# H-6730

## Environmental Control Trainer

## Purpose

The Hampden **Model H-6730** Environmental Control Trainer has been designed to teach the fundamental principles of room air conditioning. The unit has sufficient capacity to air condition an entire room with control over the temperature, humidity and air movement. The refrigerant used is HFC-134a.

## Description

The Hampden **Model H-6730** Environmental Control Trainer utilizes a direct expansion coil, refrigerant-to-air heat exchanger. This heat exchanger is located in a lighted duct with a transparent top so that students can observe water vapor condensing on the heat exchanger face. Condensed water vapor is collected in a drain under the unit. The recirculated room air is mixed with up to 30% outside air and is moved by an axial flow fan. The air flow rate is set by a variable speed fan control.

The instrumentation includes the following:

- ***Flowmeter:*** Rotameter which is calibrated in ml/s at 20°C and features a borosilicate glass tube with a stainless steel float.
- ***Pitot Tube:*** A pitot-static probe used in conjunction with an inclined manometer to measure the air flow velocities at various duct locations.
- ***Digital Temperature Meter:*** A precision unit which displays the output of the Chromel/Alumel (type T) thermocouples in use on the unit. There is a thermocouple selector switch which allows the user to display any of the 10 thermocouples supplied with the unit.
- ***Thermocouples:*** A pair of type T thermocouples are located at the expansion coil inlet and outlet. The average temperature of the air across the expansion coil is monitored by a pair of averaging thermocouples composed of four type T thermocouples connected in parallel. Plus four more thermocouples placed in crutial areas.
- ***Thermometers:*** Wet and dry bulb thermometers (one each) that are used to determine the relative humidity of the recirculated room air. The bulbs are located in the return air duct and the indicators are on the front of the bench.
- ***Humidity Controller:*** Two proportional control elements which are room mountable and control the humidity level from 30 to 80% RH. The units are adjustable to any point over this range. One controls the humidifier and the other cools the heat exchanger (dehumidifier).
- ***Humidifier:*** A spinning drum type unit which is mounted in the delivery duct. Unit capacity is 15 Gal/day (2.3 kg/h) and is electrically operated with proportional speed setting via thermal feedback.
- ***Electronic Controls:*** Complete control system to allow the student to maintain the air conditioned space subject to external load conditions and unit capacity:
  a) Outside Air - 0 to 30% of total regulated by electronically controlled louvres. The student has control over the primary and secondary temperature sensors (recirculated and outside air) which serve as the signals to determine the heating or cooling requirements.
  b) Relative Humidity - 30-80% RH regulated by a proportional band humidity controller.
  c) Dry Bulb Temperature - 50° to 90°F (10° to 32°C) room air temperature.
  d) Solid State Zone Load Analyzer - controls the fans, louvres and humidifier to maintain the room at the present conditions.
- ***Air Heater:*** Electrical air heating elements at 600W.
- ***Thermostatic Expansion Valve:*** Features an external pressure equalizer.
- ***Axial Fan:*** Delivers up to 1500 scfm (708 slps) of air at 1" WC (250 Pa) and incorporates a ½ hp variable speed motor.

This unit will allow the students to perform the following experiments:

- Heating air to determine the change in comfort due to the change in relative humidity.
- Cooling air to determine the changes in comfort due to the condensation of water vapor.
- Effect of mixing two air streams on the operating conditions to maintain the same space.
- Conduct a heat balance on the heat exchanger and heating elements.
- Determining the domains of comfort or discomfort in the controlled space by manipulating the:
  a) Temperature
  b) Relative Humidity
  c) Air Movement

This unit is supplied with a comprehensive technical manual.

The entire unit is mounted on a stationary bench constructed of square mechanical tubing and faced with 14 gauge sheet metal panels. The overall dimensions of the unit are 68"H x 70"W x 36"D (1727mm x 1778mm x 914mm).

## Services Required

- 208VAC-3$\phi$- 50/60Hz

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

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