

# Solar Photovoltaic Trainer

Educational Training Equipment for the 21st Century

Bulletin 234-6E

## H-PVIT-1 Photovoltaic Installers Trainer

### Purpose

The Hampden **Model H-PVIT-1** Photovoltaic Installers Trainer has been designed with the latest Industrial/Commercial components available. The trainer will provide the necessary training in completing a fully functioning, grid-tied solar electric system. This system will have the capability to be fully monitored and controlled.

### Description

The Hampden **Model H-PVIT-1** Photovoltaic Installers Trainer consists of a mobile steel frame with (4) solar panels mounted on the rear. The solar panels are mounted to a frame that allows the panels to be positioned for optimal sun exposure. The front of the frame has all the intricate components mounted for easy access. The frame includes (4) swivel casters, 2 with brakes.

### Specifications

#### Solar Modules

Solar modules are a reliable, virtually maintenance-free power supply designed to convert sunlight into electricity at the highest possible efficiency.

#### Specifications:

<b>Power</b>	130W
<b>Voltage</b>	12V
<b>Current</b>	7.39A
<b>Inter-Connection Cables</b>	(4) 2 male, 2 female

#### Combiner Box

ETL listed for the US and Canada up to 3-1/2 pitch.

#### Features:

- Din rail to accommodate up to three 150 VDC breakers
- 6 position PV negative bus bar
- 6 position ground bus bar

- 60 Amp Plus bus bar
- Gray aluminum rainproof enclosure

#### Lightning Arrestor

Protect your Renewable Energy System investment from dangerous nearby lightning strikes.

High DC voltage lightning arrestor for DC current devices. Protects your solar and wind energy equipment from nearby lightning strikes.

#### Solar Charge Controller

The Xantrex XW Solar Charge Controller is a photovoltaic (PV) charge controller that tracks the electrical maximum power point of a PV array to deliver the maximum available current for charging batteries. When charging, the XW SCC regulates battery voltage and output current based on the amount of energy available from the PV array and state-of-charge of the battery.

The XW SCC can be used with 12, 24, 36, 48, and 60-volt DC battery systems and is able to charge a lower nominal-voltage battery from a higher nominal-voltage array. For example, the XW SCC can charge a 12-volt battery from a 36-volt array. This provides flexibility for installers to use longer wiring runs without compromising efficiency.

The XW SCC incorporates a dynamic Maximum Power Point Tracking (MPPT) algorithm designed to maximize energy harvest from the PV array. The MPPT constantly adjusts the operating points of the array to ensure it stays on the maximum power point. It does not stop energy harvest to sweep the array like some other competing products. This feature is beneficial in all sunlight conditions, especially in areas with fast moving cloud cover and quickly changing solar conditions.



Hampden **Model H-PVIT-1** Photovoltaic Installers Trainer  
Dimensions: 114"L x 31"W x 66"H  
Shipping Weight: 1,980 lbs.

#### Features:

- Integrated PV ground-fault protection
- Ultra-reliable, convection-cooled design does not require a cooling fan — large, aluminum, die-cast heat-sink allows full output current up to 45°C without thermal derating
- Selectable two or three-stage charging algorithms with manual equalization to maximize system performance and improve battery life
- Configurable auxiliary output
- Two-line, 16-character liquid crystal display (LCD) and four buttons for configuration and system monitoring
- Input over-voltage and under-voltage protection, output over-current protection, and back feed (reverse current) protection (warning and fault messages appear on LCD when unit shuts down as a protective measure)
- Over-temperature protection and power derating when output power and ambient temperature are high
- Battery Temperature Sensor (BTS) included — automatically provides temperature compensated battery charging
- Xanbus™-enabled network communications protocol
- Communicates settings and activity to other Xanbus™-enabled devices, such

All Hampden units are available for operation at any voltage or frequency

**Hampden**  
ENGINEERING CORPORATION

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## H-PVIT-1

### Photovoltaic Installers Trainer

as the XW Hybrid Inverter/Charger, the XW System Control Panel (XW SCP), XW Automatic Generator Start (XW AGS), and other XW Solar Charge Controllers.

#### System Control Panel

##### Product Information:

The System Control Panel features a graphical, backlit LCD display that provides system configuration and diagnostic information for devices connected to the Xanbus™-enabled network. The XW SCP gives a single point of control to setup and monitor an entire system, which may consist of multiple XW Inverter/Chargers, XW Solar Charge Controllers and other components.

##### Operational Features:

- Compatibility – connects to additional Xanbus™-enabled XW System devices without requiring additional hubs, control cards, or other device-specific control panels
- Internal clock – keeps time for the entire system
- Audible alarm – when enabled, alerts users when a fault condition arises
- Low power consumption – automatically turns off backlight after a period of inactivity
- Non-volatile memory – preserves System Control Panel settings if network power is interrupted or network communication is disrupted

##### Product Features:

- Graphical 128 x 64 pixel, backlit LCD screen
- Large, tactile keypad buttons
- Intuitive onscreen menu system (basic and advanced)
- Xanbus™-enabled
- Complete with insertable faults (Up to 15 faults can be inserted.)

#### Battery Enclosure

Battery Enclosure with cover air vents and 2" knock out on side. Holds up to 6 sealed batteries.

#### Sealed Gel Cell Batteries (4)

##### Features:

- Completely maintenance free. Sealed construction eliminates periodic watering, corrosive acid fumes and spills.
- Electrolyte will not stratify, no equalization charging required. Allows faster recharge.
- Increases durability and deep cycle ability for heavy demand applications.
- Less than 2% per month stand loss means little deterioration during transport and storage.
- Tank formation ensures voltage matching between cells.

##### Specifications:

<b>Voltage</b>	12
<b>20 Hr Rate (Ah)</b>	73.6
<b>Weight (lb)</b>	54
<b>Interconnect Cables</b> (4) with hardware	
<b>Main Power Cables</b> (2) with hardware	

#### Power Distribution Panel AC/DC Disconnect

The XW Power Distribution Panel with conduit box is factory-wired and labeled to support a code-compliant single-inverter installation. Internal wiring and breakers can be added to expand the XW System with up to three inverters, four charge controllers, or other equipment to support larger systems.

##### Features:

- Accommodates both AC and DC breakers and wiring for three XW Hybrid Inverter/Chargers and four XW Solar Charge Controllers
- Includes breakers and wiring to connect to XW Hybrid Inverter/Charger
- Wiring is labeled and cut-to-length, ready to connect to inverter
- Uses flexible Arctic Ultraflex Blue™ wires
- Multiple knockouts on sides, top, bottom and back of unit
- Includes mounting back plate and and XW Conduit Box

#### Hybrid Inverter/Charger

Xantrex brings the next generation of inverter/charger to market, with the XW Hybrid Inverter/Charger, the heart of the XW System. The XW Hybrid Inverter/Charger (XW) is a true sine wave, 120/240-volt AC, split-phase, inverter/charger that incorporates a DC to AC inverter, a battery charger, and an AC auto-transfer switch. It is the foundation for battery-based residential and commercial applications up to 18 kilowatts (kW). Capable of being grid-interactive or grid-independent, the XW can operate with generators and renewable energy sources to provide full time or backup power. Integrating the best features available in the market and from the Xantrex, the XW Hybrid Inverter/Charger's design makes installation quicker and easier. The XW offers high efficiency and unprecedented surge capacity to maximize the owner's return on investment.

##### Specifications:

<b>Watts</b>	4000
<b>Volts</b>	24

##### Complete with:

- Power cord connected to a watt hour meter to simulate a typical home utility service.
- Load center connected to (1) duplex receptacle and (1) 220V receptacle to simulate a typical home electrical panel.
- Four 500 ft rolls of #10AWG stranded wire mounted on a spool holder.
  - (1) Black (1) White
  - (1) Green (1) Red
- Tool box with miscellaneous connectors, hardware and tools.
- Courseware:
  - (1) Hampden H-PVIT-1 Instructor's Guide
  - (25) Photovoltaics Design and Installation Manual

##### Options

**H-PVIT-MAST** Mobile Solar Array w/ Solar Tracking Option (Bulletin 234-7)

**H-PVIT-MA** Mobile Solar Array Option

All Hampden units are available for operation at any voltage or frequency

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