

# ENERGY STATION WITH PERFORMANCE CONTROLLER

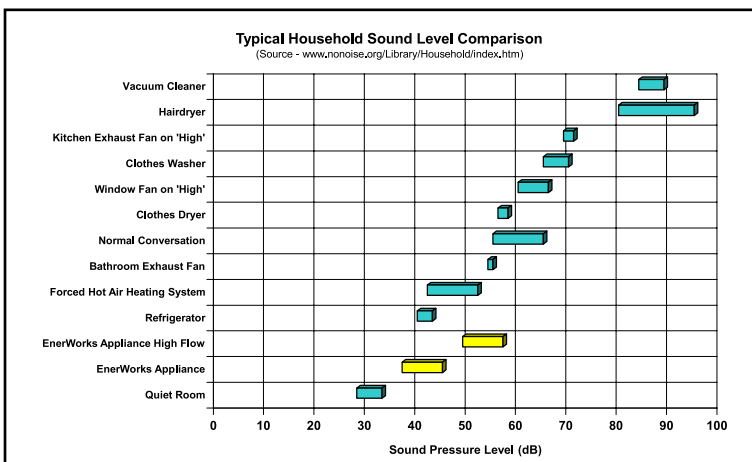
## PRODUCT SPECIFICATIONS

- Dry weight without accessories: 33 lb (15 kg)
- Overall size: 24 $\frac{1}{8}$ " (614 mm) high x 12 $\frac{5}{8}$ " (320 mm) wide x 11" (281 mm) deep with mounting brackets or 8 $\frac{1}{4}$ " (211 mm) deep without brackets
- Internal volume on the heat transfer fluid side: 0.18 US gallons (0.7 L); internal water volume 0.13 US gallons (0.5 L)
- Designed to work with 50% volume food-grade heat-transfer fluid USP/EP solution
- Maximum operating pressure: 145 psi on water side and 50 psi on the collector loop
- All materials in contact with potable water are known to be safe i.e., no leeching of toxic micro-elements
- Audible noise level, measured at 6 ft (2 m) in front of the unit and 3 ft (1 m) above: Model EPRS-TEC/TEM 42-44 dBA; Model EPRS-HF-TEC/TEM 52-56 dBA



## KEY FEATURES AND BENEFITS

- Measures and reports the amount of heat energy delivered in kWh or BTUs
- Calculates the amount of natural gas, heating oil, propane or electrical energy displaced as well as money saved on a daily, monthly, yearly and lifetime basis
- Wireless communication and power outage data protection
- Patented heat exchanger back flush valve automatically removes scaling, caused by hard water, on the heat exchanger's internal surfaces – US Pat. # 6,827,091
- Rated for use with up to 100 ft (30.5 m) one way of  $\frac{3}{8}$ " (9.5 mm) refrigeration grade soft copper tubing, (0.032" [0.8 mm] wall thickness per ASTM) that is insulated with  $\frac{3}{8}$ " (9.5 mm) thick Armaflex AT or equivalent insulation. Fluid content for this tube is 0.00395 US gallons/ft or 0.045 L/m
- Plugs into standard electrical outlet and electrically rated at 120 VAC/60 Hz/0.25 A
- Minimal maintenance requirements: fluid pH check is recommended every three years in normal operation with fluid change required if pH < 5.5 or milky or dark
- Easy fill/drain via quick-connect ports
- Easy service: compact pump/motor group replacement by two machine screws and one electric connector; controller group replacement by two sheet metal screws and one electrical connector



## PRODUCT DESCRIPTION

- Major components of a "micro-flow" solar water-heating system contained in one compact pre-engineered unit
- Available in different models: Model EPRS-TEC/TEM is suitable for use with either one- or two-collector EnerWorks Solar Water Heating Appliance; Model EPRS-HF-TEC/TEM is used with three- or four-collector appliance
- Designed and optimized to operate in a "closed-loop" freeze- and mineral-protected heat-transfer fluid system with low flow (pumped) and natural-convection water circulation (no water pump)
- Mounts on side of water storage tank, close to bottom of tank

### Heat Exchanger

- High efficiency, brazed-plate type with integrated start/end plates; 20 plates in total;
- Plates are made out of grade 316 stainless steel; brazing material is pure copper
- Stamped chevrons on the plates are optimized for maximum heat transfer with minimum pressure drop
- Available in double wall or single wall
- Rated working pressure 10 bar (145 psi), test pressure 20 bar (290 psi). Each exchanger is factory tested
- Maximum flow rate 17.6 US gal/min (4 m<sup>3</sup>/hr)
- Maximum working temperature of the plates 212 °F (100 °C)
- UL and KIWA certified

### Pump for Heat-Transfer Fluid

- Precision miniature gear pump with magnetic coupling – no rotating seals
- Body is cast/machined out of 303 stainless steel, PEEK® self lubricating helical gears, flat Teflon gasket, stainless steel shaft
- Mounted to a manifold using two #8-32 x 1" machine screws and two EPDM O-rings
- Pump in Model EPRS-TEC/TEM delivers 0.29 US gal/min (1.1 L/min) of flow at the nominal 1,450 rpm speed. Pump in Model EPRS-HF-TEC/TEM delivers 0.555 US gal/min (2.1 L/min) at 1,450 rpm. Being a "metering" type of pump, the flow is essentially constant at any pressure within the normal range: 0 to 50 psi
- Passed 10,000 hr endurance test with water at 50 psi back pressure and 3,000 rpm; estimated to last at least 30,000 hrs in normal operating conditions for the Energy Pack

### Motor

- Model 2IK6A-AWU, induction ACT type, 4 poles
- 115 V AC/single phase/60 Hz, 6 W (1/125 HP) mechanical power output, 23 W power input, nominal 0.25 A
- 0.24" (6 mm) diameter shaft
- Rated speed 1,450 rpm
- Start-up capacitor Model CH25FAUL rated 2.5µF, tolerance + 10% - 5%
- UL certified, CSA approved for use in Energy Station
- Rated torque 5.8 oz-in
- Winding rated temperature 266 °F (130 °C)

### Transformer

- Only powers the controller
- Step-down 115V/10V
- Class 2 rated at 5 VA

### Expansion Tank

- 0.475 US gal. (1.8 L) internal capacity
- Coated steel with butyl bladder
- 1" (25.4 mm) NPT stainless steel connection
- "HF" Model has an additional 2.1 US gallon (7.9 L) external expansion tank

### Casing

- Powder coated steel
- Galvanized mounting brackets for direct attachment to the storage tank's external skin
- "Arctic White" color to match with most hot-water storage tanks

### Pressure-Relief Valve

- Model 53, spring loaded, factory adjustable but tamper-proof after adjustment
- Mounted on the collector (heat-transfer fluid) side
- Nominally set at 50 psi, tolerance + 2.5 psi – 5 psi

### Performance Controller

- Model TEC001, differential setpoint type, digital, programmable
- Uses 10 kΩ NTC thermistor-type temperature sensors. Rated resistance is at 77 °F ± 0.4 °F (25 °C ± 0.2 °C)
- Power supply 12 V AC or DC ± 10% 60 Hz; maximum power consumption 1.08 W (90 mA)
- Has two relays rated 0.24 A/240 V resistive or 0.04 A pilot duty
- Approval under Temperature Indicating and Regulating Equipment ANSI/UL 873, CSA C22.2 No. 0 and No. 24
- Meets FCC regulations on EMI/RFI: FCC listing # VFC070501
- Records minimum and maximum temperatures on the sensors (resettable), calculates and cumulates delivered energy, money saved, displaced natural gas, heating oil, propane, or electricity
- Displays current temperature reading of either sensor, temperature differential, thermal power consumption or time
- Allows installer setting of temperature differential, minimums and maximums on either sensor
- Self diagnosis feature generates error message upon out of range reading of sensors
- Protects the heat exchanger from freezing; protects the storage tank from boiling over
- Wireless communication via 802.15.4 protocol over a 100 ft (30 m) radius
- Four-button operation: menu, enter, up, down
- Uses intuitive pictograms on the display

### Remote Wireless SolarView Monitor

- Model TEM001, remotely displays data from Performance Controller up to 100 ft (30 m) away
- Power supply: 3 VDC (2 x AAA batteries)
- User interface: LCD display and two buttons: up and down

### Flow/Temperature Sensor

- Model VFS 2-40 combined flow and temperature sensor
- No moving parts; flow is measured using bluff body/vortex shedding differential pressure indication
- Certified to NSF61, UL 61010-1, CAN/CSA-C22.2 No. 61010-04
- Flow range 0.53 to 10.57 US gal/min (2 to 40 L/min), accuracy ± 1.5% of full scale, resolution 0.026 US gal/min (0.1 L/min)
- Temperature range 32–212 °F (0–100 °C), accuracy ± 1 °C, resolution 0.5 °C
- Power supply 5 VDC, power consumption < 50 mW, IP44 insulation
- Flow signal 0.35 V – 3.5 V, temperature signal 0.5 V – 5 V linear
- Wetted materials: EPDM, PPS, PPA 40-GS
- Sensor element: silicone based MEMS technology, corrosion resistant

### Fill/Drain Ports

- Quick-connect type, 1/8" (3.175 mm) male Model 1Hk

### Manifolds

- Cast/machined brass
- 3/4" (19 mm) male NPT water side connections
- 1/2" (12.7 mm) female NPT top connection to the tank (thermosiphon loop)
- 3/8" (9.5 mm) flare connections on collector loop side
- UL certified for water safety
- EPDM O-ring seals
- 0 to 60 psi pressure gage
- Contains back flush valve on water side
- Contains 50 micron mesh filter on the closed loop side