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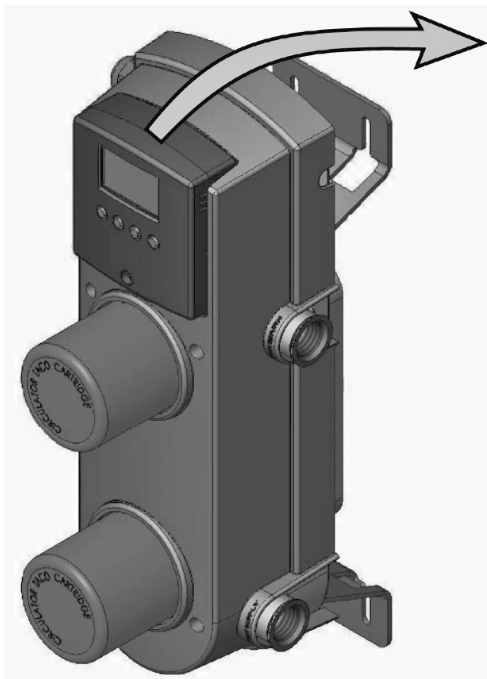
Plant ID#001-3922



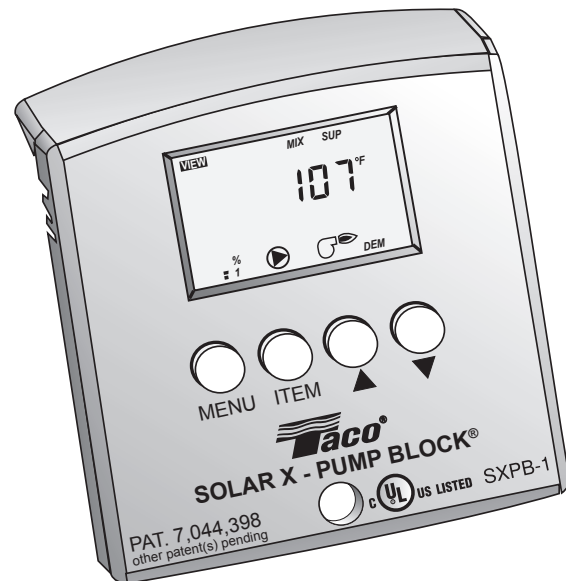
**WARNING SYMBOL: THIS SYMBOL INDICATES THE PRESENCE OF HAZARDS WHICH CAN CAUSE SEVERE PERSONAL INJURY, SUBSTANTIAL PROPERTY DAMAGE OR EVEN DEATH IF IGNORED.**

## General

The Taco Solar X – Pump Block (SXPB) represents a breakthrough in the design, control and installation of solar thermal systems. The patent pending design combines a variable speed solar temperature control (STC), collector circulator, storage tank circulator, and heat exchanger into a single unit. This combination delivers complete isolation between the collector side of the system and the storage tank side of the system.



**SOLAR X – PUMP BLOCK (SXPB)**



**SOLAR TEMPERATURE CONTROL (STC)**

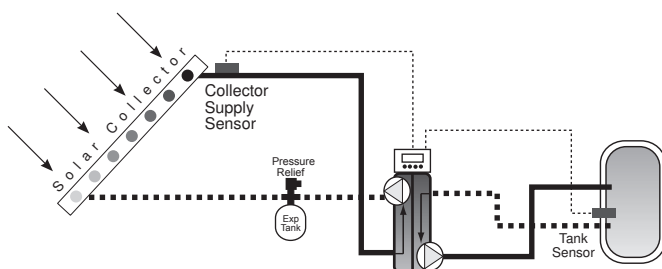
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## Typical Piping



**WARNING! Must Install a Pressure Relief Valve and Expansion Tank on Solar Collector Side of System When Installing a Closed Loop Application.**



### Essential Installer Settings

MODE = Au

### Essential Advanced Settings

AUXILIARY = OFF

FLOW SIGNAL = ON (when using optional flow meter)

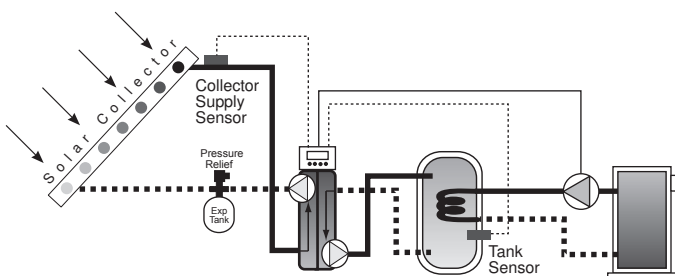
### Desired Installer Settings

STORAGE MAX

STORAGE MAX DIFF

### SXPB-1: Solar X-Pump Block (SXPB), Single Storage Tank, Flow Meter

The control operates to maintain a setpoint temperature difference between the solar collector and the storage tank. A flow meter is included in order to provide an input signal that is interpreted as a flow rate. This flow rate in conjunction with the temperature difference across the collector and the fluid property constant determines the energy collected in kW-hr.



### Essential Installer Settings

MODE = Au

### Essential Advanced Settings

AUXILIARY = SUPPLEMENT

### Desired Installer Settings

STORAGE MAX

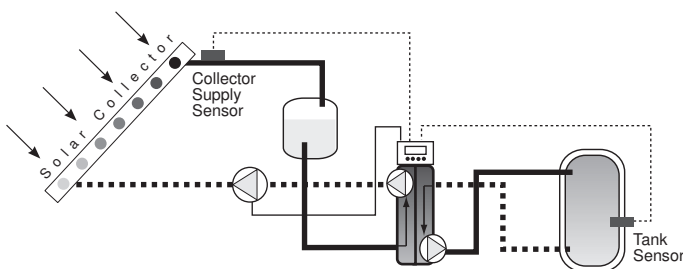
STORAGE MAX DIFF

STORAGE TARGET

STORAGE TARGET DIFF

### SXPB-2: Solar X-Pump Block (SXPB), Single Storage Tank, Storage Tank Supplement

The control operates to maintain a setpoint temperature difference between the solar collector and the storage tank with a tank supplement feature.



### Essential Installer Settings

MODE = Au

### Essential Advanced Settings

AUXILIARY = BOOSTER

DRAINBACK = ON

FREEZE = OFF

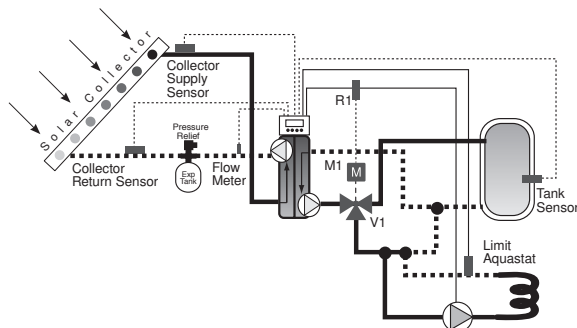
### Desired Installer Settings

STORAGE MAX

STORAGE MAX DIFF

### SXPB-3: Solar X-Pump Block (SXPB), Single Storage Tank, Drainback, Booster Pump

The control operates to maintain a setpoint temperature difference between the solar collector and the storage tank with drainback operation. Drainback system includes booster pump.



### Essential Installer Settings

MODE = Au

### Essential Advanced Settings

AUXILIARY = SINK

DRAINBACK = OFF

FLOW SIGNAL = ON (when using optional flow meter)

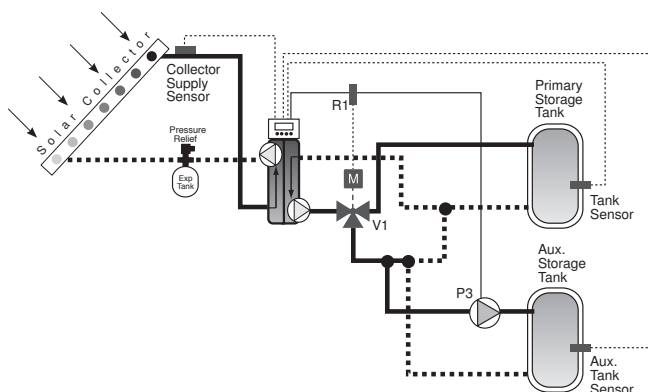
### Desired Installer Settings

STORAGE MAX

STORAGE MAX DIFF

### SXPB-4: Solar X-Pump Block (SXPB), Single Storage Tank, Collector Sink, Flow Meter

The control operates to maintain a setpoint temperature difference between the solar collector supply and the storage tank with a collector sink feature. A flow meter is included in order to provide an input signal that is interpreted as a flow rate. This flow rate in conjunction with the temperature difference across the collector and the fluid property constant determines the energy collected in kW-hr.



#### Essential Installer Settings

MODE = Au

#### Essential Advanced Settings

AUXILIARY = STORAGE

FLOW SIGNAL = OFF

#### Desired Installer Settings

STORAGE MAX

STORAGE MAX DIFF

### SXPB-5: Solar X-Pump Block (SXPB), Two Storage Tanks

The control operates to maintain a setpoint temperature difference between the solar collector and the primary storage tank, and a setpoint temperature difference between the collector and the auxiliary storage tank. Operation occurs first for whatever storage tank requires it. Then once the first storage tank is satisfied, operation can then occur for the other storage tank if required.

## Getting Ready

Ensure that the contents of this package are complete. If any of the contents are missing or damaged, please contact your local Taco sales representative for assistance.

Contents should include the following:

- One Solar X – Pump Block, preassembled unit consists of the following parts:
  - One Solar Temperature Control (STC)
  - One Green Enclosure
- Two Casings with Circulators Attached
- One Heat Exchanger
- One Power Cord (6 feet)
- Also included:
  - Three Taco Strap-on Sensors
  - One Instruction Sheet

## Application

The Taco Solar X – Pump Block (SXPB) is a complete solar system with an attached heat exchanger for system isolation. Integral to the unit is a variable speed collector circulator, constant speed storage tank circulator, heat exchanger, and the electronics to drive it all. With only four piping connections needed, the SXPB greatly reduces the time and space required for installation. The heat exchanger provides complete isolation between fluid on the collector side and the fluid on the storage tank side.

## Design Procedure

1. Verify BTU capacity of X-Pump Block using charts below.

**BTU/H Chart @ Expressed Conditions 10 degree Delta T**  
(000 btu/h)

X-Pump BTU/hr Capacities							
System Temp.	Heat Source Temperature Range						
	120/100	130/110	140/120	150/130	160/140	170/150	180/160
70/80	29.9	29.9	29.9	29.9	29.9	29.9	29.9
80/90	29.8	29.8	29.8	29.8	29.8	29.8	29.8
90/100	29.8	29.8	29.8	29.8	29.8	29.8	29.8
100/110	X	29.7	29.7	29.7	29.7	29.7	29.7
110/120	Y	X	29.6	29.6	29.6	29.6	29.6
120/130	Y	Y	X	29.6	29.6	29.6	29.6
130/140	Y	Y	Y	X	29.5	29.5	29.5
140/150	Y	Y	Y	Y	X	29.4	29.4
150/160	Y	Y	Y	Y	Y	X	29.3

**BTU/H Chart @ Expressed Conditions 20 degree Delta T**  
(000 btu/h)

X-Pump BTU/hr Capacities							
System Temp.	Heat Source Temperature Range						
	120/100	130/110	140/120	150/130	160/140	170/150	180/160
60/80	59.9	59.9	59.9	59.9	59.9	59.9	59.9
70/90	59.8	59.8	59.8	59.9	59.9	59.9	59.9
80/100	27.0	59.7	59.8	59.9	59.6	59.6	59.6
90/110	X	29.0	59.8	59.9	59.6	59.6	59.6
100/120	X	X	31.5	59.9	59.4	59.4	59.6
110/130	Y	X	X	33.5	59.4	59.3	59.3
120/140	Y	Y	X	X	35.5	59.1	59.1
130/150	Y	Y	Y	X	X	37.6	59.0
140/160	Y	Y	Y	Y	X	X	39.7

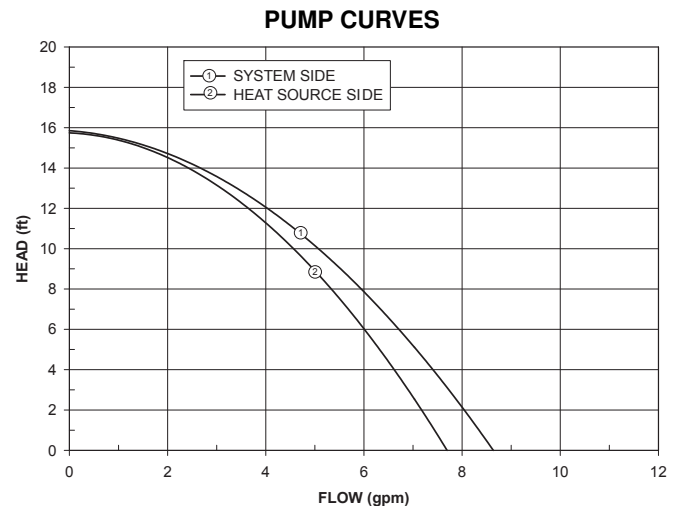
**BTU/H Chart @ Expressed Conditions 30 degree Delta T**  
(000 btu/h)

X-Pump BTU/hr Capacities							
System Temp.	Heat Source Temperature Range						
	130/100	140/110	150/120	160/130	170/140	180/150	190/160
50/80	89.1	88.9	88.6	88.4	88.2	88.0	87.8
60/90	72.8	88.9	88.6	88.4	88.2	88.0	87.8
70/100	40.0	78.5	88.6	88.4	88.2	88.0	87.8
80/110	X	43.0	80.0	88.4	88.2	88.0	87.8
90/120	X	X	46.0	80.0	88.2	88.0	87.8
100/130	Y	X	X	50.1	80.8	88.0	87.8
110/140	Y	Y	X	X	52.9	82.1	87.8
120/150	Y	Y	Y	X	X	55.7	83.4
130/160	Y	Y	Y	Y	X	X	58.5

**BTU/H Chart @ Expressed Conditions 40 degree Delta T**  
(000 btu/h)

X-Pump BTU/hr Capacities							
System Temp.	Heat Source Temperature Range						
	140/100	150/110	160/120	170/130	180/140	190/150	200/160
40/80	116.7	118.3	118.0	117.7	117.4	117.2	116.9
50/90	83.0	118.3	118.0	117.7	117.4	117.2	116.9
60/100	61.7	90.7	118.0	117.7	117.4	117.2	116.9
70/110	X	57.2	96.4	117.7	117.4	117.2	116.9
80/120	X	X	61.0	98.1	117.4	117.2	116.9
90/130	Y	X	X	66.7	117.4	117.2	116.9
100/140	Y	Y	X	X	90.0	117.2	116.9
110/150	Y	Y	Y	X	X	95.7	116.9
120/160	Y	Y	Y	Y	X	X	97.4

- Using the pump curve on the right, ensure the Storage Tank Pump of the Solar X – Pump Block will provide adequate head and flow for the system in which it is to be installed.
- Using the pump curve located below, ensure that the Collector Pump of the Solar X – Pump Block will provide adequate head and flow for the system to which it is installed.



## Installation of the Solar X – Pump Block

### STEP ONE – MOUNTING

- Mounting position – The Solar X – Pump Block must be mounted in the vertical position with the Solar Temperature Control (STC) located at the top of the Solar X – Pump Block.
- Mount the Solar X – Pump Block, using the attached brackets, to a solid surface capable of supporting 23.5 pounds.
- Using four suitable screws or bolts (1/4"), fasten the Solar X – Pump Block to the selected location. Ensure that at least two of the mounting screws are attached to a wall stud or similar surface.

### STEP TWO – PIPING CONNECTIONS



**Warning! Must install a pressure relief valve and expansion tank on solar collector side when installing a closed loop application. Note! Heat should never be applied to Solar X – Pump Block connections or damage to housing and/or electronics may result.**

- Using proper piping practices, connect the supply to the storage tank to the Radiant Supply (bottom right hand connection) as indicated on the plastic cover of the Solar X – Pump Block. Ensure that a proper isolation valve is installed.
- Using proper piping practices, connect the return from the storage tank to the Radiant Return (top right hand connection) as indicated on the plastic cover of the Solar X – Pump Block. Ensure that a proper isolation valve is installed.
- Using proper piping practices, connect the supply from the collector to the Heat Source Supply (bottom left hand connection) as indicated on the plastic cover of the Solar X – Pump Block. Ensure that a proper isolation valve is installed.
- Using proper piping practices, connect the return to the collector to the Heat Source Return (top left hand connection) as indicated on the plastic cover of the Solar X – Pump Block. Ensure that a proper isolation valve is installed.

### STEP THREE – FILLING

- Fill both system and collector with tap water – The system must be filled before operating the circulator. The bearings are water lubricated and should not be allowed to operate dry. Filling the system will result in immediate lubrication of the bearings. It is always good practice to flush a new system of foreign matter before starting the circulator.
- Circulator operation – Operate the circulators for 5 minutes immediately after filling system to purge remaining air from the bearing chamber. This is especially important when installing the circulator during the off-season.

## STEP FOUR – ELECTRICAL CONNECTIONS

1. Observe all applicable codes when connecting to power supply. The motors are impedance protected, and do not require overload protection. The pumps cannot run backwards.

### Solar Temperature Control (STC) Settings and Features

#### VARIABLE SPEED SOLAR MIXING $\Delta T$ OPERATION

The STC operates the collector pump based on a target temperature difference ( $\Delta T$ ) between the collector supply and the storage tank (storage tank). The variable speed output of the collector pump is adjusted to maintain the target  $\Delta T$ . As the actual  $\Delta T$  increases the variable speed output increases, and as the actual  $\Delta T$  decreases the variable speed output decreases. The variable speed output turns off once the collector pump has been on for a minimum amount of time and the actual  $\Delta T$  drops to the  $\Delta T$  target temperature less the  $\Delta T$  target differential temperature.

##### $\Delta T$ Target

The  $\Delta T$  target is set to the desired setpoint temperature difference between the collector supply sensor and the storage tank sensor. If the control is configured for two storage tanks (Auxiliary set to storage), the  $\Delta T$  target temperature also applies between the collector supply and the auxiliary storage tank sensor.

##### $\Delta T$ Target Diff

The  $\Delta T$  target diff is set to the desired setpoint temperature difference differential temperature. If the control is configured for two storage tanks (Auxiliary set to storage), the  $\Delta T$  target differential temperature also applies between the collector supply and the auxiliary storage tank sensor.

##### Minimum On / Off Time

The collector pump includes a minimum on time of 2 minutes and a minimum off time of 5 minutes. However, a temperature limit condition will override the minimum times.

#### MINIMUM VARIABLE SPEED COLLECTOR PUMP OUTPUT

The STC includes a minimum variable speed output for the collector pump during mixing  $\Delta T$  operation. This is useful in order to ensure sufficient flow throughout the solar heating system allowing proper mixing  $\Delta T$  operation. During mixing  $\Delta T$  operation the control adjusts the output to the collector pump between the minimum variable speed output and full output.

#### COLLECTOR PUMP FULL OUTPUT TIME

When mixing  $\Delta T$  operation is required the STC first operates the collector pump at full speed for a period of time in order to ensure there is sufficient flow for proper control operation. After the period of time elapses, the control adjusts the output of the collector pump between the minimum speed and full output to perform mixing  $\Delta T$  operation.

Note: if the STC is configured for booster pump, the period of time also applies for the booster pump. In this case, after the period of time elapses, the booster pump turns off.

#### ACCESS LEVELS

The STC includes two access levels for viewing and adjustment of items in the View and Adjust menu's of the control. Selection is made through a switch on the circuitboard. If the switch is set to OFF, the access level is Installer. If the switch is set to ON, the access level is advanced.



##### Installer

When Installer is selected only certain items are made available for setup and monitoring of the control.

##### Advanced

When Advanced is selected all items are made available for setup and monitoring of the control.

#### MODE OF OPERATION

The mode of operation sets the control functionality and is set using the MODE item in the Adjust menu.

##### Off

When off is selected, the control does not provide operation. Limit conditions are not considered. This is useful if the solar system is placed out of commission in order for servicing or maintenance and requires all outputs to be off.

##### Au

When automatic (Au) is selected, the control operates to provide variable speed mixing  $\Delta T$  operation and the application configuration. Limit conditions are considered.

##### On

When on is selected, the control turns on all outputs with the collector pump at full speed. Limit conditions are not considered. This is useful if for commissioning for initial startup in order to, for example, to purge the air out of the system.

## APPLICATION CONFIGURATION (Auxiliary Device)

The STC includes an auxiliary relay that can be used to operate a device in order to support a variety of different piping and application configurations. The application configuration is set through the AUXILIARY item in the Adjust menu.

### Standard (OFF)

If the application and piping configuration does not require use of the auxiliary relay, the Auxiliary setting must be set to Off. This is typical of an application where the Taco Solar X – Pump Block is configured between a collector and a storage tank.

### Booster Pump (BOOSTER)

If the application and piping configuration requires the use of a booster pump, the Auxiliary setting must be set to Booster. This is typical in an application where drainback is used and a high head pump is required in order to provide the necessary boost on startup.

The booster pump turns on together with the collector pump, at full speed, on startup of delta T operation for a period of time. After the period of time elapses, the booster pump turns off and the collector pump provides mixing  $\Delta T$  operation. The period of time is set through the Collector 'Pump symbol and full output bars segments' item in the Adjust menu.

### Collector Sink (SINK)

If the application and piping configuration requires activation of a device to provide collector sink operation, the Auxiliary setting must be set to Sink and the Drainback setting must be set to Off. This is typical of an application where a secondary heat sink is present which can accept excess heat in the event both the storage tank and the collector supply temperature are above their respective limit temperatures. In this case, the auxiliary relay is used to activate a mechanical device such as a pump or diverting valve to direct flow from the collector to the secondary heat sink. The secondary heat sink could be a heat exchanger such as a radiator, pool, heat pump loop field, etc.

The auxiliary relay, along with collector pump (at full speed) and storage tank pump, turn on once the tank temperature rises to the Tank Limit Temperature and the collector supply temperature rises to the Collector Maximum Temperature. The auxiliary relay, along with the collector pump (at full speed) and storage tank pump, then remain on until the collector temperature falls to the Collector Maximum Temperature less the Collector Maximum Differential Temperature or the tank temperature falls to the Tank Limit Temperature less the Tank Limit Differential Temperature. All outputs will also turn off if a limit input is received. However, the collector pump and storage tank pump can still operate if required while a limit input is present.

### Tank Supplement (SUPPLEMENT)

If the application and piping configuration requires activation of a device to provide storage tank supplement operation, the Auxiliary setting must be set to Supplement. This is typical of an application where an alternate heat source is included to supplement the storage tank. In this case, the auxiliary relay is used to activate a heat source such as a boiler or instantaneous water heater. Operation between the secondary heat source and the storage tank is independent from operation between the collector and the storage tank.

The auxiliary relay turns on once the tank temperature falls to the Storage Target Temperature and turns off once the tank temperature rises to the Storage Target Temperature plus the Storage Target Differential Temperature.

### Storage Target

The storage target is set to the desired target temperature for the storage tank during tank supplement operation.

### Storage Target Diff

The storage target diff is set to the desired target differential temperature for the storage tank during tank supplement operation.

### Second Storage Tank (STORAGE)

If the application and piping configuration requires activation of a device to provide operation for an additional storage tank, the Auxiliary setting must be set to Storage and the Flow Signal setting must be set to Off. This is typical of an application where a second storage is included with the primary storage tank having priority over the second. When operation for the primary storage tank is required, the STC operates the collector pump and the storage tank pump. When operation for the second storage tank is required, the control operates the collector pump, storage tank pump and the auxiliary relay. The auxiliary relay could be used to operate an isolation relay that in turn activates a diverting relay and pump.

## DRAINBACK OPERATION

In certain applications and appropriate climates it is desirable to drain back the fluid in the collector into the storage tank or into a separate reservoir once operation is no longer required. This is achieved when the collector pump turns off resulting in the fluid draining back into the reservoir. Specific piping practices must be adhered to in order for proper drainback operation to occur.

Once the fluid in the collector has drained back into the reservoir, system protection is no longer an issue as there is no fluid in the system for undesirable heat transfer to occur. Therefore, safety features including freeze protection and collector sink are not applicable.

If the STC is to operate using drainback, the Drainback setting must be set to On. Also, Freeze protection must be set to Off and the Auxiliary device must not be set to sink in order for the Drainback setting to be made available.

## TANK MAXIMUM FEATURE

The STC includes a tank maximum feature that conditionally ceases operation in order to prevent overheating of the storage tank. In order for the STC to allow mixing  $\Delta T$  operation to occur, the tank temperature must be below the maximum target temperature. If the storage tank temperature reaches the maximum storage temperature the control turns off the storage tank pump and, if applicable, the collector pump and auxiliary relay. The storage tank pump, and if applicable, the collector pump and auxiliary relay, then remain off until the tank temperature drops to the maximum storage temperature less the maximum storage differential temperature.

If the STC is configured for two storage tanks (Auxiliary set to STORAGE), the maximum storage temperature and the maximum storage differential temperature also apply to the second storage tank.

#### **Max Storage**

The max storage is set to the desired maximum storage tank temperature.

#### **Max Storage Diff**

The maximum storage diff is set to the desired maximum storage tank differential temperature.

### **TANK LIMIT FEATURE**

The STC includes a tank limit feature that ceases operation to prevent further overheating of the storage tank. In the event the storage tank temperature reaches the maximum storage temperature, the storage tank pump and, if applicable, the collector pump and auxiliary relay turn off. If then, the collector supply temperature reaches the maximum collector supply temperature, the storage tank pump and, if applicable, the collector pump (full speed) and auxiliary relay, turn back on to further heat the storage tank up to the tank limit temperature of 200°F. Once the tank temperature reaches the tank limit temperature of 200°F all outputs turn off. All outputs then remain off until the tank temperature falls to 190°F.

When the control is configured for collector sink operation, the tank limit operation occurs first to expel heat from the collector. Then once the tank has reached its limit temperature of 200°F, collector sink operation occurs.

When the control is configured for auxiliary storage, the tank limit operation occurs after the second storage has reached its tank maximum temperature.

### **COLLECTOR MAXIMUM FEATURE**

The STC includes a maximum collector supply feature that operates the collector pump, storage tank pump and, if applicable, the auxiliary relay to transfer heat from the collector to the storage tank in the event the storage tank rises above the maximum storage temperature and the collector supply temperature rises above the maximum collector supply target temperature. The collector pump, storage tank pump and, if applicable, auxiliary relay then remain on until either the collector supply temperature falls to the maximum collector supply target temperature less the maximum collector supply differential target temperature, or the storage tank temperature rises to the tank limit temperature of 200°F.

#### **Max Collector Supply**

The max collector supply is set to the desired maximum collector supply temperature.

#### **Max Collector Supply Diff**

The max collector supply diff is set to the desired maximum collector supply differential temperature.

### **COLLECTOR LIMIT FEATURE**

The STC includes a limit collector feature that turns off the collector pump, storage tank pump and, if applicable, auxiliary relay if the collector supply temperature rises to the limit collector supply temperature. The collector pump, storage tank pump and, if applicable, auxiliary relay then remain off until the collector supply temperature falls to the limit collector supply temperature less the limit collector supply differential temperature.

#### **Limit Collector Supply**

The limit collector supply is set to the desired limit collector supply temperature.

#### **Limit Collector Supply Diff**

The limit collector supply diff is set to the desired limit collector supply differential temperature.

### **COLLECTOR MINIMUM CONDITION**

The STC includes a minimum collector feature that turns off all outputs if the collector supply temperature falls to the minimum collector supply temperature. All outputs then remain off until the collector supply temperature rises to the minimum collector supply temperature plus the minimum collector supply differential temperature. The collector minimum condition overrides the mixing  $\Delta T$  operation and is used to prevent undesirable temperature reduction of the storage tank.

#### **Min Collector Supply**

The min collector supply is set to the desired minimum collector supply temperature.

#### **Min Collector Supply Diff**

The min collector supply diff is set to the desired minimum collector supply differential temperature.

### **LIMIT INPUT CONDITION**

The STC includes a limit input condition that can conditionally terminate operation. The limit input condition is dependent on whether or not the control is configured for collector sink operation.

If the control is not configured for collector sink operation and a limit input is received, the control turns off all outputs including the collector pump, storage tank pump and auxiliary relay. This is typical of a scenario in which system shutdown is desired in order to allow for maintenance.

If the control is configured for collector sink operation and a limit input is received, the control turns off all output including the collector pump, storage tank pump and the auxiliary relay. However, operation can still occur between the collector and the primary storage tank even if a limit input is present. This is typical of a scenario in which a safety limit device is used in the secondary heat sink (i.e. pool limit aquastat).

## **FREEZE PROTECTION**

When the STC is not configured for drainback, the control provides freeze protection through intermittent collector pump operation. When the collector supply temperature drops to 40°F, the collector pump operates at full speed until the collector supply temperature rises to 45°F. Once the collector supply temperature reaches 45°F, the collector pump turns off. Freeze protection is enabled by setting the FREEZE item in the Adjust menu to On. This feature is not recommended in climates where the outdoor temperature is near freezing for extended periods of time.

Note: Freeze protection is not available when the control is configured for drainback.

## **VACUUM TUBE**

The STC includes a feature that considers improved collector supply temperature measurement when a vacuum tube collector is used. Unlike plate collectors, where the sensor is in direct contact with the heat exchanger surface, the sensor for a vacuum tube collector is only in direct contact with heat exchanger materials when the circulator is on and the heat transfer fluid is flowing through the tube. In order to obtain accurate collector supply temperature measurement, the control turns on the collector pump at full speed for a 30 second period every 30 minutes of collector stagnation. Note: Stagnant collector supply temperature measurement still applies in determining operation. Vacuum tube collector feature is enabled by setting the VACUUM TUBE item in the Adjust menu to On.

If the control is configured for drainback operation and vacuum tube collector function, the control turns on the collector pump for the time it takes to establish a proper siphon every 30 minutes.

## **HOLIDAY FEATURE**

The STC includes a holiday feature that is used to cool off the storage tank in the event the tank is not being utilized. During periods of no occupancy, the storage tank can heat up undesirably as there is no draw from the tank, resulting in potentially stagnation conditions within the solar energy system. In this case the STC will operate to transfer heat from the storage tank to the collector. The Holiday feature is enabled by pressing and holding the 'Down' button while viewing the DHW temperature in the View Menu for 3 seconds. While the Holiday feature is enabled, the 'Holiday' segment in the display is turned on. The Holiday feature is disabled by pressing and holding the 'Down' button for 3 seconds while viewing the DHW temperature in the View Menu.

When the holiday feature is enabled, and the storage tank temperature is greater than the storage tank maximum temperature, and the storage tank temperature is 10°F warmer than the collector supply temperature, the collector pump and, if applicable, the storage tank pump turn on. The pump(s) then remain on until the storage tank temperature drops to 130°F.

## **COLLECTOR ENERGY MONITORING**

The STC includes a collector energy monitoring feature that displays the energy collected by the collector. The collected energy is determined from the collector supply temperature, collector return temperature, collector flow rate and glycol percentage. The collector energy is displayed through the ENERGY item in the View menu. The Flow Signal setting must be set to on and the auxiliary relay must not be set to storage in order to activate the collector energy monitoring feature.

Note: The optional external flow sensor is required for collector energy monitoring. This is not supplied with the SXPB.

### **Flow Meter Analog Signal**

The STC supports an analog flow meter with a signal range from 0 V(dc) to a maximum of 10 V(dc). The control allows for a minimum and maximum V(dc) range to be set.

### **Min Flow Signal**

The min flow signal is set to the minimum V(dc) value of the flow metering device.

### **Max Flow Signal**

The max flow signal is set to the maximum V(dc) value of the flow metering device.

### **Flow Meter Flow Rate**

In order to correlate the analog input signal to a flow rate in gallons per minute, the control allows for a minimum flow rate and maximum flow rate to be set.

### **Min Flow**

The min flow is set to the minimum flow rate of the flow metering device which corresponds to the min flow signal.

### **Max Flow**

The max flow is set to the maximum flow rate of the flow metering device which corresponds to the max flow signal.

### **Glycol**

The glycol is set to the percentage by weight of glycol used in the heat transfer fluid within the solar heating system. The control uses the associated fluid property value from the glycol percentage in calculating the collected energy.



## Set Up of Solar Temperature Control

### CAUTION

Improper installation and operation of this product could result in damage to the equipment and possibly personal injury. It is your responsibility to ensure that this product is installed in a safe manner according to all of the applicable codes, standards and instructions. The electronic control contained in this product is not intended as a primary limit control. Removal of the PC Board from its enclosure can result in damage to the control and possibly even personal injury. Refer to qualified personnel for servicing.

## STEP ONE – REMOVING THE SOLAR TEMPERATURE CONTROL FROM THE SOLAR X – PUMP BLOCK

- Remove the screw from the front of the control.
- Grasp the front of the control and remove it from the green plastic enclosure surrounding the solar x – pump block.
- Wiring to the control is connected to the back of the circuit board using either the indicated spade connectors, molex connectors or the snap on terminal plugs. These may need to be disconnected to fully remove the control.

## STEP TWO – INSTALLING THE SENSORS

### Installing the Collector and Storage Tank Sensors

**Note:** These sensors are designed to be mounted on a pipe or in a temperature well.

- These sensors can be strapped directly to the pipe using the cable tie provided with the sensors. Insulation should be installed around the sensors to reduce the effect of air currents on the temperature measurement. Care should be taken not to over-tighten the cable tie as this can cause damage to the sensor.
- The Collector Supply Sensor is to be installed on the collector supply pipe. This sensor is required at all times.
- The Storage Tank Sensor is to be installed in a temperature well. This sensor is required at all times.

## STEP THREE – WIRING THE STC

- Before wiring the control, ensure that power to all circuits is off.
- Ensure that all wires are stripped to a minimum of 3/8" (9 mm) in order to ensure proper connection to the low voltage terminals.
- Provide a separate circuit with a minimum 15 A capacity in order to insure proper operation.

### Wiring Power to the STC

Using the supplied line cord, connect the white wire with the 1/4 inch female spade connector to the 1/4 inch male spade connector labelled "N" on the back of the STC circuit board. Connect the black wire with the 1/4 inch female spade connector to the 1/4 inch male spade connector labelled "H" on the back of the STC circuit board. Connect the green wire to the ground screw located on the casting of the Solar X – Pump Block.

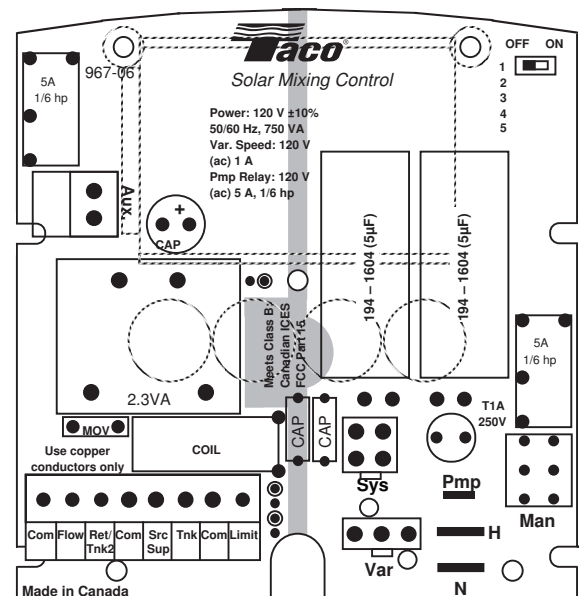
### Wiring to the Solar X – Pump Block

#### Wiring to the Variable Speed Collector Pump

Connect the variable speed pump's three pin molex connector from the Solar X – Pump Block to the matching three pin molex connector labelled "Var" on the back of the STC circuit board.

#### Wiring the Solar X – Pump Block Storage Tank Pump

Connect the system pump's four pin molex connector from the Solar X – Pump Block to the matching four pin molex connector labelled "Sys" on the back of the STC circuit board.



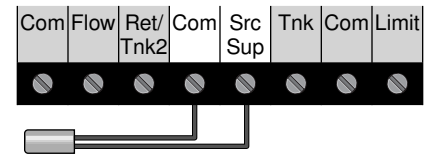


## Wiring the Sensors

Do not apply power to the sensors or the sensor terminals as this will damage either the sensors or the control. Begin by removing the eight (8) pin plug-in terminal block from the STC's circuit board. To do this, pull the terminal block directly away from the circuit board.

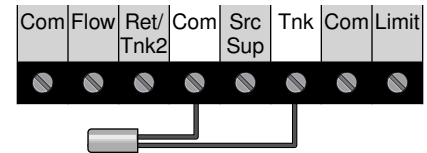
### Collector Supply Sensor (Required)

Connect the two wires from the Collector Supply Sensor directly to the "Com" and "Src Sup" terminals of the terminal block. The Collector Supply Sensor is used to measure the supply temperature being delivered from the collector.



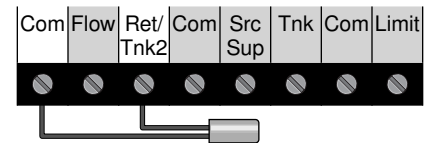
### Storage Tank Sensor (Required)

Connect the two wires from the Storage Tank Sensor directly to the "Com" and "Tnk" terminals of the terminal block. The Storage Tank Sensor is used to measure the tank temperature of the primary storage tank.



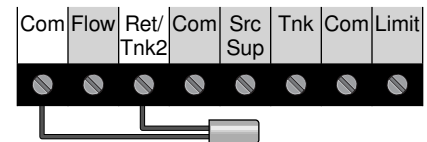
### Collector Return Sensor (Optional)

Connect the two wires from the Collector Return Sensor directly to the "Com" and "Ret / Tnk 2" terminals of the terminal block. The Collector Return Sensor is used to measure the collector return temperature and is required for flow metering.



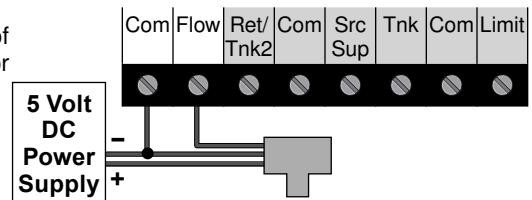
### Auxiliary Tank Sensor (Optional)

Connect the two wires from the Auxiliary Tank Sensor directly to the "Com" and "Ret / Tnk 2" terminals of the terminal block. The Auxiliary Tank Sensor is used to measure the tank temperature of the auxiliary storage tank.



### Wiring the Flow Meter (Optional)

Connect the two wires from the Flow Meter to the 'Com' and 'Flow' terminals of the terminal block. The flow meter is used to measure the flow rate of the collector pump. Additional information is supplied with optional Taco flow meter.

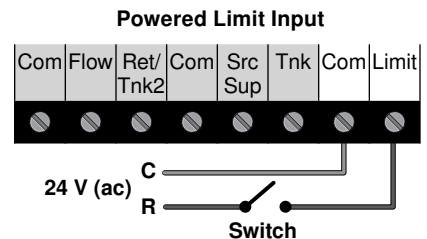


## Wiring the Limit Demand Input

The optional Limit Input circuit can be wired using either a powered signal or an unpowered switch closure.

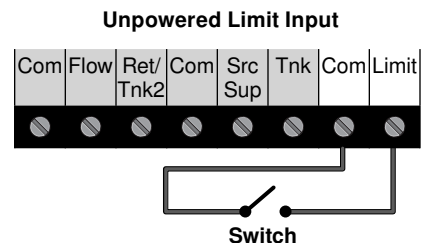
### Powered Limit Input

If a powered limit input is being used, connect the switched side of the 24 V (ac) limit input circuit to the "Limit" terminal of the terminal block. Connect the second side of the 24 V (ac) limit input circuit to the "Com" terminal of the terminal block.



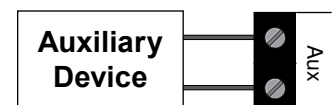
### Unpowered Limit Input

If an unpowered limit input is being used, connect one side of the limit input switch to the "Limit" terminal of the terminal block. Connect the second side of the limit input switch to the "Com" of the terminal block.



## Wiring the Auxiliary Device

Begin by removing the two (2) pin plug-in terminal block from the STC's circuit board. To do this, pull the terminal block directly away from the circuit board. The Auxiliary Device Relay is a switch that is to be used in the auxiliary device circuit. There is no power available on these terminals from the STC.



STEP FOUR – RECONNECTING THE TERMINAL BLOCKS

Insert the eight (8) pin plug-in terminal block into the eight (8) pin terminal header on the STC circuit board. Press firmly until it snaps into place. Insert the two (2) pin plug-in terminal block into the two (2) pin terminal header on the STC circuit board. Press firmly until it snaps into place.

STEP FIVE – MOUNTING THE STC

- Begin by pushing all excess wiring back into the Solar X – Pump Block.
  - Place the STC into the Solar X – Pump Block’s plastic enclosure.
- Insert the screw into the hole located on the face of the STC and tighten the screw to fasten the STC to the Solar X – Pump Block Enclosure. Do not overtighten.

STEP SIX – POWERING THE STC

Apply power to the STC circuit by plugging in the line cord.

Display Operation

POWER UP

On power up, the control displays all segments for 2 seconds followed by the control version number.

The control then automatically goes to the operating mode and displays the collector supply temperature.

The control automatically goes back to the view menu when the buttons are left alone for 20 seconds. All settings will be saved even during power down of the control.


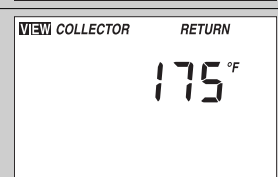
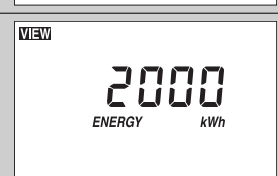

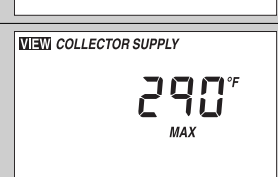
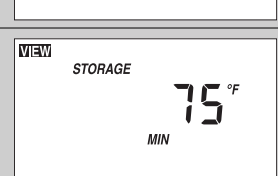
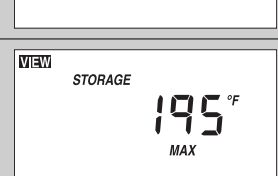
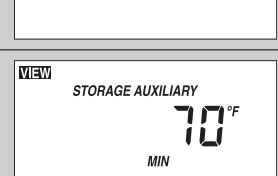
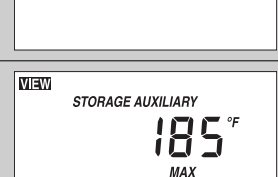
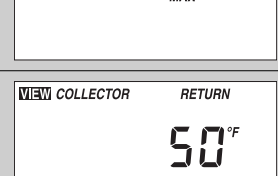


VIEW MENU



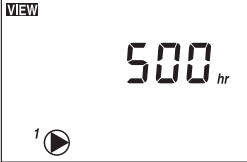

To advance to the next available View item, press and release the ITEM button on the face of the control.

	<p><b>Collector Supply Temperature</b></p> <p>The collector supply temperature is displayed when the COLLECTOR SUPPLY elements are turned on. This is the current collector supply temperature at the collector supply sensor.</p>
	<p><b>Storage Target Temperature</b></p> <p>The storage target temperature is displayed when the STORAGE TARGET elements are turned on. This is the temperature the STC is currently trying to maintain at the storage sensor. The storage target temperature is only displayed if the Auxiliary is set to Supplement.</p> <p>Note: This item is available in only available in the Advanced access level.</p>
	<p><b>Storage Temperature</b></p> <p>The storage temperature is displayed when the STORAGE element is turned on. This is the current tank temperature at the tank sensor.</p>
	<p><b>Auxiliary Storage Temperature</b></p> <p>The auxiliary storage temperature is displayed when the AUXILIARY STORAGE elements are turned on. This is the current tank temperature at the auxiliary tank sensor. The auxiliary storage temperature is only displayed if the Auxiliary is set to Storage.</p>
	<p><b>ΔT Target Temperature</b></p> <p>The ΔT target temperature is displayed when the ΔT TARGET elements are turned on. This is the temperature the STC is currently trying to maintain between the collector supply sensor and the tank sensor. If “---” is displayed, the STC does not have a requirement to provide operation.</p> <p>Note: This item is only available in the Advanced access level.</p>

## VIEW MENU CONTINUED





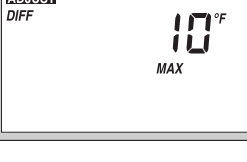
	<p><b>ΔT Temperature</b></p> <p>The ΔT temperature is displayed when the ΔT element is turned on. This is the current temperature difference between the collector supply sensor and the tank sensor.</p>
	<p><b>Collector Return Temperature</b></p> <p>The collector return temperature is displayed when the COLLECTOR RETURN elements are turned on. This is the current collector return temperature at the collector return sensor.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Energy</b></p> <p>The energy collected at the collector is displayed when the ENERGY element is turned on. This is the current energy collected at the collector calculated. The energy is only displayed if the Auxiliary setting is not set to STORAGE and the FLOW SIGNAL item is set to On.</p>
	<p><b>Minimum Collector Supply Temperature</b></p> <p>The minimum collector supply temperature is displayed when the MIN COLLECTOR SUPPLY elements are turned on. This is the coolest collector supply temperature at the collector supply sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Maximum Collector Supply Temperature</b></p> <p>The maximum collector supply temperature is displayed when the MAX COLLECTOR SUPPLY elements are turned on. This is the warmest collector supply temperature at the collector supply sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Minimum Storage Temperature</b></p> <p>The minimum storage is displayed when the MIN STORAGE elements are turned on. This is the coolest storage tank temperature at the tank sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Maximum Storage Temperature</b></p> <p>The maximum storage is displayed when the MAX STORAGE elements are turned on. This is the warmest storage tank temperature at the tank sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Minimum Auxiliary Storage Temperature</b></p> <p>The minimum auxiliary storage is displayed when the MIN AUXILIARY STORAGE elements are turned on. This is the coolest auxiliary storage tank temperature at the auxiliary tank sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Maximum Auxiliary Storage Temperature</b></p> <p>The maximum auxiliary storage is displayed when the MAX AUXILIARY STORAGE elements are turned on. This is warmest auxiliary storage tank temperature at the auxiliary tank sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Minimum Collector Return Temperature</b></p> <p>The minimum collector return temperature is displayed when the MIN COLLECTOR RETURN elements are turned on. This is the coolest collector return temperature at the collector return sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>

## VIEW MENU CONTINUED

	<p><b>Maximum Collector Return Temperature</b></p> <p>The maximum collector return temperature is displayed when the MAX COLLECTOR RETURN elements are turned on. This is the warmest collector return temperature at the collector return sensor since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Collector Pump Running Time</b></p> <p>The collector pump running time is displayed when the COLLECTOR 'Pump' elements are turned on This is the time in hours the collector pump has operated since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Storage Tank Pump Running Time</b></p> <p>The storage tank pump running time is displayed when the 'Pump 1' elements are turned on This is the time in hours the storage tank pump has operated since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Auxiliary Relay Running Time</b></p> <p>The auxiliary relay running time is displayed when the 'Pump 2' elements are turned on This is the time in hours the auxiliary relay has operated since last cleared. To clear, press and hold the 'Up' and 'Down' buttons simultaneously.</p> <p>Note: This item is only available in the Advanced access level.</p>

## ADJUST MENU


To switch between the View menu and the Adjust menu, press and release the MENU button on the face of the control. To advance to the next available Adjust item, press and release the ITEM button on the face of the control.

	<p><b>Operating Mode</b></p> <p>The operating mode sets the control operation.</p>
	<p><b>Delta T Target Temperature</b></p> <p>The delta T target temperature sets the desired temperature difference between the collector supply sensor and the storage tank sensor.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Delta T Differential Target Temperature</b></p> <p>The delta T differential target temperture sets the desired temperature difference differential between the collector supply sensor and the storage tank sensor.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Maximum Collector Supply Temperature</b></p> <p>The maximum collector supply temperture sets the warmest temperature for the maximum collector supply temperature.</p> <p>Note: This item is only available in the Advanced access level.</p>
	<p><b>Maximum Collector Supply Differential Temperature</b></p> <p>The maximum collector supply differential temperature sets the differential for the maximum collector supply temperature.</p> <p>Note: This item is only available in the Advanced access level.</p>

## ADJUST MENU CONTINUED

<p>COLLECTOR SUPPLY <b>ADJUST</b></p> <p>250 °F</p> <p>LIMIT</p>	<p><b>Limit Collector Supply Temperature</b></p> <p>The limit collector supply temperature sets the warmest temperature limit for the collector supply temperature. This item is not available if Drainback setting is set to on.</p> <p>Note: This item is only available in the Advanced access level.</p>
<p>COLLECTOR SUPPLY <b>ADJUST</b> DIFF</p> <p>10 °F</p> <p>LIMIT</p>	<p><b>Limit Collector Supply Differential Temperature</b></p> <p>The limit collector supply differential temperature sets the differential for the limit collector supply temperature. This item is not available if Drainback setting is set to on.</p> <p>Note: This item is only available in the Advanced access level.</p>
<p>COLLECTOR SUPPLY <b>ADJUST</b></p> <p>OFF</p> <p>MIN</p>	<p><b>Minimum Collector Supply Temperature</b></p> <p>The minimum collector supply temperature sets the coolest temperature for the collector supply temperature.</p> <p>Note: This item is only available in the Advanced access level.</p>
<p>COLLECTOR SUPPLY <b>ADJUST</b> DIFF</p> <p>10 °F</p> <p>MIN</p>	<p><b>Minimum Collector Supply Differential Temperature</b></p> <p>The minimum collector supply differential temperature sets the differential for the minimum collector supply temperature.</p>
<p><b>ADJUST</b> STORAGE</p> <p>160 °F</p> <p>MAX</p>	<p><b>Maximum Storage Temperature</b></p> <p>The maximum storage temperature sets the highest temperature for the storage tank and, if applicable, auxiliary storage tank.</p>
<p><b>ADJUST</b> STORAGE DIFF</p> <p>3 °F</p> <p>MAX</p>	<p><b>Maximum Storage Differential Temperature</b></p> <p>The maximum storage differential temperature sets the differential for the maximum storage temperature.</p>
<p><b>ADJUST</b> STORAGE TARGET</p> <p>130 °F</p>	<p><b>Storage Target Temperature</b></p> <p>The storage target temperature sets the target temperature for the storage tank. This item is only available if the Auxiliary setting is set to supplement.</p>
<p><b>ADJUST</b> STORAGE DIFF TARGET</p> <p>3 °F</p>	<p><b>Storage Target Differential Temperature</b></p> <p>The storage target differential temperature sets the differential for the storage target temperature. This item is only available if the Auxiliary setting is set to supplement.</p>
<p>COLLECTOR <b>ADJUST</b></p> <p>20 %</p> <p>MIN</p> <p>▶</p>	<p><b>Minimum Collector Pump Output Speed</b></p> <p>The minimum collector pump output speed sets the minimum variable speed output for the collector pump.</p> <p>Note: This item is only available in the Advanced access level.</p>
<p><b>ADJUST</b> AUXILIARY</p> <p>SINK</p>	<p><b>Auxiliary Device</b></p> <p>The auxiliary device sets the application configuration for the auxiliary relay.</p> <p>Note: This item is only available in the Advanced access level.</p>

## ADJUST MENU CONTINUED

<div>ADJUST</div> <div>OFF</div> <div>DRAINBACK</div>	<p><b>Drainback Feature</b></p> <p>The drainback feature selects whether or not drainback is active.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>COLLECTOR</div> <div>ADJUST</div> <div>3:00<sup>min</sup></div> <div>7% </div>	<p><b>Collector Pump Full Output Time</b></p> <p>The collector pump full output time sets the period of time the collector pump operates at full speed for during start up.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>OFF</div> <div>FREEZE</div>	<p><b>Freeze Protection</b></p> <p>The freeze protection feature selects whether or not the freeze protection is active.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>OFF</div> <div>VACUUM TUBE</div>	<p><b>Vacuum Tube Feature</b></p> <p>The vacuum tube feature selects whether vacuum tube collectors are used.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>OFF</div> <div>FLOW SIGNAL</div>	<p><b>Flow Metering</b></p> <p>The flow metering feature selects whether a flow meter is used in order to calculate the amount of energy collected at the collector.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>FLOW SIGNAL</div> <div>3.5</div> <div>MAX</div>	<p><b>Maximum Flow Meter Signal</b></p> <p>The maximum flow meter signal sets the upper rail of the analog flow meter range.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>FLOW</div> <div>0</div> <div>MIN</div>	<p><b>Minimum Flow Meter Flow Rate</b></p> <p>The minimum flow meter flow rate sets the minimum flow rate of the flow meter.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>FLOW</div> <div>10</div> <div>MAX</div>	<p><b>Maximum Flow Meter Flow Rate</b></p> <p>The maximum flow meter flow rate sets the maximum flow rate of the flow meter.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>GLYCOL</div> <div>40 %</div>	<p><b>Glycol Percentage</b></p> <p>The glycol percentage sets the weight percentage of antifreeze.</p> <p>Note: This item is only available in the Advanced access level.</p>
<div>ADJUST</div> <div>°F</div>	<p><b>Units</b></p> <p>Selects the units for display of temperature.</p>



## Troubleshooting

As in any troubleshooting procedure, it is important to isolate the problem as much as possible. By using the Error Messages located on page 17, the trouble shooting process can be greatly simplified. When an error message is displayed on the STC, refer to the error messages on page 17 to identify the cause of the error and use standard testing procedures to confirm the fault. If you suspect an external wiring fault, return to step three and carefully check all external wiring connections.

Once the fault has been corrected, press any button on the face of the control to clear the error message.

## TEST ROUTINE

The main control functions of the STC can be tested by pressing and holding the UP button for more than three (3) seconds.

**Continue** to hold the UP button and the STC will test the outputs in the following sequence.

### Step One

The variable speed output is increased from 0% to 100% over 10 seconds.

### Step Two

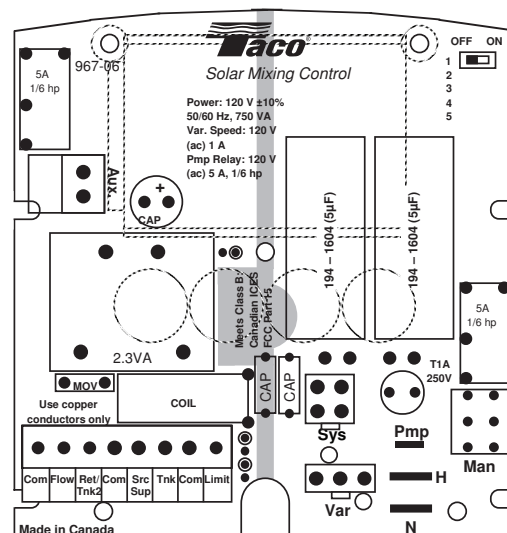
The variable speed output is decreased from 100% to 0% over 10 seconds.

### Step Three

The storage tank pump is turned on for 10 seconds and is then turned off.

### Step Four

The Auxiliary Contact is turned on for 10 seconds and is then turned off. The STC continues normal operation.



## MANUAL OVERRIDE

In the event that the STC fails to operate, a manual operation switch is located on the STC's circuit board. When the manual operation switch is set to Man, the variable speed pump and the storage tank pump outputs are turned on. This operation continues until the manual switch is returned to its original position.

## FUSE REPLACEMENT

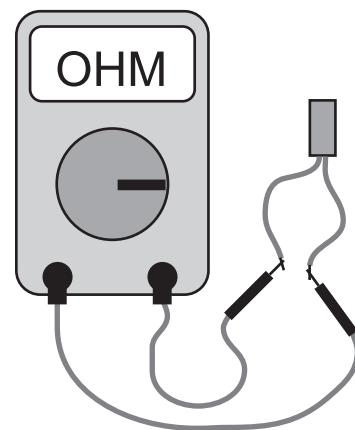
The Variable Speed output of the STC is fuse protected. This fuse is located on the circuit board on the back of the STC. This is a field replaceable item. Fuse rating: 1 A 1/12 hp, fuse T1 A 250 V

## TESTING THE SENSORS

Do not apply voltage to the sensor or to the sensor input of the control as this will result in damage to either the sensor, the control, or both the sensor and the control.

A quality testing meter capable of measuring up to 2,000,000 ohms and a good quality digital thermometer are required to test the sensors. If a digital thermometer is not available, place a second sensor next to the original sensor and compare the readings.

Begin by measuring the temperature at the sensor location using the digital thermometer. Next, measure the resistance of the sensor using the testing meter. Ensure that the sensor is disconnected from the control at the time of testing. Using the reference chart below, determine the sensor's temperature. Compare the sensor's temperature to that measured by the digital thermometer. The two temperature readings should be close. If the sensors temperature is too high, this can indicate that there is a partial short in the sensor wiring. If the sensor's temperature is too low, this can indicate that there is a loose connection or break in the sensor wiring. Isolate and repair the problem. If the problem is isolated to the sensor, replace the sensor.



Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-30	-34	234,196	30	-1	34,558	90	32	7,334	150	66	2,045
-20	-29	165,180	40	4	26,099	100	38	5,828	160	71	1,689
-10	-23	118,018	50	10	19,900	110	43	4,665	170	77	1,403
0	-18	85,362	60	16	15,311	120	49	3,760	180	82	1,172
10	-12	62,465	70	21	11,883	130	54	3,050	190	88	983
20	-7	46,218	80	27	9,299	140	60	2,490	200	93	829



## Error Messages

<div>VIEW</div> <div>E01</div> <div></div>	<b>EEPROM Read Error</b> The control was unable to read the installers settings from its memory. The control was forced to load factory defaults for all settings. The control will stop operation until all of the settings in the Adjust menu have been checked.
<div>VIEW COLLECTOR SUPPLY</div> <div>Shr</div> <div></div>	<b>Collector Supply Sensor Short Circuit</b> A short circuit has been detected in the collector supply sensor. The control does not operate while fault is present. To clear this error message, correct the short circuit and press any button on the control.
<div>VIEW COLLECTOR SUPPLY</div> <div>OPn</div> <div></div>	<b>Collector Supply Sensor Open Circuit</b> An open circuit has been detected in the collector supply sensor. If freeze protection is enabled, the control operates the collector pump at full speed. If freeze protection is not enabled, the control stops operation until the fault is corrected. To clear this error message, correct the open circuit and press any button on the control.
<div>VIEW STORAGE</div> <div>Shr</div> <div></div>	<b>Storage Sensor Short Circuit</b> A short circuit has been detected in the primary storage tank sensor. The control does not operate for the primary storage tank while fault is present. To clear this error message, correct the short circuit and press any button on the control.
<div>VIEW STORAGE</div> <div>OPn</div> <div></div>	<b>Storage Sensor Open Circuit</b> An open circuit has been detected in the primary storage tank sensor. The control does not operate for the primary storage tank while fault is present. To clear this error message, correct the open circuit and press any button on the control.
<div>VIEW COLLECTOR RETURN</div> <div>Shr</div> <div></div>	<b>Collector Return Sensor Short Circuit</b> A short circuit has been detected in the collector return sensor. If no storage sensor error condition is present, the control operates using the storage sensor. If storage sensor error condition is present, the control does not provide the collector energy monitoring feature. To clear this error message, correct the short circuit and press any button on the control.
<div>VIEW COLLECTOR RETURN</div> <div>OPn</div> <div></div>	<b>Collector Return Sensor Open Circuit</b> An open circuit has been detected in the collector return sensor. If no storage sensor error condition is present, the control operates using the storage sensor. If storage sensor error condition is present, the control does not provide the collector energy monitoring feature. To clear this error message, correct the open circuit and press any button on the control.
<div>VIEW STORAGE AUXILIARY</div> <div>Shr</div> <div></div>	<b>Auxiliary Storage Sensor Short Circuit</b> A short circuit has been detected in the auxiliary storage tank sensor. The control does not operate for the auxiliary storage tank while fault is present. To clear this error message, correct the short circuit and press any button on the control.
<div>VIEW STORAGE AUXILIARY</div> <div>OPn</div> <div></div>	<b>Auxiliary Storage Sensor Open Circuit</b> An open circuit has been detected in the auxiliary storage tank sensor. The control does not operate for the auxiliary storage tank while fault is present. To clear this error message, correct the open circuit and press any button on the control.

## Replacing Cartridge Assembly

1. Disconnect the electrical supply.
2. Reduce system pressure to 0 psi and allow system to return to room temperature. Isolate the SXPB by closing the service valves or draining the system.
3. Remove screw holding the STC module to Solar X – Pump Block. Unplug both pump Molex plugs, power cord and auxiliary & sensor terminal blocks from STC. Set STC control aside in safe place, away from water damage.
4. Remove 4 screws holding plastic housing to pump castings.
5. Remove the body bolts and swing motor assembly away from the body.
6. Pull cartridge out of the motor housing.
7. Install replacement cartridge, making sure that the cover plate is between the cartridge flange and motor.
8. Make sure the replacement cartridge corresponds to the full circulator product number. A complete parts list is available from your local plumbing supply wholesaler.
9. Reassemble the circulator using the new gasket and bolts supplied.
10. Reassemble plastic housing and STC control in reverse order.
11. Follow the “Installation” procedure to start up the circulator.

## Technical Data

### PERFORMANCE DATA

Flow Range .....	0 - 7.5 GPM
Head Range .....	0 - 15.5 Feet
Minimum Fluid Temperature .....	32°F (0°C)
Maximum Continuous Fluid Temperature .....	180°F (85°C)
Maximum Working Pressure.....	125 psi
Connections .....	3/4" NPT

C US UL Mark

FOR INDOOR USE ONLY

### MATERIALS OF CONSTRUCTION

Casing (body) .....	Bronze
Stator Housing .....	Steel
Cartridge .....	Stainless Steel
Impeller .....	Non-Metallic
Shaft .....	Ceramic
O-Ring & Gaskets .....	EPDM
Standard Heat Exchanger .....	Stainless Steel
	Single Wall Design
Optional Heat Exchanger.....	Stainless Steel
	Double Wall Design

### ELECTRICAL DATA CHART

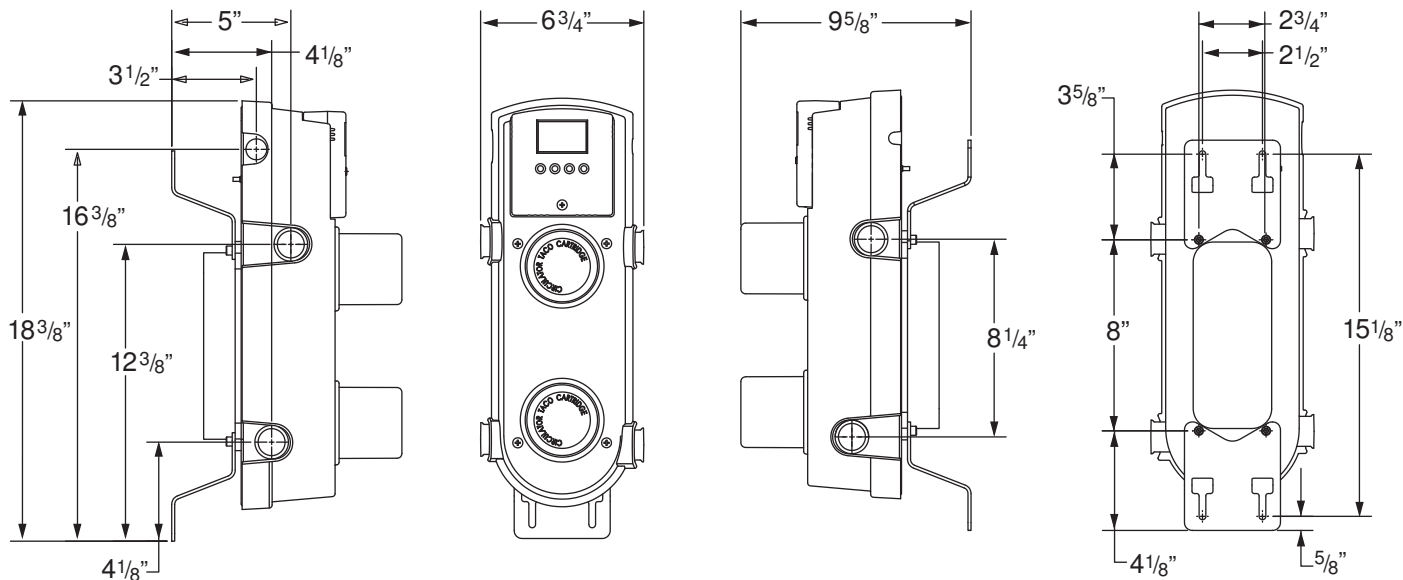
Volts.....	120
Hz .....	60
Ph .....	1
Amps .....	2
RPM.....	3250
HP.....	2 @ 1/25
Motor Type .....	Permanent Split
	Capacitor Impedance
	Protected

### CONTROL ADJUSTMENT MENU

Mode .....	On, Au, OFF
ΔT Target Temperature .....	2°F to 90°F
ΔT Differential Target Temperature .....	2°F to 45°F
Maximum Collector Supply Temperature .....	190°F to 300°F, OFF
Maximum Collector Supply Differential Temperature .....	2°F to 45°F
Limit Collector Supply Temperature .....	190°F to 300°F
Limit Collector Supply Differential Temperature.....	2°F to 45°F
Minimum Collector Supply Temperature .....	OFF, 50°F to 185°F
Minimum Collector Supply Differential Temperature .....	2°F to 45°F
Maximum Storage Temperature .....	50°F to 250°F, OFF
Maximum Storage Differential Temperature .....	2°F to 45°F
Storage Target Temperature.....	OFF, 70°F to 190°F
Storage Target Differential Temperature .....	2°F to 45°F
Minimum Collector Pump Variable Speed Output .....	10% to 100%
Auxiliary Relay Configuration .....	SINK, BOOSTER,
	SUPPLEMENT,
	STORAGE, OFF
Drainback Feature .....	On, OFF
Collector Pump Maximum Variable Speed Output Time .....	0:30 min to 10:00 min
Freeze Protection Feature .....	OFF, On
Vacuum Tube Feature .....	OFF, On
Flow Signal .....	OFF, On
Minimum Flow Signal.....	0 V(dc) to 10 V(dc)
Maximum Flow Signal.....	0 V(dc) to 10 V(dc)
Minimum Flow Rate .....	0 GPM to 60 GPM
Maximum Flow Rate .....	1 GPM to 60 GPM
Glycol Percentage.....	0% to 60%
Units .....	°F, °C

### DIMENSIONS & WEIGHT

Model: SXPB-1 Ship Weight: 26.5 lbs (12.0 kg)



#### CAUTION:

1. The addition of petroleum based fluids or certain chemical additives to systems utilizing TACO equipment voids the warranty.
2. Use supply wires suitable for 90°C – ATTENTION: Employer des fils d'alimentation adequats pour 90°C.

#### WARNING:

1. To avoid electrical shock, disconnect the power supply to the circulator and the main electrical unit.
2. Do not use in swimming pool or spa areas; pump has not been investigated for this application.

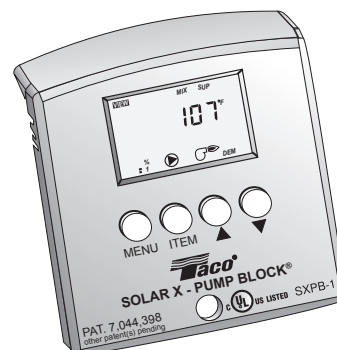
## Cleaning

The exterior of the control can be cleaned using a damp cloth. Do not use any solvents. Moisten the cloth and wring out any excess water before cleaning the control.

## Technical Data

### STC - Solar Temperature Control

Control	- Microprocessor PID control: This is not a safety (limit) control
Ambient Conditions	- Indoor use only, 32 to 185°F (0 to 85°C), <90% RH noncondensing
Power Supply	- 120 V (ac) +/- 10% 50/60 Hz 720 VA
Var. Pump	- 120 V (ac) 1 A 1/12 hp, fuse T1 A 250 V
Sys / Pmp Relay	- 120 V (ac) 5 A 1/4 hp, pilot duty 240 VA
Aux. Relay	- 120 V (ac) 5 A 1/4 hp, pilot duty 240 VA
Demand	- 24 V (ac) 0.1 VA or Dry contact
Sensors	- NTC thermistor, 10k ohm @ 77°F (25°C +/- 0.2°C) B=3892
Included	- 2 Taco Strap-on Sensors



The installer must ensure that this control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise. Conversely, this Class B digital apparatus complies with Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Regulations. However, if this control does cause harmful interference to radio or television reception, which is determined by turning the control off and on, the user is encouraged to try to correct the interference by re-orientating or relocating the receiving antenna, relocating the receiver with respect to this control, and/or connecting the control to a different circuit from that to which the receiver is connected.

## Limited Warranty Statement

Taco, Inc. will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within one (1) year from the date of startup or one (1) year and six (6) months from the date of shipment (whichever occurs first). Taco, Inc. will repair or replace without charge (at the company's option) any Taco "00" Series circulator cartridge that is proven defective under normal use within three (3) years from the date of manufacture.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at (401-942-8000).

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

**TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.**

**THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.**

**TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.**

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.



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