Geothermal H-GTL-1 Training

What is a Geothermal Heat Pump?

Geothermal heat pumps or ground source heat pumps (GSHPs) are used as central heating or cooling systems and take advantage of using either the ground or bodies of water as sources of heat exchange. The earth is always absorbing heat from the sun which make ground temperatures cooler than the air in the summer and warmer than the air in the winter. This makes it an optimal source of heat exchange. A GSHP works by taking heat from the ground or water and transferring it to another location. It can also be used as a cooling unit by taking the heat from a location such as a house and dispensing it into the ground or water. GSHPs are one of the most efficient residential heating and cooling systems. The system can range from 300% to 600% efficiency on the coldest winter nights compared to 175%-250% for air-source heat pumps on the same nights.

The H-GTL-1 water source heat pump demonstrates through a "hands on" approach an open loop heating and cooling system. This type of system pumps water from a source to heat or cool an area and expel the water to another location.

Course topics include:

Introduction to Geothermal Systems

Operation—Heating system

Operation—Air Conditioning System

Capillary Tube Metering Device

Pressure Enthalpy Charts

Relative Humidity and Psychometrics

SOLAR PHOTOVOLTAIC H-SPT-AC-1

Systems using solar photovoltaic cells offer the user a practical alternative to the difficulties of supplying electric power to remote locations. In one application, for example, a solar array is used to power the pumping facilities of a remote African village; in another, a solar array is the sole means of power for a mountain top radio repeater.

The Hampden H-SPT-AC-1 is a control system trainer which lets the student technician examine the electrical layout and operational features normally associated with a photovoltaic power source. The trainer demonstrates the electrical characteristics of the solar array, storage battery, AC and DC distribution, and AC and DC loading. The complete charging sequence can be observed. Provisions are made for an external load. A 12 volt charger/ controller provide overall system control and operation. A 120VAC, 375W inverter completes the system.

The trainer layout is represented pictorially on the face of the trainer. Terminal points are brought out so that voltage and current measurements can be taken. The trainer is fully instrumented. Patch cords are provided so that the user can make the connections between the test points and the meter. Separate DC and AC loads can be connected to the terminal points.

Gray Water System H-PST-1 Training

Americans are becoming increasingly aware of how we use, and reuse Water. The household use of Gray water can be a unique way to go Green. **Graywater** is **wastewater** generated from domestic activities such as laundry, dishwashing, and bathing, which can be **recycled** on-site for uses such as landscape irrigation and constructed wetlands. Graywater differs from water from the toilets which is designated sewage or **blackwater** to indicate it contains human waste. Graywater composes 50–80% of residential wastewater generated from all of the house's sanitation equipment (except toilets).

Course objectives includes: Plumbing Code, Installation Process, and Maintenance and Repair

Residential Piping H-RPT-1 Training

In the interest of water conservation, engineers are designing various different water closets and flushing devices. The H-RPT-1 Trainer represents four different methods of low volume flushing. Listed below are the water volumes in gallons that have been calculated for each flushing device at 35 psi. This trainer is designed to allows students to study and observe the different type of flushing systems available and to document the amount of water consumed. In addition, students are instructed on installation process, maintenance, and plumbing code regarding each type of flusher.
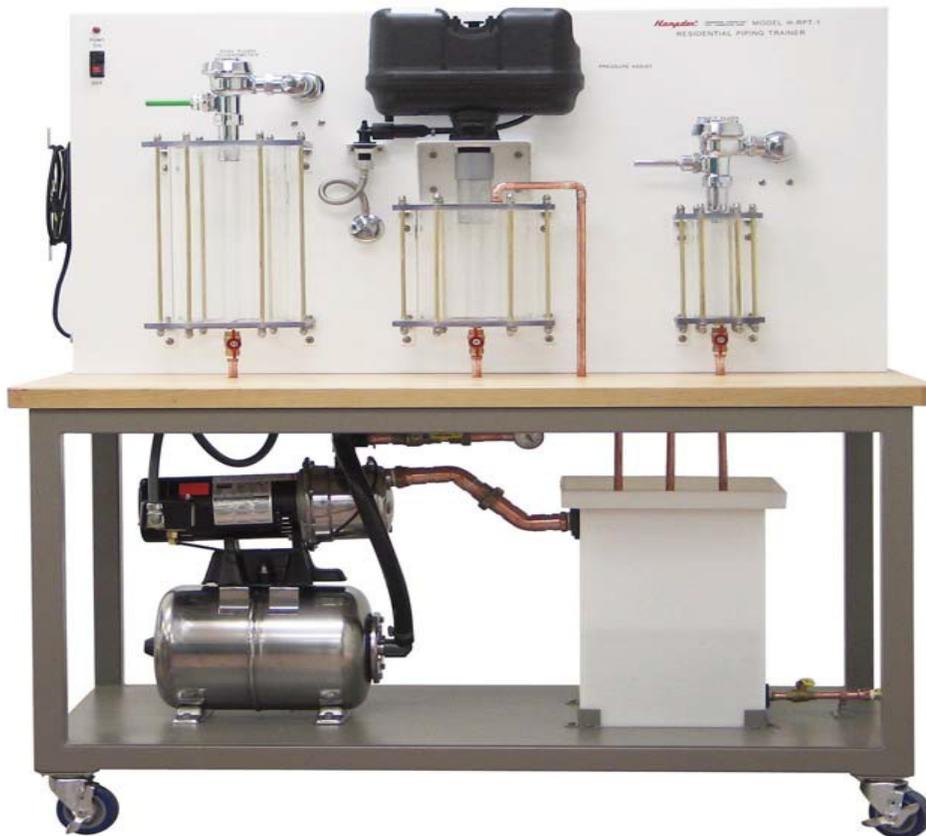
Wind Turbine H-WPG-1B

Green energy is a source of energy that is considered clean and environmentally friendly. These types of energy usually come from renewable recourses which do not pollute or harm the planet. One type of renewable resource which can produce green energy is the wind. A wind turbine produces energy by converting the kinetic energy in wind to electricity. It does this by striking large fan propellers that are attached to a shaft which cause it to turn. This turning shaft is connected to a generator and as the shaft turns it induces an electromagnetic field across the windings, resulting in the production of electricity.

Students are given a general overview of the wind turbine to include history, terminology, new technology, job forecasts, etc. In addition, the students will perform the following hands on experiments:

Experiment 1 Varying Wind Speed
Experiment 2 Wind Speed Measurements
Experiment 3 Varying Wind Angle
Experiment 4 Varying Wind Angle and Speed

Solar Thermal H-SST-1A

Green energy consists of energy sources which are clean and environmentally friendly. These sources are typically forms of renewable energy which do not pollute our planet. One of the many sources of green energy is the sun, which energy is obtained through solar collectors.

Solar collectors absorb the suns energy using solar panels. Water is pumped through them to be heated. Solar collectors can be used as low cost water heaters. Typically applications include pool heaters that use solar energy to heat the water. Students will achieve the following objectives: General overview of solar thermal, understand different practical applications, performing 6 different hands on experiments.

Experiment 1 Angle Variation

Experiment 2 Time of Day Variation

Experiment 3 Time of Year Variation

Experiment 4 Solar Panel Manipulation

Experiment 5 Flow Rate Manipulations

Experiment 6 Heating Rates