

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Technical Support: Phone: **(800) 831-7133** - Fax: **(800) 284-4151**

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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 product. 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 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 controller is installed.

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.

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 mm²) 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.

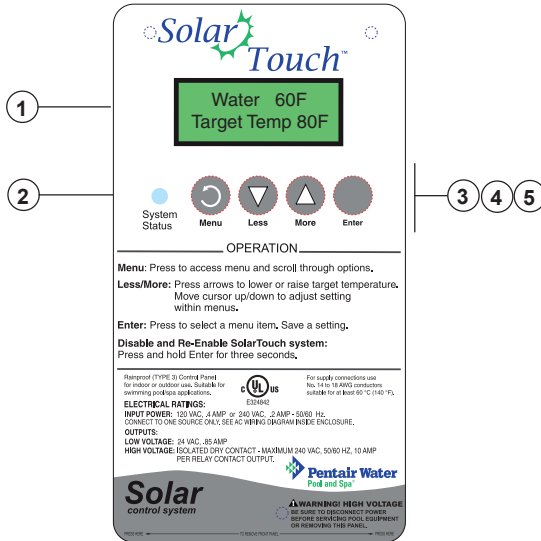
Introduction

The SolarTouch™ solar controller system consists of a four button controller, a valve actuator, a positive sealed diverter valve and two temperature sensors (used for water and solar). SolarTouch maximizes available solar heat by monitoring the temperature of both the solar collectors and the pool water. When the pool calls for heat, and solar is available (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. 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 TARGET temperature. The display also indicates if Solar Heat is on or off. Press the Enter button to view the current Water and Solar temperatures.
- **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.
- **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 6.
- **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 help prevent solar equipment damage. If an IntelliFlo or IntelliPro pump is being used, be sure that the pump provides sufficient RPM/GPM flow so the entire solar array is properly protected. Only filter pump plumbing and collectors are protected. 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 Sensors: If either of the sensors are disconnected or the sensor is shorted and Freeze Protect is enabled, Freeze Protect will automatically be switched on until the problem is corrected. Note: When the control panel LED system Status indicator is red, a sensor error has occurred (see page 10).

SolarTouch Control Panel

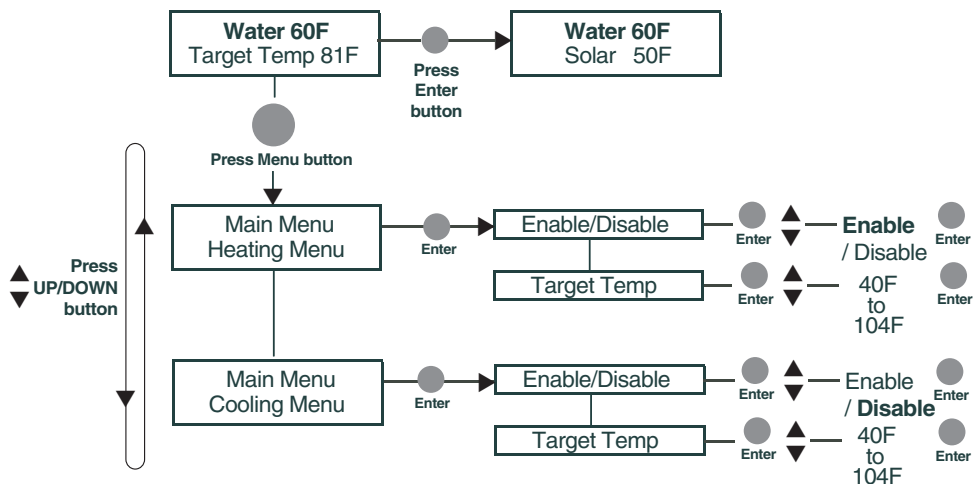


- 1 Liquid Crystal Display (LCD):** The system LCD displays backlighting for easy viewing of the menu items and status messages. Each button press will light the display. When an event message is displayed, the backlight will also be on.
- 2 System Status LED indicator:** When indicator is green, the system is running normally. If indicator is red an error occurred. See page 10 for error conditions.
- 3 Menu Button:** Access Main Menu, Advanced Menu and exit menus. Press and hold this button for three (3) seconds to access the Advanced Menu. If no menu activity is detected after 30 seconds, the main screen is displayed.
- 4 Less/More buttons:** Lower or Raise target water temperature. Scroll through menu options. Adjust menu settings. All menu settings are permanently saved and retained even after the unit is power off.
- 5 Enter button:** This button has the following functions:
 - During normal operation, when SolarTouch is displaying Water Temp, Target Temp and Solar Heat ON/OFF setting. Press and release the Enter button to view current Water and Solar Temperature.
 - While in Main Menu or Advanced Menu, press the Enter button to view menu item settings and scroll through menu options.
 - Press this button to select a menu item.
 - Press this button to save a menu setting and return to the menu tree.
 - Press and hold the Enter button for three (3) seconds to disable all SolarTouch functions (disables Heating, Cooling and Freeze Protect), The display shows “SolarTouch Disabled”). To re-enable SolarTouch press and hold the Enter button for three (3) seconds.

Note: The display will automatically revert back to the monitoring water and solar temperatures after 30 seconds from the last selection.

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, TARGET Temperature and if SOLAR HEAT, NOCTURNAL COOLING or FREEZE is ON or OFF. Press the Enter button to view the current Water and Solar temperatures.

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



Example: The following screens show SolarTouch solar is off. The water temperature is 80°F, solar heating is *off* and the target temperature is 80°F (see Heating Menu page 3).



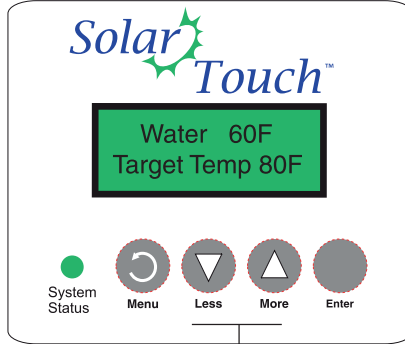
Press the **Enter** button to view current solar temperatures.

Temperature Control

From the SolarTouch control panel you can set the desired target temperature setting using the **Less (Down arrow) button** or **More (Up arrow) button**. After the target temperature is reached, the solar system will automatically switched off 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 sets 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, TARGET Temperature and if SOLAR HEAT, NOCTURNAL COOLING or FREEZE is ON or OFF. Press the Enter button to view the current water and solar temperatures. Degree units are displayed in either Fahrenheit or Celsius (see Advanced menu, page 5).

Effective solar heat depends on the solar and water temperature and the start and stop differentials, then SolarTouch will rotate the positive 3-way valve and turn on the solar booster pump or increase the RPM's if an IntelliFlo or IntelliPro pump is present. This allows the water to flow to the solar collectors.

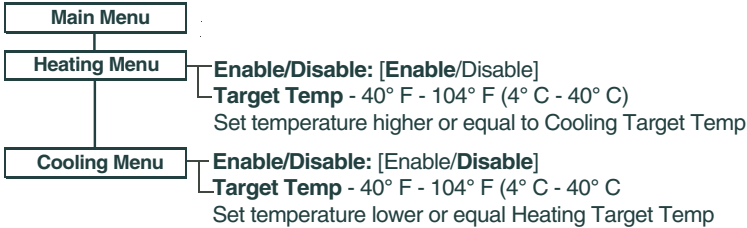
The solar roof sensor must be 6° higher than the water temperature. The pump must be ON for a few minutes for operation. When the roof sensor and the water temperature are within 2° of each other, solar heat will switch off. The solar temperature start and stop differential settings are factory set at 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 13.

SolarTouch Menus

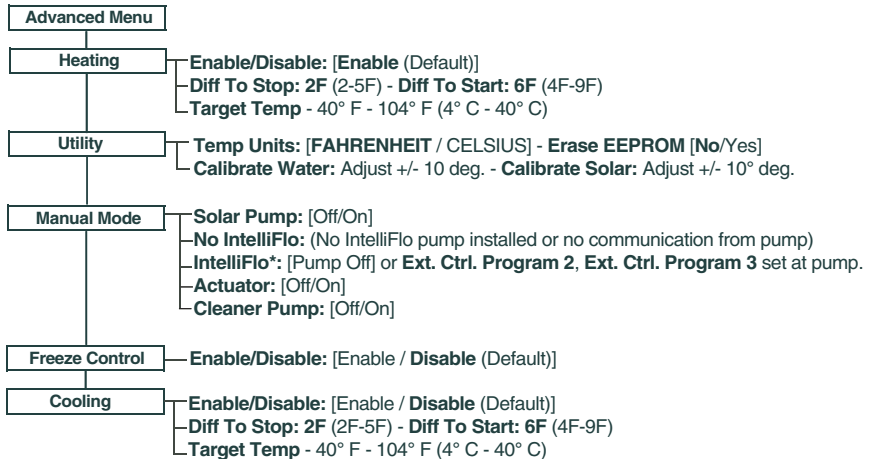
Main Menu

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 follows:



Advanced Menu

To access the Advanced Menu, press hold (three seconds) and release the MENU button. The Advanced Menu items are as follows:



Note: (*) Only displays if IntelliFlo pump if connected and communicating with SolarTouch controller.

Note: (**) **Program 2** is assigned for solar heating/cooling (see page 6).

Program 3 is assigned for freeze protect (see page 10).

Heating

The SolarTouch system can heat the pool or spa by circulating water through the solar panels. Heating must be ENABLED in the Heating Menu. The initial factory default setting is "Enabled." The Start and Stop temperature differentials for solar water heating are adjustable. Factory temperature differential settings are: Start (default 6°) and Stop (default 2°). 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 (continued)

Heating will start when both Start and Stop differential conditions are met and the water temperature is below the Target Temp. When these conditions are satisfied heating is turned ON. Example: Water Temperature is 75°F; Target Temperature is 82°F. When the roof solar collectors temperature exceeds the water temperature by 6° (76°F), the solar valve rotates. If a solar booster pump is required, this pump will turn on. When using an energy efficient IntelliFlo/IntelliPro pump; the pump will ramp up to the RPM's assigned to **Ext Ctrl Program 2**. If pool is plumbed with a pressure cleaner pump (i.e. pool cleaning system), this pressure pump will turn off for five (5) minutes. This allows the air in the solar collectors to be evacuated from the system without damage to the pump.

When Heating turns ON; the solar booster pump will turn ON and valve actuator will rotate. After five (5) minutes the Cleaner Pump Relay will turn on.

- **IntelliFlo/IntelliPro pump connected and communicating with SolarTouch:** **Ext Ctrl Program 2** default speed is assigned for solar heating or cooling. For more about setting Ext Ctrl Program 2, see page 10.

Heating will turn OFF under the following conditions:

- Pool or spa has met the target temperature.
- Cloud cover appeared and the stop differentials turn the system off.
- No more thermal energy available.
- External time clock turned system off.

When Heating turns OFF:

- The valve actuator will rotate.
- Solar booster pump will turn off.
- If IntelliFlo pump is being used as either a filtration pump or a solar booster pump, RPM will change and resume to the timed program set speed (RPM). This could take up to one (1) minute.
- IntelliFlo/IntelliPro pump connected and communicating with SolarTouch: The pump is not being controlled by SolarTouch at this time.
- Pressure Cleaner pump will remain on only if the external time clock cycle is still on.

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 start and the valve actuator will rotate. After five minutes the Cleaner Pump Relay will turn on.

- **IntelliFlo/IntelliPro pump connected and communicating with SolarTouch:** Ext Ctrl Program 2 default speed is assigned for solar cooling (solar booster pump). For more about setting Ext Ctrl Program 3, see page 10.

Cooling will turn OFF under the following conditions:

- Pool or spa has met the target temperature.
- No more thermal cooling energy available.
- External time clock turned system off.

When Cooling turns OFF:

- The valve actuator will rotate.
- Solar booster pump will turn off.
- If IntelliFlo pump is being used as either a filtration pump or a solar booster pump, RPM will change and resume to the timed program set speed (RPM). This could take up to one (1) minute.
- IntelliFlo/IntelliPro pump connected and communicating with SolarTouch: The pump is not being controlled by SolarTouch at this time.
- Pressure Cleaner pump will remain on only if the external time clock cycle is still on.

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. If the solar sensor is placed at the solar collectors and 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). Note: Sensors have a +/- 1° variance. The Freeze Menu settings are as follows:

Advanced Menu Item	Action
Enabled/Disabled (Disabled default)	Enables or disables Freeze Protection. Enable/Disable 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 filter pump, solar booster pump or IntelliFlo/IntelliPro (Ext Ctrl Program 3) pump will turn ON and valve actuator will rotate. After five (5) minutes the Cleaner Pump Relay will turn on.

When Freeze Protect is turned OFF; the filter pump, solar booster pump or IntelliFlo/IntelliPro and Valve Actuator are turned off. If an IntelliFlo pump is connected and communicating with SolarTouch, RPM will change and resume to the timed program set speed (RPM). This could take up to one minute. The pump is not being controlled by SolarTouch at this time.

Manual Mode

To access the Manual mode menu from the Advanced menu, press and hold the MENU button for three (3) seconds. Manual mode is useful for system setup or service purposes. Manual mode 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 actuators, single speed pump and IntelliFlo pump 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 Booster Pump (single speed)	On / Off
IntelliFlo* Pump	Off / Ext. Ctrl. Program 2 and Ext. Ctrl. Program 3 (set at pump).
Pressure Cleaner Pump	On / Off
Actuator	On / Off

(* IntelliFlo will only be displayed if an IntelliFlo or IntelliPro is connected and communicating with the SolarTouch controller.

Note: For IntelliFlo/IntelliPro SolarTouch connections, see page 19.

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.

Cleaning your pool: Turn SolarTouch OFF while manually vacuuming your pool/spa. Press and hold the Enter button for three (3) seconds to disable and re-enable the SolarTouch system.

Default Settings (Erase EEPROM)

The SolarTouch factory default setting can be reset from the Erase EEPROM menu. To access the Erase EEPROM menu: **Press and hold the Menu button > Advanced Menu > 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 Solar Sensor

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

The sensor can be adjusted up to +/-10°. 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 affect the performance of your solar system. See your solar professional for the optimum setting.

Troubleshooting

Pool/Spa is not warm during sunny conditions

- Check Solar Heating Target temperature, it may be set too low?
- Check external time clock settings are set to the best sunshine hours of the day.
- Solar Actuator Valve may be turned OFF or in the wrong position?
- The pool filter may be dirty or clogged. Check the filter PSI and flow strength at pool return outlets. No bubbles should be seen at the pool return line.
- Pump RPM's/Flow with IntelliFlo pump may need to be increased.
- Possible pool/spa water heat loss during nighttime. Install a pool cover to prevent heat loss.
- Not enough solar collectors. Add an additional solar collector.

Bubbles in your pool/spa. Increase RPM's/Flow

- Check 3 way valve for positioning.
- 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

- Check toggle switch at rear of actuator. Actuator should be in position 1 or 2.
- Check or replace fuse 1A5 (1.5 A) on SolarTouch controller circuit board if necessary (see page 19).

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 an open circuit occurred. For sensor resistance data, see page 22. 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	
Water Sensor Shorted	←	The water sensor reads over maximum temperature >390°F (199°C).
Solar Sensor Shorted	←	The solar sensor reads over maximum temperature >390°F (199°C).
Both Sensors Shorted	←	Both temperature sensors read over maximum temperature >390°F (199°C).
Water Sensor Open	←	The water temperature sensor circuit is open or disconnected.
Solar Sensor Open	←	The solar temperature sensor circuit is open or disconnected.
Both Sensors Open	←	Both temperature sensor circuits are open or disconnected.

IF FREEZE MODE IS ENABLED

Water S Shorted Freeze Protect
Solar S Shorted Freeze Protect
Sensors Shorted Freeze Protect
Water S Open Freeze Protect
Solar S Open Freeze Protect
Sensors Open Freeze Protect

Using IntelliFlo & IntelliPro Pumps with SolarTouch

Note: Before working on any IntelliFlo® or IntelliPro® pump (cleaning the basket etc.), first turn OFF the main circuit breaker and wait until the pump's red alarm LED light stops blinking.

IntelliFlo/IntelliPro Pumps recommended for use with SolarTouch Controller

- IntelliFlo/IntelliPro 4x160 (Mfg. 2005 -2011- P/N 011013).
- IntelliFlo/IntelliPro Variable Speed (8 programmable time clocks - P/N 011018 VS 3050).
- IntelliPro Variable Speed (8 programmable time clocks, P/N P6E6VS4H-209L).

IntelliFlo/IntelliPro Pumps not recommended for use with SolarTouch Controller

- IntelliFlo/IntelliPro VF 3.2 Kilowatts (P/N 011012)
- IntelliPro VS+SVRS (P/N P6E6XS4H-209L)
- IntelliFlo VS+SVRS (P/N 011017)

For more information about IntelliFlo and IntelliPro pumps, visit www.pentairpool.com.

Using IntelliFlo/IntelliPro Variable Speed Pump with SolarTouch

The SolarTouch Controller communicates with the IntelliFlo/IntelliPro “Variable Speed” pumps 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 19). When using a Variable Speed pump with SolarTouch, set the desired speed at the pump from the *Ext. Control Program 1-4* menu options. *Ext. Control Program 2* is assign for solar heating and cooling. *Ext.Control Program 3* is assign for freeze control. IntelliFlo and IntelliPro pumps also support 8 internal programmed schedules (time clocks) for daily filtering schedules.

IntelliFlo/IntelliPro 4x160/VS-3050 (Speed 2 and Speed 3) Overview

The IntelliFlo/IntelliPro 4x160/VS-3050 pumps do not have a built in programmable scheduler (time clock) function, External Controls or LCD display on the pump. SolarTouch assigns and controls the pump’s *Speed 2* button for solar heat/cooling and *Speed 3* button for freeze protection. When the pump is used as the pool filter pump, the pump must be wired to an external time clock. When the time clock turns on the pump, *Speed 1* is used for daily filtration. The LED indicator above the *Speed 1* button must be illuminated before the time clock turns off. For the external time clock and the 4x160 pump to operate *Speed 1* for daily filtration, please take note of the following:

- Time clock turns the pump on and off for daily use.
- Set *Speed 1* (RPM) for everyday use and turn ON. See page 12 for set up.
- *Speed 1* must be running when time clock turns off to ensure operation.

Setting Speed 1 for Daily Filtration (IntelliFlo/IntelliPro 4x160/VS-3050)

Set the speed (RPM) on the IntelliFlo 4x160/VS-3050 pump for the daily filtration speed (RPM). Speed 1 must be running when the external time clock turns off. This will ensure when the next program start time on the time clock activates the pump, will turn on Speed 1.

Setting Pump Speeds (IntelliFlo/IntelliPro VS Pumps)

Setting the IntelliFlo Variable Speed (VS) pump speed for solar/cooling and freeze protect mode is setup in the pump's "Ext. Ctrl" menu. *Note: The IntelliFlo pump must be in "Running Schedule" mode to communicate with the SolarTouch controller. Note: SolarTouch supports one IntelliFlo or IntelliPro pump assigned to pump ADDRESS 1.*

Changing default speeds in Ext. Ctrl. Program 2 (1500 RPM) and Program 3 (2350) default speed:

1. From the pump's control panel, press the **MENU** button.
2. Press **Up or Down arrow** button until "EXTERNAL CONTROL" is displayed.
3. Press **Select** button.
4. Press the **Up/Down arrow** button to select Program 2*. Enter the desired RPM for solar heat/cooling.
5. Press the **Select** button to change the current value.
6. To change the value, press the **Left** and **Right** arrows to select which digit to modify, then use the **Up** and **Down** arrows to change the selected digit.
7. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Escape** button to exit edit mode without saving. *Note: If Nocturnal cooling is required select Program 3** and follow step 4 -7.*

(*) **Program 2** (Assigned for solar heating or cooling only).

(**) **Program 3** (Assigned for freeze protect mode only).

Note: Set freeze protection RPM's the same as solar heating to ensure proper flow.

Adjusting IntelliFlo or IntelliPro Pump Preset Speeds

Be sure the pump is powered on and the green power LED is on. SolarTouch supports one IntelliFlo or IntelliPro pump assigned to pump ADDRESS 1. The IntelliFlo pump must be in "Running Schedules" mode to communicate with the SolarTouch controller. **Note: IntelliFlo VS+SVRS and IntelliFlo VF (Variable Flow) programmable (up to 8 time clocks) is not recommended for use with solar systems.**

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 8 Programmable time clocks. IntelliFlo & IntelliPro VS 3050 (also known as 4x160).

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 (pool filter pump, booster pump, cleaner and time clock)

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

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

- Solar Booster Pump relay output on the SolarTouch controller circuit board is on whenever solar heat is available and off whenever solar heat is *not* available.
- Pressure Cleaner Booster pump is on whenever solar heat is unavailable.
- Pressure Cleaner Booster Pump: The cleaner is delayed 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 delays, turns off the pool cleaner pump for 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 solar booster pump control

The SolarTouch solar controller control panel can control a high voltage booster pump for solar in addition to the valve actuator. The high voltage relay (Single Pole Single Throw) contacts will turn on when solar, freeze or cooling is turned on (see page 19).

High voltage relay output, as a time clock override

The SolarTouch solar controller can be used to override a single speed 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 19.

Low voltage output: Solar Actuator Valve Connector

The SolarTouch solar controller can control a single solar valve, which diverts the water, depending on the temperature differentials of the water and solar. 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. For more information, see page 19.

Time clock pool daily filtering override

When using a single speed pump, or an IntelliFlo or IntelliPro VS 3050 / 4x160 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 UNPLUG THE MAIN POWER CORD TO THE SOLARTOUCH CONTROLLER.



WARNING **WARNING** INSTALL ALL ELECTRICAL CONTROLS AT EQUIPMENT PAD, SUCH AS ON/OFF SWITCHES, TIMERS, AND CONTROL SYSTEMS, ETC. TO ALLOW THE OPERATION (START-UP, 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

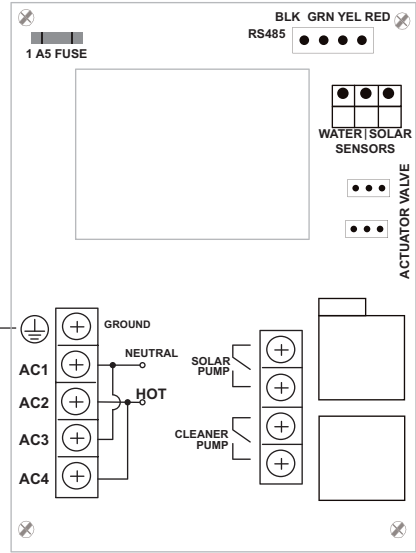
Before installing the Controller enclosure read the following guidelines:

- 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. If wires need to be extended water proof connectors are required.
- 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 a grounding 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

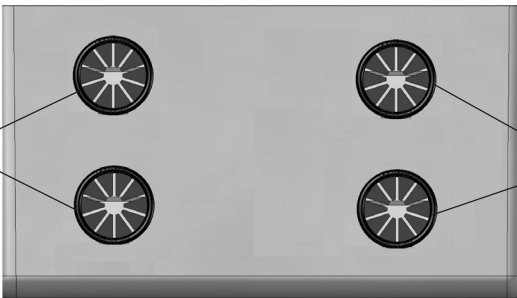
Connect a ground wire from the primary electrical panel to the Controller ground bus bar. Also ground each piece of high voltage (120 VAC or 240 VAC) equipment that is connected to the Controller relays. The Controller must also be connected to the pool bonding system using an 8 AWG (minimum) wire. An earth terminal for bonding is provided on the grounding bus bar inside the Controller. For input AC wiring information, see page 18.

**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.

- 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 19).



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

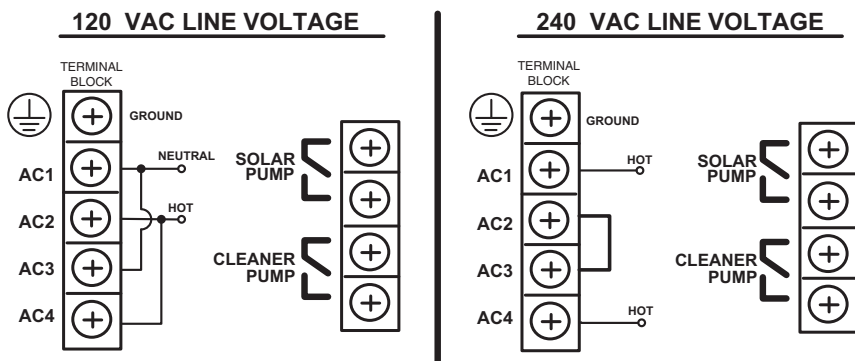
The high voltage wiring section is located inside the SolarTouch Controller enclosure on the right side. The SolarTouch Controller can be connected either to 120 VAC or 220 VAC. The Controller should be wired to receive continuous power (connect directly to sub-panel).

- 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.

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.
- **240 VAC .2 AMP:** Connect the LINE conductors to AC1 and AC4. Jumper AC2 and AC3 together. One wire must be connected to the ground screw terminal.

AC WIRING DIAGRAM

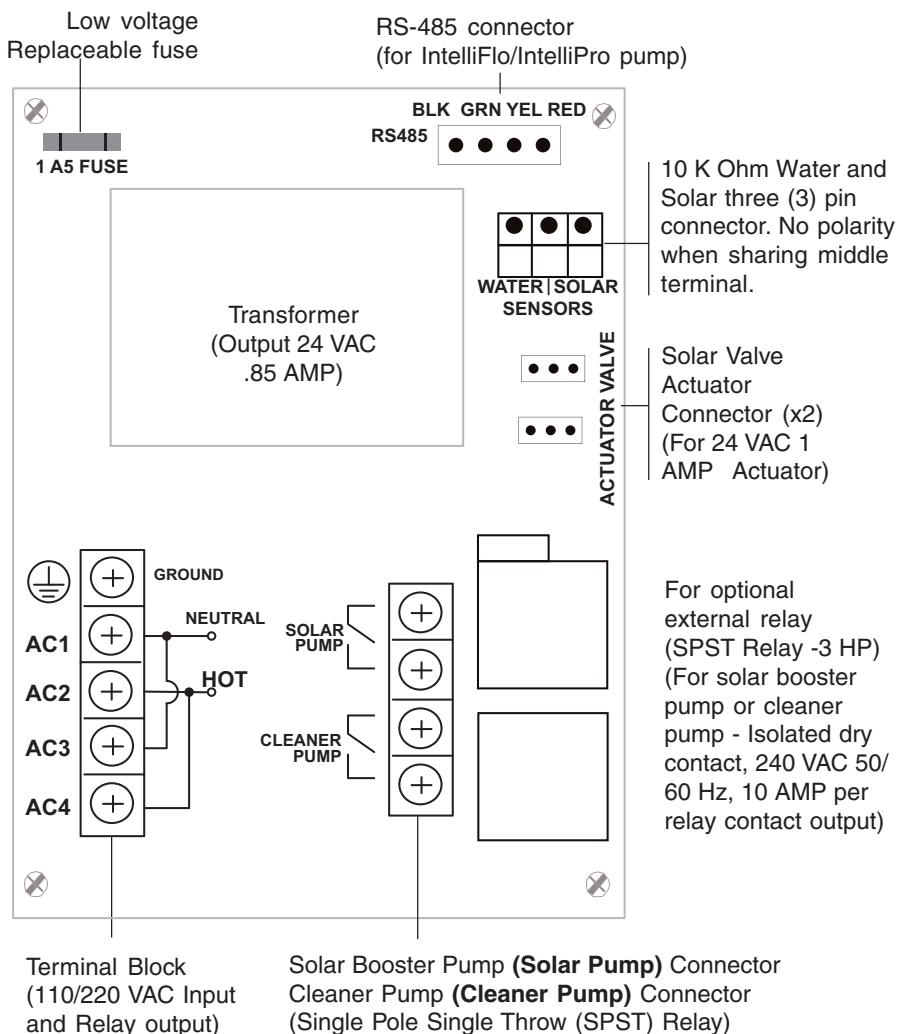


Controller Circuit Board Connections

The SolarTouch controller circuit board is mounted onto the back of the enclosure. The circuit provides the voltage connections to switch the solar booster pump, cleaner pump, solar valve actuators, connections for temperature sensors and connections for communication with an IntelliFlo or IntelliPro pump via RS-485 communication cable.

Equipment Power

- It is recommended to connect the filter pump relay to an independent circuit breaker. Follow manufacturer's 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 be required 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 or solar is not on. Positive sealed valve recommended.
- Check valves are not recommended to be used as an isolation valve to prevent back flow into the solar collector. Check valves fail and are not considered positive sealing.

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.
2. Set the filter pump time clock accordingly. *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.*
3. 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.
4. Check that Solar Valve is in “solar bypass” position, diverting water away from solar panels when solar is off. 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.
5. 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. If solar override is necessary, install sensor underneath the pipe. This will help ensure a more accurate reading of the stagnate water in the pipe if sensor is in direct sunlight.
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 19).
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 19). *Note: There are three screw terminals; use the middle screw terminal to share with one of the solar sensor wires. No polarity is required with the sensors.*

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.

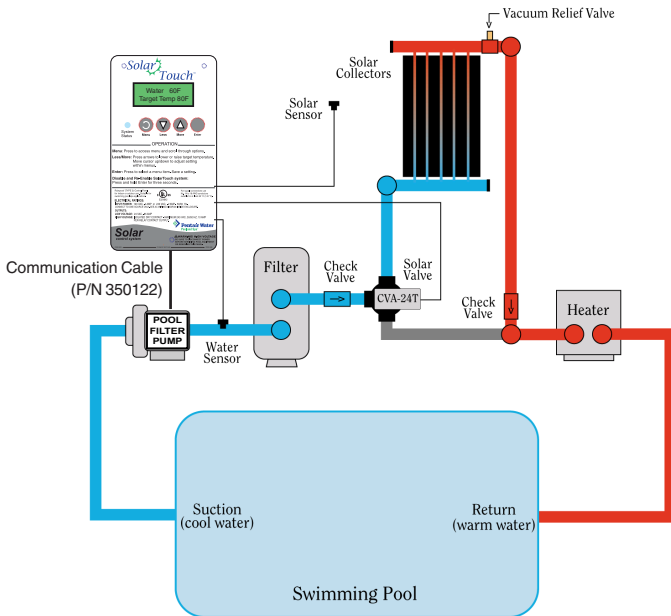
To install the solar sensor:

1. Mount the sensor on a flat surface, with the same exposure to sun as the solar collectors (next to the collectors is recommended). 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 19).
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 19). *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.



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:

24 VAC (for solar actuator valve)

High Voltage isolated contacts

10 A at 120VAC/ 240VAC

SolarTouch Package Contents

SolarTouch kit with 3-way positive seal solar valve with drain-down (P/N 521592)

- SolarTouch Controller - QTY 1
- CVA-24T Valve Actuator (P/N 263045) - QTY 1
- 3-way positive seal solar valve with drain-down (P/N 263047) - QTY 1
- 10k ohm Temperature Sensor kit
- 20 ft. water, solar 40 inches) - QTY 1 each

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

- SolarTouch Controller - QTY 1
- CVA-24T Valve Actuator (P/N 263045) - QTY 1
- Standard 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)

Notes



SAVE THESE INSTRUCTIONS



P/N 521591 Rev. B 5/18/12