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.

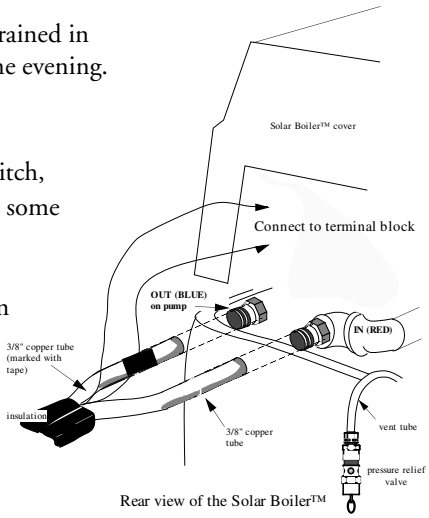
Solar Boiler HTF (heat transfer fluid) Draining/Refilling Instructions

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.

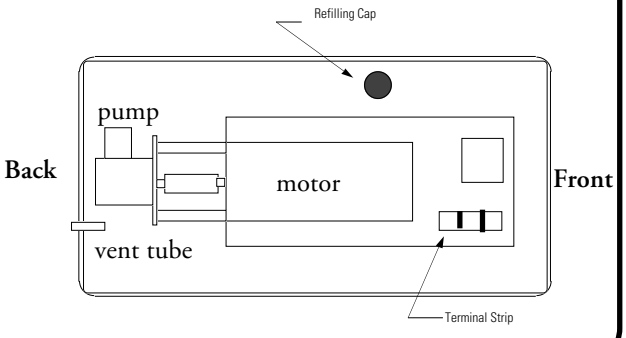


Rear view of the Solar Boiler™

- ❑ 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.

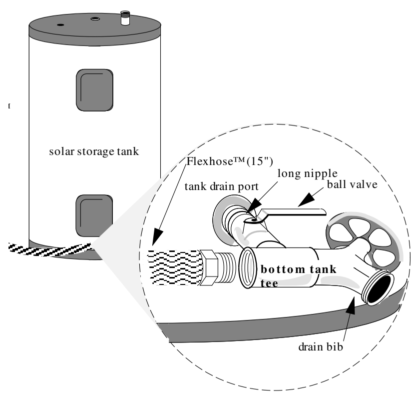
Refilling the Solar Boiler™ with HTF (heat transfer fluid)

- ❑ 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.

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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.

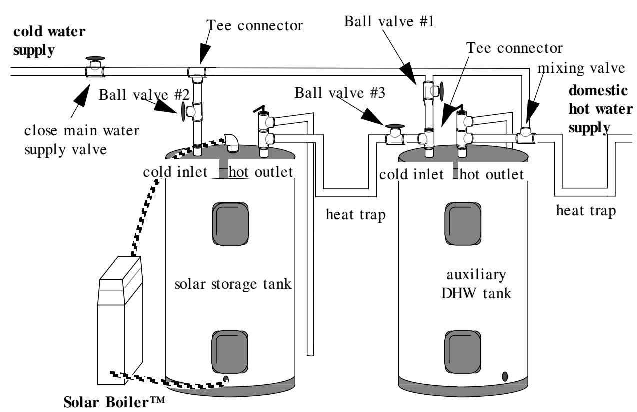
To determine if your Solar Boiler™ is operating properly, perform the following simple tests:

• 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:

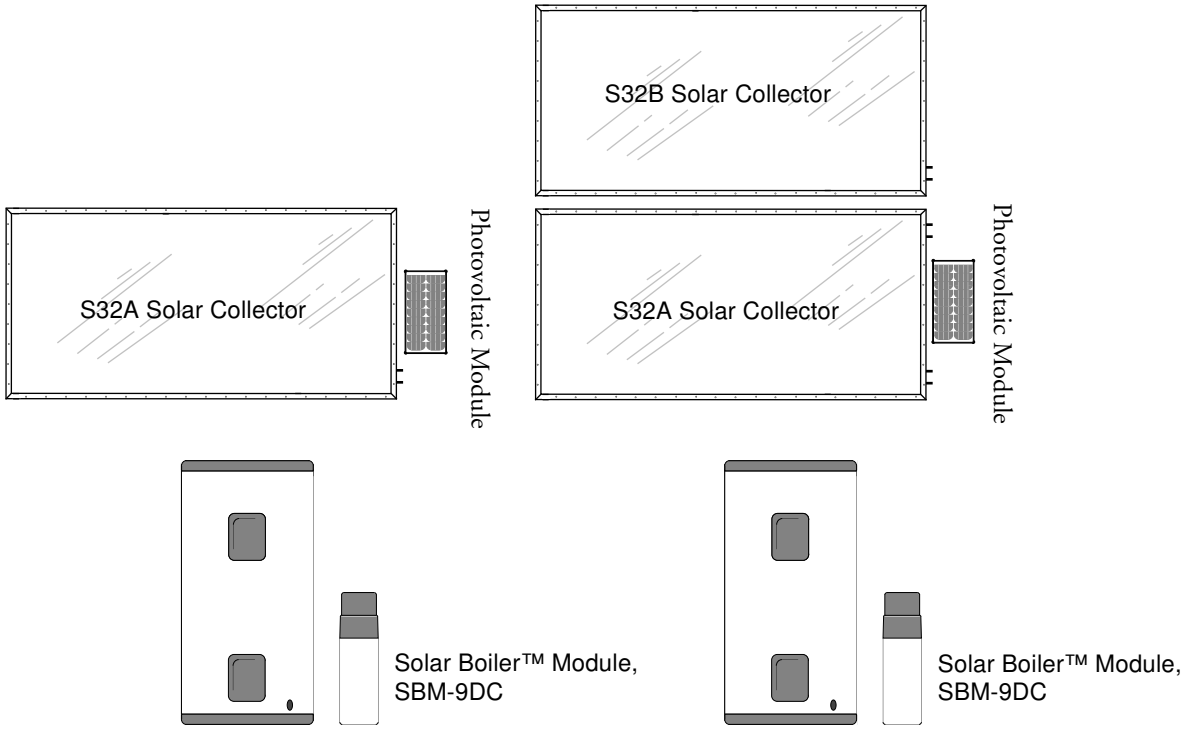
Ball Valve #1 - Close
Ball Valve #2 - Close
Ball Valve #3 - Close



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

Thermo Dynamics Ltd.
44 Borden Avenue
Dartmouth, Nova Scotia
Canada, B3B 1C8
Tel: (902) 468 - 1001
Fax: (902) 468 - 1002

www.thermo-dynamics.com
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.