Solar Boiler

By Thermo Dynamics Ltd.

THERMO DYNAMICS LTD.

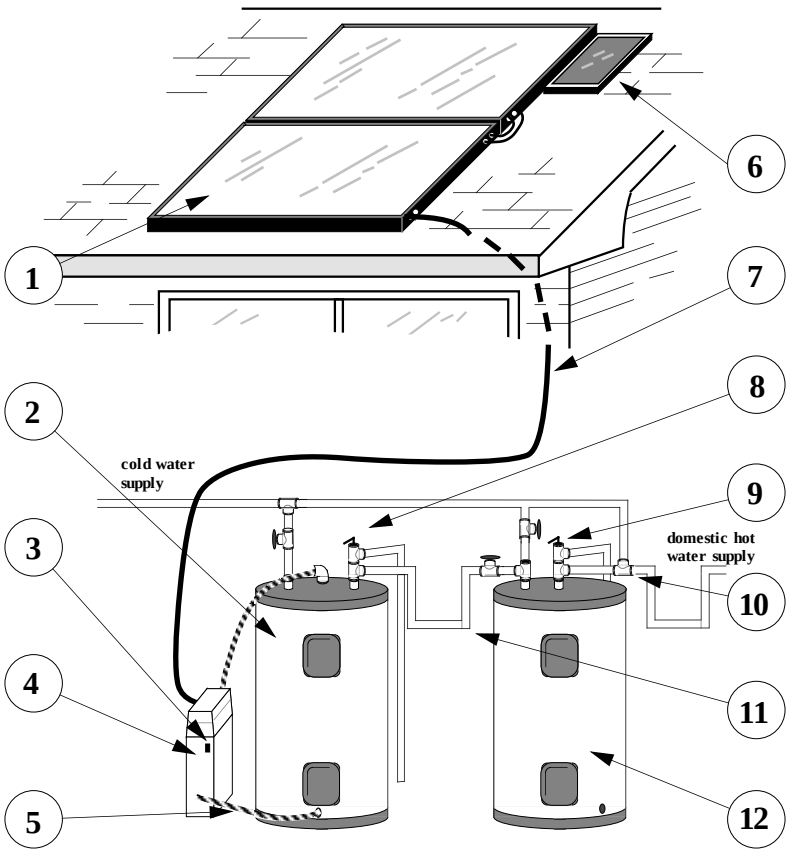
Installation Manual for SB32-9PV, SB64-9PV, Systems

Fuel Prices are always rising ...

So is the SUN

Congratulations on the purchase of your new Solar Boiler™ by Thermo Dynamics Ltd. The Solar Boiler™ is the newest and most advanced concept in residential solar water heating systems.

This manual outlines all the steps for a quick, easy, trouble-free installation. Read the entire manual carefully before any installation attempt is made.



1. Micro-Flo® solar collectors
2. Solar storage tank
3. Temperature gauge (optional)
4. Solar Boiler™ Module
5. 3/4" Hard Copper Tube
6. Photovoltaic Module
7. LifeLine® tubing
8. Solar isolation and bypass valves
9. Temperature - pressure relief valve
10. Mixing valve
11. Heat traps
12. Auxiliary water heater

WARNING:

- Installation shall be in accordance with the National Fire Code, and all local codes.
- The approved heat transfer fluid is a mixture of 40% Propylene Glycol USP and 60% distilled water. The substitution of any other heat transfer fluid can cause irreparable damage and create a health and safety hazard.
- The Solar Boiler™ module contains 3.75 litres, (1 USgallon), of heat transfer fluid when full.
- The installation of the Solar Boiler™ should be inspected by a qualified technician prior to start-up.

CERTIFICATION

The solar energy system described by this manual, when properly installed and maintained, meets the minimum standards established by the SRCC, (Solar Rating & Certification Corporation). This certification does not imply endorsement or warranty of this product by SRCC.

SOLAR CERTIFICATION SRCC ISCC & SEIA

FLORIDA SOLAR ENERGY CENTER
Testing & Operations Division
300 State Road 401, Cape Canaveral, Florida 32920

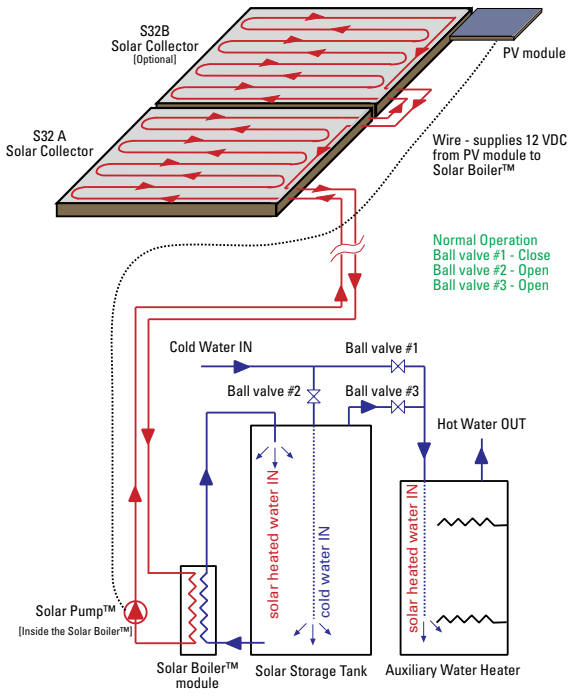
NATIONAL SOLAR TEST FACILITY

How the Solar Boiler™ works

- Solar collectors absorb sunlight and convert it to heat.
- When there is sufficient sunlight, the photovoltaic module produces electricity and turns the pump.
- The pump circulates heat transfer fluid, (HTF), through the solar collectors.
- Heat is transferred to the HTF in the solar collector.
- The HTF is returned to the heat exchanger in the Solar Boiler™ module.
- The heat is transferred to the water which circulates naturally to the top of the solar storage tank.
- Solar heated water is stored in the solar storage tank until water is drawn from the auxiliary tank (in this case an electric water heater).
- As hot water is drawn from the electric water heater it is replaced with solar heated water.
- The electric heaters increase the temperature of the solar heated water, if necessary.
- The electrical energy required to heat water is significantly less when water is preheated by the solar water heater.
- **In this manner, the solar water heater saves electrical energy.**

NOTE: The Solar Boiler™ is designed to shut off when a temperature of 180°F is attained in the solar storage tank.

The HTF is a 40/60 % by volume mixture of Propylene Glycol USP and distilled water, and will provide freeze protection to -10°F (-24°C)



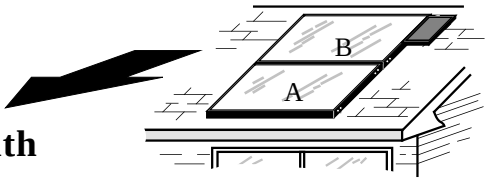
Solar Collector Installation

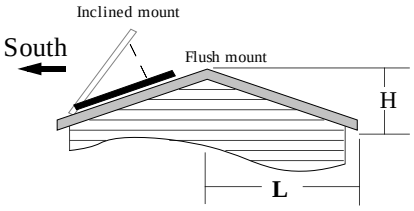
Micro-Flo® solar collectors are designed to work with the Solar Boiler™ module and other Micro-Flo® systems.

Locate the solar collectors on the roof of your home that is oriented true south or as close as possible. There are no major losses up to 45° east or west of true south. If your orientation is not in this range, consider a ground mounting system. The solar collectors are to be installed such that they are not shaded for for at least 5-6 hours during the middle of the day.

The recommended slope is equal to the local latitude plus or minus 10°. For example, Halifax, Nova Scotia is at a latitude of 45°. Therefore the recommended collector slope for a home located in or near Halifax is between 35° and 55°. For effective snow removal in the winter a slope of at least 45° is recommended.

To calculate the slope of your roof, measure the dimensions "H" and "L" as shown in the figure. Calculate the quantity H/L and compare it to the table to determine if an inclined mount is required.





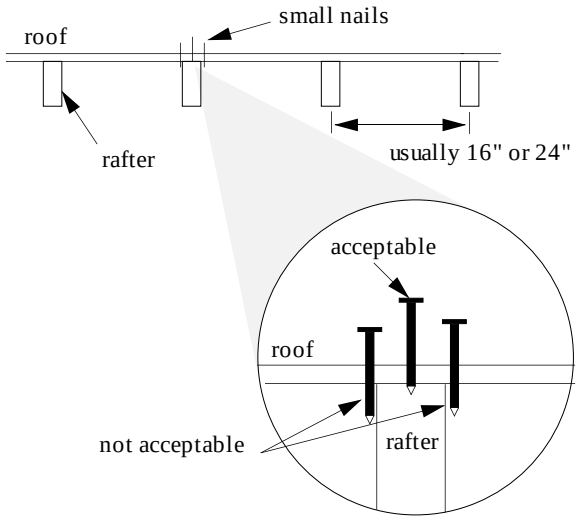
Angle	H/L	Rise/Run
14°	0.25	3/12
18°	0.33	4/12
23°	0.42	5/12
27°	0.50	6/12
34°	0.67	8/12
45°	1.0	12/12

Inclined Mount

- The inclined mounting kit allows the collectors to pivot in the front and uses aluminum channel to support the solar collector at the rear. Instructions are provided with the rack mount kit.

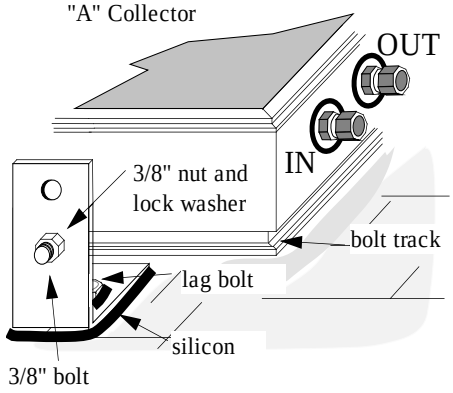
1 Locating Roof Rafters

- ❑ Locate the rafters directly under the solar collectors, and at least 8" from the ends of the solar collectors. In the case of 4' x 8' solar collectors and 24" rafter spacing, the clips should be mounted six feet apart (that is, one foot from the edge of the collector).
- ❑ To find the center of the rafters, lift the shingle and use small nails to find the two edges of the rafter.
- ❑ Drill a 1/4" pilot hole in the rafter for each of the front mounting clips.



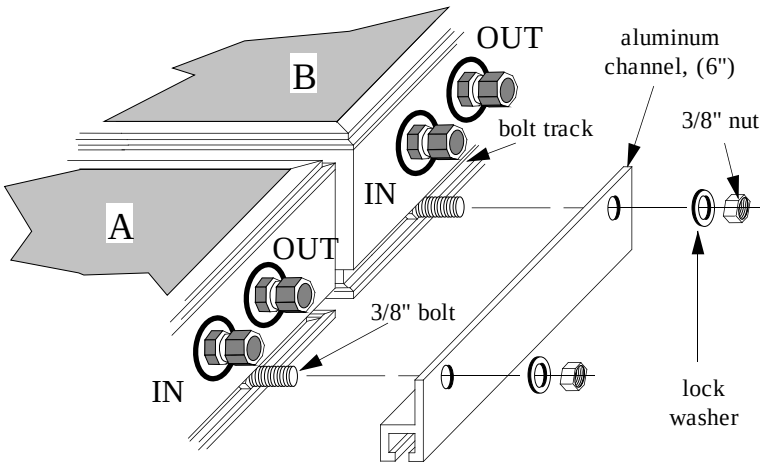
2 Flush Mounting Micro-Flo® Solar Collectors

- ❑ Fill the holes with silicon sealant and secure the two front clips to the roof using lag bolts. Seal the perimeter of each mounting clip base with silicon.
- ❑ Take the A solar collector and slide two 3/8" bolts in the bolt track.
- ❑ Loosely fasten these bolts to the bottom hole of the front mounting clips using a lock washer and nut.
- ❑ Center the solar collector so that the spacing from the end of the solar collector to the mounting clip is equal on both ends. The solar collector ports must be on the right hand corner of the solar collector when, viewed from below.



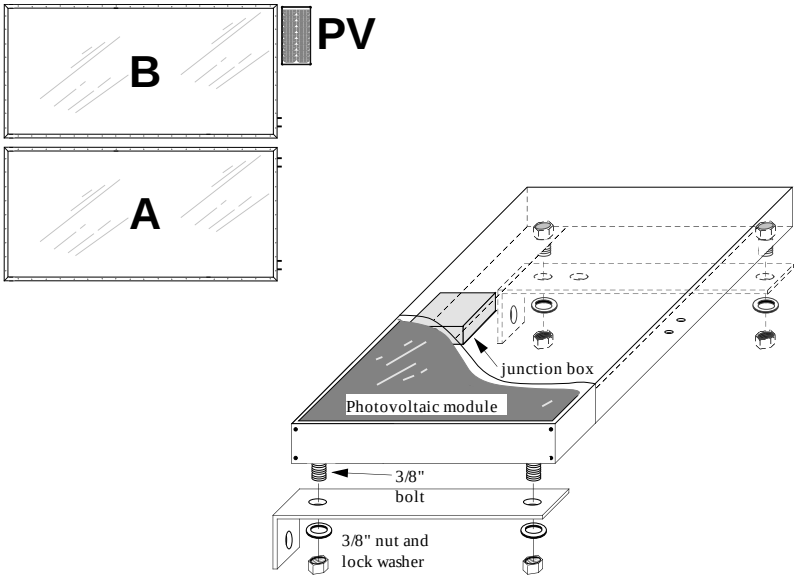
3 Optional Second Solar Collector

- ❑ If you have a two solar collector system, place the B solar collector above the A solar collector. Make sure that the ports are on the right hand side.
- ❑ Using the aluminum channel, fasten collector B to A as shown in the figure.
- ❑ Fasten the upper mounting clips (not shown) to the top of the collector(s), and use lag bolts to secure them to the rafters in the same manner as for solar collector A.
- ❑ Tighten all nuts that secure the collector(s) to the mounting clips.



4 Preparing the photovoltaic module

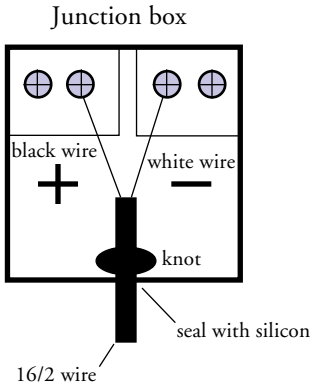
- ❑ Attach the two large aluminum brackets to the photovoltaic module using the 3/8" bolts, nuts, and lock washers supplied.
- ❑ Make sure both aluminum angle brackets are securely fastened to the photovoltaic module.
- ❑ The location of the PV module should be as shown in the diagram. It is recommended that it be located towards the top of the collectors so that snow will easily fall off.



5 Wiring the photovoltaic module

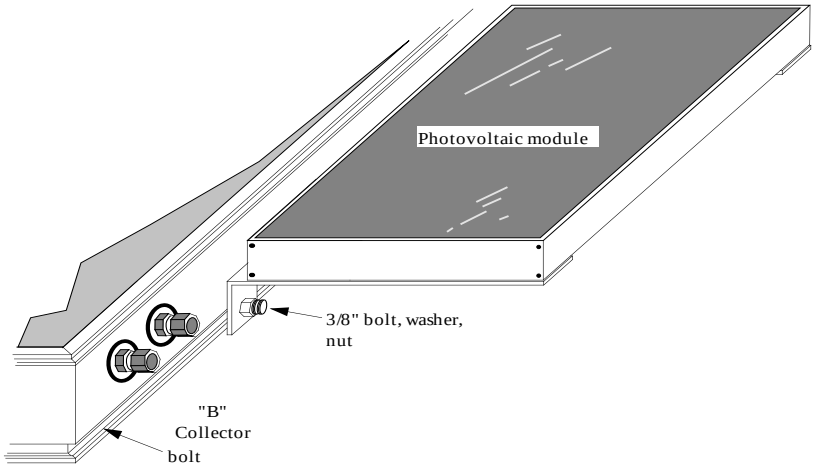
- ❑ The photovoltaic module comes with an electrical junction box located on the back of the module. Open the box, and note the positive terminal marked "+" and the negative terminal marked "-". (Follow the diagram on the back of the PV module)
- ❑ 16/2 wire is supplied with your Solar Boiler™. Drill a small 1/4" hole in the junction box and slip the wire through. Tie a knot in the wire so that it can not be pulled out of the box. Connect the black wire to the "+" terminal, and the white wire to the "-" terminal.
- ❑ Seal the hole in the junction box wire hole with silicon. Close the junction box securely.

CAUTION: The photovoltaic module produces electricity when exposed to sunlight. To avoid any chance of shock, cover the photovoltaic module with a towel during installation. The photovoltaic module is rated for 1.2 amps, 17.0 volts, and 20 watts.



6 Locating the photovoltaic module

- ❑ Locate the photovoltaic module as shown in the diagram. Using the 3/8" bolts, washer, and nuts, attach the photovoltaic module to the "B" collector bolt track as shown in the diagram. Tighten the nuts securely. The location should be as close to the top of the "B" collector as possible. It can be on either the left hand side or the right hand side.

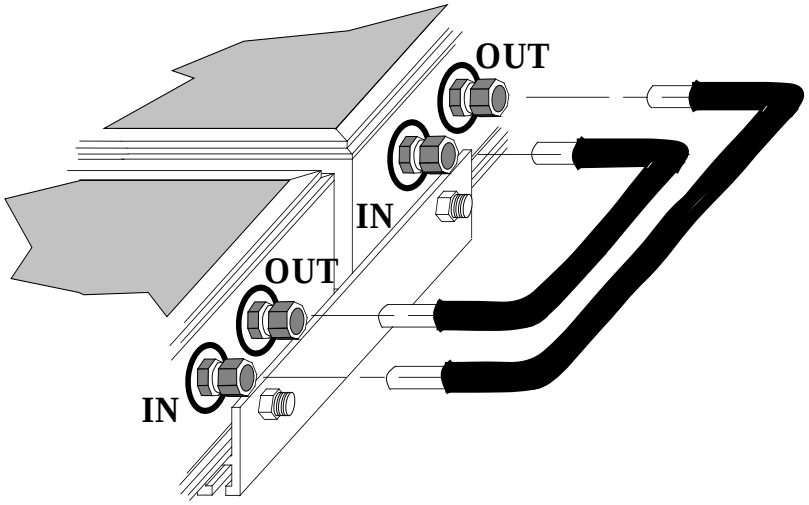


7

LifeLine® connection between collector A and B

- ❑ Remove the orange caps from the fittings on the collectors. Turn the 3/8" compression nuts on the fitting body until finger tight.
- ❑ Insert the two 3/8" copper tubes into the ports as shown.
- ❑ Using a 11/16" and a 5/8" wrench, tighten the nuts one full turn.

IMPORTANT: The 11/16" wrench is required to prevent the fitting body from rotating while turning the nut with the 5/8" wrench.



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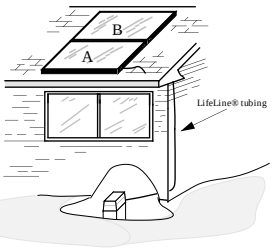
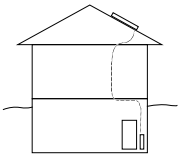
LifeLine® and CopperTube Kit Installation (For ease, the term "LifeLIne®" will be used in the manual to refer to both.)

- LifeLine® is used to connect the Solar Boiler™ module to the solar collectors.
- Locate the solar collectors as close as possible to the Solar Boiler™ module without compromising collector orientation. This will minimize the length of LifeLine® required to connect the Solar Boiler™ to the solar collectors.
- Run the LifeLine® to the solar collectors via an unused space or closet. **Note:** All LifeLine® installed in the horizontal position must slope down 1/4" for every horizontal foot.
- Secure the LifeLine® at intervals of 6 feet with the clamps. Do not kink the tube.
- Do not cut the LifeLine® until you are absolutely sure there is adequate length available.
- Insulate the entire length of LifeLine® with insulation provided.

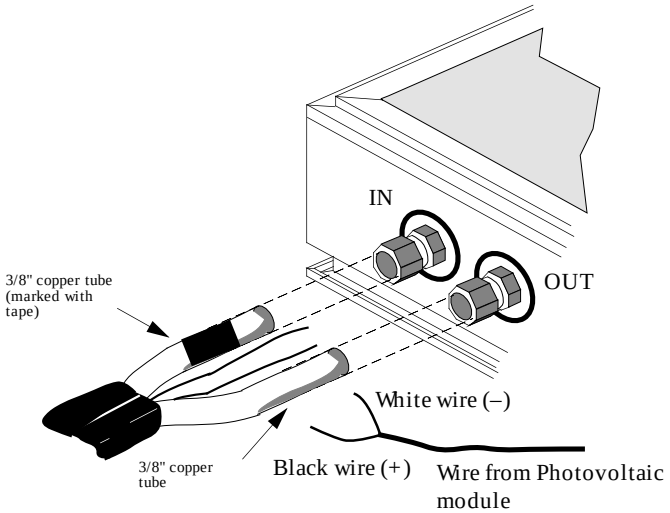




9

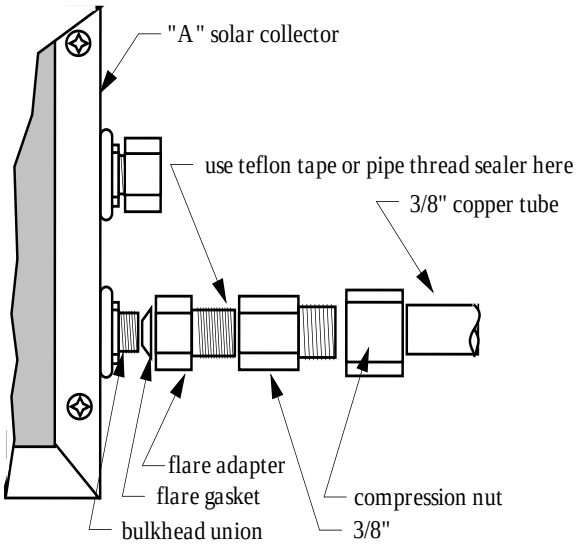
LifeLine® roof penetration

- ❑ Make a roof penetration at a position 6" - 8" horizontally away from the bottom “A” collector ports.
- ❑ Pass the LifeLine® through the roof penetration from below. Clamp the LifeLine® to the truss. Do not crimp the LifeLine®. Mark one of the copper tubes with tape on both ends to identify it as the supply line. It will be connected to the "IN" port of the "A" collector and to the pump or "OUT" port of the Solar Boiler module.
- ❑ Use a 3/8" tube bender to bend the copper tubes so that they may be inserted to the bottom ports of the "A" collector.



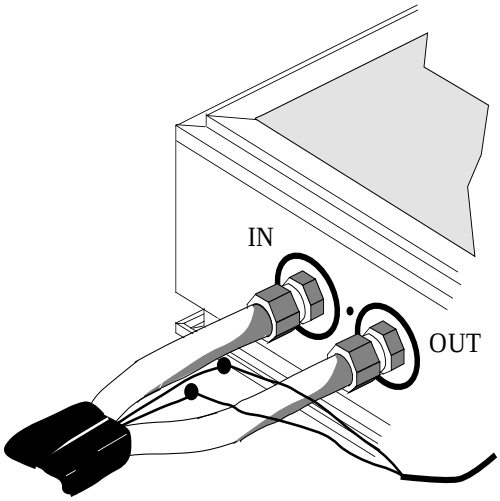
LifeLine® 3/8" adapter (SKIP THIS STEP IF YOUR COLLECTOR HAS 3/8" PORTS)

- ❑ In order to connect 3/8" tube(s) to the 1/4" bulkhead unions on the solar collector, adapters are included with installation hardware. The adapters consist of several brass and copper fittings. A top view of the lower right hand corner of the "A" solar collector is shown here and illustrates the proper arrangement of the fittings.
- ❑ Before attaching the flare adapter, remove the 1/4" compression nut from the solar collector.
- ❑ Connect fittings in the order shown.
- ❑ Use two wrenches to tighten all connections. Use a 9/16" wrench to prevent the bulkhead union from turning.



LifeLine® connection to collector "A"

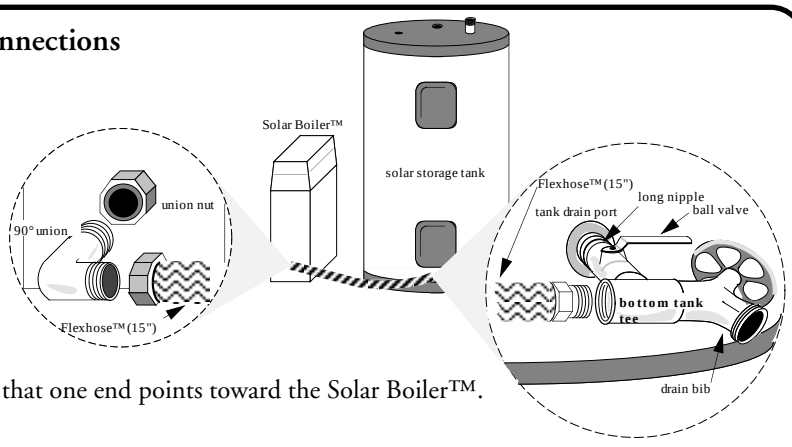
- ❑ Insert the marked 3/8" copper tube into the "IN" (blue) port of the "A" collector. Use a 5/8" wrench to tighten the compression nut one full turn. Be sure to hold the bulkhead union from moving during this process with a 11/16" wrench. **DO NOT OVER TIGHTEN !**
- ❑ Insert the other 3/8" copper tube into the "OUT" (red) port of the "A" collector. Use a 5/8" wrench to tighten the compression nut one full turn. Be sure to hold the bulkhead union from moving during this process with a 11/16" wrench. **DO NOT OVER TIGHTEN !**
- ❑ Insulate the copper tubing using the 3/8" ID insulation provided with the Solar Boiler™. Seal the roof penetration with silicon sealant.



Note:
Be sure to note which wire to the Solar Boiler™ is POSITIVE

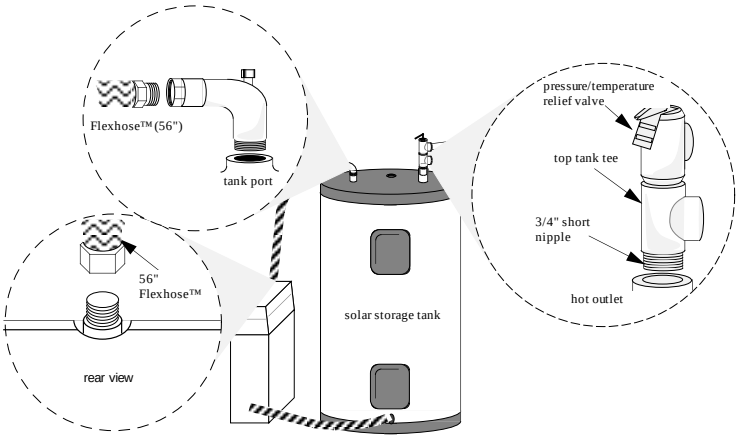
Setting up the Solar Boiler™ module,bottom connections

- ❑ Place the Solar Boiler™ module and solar storage tank next to your auxiliary water heater.
- ❑ Attach a 90° 3/4" elbow to the bottom of the Solar Boiler™ module and position it in the direction of the solar storage tank.
- ❑ Remove the drain valve from the solar storage tank. Install the bottom tank assembly. Position the tee such that one end points toward the Solar Boiler™.
- ❑ Apply teflon tape to the hose bib and attach it to the end of the tee that is pointing away from the Solar Boiler™.
- ❑ Connect the bottom of the Solar Boiler module to the tee at the bottom of the solar storage tank using 3/4" hard copper tubing. In the diagram, the copper tubing is referred to as Flexhose™. Flexhose™ is no longer used.



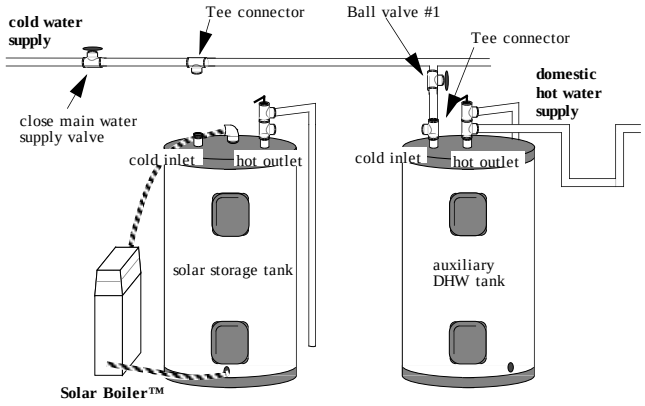
Setting up the Solar Boiler™ module,top connections

- ❑ Using 3/4" copper tube,attach the top port of the Solar Boiler module to the copper elbow fitting at the top of the tank. In the diagram, the 3/4" coper tube replaces the Flexhose™ which is no longer available.
- ❑ Wrap teflon tape around the short nipple of the top tank tee, and thread it into the "hot outlet" port of the solar storage tank. This tee becomes the "hot outlet" port of the solar storage tank.
- ❑ Plumb the temperature - pressure relief valve to a drain. **(We recommend a plumber integrate the Solar Boiler™ and solar storage tank with your existing water heater.)**



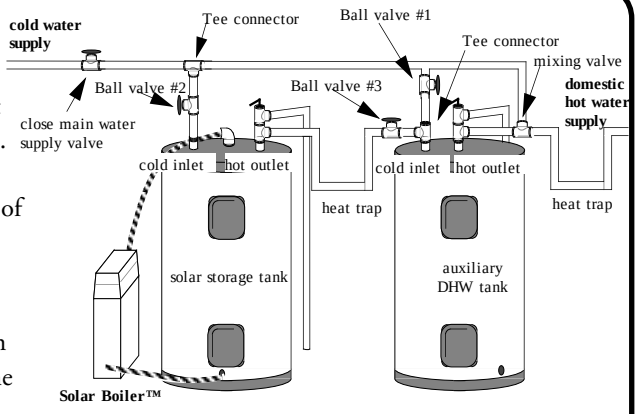
Isolation Bypass preparation

- ❑ Close the main cold water supply valve to the existing water heater.
- ❑ Install two copper tees and a ball valve #1 as shown in the diagram. Label this ball valve: BALL VALVE #1.
- ❑ Insulate all hot water pipes and the 5 feet of cold pipe leading to the solar storage tank.



Isolation Bypass connection

- ❑ Connect the main cold water supply to the cold inlet of the solar preheat tank. Install a ball valve in this line. Label this valve: BALL VALVE #2.
- ❑ Connect the hot outlet of the solar storage tank to the cold water supply of the existing water heater. Install a ball valve in this line, and label it: BALL VALVE #3.
- ❑ Install two heat traps as shown in the diagram to minimize heat loss from the solar storage tank. Please note that the domestic hot water supply line must have a mixing valve installed as shown in the diagram.
- ❑ Insulate all hot water pipes.



For normal solar operation:
- Ball valve #1 - close
- Ball valve #2 - open
- Ball valve #3 - open

- For normal solar operation, the valves should be opened or closed as shown in the diagram.

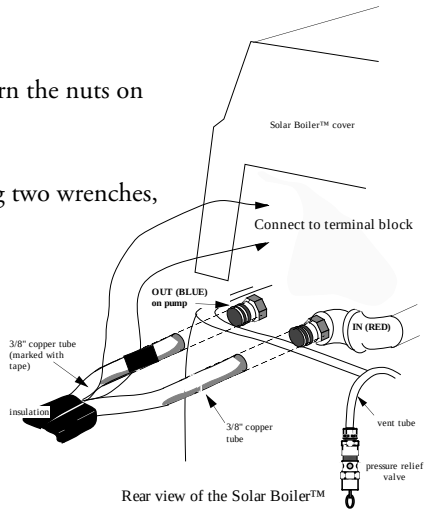
- The Solar Boiler™ module is precharged with the heat transfer fluid.

❑ Remove the plugs from the brass fittings and retain. Replace with the nuts provided. Turn the nuts on until finger tight.

16

❑ Insert the marked copper tube in the fitting located on the pump until it bottoms. Using two wrenches, one on the fitting body and one on the nut, tighten the nut exactly one full turn.

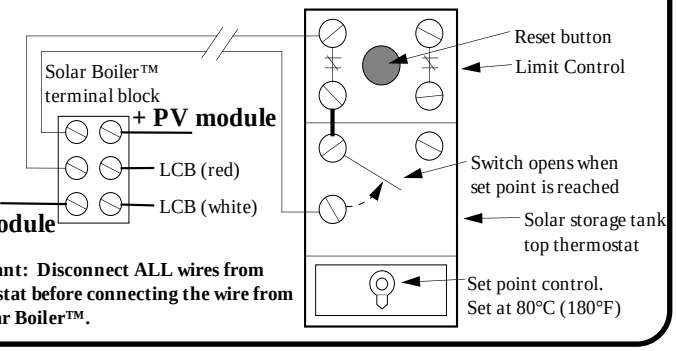
❑ Repeat the above procedure for the other copper tube, which connects to the "IN" (red) port under the pump.
Important: Do not over tighten the nuts. Failure to follow this procedure could result in a leaky connection and/or cracked nut.



Rear view of the Solar Boiler™

❑ Connect the photovoltaic module (PV) and solar storage tank thermostat to the Solar Boiler™ terminal block as shown in the diagram. **Note: Not all tanks have the same thermostat as shown in the diagram. Please refer to your tank owners manual for a schematic of the thermostat.**

❑ Set the top thermostat of the solar storage tank at 80°C (180°F). Note: Some thermostats have a high limit which is less than 80°C. If so, set the thermostat to its maximum. **Do not set the thermostat higher than 80°C.**



CAUTION: NEVER CONNECT ANY OTHER WIRES OR SOURCES OF ELECTRICITY TO THE SOLAR STORAGE TANK THERMOSTATS!!! NO A/C POWER IS TO BE CONNECTED TO THIS THERMOSTAT

Important: Disconnect ALL wires from thermostat before connecting the wire from the Solar Boiler™.

Solar Boiler™ Start up

17

❑ Pressurize the solar storage tank by opening the main cold water supply valve and a hot water tap (near the Solar Boiler™ if possible).

❑ As the solar storage tank fills with water, air will escape through the open hot water tap. Check for leaks.

❑ When the solar storage tank is full, close the hot water tap.

❑ Ensure that the solar isolation bypass valves are in the correct positions as indicated in step 15.

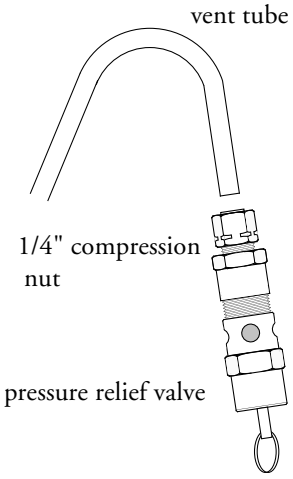
❑ Remove the pressure relief valve and brass cap from the Solar Boiler. Some fluid may be visible.

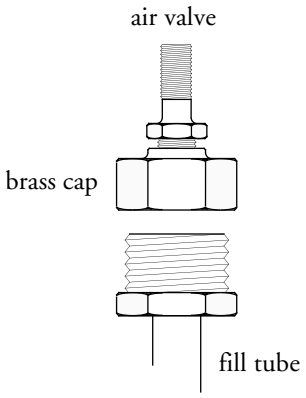
❑ Connect the wires from the photovoltaic module to the proper screws as shown in step 16. Ensure there is sufficient sunlight. The pump will begin operation, and air bubbling wwill be heard.

❑ When the pump has been running for a few minutes, you will not hear any bubbling noise from the Solar Boiler. Place a small container under the vent tube. Slowly, fill the Solar Boiler with fluid until it comes out of the vent tube.

❑ Reinstall the pressure relief valve and brass cap. Pressurize the system using a small pump. Pressurize to approximately 5 psi. (use a tire gauge to check the pressure).

❑ Check for leaks at all LifeLine® connections. If a leak is observed, tighten the nut 1/4 turn. Remember to use two wrenches, one on the fitting body and one on the nut.





Congratulations

You are now ready to enjoy of your new Solar Boiler™. It can provide a large fraction of your hot water requirements. If you have any questions or comments regarding its operation or installation, contact your dealer, installer, or Thermo Dynamics Ltd.

Operating Restrictions

Do not use the Solar Boiler™ system to heat any treated water system, such as pools, directly.

Use the proper mixture and quantity of propylene glycol USP and distilled water for freeze protection. DO NOT use automotive antifreeze, recreational vehicle antifreeze, ethylene glycol, or other poisonous fluids. Thermo Dynamics recommends a mixture of 40% Propylene Glycol USP and 60% distilled water for use as the heat transfer fluid.

System Maintenance

- Solar Collector Glass:
  In some areas the glass plate of the collectors may require cleaning once a year with an industrial cleaning product. In areas where air pollution is severe, more frequent cleaning may be required.

- pH and Freeze Protection:
  The pH and freeze protection capability of the propylene glycol USP/water solution should be checked annually.

- Back Flushing the Heat Exchanger:
  The Solar Boiler™ heat exchanger should be flushed with clean water ever 6 months. First, close the valve at the bottom of the solar storage tank near the Flexhose™ that connects the tank to the Solar Boiler™. Second, connect a hose to the drain bib at the bottom tank tee, and place the free end in a drain. Open the drain bib and allow water to flow for a few minutes. This will remove residue from the heat exchanger and hoses.

- Reservoir Fluid Level:
  The fluid level in the Solar Boiler™ reservoir should be checked every year. Instructions for this procedure are part of the refilling instructions.

Repairs

If any of the components of the Solar Boiler™ or Micro-Flo® solar collectors are damaged, your local dealer or Thermo Dynamics Ltd. should be advised before any repair is attempted.

In the case of broken glass, we recommend the use of an industrial vacuum cleaner to remove all glass fragments fro the collector and surrounding area. Cover the collector with a sheet of plywood to protect the absorber plate until a replacement glazing is obtained. Disconnect the wires from the photovoltaic module to the Solar Boiler™ and contact your local dealer or Thermo Dynamics Ltd.

The Solar Boiler™ should be repaired by a qualified solar technician. In some cases it may be necessary to disconnect the Solar Boiler™ for factory repair. Your local solar dealer or Thermo Dynamics should be notified before you attempt disconnection.

There are several ways to increase the performance of your Solar Boiler™ and to reduce hot water heating costs. Here are a few tips on getting the most from your water heating system.

- Add an insulating blanket to your electric water heater.*
- Add an insulating blanket to your solar storage tank.*
- Install low flow shower heads.
- Use warm water instead of hot when washing clothes.
- Insulate exposed hot water pipe where possible.*
- Minimize hot water use on overcast days.
- Use solar heated water as it is collected. If possible, postpone consumption of hot water to mid-morning or noon on a sunny day.
- Lower the thermostat setting of your electric water heater from 60°C (140°F) to 50°C (122°F). This should only be done by a qualified technician.

* Available by mail order from Thermo Dynamics Ltd.

TROUBLESHOOTING PROCEDURES AND INSTRUCTIONS

SYMPTOM	COMPONENT	PROBLEM	SOLUTION
Solar Boiler Stays OFF	Photovoltaic Module	snow covered	- remove snow or allow to melt
		module is in the shade	- check to see if there are any removable obstructions shading the module
		loose wire connections	- check all wire connections - measure resistance to make sure that there is not an infinite resistance - measure voltage of module on a bright sunny day (approx. 17 VDC)
	Linear Current Booster (LCB)	defective LCB	- contact dealer or Thermo Dynamics to replace LCB
	Pump	pump is seized	- turn pump shaft by hand to check that it is turning freely - have pump repaired or replaced
	Motor	defective motor	- measure resistance of motor (ohms) - replace with new motor
	Storage tank thermostat	loose wire connections	- check wire connections
		defective storage tank thermostat	- reset thermostat - check thermostat relay - replace thermostat
Fluid Leaks	Solar Collectors	LifeLine® connections	- use two wrenches to tighten the nut 1/4 turn
		copper tube connections	- use two wrenches to tighten the nut 1/4 turn
		absorber or internal connections	- disconnect photovoltaic module and contact dealer or Thermo Dynamics for assistance
	Solar Boiler	LifeLine® connections	- use two wrenches to tighten the nut 1/4 turn
		pump housing	- replace pump
		heat exchanger	- contact dealer or Thermo Dynamics for assistance
		hose fitting	- tighten hose 1/8 turn - isolate tank from pressure, depressurize, remove hose, replace gasket on swivel end and reseal threads on solid end - isolate tank from city supply, depressurize and replace hose
		hose	- repair or replace
	Solar Storage Tank	fittings	- tank may require replacement, contact dealer or Thermo Dynamics
Antifreeze not Hot on Bright Sunny Day	Motor not turning pump	loose or defective wire connections	- have a technician repair or replace as required - remove pump to verify that motor is turning freely
		pump is seized	- turn pump shaft by hand to check that it is turning freely - have pump repaired or replaced
		defective motor	- replace with new motor and reattach pump
	Pump	pump very hot and fluid cool (turning but not circulating)	- check fluid level and add fluid as required (see technical note attached to installation manual) - disconnect photovoltaic module and contact dealer or Thermo Dynamics
No Heat Transfer to Water on Bright Sunny Day	Flexhose™	air trapped near top of tank connection	- open cap at top of tank connection about 1/2 turn to allow air to escape (DO NOT REMOVE CAP)
		kink in hose	- undo kink
		valve closed at bottom of solar storage tank (near hose connection)	- open valve
Pump/Motor Unusually Noisy	Solar Boiler Cover	cover of Solar Boiler is resting against the motor or pump	- adjust cover
	Dip Tube	low fluid level in reservoir	- disconnect photovoltaic module and check fluid level in reservoir (see technical note attached to installation manual)

IMPORTANT: If any of the above persist and you are unable to correct the problem, contact your dealer or Thermo Dynamics Ltd. immediately. The safest action to take in any case is to disconnect the Solar Boiler module from the photovoltaic module.

Thermo Dynamics Ltd. reserves the right to modify their products without notice as deemed necessary for product improvement and development.

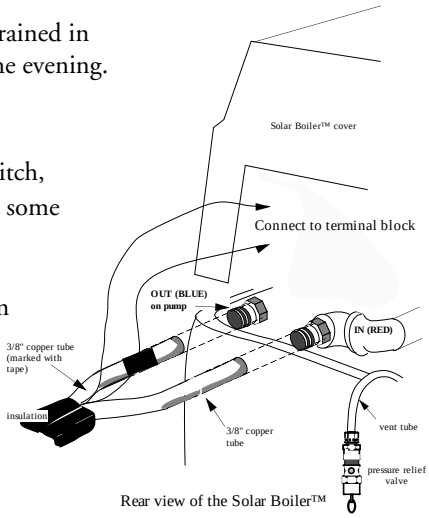
Solar Boiler HTF (heat transfer fluid) Draining/Refilling Instructions

Your Solar Boiler™ is precharged with HFT (heat transfer fluid) which is a mixture of Propylene Glycol USP and distilled water (40/60 by volume). In the event that you should have to drain and/or refill the Solar Boiler™, follow these instructions to ensure proper system operation.

Draining the HTF (heat transfer fluid)

The HTF should never be drained during system operation. HTF should only be drained in the morning before system start up, or at least one hour after system shut down in the evening. This is to ensure that the HFT is not excessivily hot.

- ❑ Remove the cover from the Solar Boiler. Turn the Solar Boiler off using the switch, (ON = green; OFF = black), located under the cover. (Switch only available on some models. If no switch, disconnect the wires)
- ❑ Disconnect the 3/8" copper lines from the Solar Boiler™. Allow any fluid from the lines to drain into a container. Leave lines disconnected.
- ❑ To drain the fluid in the Solar Boiler™ module, you will have to wait until their is enough sunlight for the system to operate. With a container under the outlet of the pump, turn the Solar Boiler™ ON. Keep the unit on until no liquid comes out of the pump. Turn the Solar Boiler™ OFF. Do not turn the system on again until Solar Boiler™ is refilled.

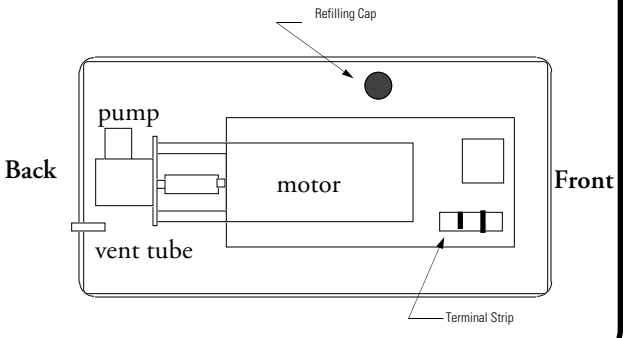


Rear view of the Solar Boiler™

- ❑ The system is now drained. Connect the 3/8" copper lines to the Solar Boiler™ unit. To refill the Solar Boiler™, follow the instructions listed below.

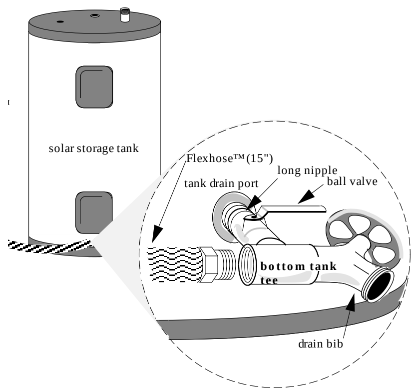
Refilling the Solar Boiler™ with HTF (heat transfer fluid)

- ❑ Remove the cover from the Solar Boiler. Turn the Solar Boiler off using the switch, (ON = green; OFF = black), located under the cover. (Switch only available on some models. If no switch, disconnect the wires)
- ❑ Locate and remove the pressure relief valve attached to the vent tube at the back of the unit.
- ❑ Locate the fill tube at the side of the unit and remove the brass cap from the fill tube. Using the wooden dowel provided check the fluid level in the reservoir. This level should be about 8 - 12” on the dowel while the system is operating. If the level is low contact your dealer or Thermo Dynamics Ltd. before continuing.
- ❑ If the fluid level is low inspect the system for signs of leakage. Inspect all visible fittings on the Solar Boiler and the connections at the solar collector on the roof. Also inspect under the Solar Boiler case for signs of HTF on the floor. Propylene glycol USP dries very slowly and will remain on surfaces for an extended period of time.
- ❑ The recommended heat transfer fluid is a 40/60 mixture by volume of Propylene Glycol USP and distilled water. Fluid should be added to the Solar Boiler with a funnel to prevent spillage. When adding fluid, follow the step 17 on page 8.
- ❑ Replace the brass cap on the fill tube and hand tighten. Replace the pressure relief valve on the vent tube at the back of the Solar Boiler. Turn the Solar Boiler ON using the switch or by connecting the PV wires, replace the cover on the Solar Boiler.



Solar Boiler™ Service Log

To ensure optimum performance from your Solar Boiler™, Thermo Dynamics Ltd. recommends that the system is back flushed at least every 6 months. This service log must be kept up to date. Failure to do so will render the warranty null and void.



Back Flushing Procedure.

• Close the valve at the bottom of thesolar storage tank near the Flexhose™ that connects the tank to the Solar Boiler™, shown in the diagram in the diagram.

• Connect a hose to the drain bib at the bottom of the solar storage tank, and place the free end in a drain.

Date:____________ Technician__________ ☐ Back Flush______
Comments____
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For more system maintenance procedures, please refer to your installation manual, or contact your local dealer, or Thermo Dynamics Ltd. at (902) 468-1001

Operating and Emergency Procedures

Once you have installed and connected your Solar Boiler™ to the photovoltaic module, you are ready to enjoy free solar energy.

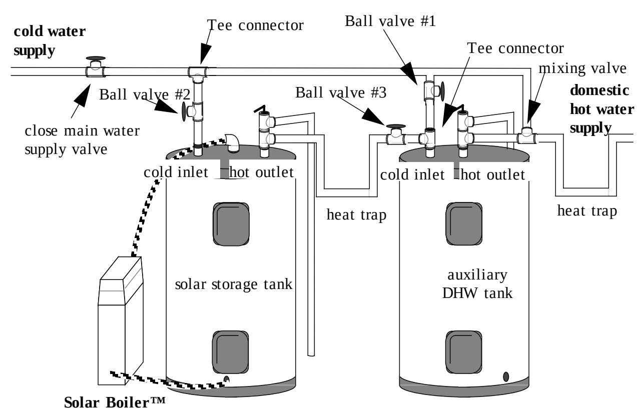
To determine if your Solar Boiler™ is operating properly, perform the following simple tests:

• On a bright sunny day, draw some water from your hot water tap. Feel the cold water inlet pipe to your solar storage tank. This pipe should be cold. Carefully feel the pipe exiting your solar storage tank. It should feel significantly warmer. **CAUTION: THE SOLAR BOILER™ IS CAPABLE OF PRODUCING VERY HOT WATER. DO NOT HOLD ON TO THE PIPE EXITING YOU SOLAR STORAGE TANK.**

• Another method for checking the operation of your Solar Boiler™ is to read the temperature gauge located on the front. At the end of a bright Sunny day, open a hot water faucet and observe the thermometer. The temperature of the water leaving the solar tank should be higher than the temperature of the city supply water going into the tank.

In the event that the there is an emergency such as a leaky tank, turn off the Solar Boiler™ using the switch or disconnecting the wires from the photovoltaic module. Close all valves as shown in the diagram:

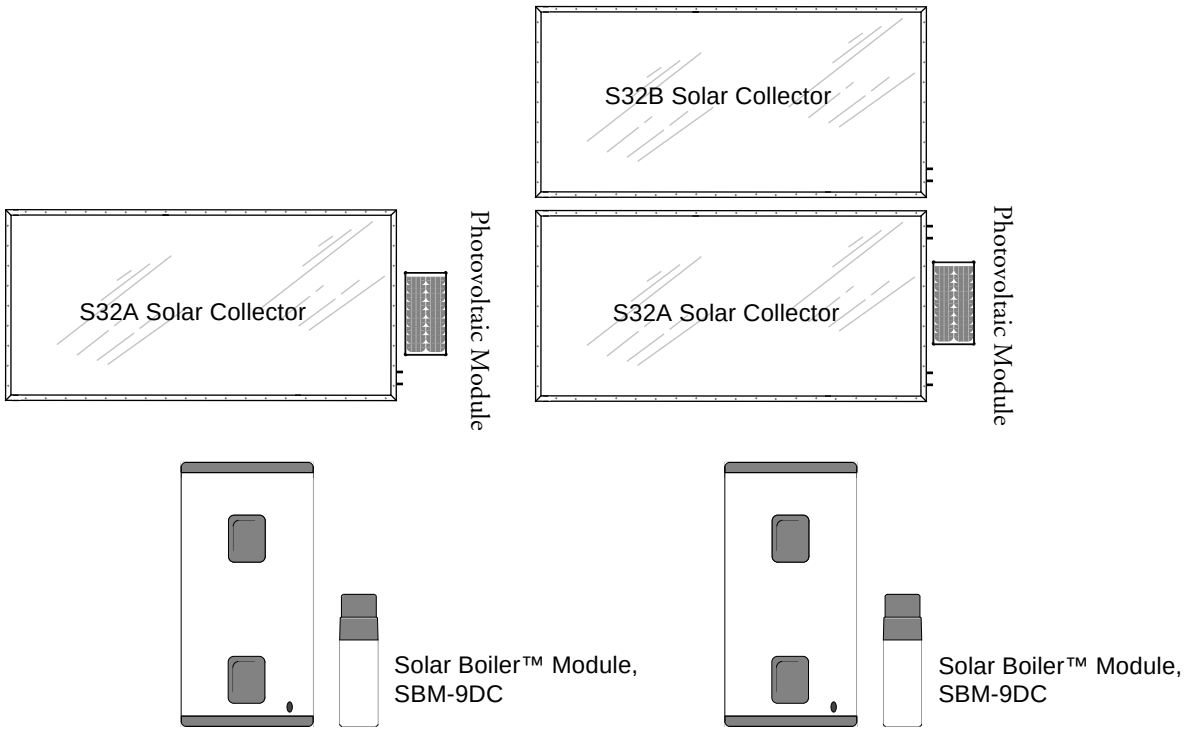
Ball Valve #1 - Close
Ball Valve #2 - Close
Ball Valve #3 - Close



If there is only a problem with the solar tank, you can open Ball Valve #1 to bepass the solar and continue to have hot water until the system is serviced.

If you are planning to be away for extended periods of time, turn the system off using the switch located under the cover of the Solar Boiler™.

System Configurations and Specifications



SB32-9PV **SB64-9PV**

System	Collectors	Surface Area	Boiler Module	DHW Load
SB32-9 PV	1 S32B	2.91 m2 (32 ft2)	SBM-9DC	< 250 L/day
SB 64-9 PV	1 S32A	5.82 m2 (64 ft2)	SBM-9DC	250 - 400 L/day
	1 S32B			

Life Expectency of major components. Please note that these are only projected values of when a component may need to be replaced.

- Solar Collectors 35 years
- Photovoltaic Module 25 years
- LifeLine® Tubing 50+ years
- Solar Boiler™ Module c/w
  - DC Motor 15 years
  - Pump 15 years
  - Heat Exchanger 50+ years
  - Linear Current Booster 50+ years

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solarinfo@thermo-dynamics.com

your authorized dealer:

Material Safety Data Sheet for PROPYLENE GLYCOL, USP [HEAT TRANSFER FLUID]

The HTF (heat transfer fluid) used in this Solar Boiler™ system is a mixture of Propylene Glycol, USP and distilled water (40/60)% by volume.

The following is a brief outline of the Material Safety Data Sheet for Propylene Glycol, USP. For more information, contact Van Waters & Rogers, reference MSDS: L1173.

Product code: VW&R Code: L1173
CAS Registration #: 57-55-6
Product Name: Propylene Glycol
Product Supplier: Van Waters & Rogers
9800 Van Horne Way
Richmond
British Columbia
V6X-1W5

1. **INGREDIENTS:**
(% w/w, unless otherwise noted)
Propylene glycol CAS# 000057-55-6 99%

2. **ENVIRONMENTAL AND DISPOSAL INFORMATION:**
Action to take for Spills/Leaks: Cover with absorbent material, soak up and sweep into bag.
Disposal method: Incinerate or bury away from water supplies in accordance with local regulations.

3. **HEALTH HAZARD DATA:**

EYE: May cause slight transient eye irritation. Corneal injury is unlikely.

SKIN CONTACT: Essentially nonirritating to skin on prolonged contact Repeated exposure may cause slight flaking, tenderness, and softening of skin.

SKIN ABSORPTION: A single prolonged skin exposure is not likely to result in absorption of harmful amounts.

INGESTION: Single dose oral toxicity is extremely low. No hazards anticipated from ingestion incidental to industrial exposure.

INHALATION: A single prolonged (hours) inhalation exposure is not likely to cause adverse effects. Mists are not likely to be hazardous.

CHRONIC EFFECTS OF EXPOSURE: Repeated excessive ingestion may cause central nervous system effects.

4. **FIRST AID:**

EYES: Irrigate immediately with water for at least 5 minutes.

SKIN: Wash off in flowing water or shower.

INGESTION: No adverse effects anticipated by this route of exposure.

INHALATION: No adverse effects anticipated by this route of exposure.

NOTE TO PHYSICIAN:
No specific antidote. Supportive care. Treatment based on judgement of the physician in response to reactions of the patient.