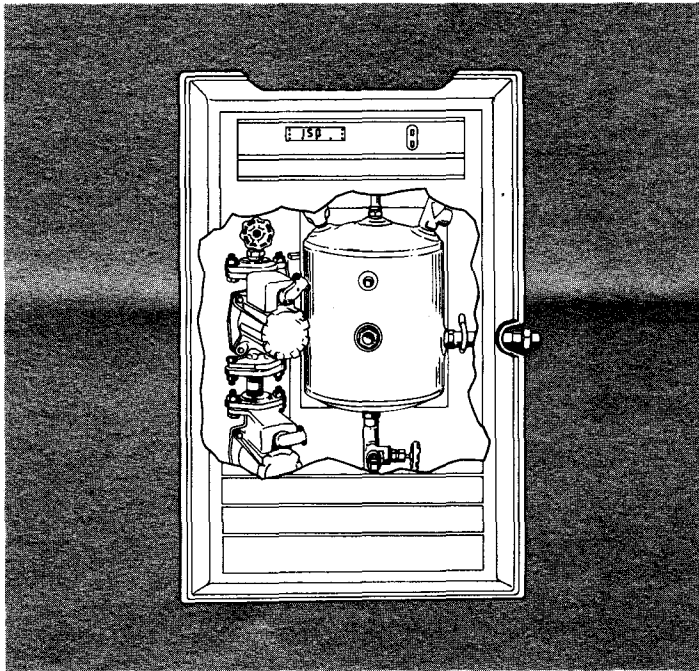




Fluid Control Center

WS-0900/WS-1100
Closed-Loop Series



Product Features

- "Zero-gauge" design
- Maintenance-free components
- Unique filling/purging system
- Temperature monitoring/control
- Engineered mechanical/ electrical components
- Absolute freeze protection
- Boiling protection
- Anti-thermosiphon device
- Simple installation

The Western Solar Products Fluid Control Center (FCC) is the central module for the heat collection loop of a WSP solar system. It is easily connected to solar panels and storage tanks to provide a complete solar-collecting system. The FCC monitors panel and storage temperatures and starts circulating heat-transfer fluid when solar energy is available. Designed to be matched with WSP solar panels and storage tanks and to utilize a unique synthetic hydrocarbon heat-transfer fluid, the integrated solar heating system provides extremely efficient and durable solar energy collection and storage. Models are available for internal and external solar storage tank heat exchangers.

Components of the FCC. The expansion tank allows thermal expansion of the heat-transfer fluid, and provides control of the amount of fluid in the system.

The check valve serves to prevent reverse "thermosiphon" flow of heat-transfer fluid when the pump is not running. Also, various valves provide filling, draining and flow calibration capabilities.

Finally, the ABS plastic cover and aluminum backplate have been included to provide a strong, aesthetically pleasing, well-ventilated casing for the FCC.

The unique "Zero-gauge"™ (patent pending) design was developed to reduce, and in most cases eliminate, the need to pressurize the solar collecting loop. This unique design provides distinct benefits: it reduces potential fluid leaks; reduces stress on component parts; and facilitates filling and servicing of the system.

In addition, all components of the FCC are engineered and matched to improve system efficiency. This planning has created a long-lasting, low-maintenance, money-saving unit.

Uncomplicated, modular design makes installation easy. Installers

merely connect pipes linking the FCC and solar panels to the solar storage tank. An electrician simply wires the FCC to house current and connects the temperature probes. Add heat-transfer fluid and your solar heating system is ready to go!

A special synthetic hydrocarbon is used as a heat-transfer fluid. It will not freeze, is non-toxic, has high dielectric strength and is non-oxidizing. In addition, its boiling point is above 500°F. If the solar system fails during critically cold or hot periods, there is no damage or loss of heat-transfer fluid. If pressure should build up in the solar collecting loop, only air is released to relieve the pressure, not expensive heat-transfer fluid. Because the fluid is very stable for long periods of time, fluid manufacturers generally provide a 10-year warranty.

Specifications

Physical Characteristics

	0900 SERIES (Domestic Hot Water)	1100 SERIES (Space Heating)
SIZE		
Height	33.75 Inches	44.75 Inches
Width	19.75 Inches	19.75 Inches
Depth	13.00 Inches	13.00 Inches
WEIGHT		
P2 Option*	38 Lbs.	55 Lbs.
EHX Option*	45 Lbs.	64 Lbs.
	54 Lbs.	Not Available
EXPANSION TANK CAPACITY		
Heat Transfer Fluid	2.5 Gallons	5.0 Gallons
Air	1.0 Gallons	2.0 Gallons
	1.5 Gallons	3.0 Gallons

Operational Characteristics

Pump Performance		
Nominal Head	27 ft H ₂ O (@0 gpm) 18 ft H ₂ O (@5 gpm)	24.5 ft H ₂ O (@0 gpm) 13.5 ft H ₂ O (@10 gpm)
P2 Option Head	54 ft H ₂ O (@0 gpm) 36 ft H ₂ O (@5 gpm)	49 ft H ₂ O (@0 gpm) 27 ft H ₂ O (@10 gpm)
Fluid Flow Rates		
- Per 3'x7' Collector	0.75 gpm	0.75 gpm
- Per 4'x8' Collector	1.00 gpm	1.00 gpm
- Overall Maximum	5.00 gpm	12.00 gpm
Operating Pressure		
Nominal	0-20 PSIG	0-20 PSIG
Maximum	75 PSIG	75 PSIG
Heat Transfer Fluid	Brayco 888 or Equivalent	
Controls		
Differential Temperature Controller (w/ 30 K Ω Thermistors)	Standard	Standard
WSP Digital Diagnostic Temperature Controller (w/ 10 K Ω Thermistors)	Optional	Optional
Power Requirements		
Voltage	110 - 120 VAC	110 - 120 VAC
Current (Standard)	1.1 Amperes	1.75 Amperes
Current (P2 Option)*	2.2 Amperes	3.50 Amperes
Current (EHX option)*	Add 0.72 Amperes	N/A
Power (Standard)	127 Watts	185 Watts
Power (P2 Option)*	253 Watts	370 Watts
Power (EHX option)*	Add 83 Watts	N/A
Cover	ABS Molded Plastic	ABS Molded Plastic

* P2 Option — 2nd Solar Pump; EHX Option — External Heat Exchanger



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Digital Diagnostic Controller

WS-2001



Product Features

- Microprocessor Based Controller
- LED Digital Display
 - Temperature at Collector Outlet
 - Temperature at Heat Exchanger Outlet
 - Temperature at Bottom of Storage Tank
 - Temperature at Top of Storage Tank
 - BTU Collection
- Continual System Monitoring
- Self Testing Feature
- Domestic Hot Water, Space Heat, and Spa Applications

The Digital Diagnostic Solar Controller is a microprocessor based controller designed to be used with most heat transfer fluid solar energy systems. It continuously monitors system temperatures and operating conditions, using up to five thermistor inputs and four relay outputs. The LED display shows temperatures and the rate of solar collection in BTU's. If the system should malfunction, the display will indicate a diagnostic error code.

The controller serves a number of important functions. It will turn collector fluid circulation pumps on and off according to the temperature differential between the collector output and the bottom of the storage tank. In other words, if the collector fluid is hotter than the storage tank, the pumps will turn on. If the storage water in the tank reaches a pre-selected high temperature limit, the controller automatically turns the solar collecting system off. This means the controller won't allow the storage tank to overheat.

A solar availability output relay is used with a space heating system to show whether or not solar heat is available for use. The top of the storage tank temperature probe is compared to a field-set temperature. An indicator light will turn on when the storage tank water is warm enough to supply heat. A similar *spa heat availability relay* is included with spa system controllers.

Temperatures from up to five different locations within the solar system read out as LED digital displays. They are as follows:

1. Temperature at the collector outlet (heated fluid)
2. Temperature at the outlet of the heat exchanger
3. Temperature at the bottom of the storage tank
4. Temperature at the top of the storage tank
5. Temperature of spa water (Option with spa systems)

In addition, the **number of BTU's x 1,000 (KBTU)** being collected per hour by the system can be read on the controller display. The calculation is based on the collector outlet temperature, the heat exchanger outlet temperature, and the flow rate of heat transfer fluid. More simply, a comparison is made between the temperature of the heat transfer fluid before the heat is exchanged into the storage water and the temperature of the heat transfer fluid after it has given up its heat to the storage water. By relating those temperatures to the flow rate, a calculation can determine a close approximation to the number of BTU's (British Thermal Units) collected per hour.

Finally, the controller serves as a diagnostic tool for the entire system. Should the system ever malfunction, the display will automatically read out a code identifying the problem. All errors

possible are monitored at all times. If one is detected, the controller indicates an error by blinking display lights and the following codes:

- E1: The thermistor temperature probe indicated is shorted.
- E2: The thermistor probe indicated is open.
- E3: The collector fluid flow rate is too low or there is no flow.
- E4: Reverse thermosiphon flow.

Also, a self testing feature allows the controller to monitor and analyze its own operations. Thermistor inputs are actively filtered to reject harmful spurious noise from the controller circuitry.

The same basic controller with modifications can be used for either space heating systems or domestic hot water systems. It also can be altered to include a spa or pool system with either space heating or hot water.

Several switches permit manual control over some functions. The Service/Operate switch allows a service person to calibrate flow rates and set field selectable temperature limits. A surface mounted Sequence/Hold switch controls whether digital LED's continually sequence or hold on a selected display. There is also an On/Off/Auto collector pump selection switch.

Specifications

Power

Requirements: 100 to 128 VAC, 50 - 60 Hz
Consumption (Controller): .075 Amps @ 120 VAC
Load Rating: 10 Amps @ 120 VAC

Temperature Probes

Type: Thermistor, high temperature, 10K resistance

Digital Readout

Accuracy: Temperature Reading $\pm 2^{\circ}\text{F} \pm 1$ Digit*
BTU/hour Reading $\pm 5\% \pm 1$ Digit*
*Accuracy limited by precision/limit of sensors

Relays

Type: Mechanical with silver plated contacts

Ratings:

- Solar Pump Relay - Line output: 110 - 120 VAC rated at 10 Amps
- Solar Pump "ON" Relay - Switch: Maximum load 28 VAC, 3 Amps
- Space Heating Available Relay - Switch: Maximum load 28 VAC, 3 Amps
- Spa Heating Available Relay - Switch: Maximum load 28 VAC, 3 Amps

Activation:

- Solar Pump Relay: Solar Collector/Storage Temperature Differential
Greater than 20°F - "ON"
Less than 3°F - "OFF"
- Solar Pump "ON" Relay: Solar Pump ON - Closed
Solar Pump OFF - Open
- Space Heating Available Relay: Temperature Threshold
Exceed Threshold - Closed
Below Threshold - Open
Selectable Thresholds: 80° , 90° , 100°F
- Spa Heating Available Relay: Solar Storage/Spa Temperature Differential
Greater than 25°F - Closed
Less than 15°F - Open

Solar Pump High Temperature (Boil) Limit:

Selectable: 160° , 170° , 180° , 190°F

Flow Rate Selection

Adjustable: 1 - 20 gpm
Fluid type for curve calibrating: Brayco 888

Operating Environment

Temperature: $32 - 105^{\circ}\text{F}$
Humidity: 5 - 90% Relative Humidity

Operating characteristics listed above are subject to modification.

**CALIBRATION CURVES ALSO
AVAILABLE FOR:**

SILICONE OIL

GLYCOL-WATER

WATER (DRAINBACK)

WATER (DIRECT)

**Western
Solar Products**

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