

## H-6720 Refrigeration Unit

### Purpose

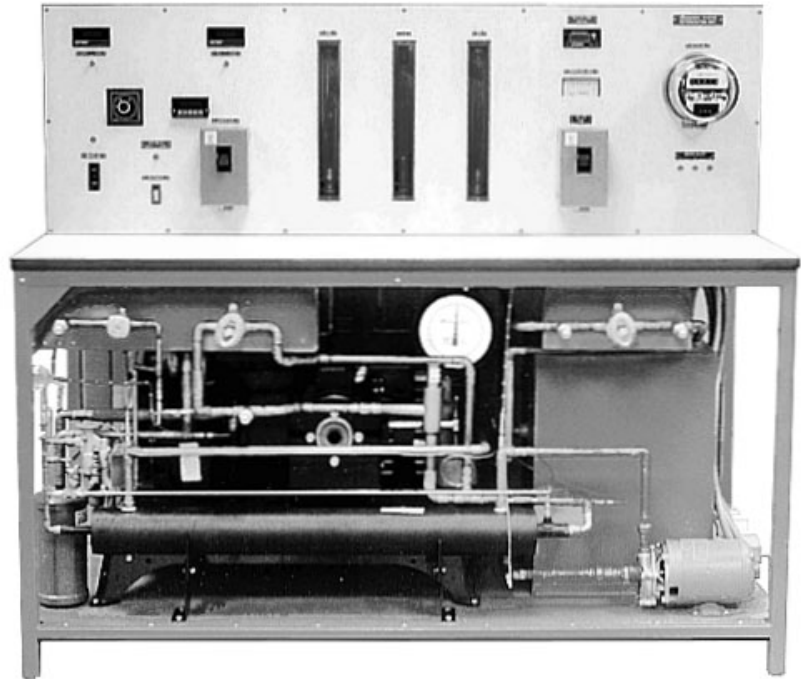
The Hampden **Model H-6720** Refrigeration Unit has been developed to illustrate the characteristics of a large scale refrigeration system. The student will be able to investigate the theoretical performance of the refrigeration cycle and compare it with the performance of the actual cycle.

Additionally, the unit serves as a source of chilled water for use in heat transfer experiments.

### Experiment Capabilities

When used as a stand-alone unit, the student will be able to investigate the workings of a refrigeration or heat pump cycle. The various experimental capabilities are:

- A. Determination of the coefficient of performance of the refrigeration cycle for different evaporator and condenser temperatures.
- B. Heat Exchanger Efficiency for:
  1. Refrigerant-to-water in the condenser
  2. Refrigerant-to-water/glycol in the evaporator (chiller)
- C. Determination of the compressor efficiency under varying inlet conditions (control of refrigerant superheat).
- D. Pressure-Temperature characteristics of:
  1. Compressor
  2. Condenser
  3. Thermostatic Expansion Valve
  4. Chiller



**Model H-6720** Refrigeration Unit  
Dimensions: 64"H x 72"W x 32-1/2"D, Weight: 2,000 lbs.

The unit can also be used as a source of chilled water to conduct further experiments, among which are:

- A. Liquid-to-air heat transfer of tube banks
  1. Tube Types
    - a. Plain Tube
    - b. Finned Tube
  2. Flow Arrangements
    - a. Single Pass
    - b. Triple Pass

- B. Characteristics of Refrigerant Expansion Valves
  1. Thermostatic Expansion Valve
  2. Hand Expansion Valve
  3. Capillary Tube
- C. Investigation of Ice Formation on:
  1. Submerged Coils
  2. Finned Tubes

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

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ENGINEERING CORPORATION

# Thermodynamics Trainers

Educational Training Equipment for the 21st Century

## Specifications

Supplied with the unit is a comprehensive instructions manual covering the theoretical background, experimental procedures, and service instructions.

The Hampden **Model H-6720** Refrigeration Unit shall consist of the following:

1. Compressor - open type, four cylinder, reciprocating compressor which is belt driven at 1143 RPM. Refrigerant - HFC-134a
2. Motor - trunnion mounted 3 Hp (2.2kW) motor, 208V AC-3 $\phi$ -60 Hz complete with dynamometer assembly and motor starter.
3. Condenser - water-cooled vertical shell-and-coil condenser complete with flow control valve. The unit also incorporates a liquid receiver.
4. Thermostatic Expansion Valve with external pressure equalizing connection.
5. Chiller/Evaporator - a fully insulated, high efficiency, finned chiller/evaporator assembly.
6. Filter/Drier - liquid line filter with a desiccant drier.
7. Accumulator - suction line accumulator to protect the compressor.
8. Centrifugal Pump - used to pump the water/glycol solution. The pump comes complete with a 3/4HP (0.56kW) capacitor motor driven at 3500 RPM, 208V AC-3 $\phi$ -60Hz and motor starter.
9. Immersion Heaters - three 6-kW immersion heaters each complete with a manually adjustable thermostat
10. Analog Temperature Display - a direct reading thermocouple meter together with a 20-point selector switch and 20 factory installed, type T thermocouples. (Digital temperature display available at extra cost).
11. Flowmeters - three flowmeters; one in the condenser water line, one in the water/glycol line and one in the liquid refrigerant line
12. kWh Meter - to record the power input to the immersion heaters.
13. Pressure Gauges - to indicate the pressure at critical points in the refrigeration cycle, 8 gauges being supplied. (Pressure transducers with digital display available at extra cost).
14. Two Flow Control Valves - to control flow of condenser cooling water and water/glycol coolant.
15. Protection Devices:
  - a. High/Low Pressure Switch for the refrigerant cycle;
  - b. Low Temperature Thermostat for the chiller;
  - c. Low Pressure Regulator for the chiller;
  - d. Low liquid Level Switch for the immersion heaters;
  - e. Dynamometer protected against overload on start-up.
16. Ammeter - measures motor current and has a full scale accuracy of  $\pm 2\%$ .
17. Quick disconnect/connect couplings featuring a positive shut-off to prevent leakage when the connection is made/broken.

## Physical Specifications

The entire unit is permanently mounted on a stationary bench which has overall dimensions of 64"H x 72"W x 32-1/2"D (1.62m x 1.83m x 0.83m). The bench is constructed out of 1-1/2" square mechanical tubing and is supplied with a plastic laminated top.

The instrument panel is constructed out of 11 gauge sheet metal and is permanently attached to the bench.

## Services Required

### Input Power:

208V AC-3 $\phi$ /4W/60 Hz with 100A supply.

### Water Required:

Source and Drain - 6 gpm (23 lpm).

## Computer Data Logging

This feature adds a 1mV/ degree temperature output, two 4–20mA DC pressure transducer outputs, three 4–20mA flowmeters and one 4-20mA torque output into the system. One interface package consisting of National Instruments I/O modules and Labview® templates for control software are provided for interfacing into an IBM compatible computer through the RS-232 port.

Computer is not included.

Specify **Model H-6720-CDL** ♦

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

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