



Bringing renewable technology
down to earth!



*** OWNER'S MANUAL ***
SOLAR WATER HEATER APPLIANCE
SYSTEM TYPE: DIFFERENTIAL CONTROL

SYSTEM MODEL #: _____

"The solar energy system described by this manual, when properly installed and maintained, meets the minimum standards established by the Florida solar energy center, in accordance with section 377.705 Florida statutes. This certification does not imply endorsement or warranty of this product by the Florida solar energy center or the state of Florida."

INTRODUCTION

Congratulations on your purchase of a new "solar direct" water heater appliance. Your system has been carefully installed using the finest materials and components available designed to give years of trouble free service.

PLEASE TAKE TIME TO READ YOUR OWNER'S MANUAL - It will answer many questions about your system; how it works and how to maintain it. After you become familiar with your manual, place it in a safe and easy to obtain location. We suggest that you keep this manual with your other solar related papers for reference; or, attach it to your water heater.

SYSTEM OPERATION

Your system is operated by an automatic controller. This controller senses the temperature of the collector and the temperature of the bottom of the tank. When the temperature of the collector is hotter than the tank bottom by 10 degrees, the controller turns the pump on and opens the motorized valve (optional). The pump circulates the water from the bottom of the tank, through the collector, and back to the middle of the tank. The water is heated by the sun as it passes through the collector. When the temperature difference between the collector and the tank decreases to only two degrees, the controller turns the pump off.

IMPORTANT: the controller switch should always be left on the "automatic" position to ensure maximum solar gain and the drain/fill handles should be in the "fill" position unless draining for freeze protection, maintenance, or extended periods of non-use (i.e. vacation).

SYSTEM DRAINING

To drain the collector and piping above the tank, follow these instructions:

- (1.) Turn the controller to the "off" position, or unplug it.
- (2.) Connect a garden hose to the pump side drain valve and place a bucket under the opposite drain valve.

(3.) Turn both isolation valves to the "closed" position and open both drain valves to allow the water to exit. A typical system holds approx. 2 - 3 gallons. Allow the system to remain drained for the entire night, to insure total drainage.

SYSTEM START UP

To fill the collector and begin heat collection, follow these instructions;

- (1.) Close the pump side drain valve. Remove the hose from the drain valve on the pump side and place it on the opposite drain valve and open drain valve. Open the isolation valve on the pump side to begin filling the lines with water and air will begin to exit from the drain hose.
- (2.) When all the air is purged from the system (approx. 30 seconds) close the drain valve with the hose to stop the purging action, and open the isolation valve below it. Remove the hose.
- (3.) Turn the controller to the automatic position. The system will now operate as described in the system operating sect.

* If your system does not have the configuration described above, call for instructions.

FREEZE PROTECTION

WARNING: SOLAR COLLECTORS ARE SUBJECT TO FREEZE, EVEN IN FLORIDA. The water temperature in the collector can be below the freezing point even when the outdoor air temperature is 40 degrees. Your system is equipped with two methods of freeze protection:

- (1.) **MANUAL DRAINDOWN** It is recommended that the homeowner, when possible, drain the collector when the temperature is expected to drop below 40 degrees. See system draining and system start up for instructions.
- (2.) **AUTOMATIC FREEZE PROTECTION** Freeze protection is accomplished by an automatic temperature sensitive valve. When the outdoor temperature drops below 42 degrees, the freeze valve begins to open. When the valve opens, it allows water to move from the bottom of the storage tank through the collector and is discharged on the roof. This warm water (approximately 70 to 75 degrees) protects the panel from freeze damage. It does not waste hot water or turn the element on because it is only using water from the bottom portion of the tank and is replaced by city or well water. The valve automatically closes when the temperature in the collector is above 52 degrees. This process will continue all night until the outdoor temperature rises above 42 degrees. Important: this valve should be replaced approx. Every 3 to 5 years for maximum protection against freeze. Important: homes with well water cannot rely on automatic freeze protection; during power outages, the pump cannot supply water to the valve. In this case, the system needs to be manually drained or an additional freeze valve can be installed on the bottom of the collector which will automatically drain the collector in the event of power outage.

HOT WATER BACK-UP SYSTEM

Your solar system has been designed to provide an average of 70% to 98% of your hot water needs on a yearly basis. In most cases, no back up will be needed in the summer months. Some back up will usually be needed in the winter months or during periods of continuous cloudy weather. It is recommended that the back up be left off during the winter months; however, you may want to modify this suggestion based upon your system sizing, your personal experience with your system, and/or your desire to save (\$) energy. When you want to rely

completely on solar, turn the 230 volt circuit breaker off at the main panel box, or turn the backup "on/off" switch to the "off" position (this is only applicable on those systems equipped with the switch.) The backup heating element is controlled by a thermostat which can be adjusted with a screw driver. The suggested setting is between 120 and 140 degrees. See "to reset safety switch" instructions for safety details when changing thermostat setting. There is also an over-temperature safety reset switch that shuts the power off to the heating element if the water in the tank gets extremely hot. If you do not have hot water when the backup is on, you may need to reset this switch. The reset switch often trips during summer months when solar is exceptionally hot, and is not noticed until fall/winter.

TO RESET SAFETY SWITCH

- (1.) Turn the 220 volt - 30 amp circuit breaker to the water heater, or the tank top power switch, off.
- (2.) Remove the cover plate.
- (3.) Peel back the insulation and press the red button. A slight click will indicate reset action.
- (4.) Replace the insulation and the cover.
- (5.) Turn the circuit breaker or the tank power switch back on.

If the water in the tank is cooler than the setting on the thermostat, the heating element will turn on. When this happens, your electric meter should spin very fast. If not, and the safety switch has been reset, please call for service.

SYSTEM MAINTENANCE

- (1.) As with any hot water heater, it is recommended that the tank be partially drained every six months to remove mineral deposits and sediment. This can be accomplished as follows:
 - (a.) Shut off the water pressure at the valve which lets cold water into the tank.
 - (b.) Attach a hose to the drain valve at the bottom of the tank.
 - (c.) Open the drain valve and allow 10 to 15 gallons of water flow out.
 - (d.) Close the drain valve, remove the hose, and open the valve to allow the cold water to enter the tank.

Note: if water does not drain because of heavy sediment build-up, open cold water shut-off with hose attached to force sediment out drain.

- (2.) Dust can be removed from the collector by spraying water on the glass in the early morning or in the late afternoon.
- (3.) Inspect your system occasionally for loose wires, water leaking, missing insulation, or signs of improper functioning (such as the pump running continuously at night or not running on sunny days). Keeping a good coat of paint on the outdoor insulation will make it last longer.

VACATION

Leave the system on automatic operation when on vacation for only 3 to 4 days. If your vacation is to be for a longer period or if the vacation occurs during the hottest or coldest part of the year, we recommend that you drain down your system to prevent the system from over-heating in the summer or from freezing in the winter.

Please refer to the simple drain down procedures found in the front of your manual.

Exception: for those people who turn off all the water pressure or electric to the house or if your area has periodic water outages, call for service suggestions.

*****COMPONENT FUNCTIONS*****

#1 COLLECTOR - ABSORBS SOLAR ENERGY TO HEAT WATER.
AET, TCT ProPlate, Heliodyne, Chromagen
Recommended Service: Clean Glass, Pressure Flush for Sediment
Recommended Frequency: Yearly
Schedule of Service: ___/___ ___/___ ___/___

#2 AIR VENT - REMOVES AIR FROM COLLECTOR AND PIPING.
Watts FV-4, Sparco FV147A
Recommended Service: Test for proper air release
Recommended Frequency: Test yearly; replace when defective
Schedule of Service: ___/___ ___/___ ___/___

#3 VACUUM BREAKER - OPENS WHEN SYSTEM IS DRAINED TO ALLOW AIR INTO COLLECTOR AND PIPING. (OPTIONAL)
Watts 36N
Recommended Service: Clean valve mechanism
Recommended Frequency: Yearly
Schedule of Service: ___/___ ___/___ ___/___

#4 PRESSURE RELIEF VALVE - OPENS IN CASE OF EXCESSIVE PRESSURE.
Watts 111-L, Watts 530C-050
Recommended Service: None
Recommended Frequency: Replace when leaking
Schedule of Service: ___/___ ___/___ ___/___

#5 PUMP - CIRCULATES WATER FROM TANK THROUGH COLLECTOR.
Hartell CP-19FCC-1A, Taco 006BC4, Grundfos UP15-18B5
Recommended Service: Check proper circulation during day only
Recommended Frequency: Semi-annual check; replace when defective
Schedule of Service: ___/___ ___/___ ___/___

#6 CONTROL UNIT - TURNS PUMP ON WHEN THERE IS SUFFICIENT SOLAR ENERGY AVAILABLE.
Goldline CM30, GL30, GL30LCO
Recommended Service: Test operation
Recommended Frequency: Yearly; replace when defective
Schedule of Service: ___/___ ___/___ ___/___

#7 ON/OFF/AUTO SWITCH - CONTROLS PUMP; TURN TO "AUTO" FOR NORMAL OPERATION. INDICATOR LIGHT - INDICATES CIRCULATION AND SOLAR ENERGY GAIN.
Recommended Service: Check for ON, OFF and AUTO function
Recommended Frequency: Yearly
Schedule of Service: ___/___ ___/___ ___/___

#8 CHECK VALVE - MOTORIZED CHECK VALVE PREVENTS THERMOSHYPONING HEAT LOSS AT NIGHT.
Erie VT2212G13B020, Honeywell V4043A1010
Recommended Service: Check for proper operation / no leak-by

Recommended Frequency: Yearly before winter; clean mechanism

Schedule of Service: ___/___ ___/___ ___/___

#9 LO-TEMP CONTROL SENSOR - MEASURES TANK TEMPERATURE.

Goldline 10K SB

#10 HI-TEMP CONTROL SENSOR - MEASURES COLLECTOR TEMPERATURE.

Goldline 10K SB

Recommended Service: Test for proper Ohm reading

Recommended Frequency: Yearly

Schedule of Service: ___/___ ___/___ ___/___

#11 FREEZE VALVE - PREVENTS FREEZE BY DISCHARGING WATER FROM BOTTOM OF TANK TO PREVENT FREEZE DAMAGE TO COLLECTOR.

Envensys Eaton/Dole FP45

Recommended Service: Periodic Replacement

Recommended Frequency: Every 3 yrs (well); every 5 yrs (city)

Schedule of Service: ___/___ ___/___ ___/___

#12A & #12B ISOLATION BALL VALVES - PROVIDES A METHOD OF ISOLATING THE COLLECTOR FOR MAINTENANCE OR FREEZE PROTECTION WHILE MAINTAINING THE BACK UP OPERATION OF THE TANK.

Recommended Service: Test for proper seat / no leak-by

Recommended Frequency: Yearly before winter

Schedule of Service: ___/___ ___/___ ___/___

#13A & #13B DRAIN VALVES - USED TO DRAIN COLLECTOR AND PIPING WHEN ISOLATION VALVES ARE CLOSED.

#14 TANK - STORES HEATED WATER FOR FUTURE USE.

Lochinvar FTA082K, #FTA066K, #FTA120K

Recommended Service: Flush tank

Recommended Frequency: Yearly (Min)

Schedule of Service: ___/___ ___/___ ___/___

#15 COLD WATER STOP VALVE - MAIN SHUT OFF VALVE FOR WATER HEATER.

#16 T & P VALVE - OPENS IN CASE OF EXCESSIVE TEMPERATURE OR PRESSURE.

Watts 100-XL

Recommended Service: Replace when leaking

Schedule of Service: ___/___ ___/___ ___/___

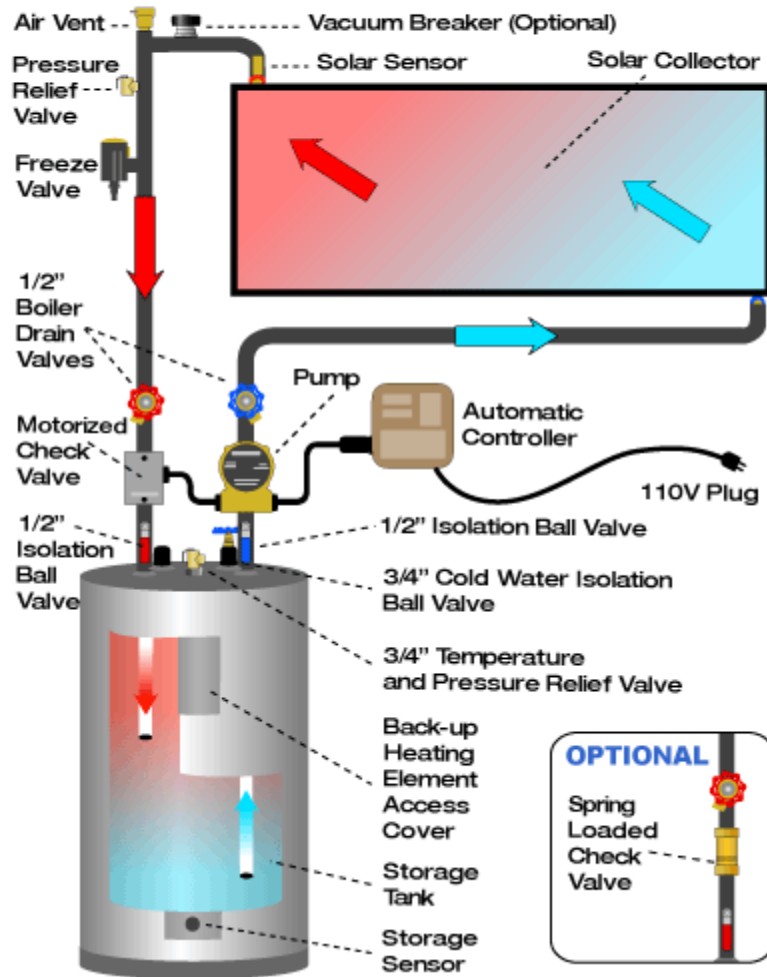
#17 BACK UP ELEMENT & THERMOSTAT - CONTROLS BACK-UP TEMPERATURE IN TANK.

#18 BACK UP SWITCH - TURNS ELECTRICITY TO ELEMENT ON & OFF MANUALLY. (OPTIONAL)

#19 TANK DRAIN - USED TO DRAIN OR CLEAN TANK.

Solar Domestic Water Heating System

Active - Open Loop
with Differential Control and 110V AC Pump



SOLAR DIRECT

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