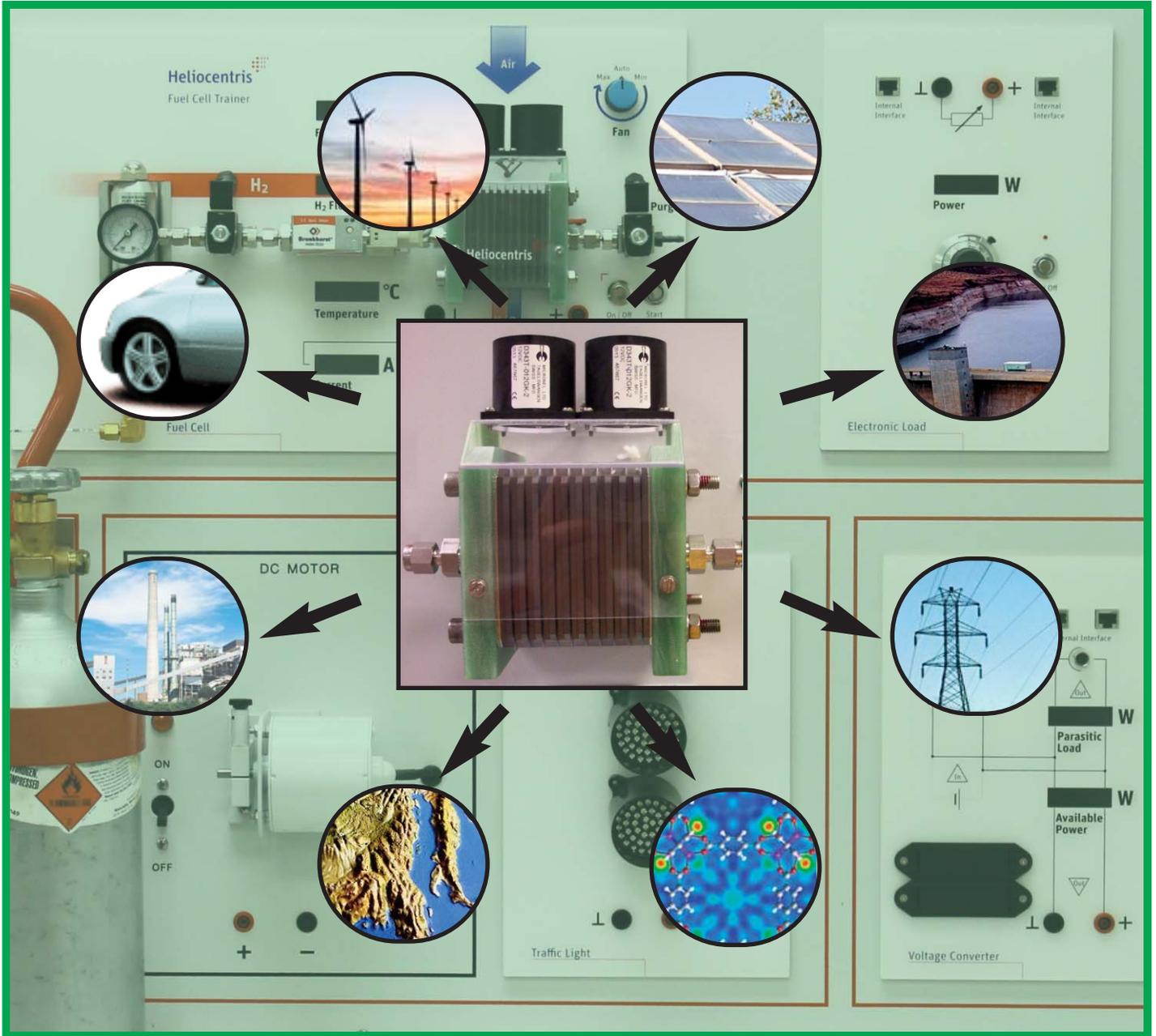


# FUEL CELL TECHNOLOGY



**Hampden**<sup>®</sup>  
ENGINEERING CORPORATION



# FUEL CELL TECHNOLOGY from *Hampden*<sup>®</sup>

EXTEND CLASSROOM KNOWLEDGE INTO A REAL-WORLD, HANDS-ON ENVIRONMENT WITH HAMPDEN TRAINING EQUIPMENT

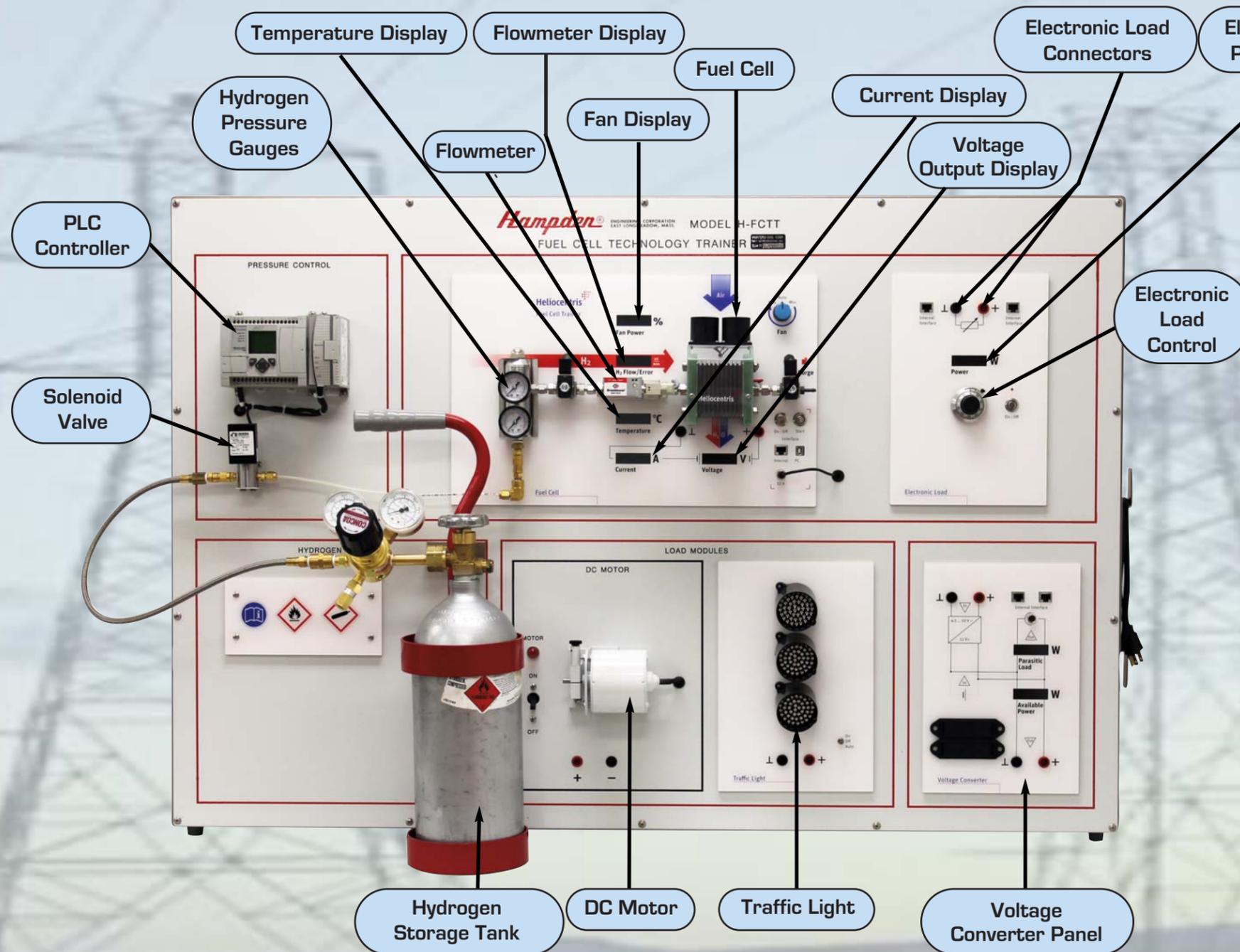
## Purpose

The Hampden **Model H-FCTT-1** Fuel Cell Technology Trainer allows the student to create a grid independent power supply that uses only hydrogen as its fuel. The system familiarizes the student with fuel cell power supply technology, an environmentally friendly method of generating power directly from a hydrogen reaction.

Fuel cells are the most promising alternate energy supply and are already being used in a number of areas, including automotive engineering and power generation systems. The **Model H-FCTT-1** can also be connected to an external energy source, such as a solar panel or wind generator, for comparison between the different technologies. A switch located on the panel allows for switching between the fuel cell and an external source.

## Experiment Capabilities

- Measurement of fuel cell stack characteristic curves
- Determination of fuel cell efficiency
- Factors affecting the characteristic curve
- Maximum power versus optimum efficiency
- Internal resistance, voltage efficiency, and temperature of the fuel cell stack
- Load profiles and utilization ratio
- Fuel cell theory analysis:
  - ▶ How energy is converted electrochemically in a fuel cell
  - ▶ The thermodynamics of electrochemical conversion of energy
  - ▶ Electrode kinetics
  - ▶ Structure of the polymer electrolyte membrane fuel cell



## Specifications

### COMPONENTS

- Fuel cell stack, 50 watts, 5V DC maximum during rated output
- Fan power control
- Hydrogen storage container, w/ Pressure Regulator
- Electronic hydrogen flow controller
- PLC
- Electronic load
- DC-DC Converter
- DC motor with mechanical load
- Traffic light signal
- Digital voltmeter
- Digital ammeter
- Flowmeter
- USB interface
- Circuit breakers (2)
- Power supply transfer switch
- Power cord
- Cord wrap
- Digital watt meters (3)

### CONSTRUCTION

The panel consists of 11 gauge furniture grade steel, finished in baked-on gloss white enamel. The case and rear panel consist of 14 gauge furniture grade steel, finished in instrument tan texture enamel, with four (4) rubber feet.

### NOMENCLATURE

- Black KEM silkscreen enamel
- Red KEM silkscreen enamel

## Services Required

**Electrical:** 120V AC-1Ø-60Hz

**Other:** Hydrogen gas

**Standard Products...Designed to Meet Your Growing Needs!**

## FUEL CELL TECHNOLOGY TRAINER OPTIONAL EQUIPMENT

### H-FCTT-1-CDL Fuel Cell Technology Trainer w/ Computer Data Logging Option

This feature adds one interface package containing National Instruments I/O modules provided for interfacing with a PC through the RS-232 port. Templates for LabVIEW control software are included.



Specify **MODEL H-FCTT-1-CDL** when ordering.

### H-FCTT-WPG Wind Powered Generator Option

It's small enough to be powered by a pedestal fan and can automatically turn to the wind with the ability to swivel over 300° and to supply up to 10VDC @ 1A (depending on the wind speed). This generator also features an on-board 330uF capacitor so you can store some of the energy for later use.



### H-FCTT-SPG Solar Panel Generator Option

This compact Solar Panel Generator can be used in a wide range of applications. Features include:

- ▶ blinking charging indicator for a clear view that generator is working
- ▶ detachable connectors for different applications
- ▶ a strong stand for getting maximum power
- ▶ built-in diode to prevent reverse charging



## ALTERNATIVE ENERGY

### H-SPT-AC-1A Solar Photovoltaic Trainer



### H-WPG-1B Wind Powered Generator



### H-SST-1A Solar System Trainer



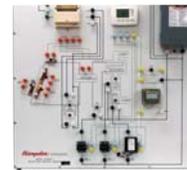
### H-SHSP-1 Solar Heat and Solar Photovoltaic Trainer



### H-HYD-1A Solar Hydronics Trainer



### H-SHST-1 Solar Heat Service Trainer



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