Heat Trainer

Educational Training Equipment for the 21st Century

Bulletin 229-6B

H-RST-20

Geothermal Trainer

Purpose

Hampden's **Model H-RST-20** Geothermal Trainer provides hands-on training by allowing students to conduct tests and adjustments on a modern Geothermal Heat Pump System.

Specifications

The **H-RST-20** Geothermal Trainer consists of the following:

- Geothermal Heat Pump Components (water-to-water)
- Microprocessor Control
- TXV Valve
- E-coated Air Coils
- Compressor
- Two-stage 24V Heating/Cooling Thermostat
- Mobile A Frame
- Instruction Manual and Text Book

The following components shall be mounted on mobile A frame:

- Compressor
- Electric Pressure Control (1 high and 1 low)
- Filter Drier
- Sight Glass
- Condensers (2)
- 24V Two-Stage Heating/Cooling Thermostat
- Power Cord
- Water Supply Tank with Pump
- Water Storage Tank with Pump
- Programmable Thermostat
- Main AC Breaker with Pilot Light
- Pump Switch with Pilot Light (2)
- Digital Temperature Meter with Selector Switch
- Flowmeter 0.5 – 5 GPM (2)
- High Pressure Refrigerant Gauge
- Low Compound Refrigerant Gauge
- Reversing Valve with Coil

FRONT

BACK

MODEL H-RST-20
Dimensions: 66-5/8"H x 72"W x 30"D
Shipping Weight: 1,050 lbs

- Suction Accumulator
- Section of Radiant Flooring with 3 Flooring Inserts
- Thermostatic Expansion Valves (2)

Input Power: 208/230V AC–1Ø–60 Hz

Options

- H-RST-20-EFP Electrical Fault Package Option
- H-RST-20-MP Meter Package Option

Description

The **H-RST-20** Geothermal Trainer is equipped with:

1. Exclusive double isolation compressor mounting system
2. Insulated divider and seperate compressor/air handler compartments
3. Extended range operation (20° to 120°F)
4. Exceeds ASHRAE 90.1 efficiencies
5. Internally trapped condensate drain line
6. Unit Performance Sentinel performance monitoring system

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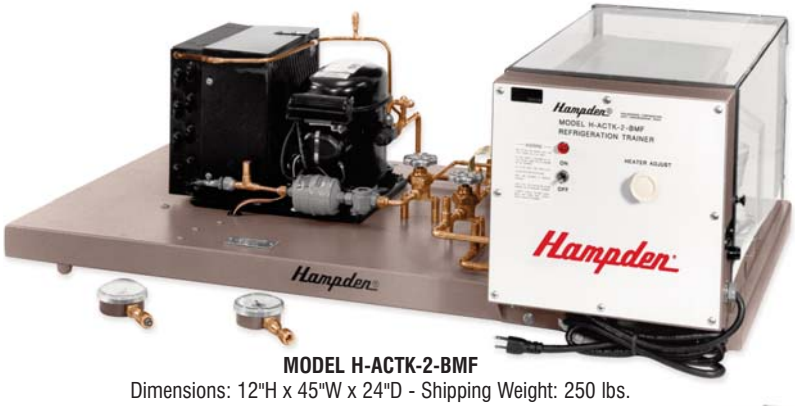
AC & Refrigeration Training Kit

Educational Training Equipment for the 21st Century

Bulletin 227-1E

The **Model H-ACTK-1-BMF** Refrigeration Trainer, using a thermostatic expansion valve as the liquid control device, is factory assembled and charged. The unit contains suction and discharge gauges and four temperature wells for student experimentation. The trainer also consists of evaporator and condenser enclosures with heater and controls.

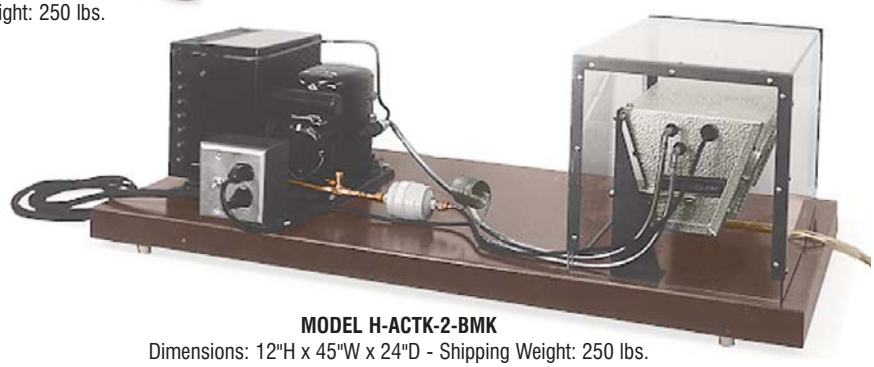
MODEL H-ACTK-1-BMF
Dimensions: 12"H x 45"W x 24"D - Shipping Weight: 250 lbs.



MODEL H-ACTK-2-BMF
Dimensions: 12"H x 45"W x 24"D - Shipping Weight: 250 lbs.

The **Model H-ACTK-2-BMF** Refrigeration Trainer, using a capillary tube as the liquid control device, is factory assembled and charged. The unit contains suction and discharge gauges and four temperature wells for student experimentation. The trainer also consists of evaporator and condenser enclosures with heater and controls.

The **Model H-ACTK-2-BMK** Refrigeration Trainer is supplied in kit form for assembly, charging and testing by the student. Equipment supplied includes: compressor with forced air condenser, forced air evaporator, filter/drier, capillary tube, Lexan cover for the evaporator, Schrader valve, and the tubing, fittings and other hardware necessary for assembly.



MODEL H-ACTK-2-BMK
Dimensions: 12"H x 45"W x 24"D - Shipping Weight: 250 lbs.

MODEL H-ACTK-CTA-BMF
Dimensions: 12"H x 35"W x 24"D - Shipping Weight: 250 lbs.

The **Model H-ACTK-CTA-BMF** Refrigeration Trainer is factory assembled, except for the liquid control device. A thermostatic expansion valve, a capillary tube and an automatic expansion valve are supplied. The student installs the liquid control device and charges the system. Suction and discharge gauges and four temperature wells are supplied for student experimentation. The trainer also includes switches for inserting six electrical faults and controls for the heater in the evaporator enclosure.

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

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Refrigeration-Compressor Trainers

Educational Training Equipment for the 21st Century

Bulletin 228-1H

MODEL H-FRD-1A
Dimensions: 36"H x 36"W x 13"D
Shipping Weight: 272 lbs

H-FRD-1A

Fundamental Refrigeration Demonstrator

The Hampden **Model H-FRD-1A** Fundamental Refrigeration Demonstrator provides students with the opportunity to observe the operation of a domestic refrigerator refrigeration system. It is a complete, ready to-operate refrigeration system. The refrigeration cycle is silkscreened on the upright panel for easy identification of components and functions. The temperature control adjustment governs the on and off compressor cycles in accordance with the cold box heat load. Power required: 120V AC 1ϕ 60Hz.

The **Model H-FRD-1A** is charged with a non-CFC refrigerant.

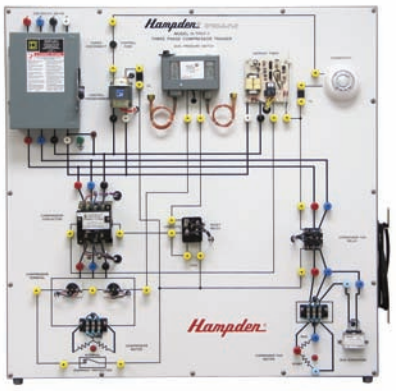
To order this unit for mounting on a Mobile A-frame stand (see Bulletin 246-1), specify **Model H-FRD-1A-MCI-1000**.

H-TPCT-1

Three-Phase Compressor Controls Trainer

The Hampden **Model H-TPCT-1** Three-Phase Compressor Controls Trainer provides students with the ability to operate, test, and troubleshoot the electrical controls of a three-phase commercial single-package air conditioner. It contains the actual components found in commercial units with the exceptions of the compressor motor and fan motor, which are simulated. All components function exactly as they would on the job. The instructor has the ability to insert up to twenty five faults via toggle switches on the side of the trainer. Students never apply power externally to any of the test points. When the trainer is energized, realistic voltages appear across the actual and simulated devices. When de-energized, all components and devices may easily be isolated for resistance and continuity tests. Power required: 120V AC 1ϕ 60Hz. Three-phase power to operate the trainer is obtained from a 1-phase to 3-phase converter.

To order this unit for mounting on a Mobile A-frame stand (see Bulletin 246-1), specify **Model H-TPCT-1-MCI-1000**.



Model H-TPCT-1
Dimensions: 36"H x 36"W x 13"D
Shipping Weight: 254 lbs

MODEL H-CPT-1A
Dimensions: 36"H x 36"W x 13"D
Shipping Weight: 260 lbs

H-CPT-1A

Single-Phase Compressor Trainer

The Hampden **Model H-CPT-1A** Single-Phase Compressor Trainer provides students with the opportunity to connect a single-phase compressor in various wiring configurations and varying suction and discharge pressures to produce realistic operating conditions. It contains a ⅛ HP hermetically-sealed compressor similar to those used in small domestic refrigerators, dehumidifiers, water coolers, etc. Pressure-sensitive connections are made from the suction and discharge lines to gauges and to low and high pressure cut-outs. Students interconnect the compressor with the various control devices, including starting and running capacitors, potential and current relays, cutout switches, thermostat, and an overload switch. Hand valves permit the regulation of pressures for realistic operation. Furnished complete with cords. Power required: 120V AC 1ϕ 60Hz.

To order this unit for mounting on a Mobile A-frame stand (see Bulletin 246-1), specify **Model H-CPT-1A-MCI-1000**.

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

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Environmental Systems Trainers

Educational Training Equipment for the 21st Century

Bulletin 230M

H-DSSCT-1
Solid State Controls Trainer

The Hampden **Model H-DSSCT-1** Solid State Controls Trainer contains the actual control components of a two stage heating and cooling system using both digital and analog thermostats. Each component terminates at Hampden binding posts for easy interconnection into a variety of configurations. Up to 15 faults may be inserted from the panel on the rear. Furnished with cords. The typical fault panel is found on the side of Hampden Environmental Systems Trainers.

MODEL H-DSSCT-1
Dimensions: 36"H x 36"W x 13"D
Shipping Weight: 260 lbs.

MODEL H-PS-1A
Dimensions: 36"H x 36"W x 13"D
Shipping Weight: 260 lbs.

H-PS-1A
Power Saver Trainer

The Hampden **Model H-PS-1A** Power Saver Trainer contains the control components of a "mixed air" temperature control system that saves power by using outside air whenever possible for cooling. The trainer incorporates several elements of the mixed air control system and adapts the layout for student use. The student learns important design concepts and methods of operation normally associated with commercial HVAC equipment. The **H-PS-1A** may be used as a stand-alone trainer or in conjunction with the **Model H-TPCT-1** Three Phase Compressor Trainer (Bulletin #228-1) and the **Model H-GHT-2A** Gas Heat Trainer (Bulletin #229-3). Up to 13 faults may be inserted from the side panel. Furnished with cords.

H-CFS-1B
Compressor Fault Simulator

The Hampden **Model H-CFS-1B** Compressor Fault Simulator is designed to give students experience with troubleshooting hermetic compressors. Up to 16 faults may be inserted into the compressor, the current relay, the capacitors, the overload relay, or the power wiring. Using a standard hermetic compressor tester, the student determines the fault and simulates corrective action via toggle switches on the front of the panel. Lights are used to signal successful or unsuccessful results of the action. Available on a tabletop unit (shown) or for mounting on an A-frame mobile stand (as described on Bulletin 246-1). Furnished with cords.

MODEL H-CFS-1B
Dimensions: 24"H x 36"W x 11"D
Shipping Weight: 160 lbs.

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

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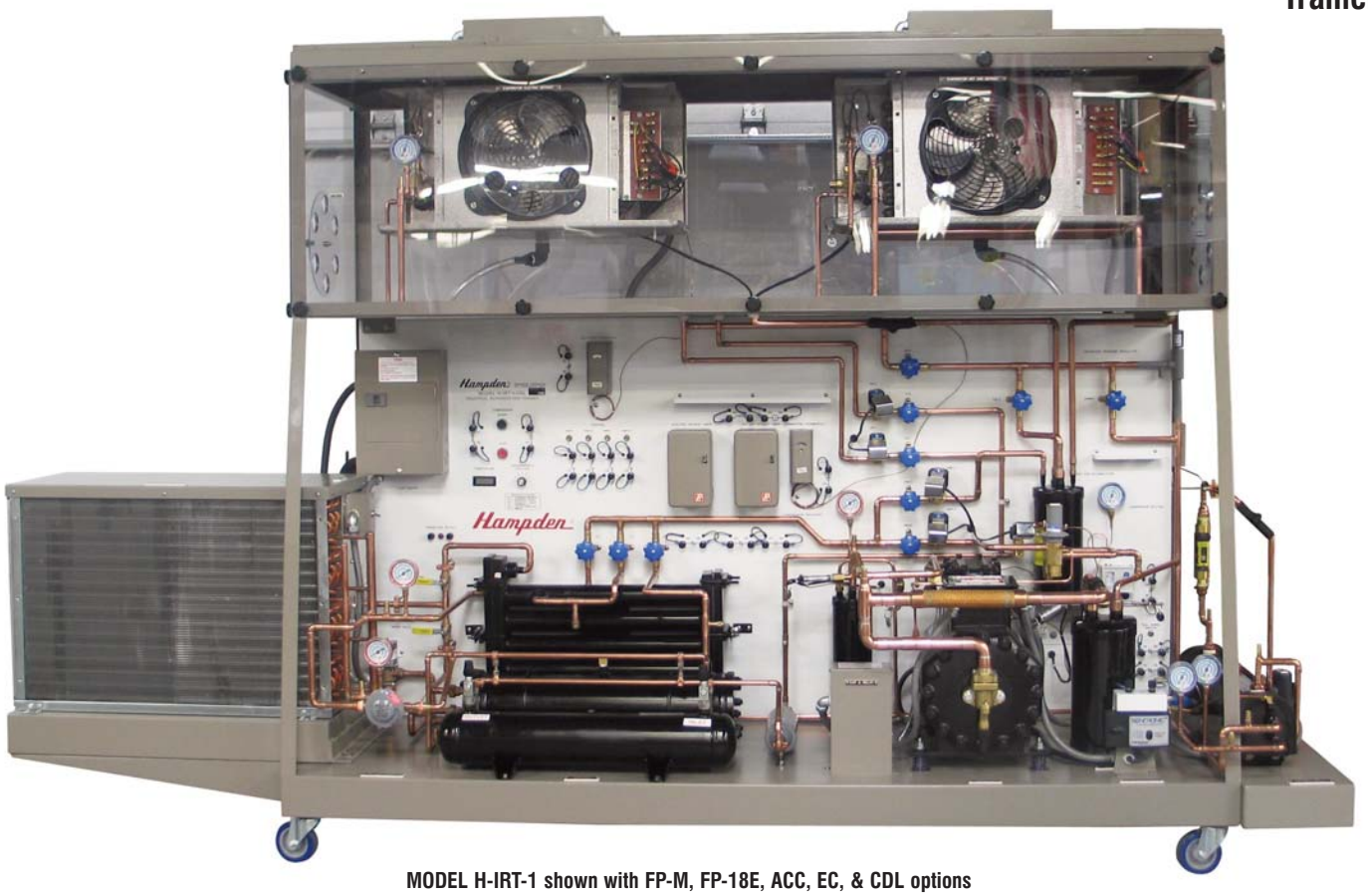
Industrial Refrigeration Trainer

Educational Training Equipment for the 21st Century

Bulletin 231J

H-IRT-1
Industrial Refrigeration Trainer



MODEL H-IRT-1 shown with FP-M, FP-18E, ACC, EC, & CDL options
Dimensions: 76"H x 88"W x 31"D
Shipping Weight (without options): 1500 lbs
Four clear plastic panels enclose the upper portion containing the evaporators.

The Hampden **Model H-IRT-1** Industrial Refrigeration Trainer consists of industrial refrigeration components completely factory assembled and wired. It is designed to provide training with larger commercial and industrial refrigeration systems which require water-cooled condensers (tube-in-tube and shell-in-tube), electric and hot gas defrost systems, cooling towers, hot bypass capacity control systems, crankcase pressure regulators, crankcase heaters and pressure pumps.

Options

H-IRT-FP-M Mechanical Fault Package

H-IRT-FP-18E Electrical Fault Package

H-IRT-ACC Third Condenser to expand training capabilities (Air Cooled)

H-IRT-EC Evaporator Chiller, shell and tube type water chiller

H-IRT-1-CDL Industrial Refrigeration Trainer with Computer Data Logging package

H-ACTK-CT Water Cooling Tower

Options must be specified at time of original order.

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

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Industrial Refrigeration Trainer

Educational Training Equipment for the 21st Century

Bulletin 231-1J

H-IRT-1

Industrial Refrigeration Trainer

Description

The Hampden **Model H-IRT-1** Industrial Refrigeration Trainer consists of the following:

- 3 HP semi-hermetic compressor
- Refrigerant R-134A (other refrigerants available)
- Crankcase heater with automatic control system
- Oil circulating pump
- Two evaporators (forced-air type) with solenoids, timers, etc.
- Two water-cooled condensers (tube-in-tube and shell-in-tube)
- Gas bypass systems
- Crankcase pressure regulator with gauges
- Operating instructions, student experiment manual and teacher manual
- Text: *Modern Refrigeration and Air Conditioning* with study guide and lab manual

Lessons

The following lessons are included in the Hampden **Model H-IRT-1** Teacher's Manual:

- Properties of Matter
- Temperature and Heat Energy
- Refrigerants
- The Refrigeration Cycle
- Pressure-Enthalpy Charts
- Heat Transfer
- Refrigerant Oils
- Leak Detection
- Removing Refrigerant From a System
- Charging a Refrigeration System
- Liquid Control Devices-Thermostatic Expansion Valve
- Pressure Controls

Services Required

- 240/120V AC 1Ø 60Hz 35A with ground
- A source of flowing water
- A drain to sewer
- A means of connecting the optional cooling tower to a source of 220V AC 1Ø 60Hz electric power

Experiments

- Evaporator No. 1 with Tube-in-Tube Condenser No.1
- Evaporator No. 1 with Shell-in-Tube Condenser No.2
- Evaporator No. 2 with Tube-in-Tube Condenser No.1
- Evaporator No. 2 with Shell-in-Tube Condenser No.2
- Electric Defrost
- Hot Gas Defrost

The Hampden **H-ACTK-CT** Cooling Tower provides a hands-on introduction to the principal components of cooling towers. The unit provides the student with the ability to assemble and troubleshoot the systems.

Enclosure:	Steel with an Epoxy finish-mobile
Fan:	1/4 HP
Pump and Motor:	1/2 HP with thermal protection
Controls:	Thermostat
	Hi-Pressure switch
	Disconnect switch
	Float valve
Hardware:	Galvanized pipe and fittings
	Wire
	Conduit or liquid type cable
	Connectors
	Fill connector
	Hoses
Courseware:	Correlated operations manual
Input:	208/220V AC, single phase

Front view

Side view

Back view

MODEL H-ACTK-CT Water Cooling Tower
Dimensions: 54"H x 31"W x 33"D
Shipping Weight 610 lbs

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

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Mobile Air Conditioning Trainers

Educational Training Equipment for the 21st Century

Bulletin 232C

H-ACT-1

Air Conditioning System Trainer

Purpose

The Hampden **Model H-ACT-1** Air Conditioning System Trainer is based on R-410A refrigerant. R-410A is an efficient and environmentally friendly refrigerant. The **Model H-ACT-1** is designed to provide the student with a thorough understanding of the systems used in residential and commercial applications. The system components are panel mounted and provide easy access for testing and troubleshooting. When specified, the trainer can be supplied with an integral fault package comprised of ten electrical faults, mounted in a locking box on the rear of the trainer. Also available is a panel mounted meter package that permits monitoring of the system voltage, current and watts, and a digital temperature package with thermocouples to display the system temperatures at critical locations.

Description

The Hampden **Model H-ACT-1** Air Conditioning System Trainer contains three types of liquid control devices, a capillary tube, thermostatic expansion valve, and hand expansion valve. A reversing valve is included so that the system may be run as a heat pump. R-410A works at a higher pressure than past refrigerants, so all of the system's fittings have been brazed. The trainer includes sight glasses and pressure gauges at the inlet and outlet of the evaporator and condenser, thermometer wells, temperature and pressure controls, receiver, filter dryer, and accumulator. It is factory charged with R-410A refrigerant. Furnished complete with operating instructions, experiment and teacher manuals.

The components are mounted to a steel panel and completely piped and wired. All components are clearly identified by legends. The panel is mounted to a mobile cart with four (4) casters, two with brakes.

Model H-ACT-1 Air Conditioning System Trainer
(shown with all options)
Dimensions: 76"H x 64"W x 31"D
Shipping Weight: 885 lbs.

Options*

- **H-ACT-1-CDL** Computer Data Logging Package
- **H-ACT-MP** Instrument Package, volts, amperes, and watts
- **H-ACT-FP-10E** Fault Package, electrical
- **H-ACT-TC** Digital Temperature Module with thermocouples

**Options must be specified at time of order.*

POWER REQUIRED:

Input: 220VAC - 1Ø - 3W - 60Hz

R-410A is a replacement for R-22 and is an EPA approved refrigerant

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

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Air Conditioning Training Systems

Educational Training Equipment for the 21st Century

Bulletin 233-1H

H-ACD-2

Recirculating Air Conditioning Demonstrator

Purpose

The Hampden **Model H-ACD-2** Recirculating Air Conditioning Demonstrator is designed to demonstrate the principles of air conditioning. Students can investigate the theorectical performance of the R-134a refrigeration system (other refrigerants available) along with the various treatments utilized in the air flow distribution cycle including: heating, cooling, humidification, de-humidification, recirculation, and mixing.

The Hampden **H-ACD-2** Recirculating Air Conditioning Demonstrator consists of eight basic segments:

1. Blower
2. Manometers
3. Damper
4. Mixers
5. Preheater
6. Humidifier
7. Evaporator
8. Reheater

All controls are centrally located with analog or digital display for monitoring.

MODEL H-ACD-2 with CDL package
Dimensions: 70"H x 88"W x 31"D
Shipping Weight: 1450 lbs

Services Required

- 208V AC, 3Ø, 4W, 60Hz
- Water Supply

This unit comes complete with operating instructions, experiment, and teacher's manuals.

Experiments

- Air Flow Measurement
- Wet Bulb Temperature Measurement
- Air Density and Velocity Flow Rate Calculations
- Humidity and Dew Point
- The Refrigeration Cycle
- Effect of Humidity on Refrigeration
- Refrigeration Controls
- Air Conditioning Process
- Removing Sensible and Latent Heat

Options

♦The Hampden **Model H-ACD-2-CDL** Recirculating Air Conditioning Demonstrator with Computer Data Logging package includes the following:

- Thermocouples (13), Type "T"
- Air Velocity Transmitter with a 4–20mA output
- Pressure Transmitters (2) with 4–20mA output
- Differential Low Pressure Transmitters (2) with 4–20mA output
- Wattmeters (2) with 4–20mA output
- Elapsed Time Meters (9)
- Interface Modules and Windows® Software

♦The Hampden **Model H-ACD-FP-16E** Electrical Fault Package

Options must be specified at time of original order

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

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Air Conditioning Training Systems

Educational Training Equipment for the 21st Century

Bulletin 233H

H-ACD-1

Air Conditioning Demonstrator

MODEL H-ACD-1
Dimensions: 65"H x 87-1/2"W x 31"D
Shipping Weight: 950 lbs

Purpose

The Hampden **MODEL H-ACD-1** Air Conditioning Demonstrator has been designed to teach the principles of thermo-dynamics as related to the field of air conditioning and refrigeration. The unit comes complete with operating instructions, experiment and teacher's manuals. Areas covered include air flow, inlet heating and humidification, air cooling, and air reheating. It consists of eight basic segments:

1. Blower
2. Pre-Heater
3. Vaporizer
4. Observation Port
5. Refrigeration
6. Re-Heater
7. Observation Port
8. Manometer

This unit is designed to demonstrate complete energy balance with provisions to inject heat, water vapor, heat extraction, and changes in air flow. The electrical controls are conveniently located on an incline faced panel with nomenclature silk-screened in a contrasting color.

This demonstrator is self-contained and requires only 220V AC,1Ø, 60Hz.

Refrigerant: R-134a (other refrigerants available)

Options

♦The Hampden **MODEL H-ACD-1-CDL** Air Conditioning Demonstrator with Computer Data Logging package includes the following:

1 - Air Velocity Transmitter
2 - Pressure Transmitters
12 - Type "T" Thermocouples
Interface Modules and Windows® Software

♦The Hampden **Model H-ACD-FP-10E** Electrical Fault Package

Options must be specified at time of original order

All Hampden HVAC equipment is charged with non-CFC refrigerant, as available

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

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Bulletin 234-2C

H-RST-5
Refrigeration and Air Conditioning Trainer

MODEL H-RST-5
Dimensions: 66"H x 34"W x 31"D
Shipping Weight: 575 lbs

The Hampden **Model H-RST-5** Refrigeration and Air Conditioning Trainer is a thermostatic expansion valve (TEV) controlled refrigerating system which provides the basic facilities for studying the principles, mechanics and maintenance aspects of industrial refrigeration systems.

The **H-RST-5** consists of a mobile demonstration carrier with base and compressor mounting frame and an instrument/control panel. Gauges read evaporation and condensing pressures, while strategically located temperature wells permit temperature measurements. The lower portion of the workbench houses the evaporator with its fan, permitting the compressor to cycle based on evaporating pressure. The trainer is provided with faulted components which the instructor can temporarily install in place of the functioning components. The fault system includes: Air Flow Restrictor, Deflection Shield, TEV-Faulted Orifice, TEV-Faulted Screen, and Faulted Filter-Drier. The **H-RST-5** is R-134a based and is completely factory assembled and tested. It comes complete with operating instructions, a student experiment manual, and a teacher's manual.

Manual

A student manual includes the following topic areas:

- System Components
- System Operation and Performance
- Refrigeration Cycle
- Pressure Enthalpy Charts
- Compressors
- Refrigerant Control Device (TEV)
- Electric Circuits and Controls
- Pressure Controls
- System Charging and Servicing

Experiments

- Familiarization with the H-RST-5
- The Refrigeration Cycle
- Deflected Evaporator Air Flow
- Restricted Evaporator Air Flow
- High Pressure Protection
- Low Pressure Protection

Power required: 120V AC 1Ø 60Hz

Options

H-RST-5-CDL Refrigeration and Air Conditioning Trainer with Computer Data Logging package

Model H-RTS-1 Refrigeration Tool & Spare Parts Set

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

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H-IMD-1

Ice Machine Demonstrator

Purpose

The Hampden Educational **Model H-IMD-1** Ice Machine Demonstrator demonstrates the principles, mechanics, and maintenance aspects of commercial ice machine systems.

Description

The unit consists of three sections: the ice cube machine, bin, and the control panel with six electrical and four mechanical programmable faults. The ice cube machine has an efficient vertical plate design with positive release harvest assist. The foamed-in-place polyurethane insulated head and fan pressure control maintains proper gas temperature to maximize freezing and harvest cycles. The bin provides support and ice storage for the ice cube machine. The control panel incorporates the educational modification including: electrical and refrigeration schematics, freeze cycle LED's and harvest cycle LED's, designed to assist the instructor in the operation and maintenance of the ice cube machine. The **H-IMD-1** can produce 200 pounds of ice per hour at 70°F air and 50°F water. Complete operating instructions are included.

Requirements

Owner-provided electrical, water, and drain hookups.

Power Required: 115V 1Ø 60Hz

MODEL H-IMD-1
Dimensions: 59"H x 30-1/8"W x 28"D
Shipping Weight: 320 lbs.

Dimensions: 7½"H x 19"W x 8½"D
Shipping weight: 40 lbs.

H-PRD-1

Potential Relay Demonstrator

The Hampden **Model H-PRD-1** demonstrates the function of a potential relay in the starting of a 240V compressor. A potentiometer is used to simulate the increasing speed of the motor during start-up. Pilot lights indicate when the start and run windings and the start and run capacitors are energized. Lamp brightness varies during the start period to simulate voltage variation. Four test jacks permit realistic voltage measurements at the potential relay. Input power is single-phase AC through a GFI circuit breaker.

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

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A/C & Refrigeration Test Benches

Educational Training Equipment for the 21st Century

Bulletin 234-1E

MODEL 262-19 with oven
Dimensions: 52"H x 72"W x 36"D
Shipping Weight: 1000 lbs

262-19
Air Conditioning Test Bench

The Hampden **Model 262-19** is a work bench with a maple top and permanently mounted control console designed to accommodate a variety of test and repair activities, including checking out and charging an air conditioning or refrigeration unit. Its facilities include power sources, instruments and mechanical equipment, plus generous storage space below the work space. The test bench also features an optional full capacity built-in drying oven with automatic timer. All power sources, instruments and gauges are conveniently mounted on the face of the console. The mechanical equipment is portable and may be stored below when not in use. The hinged cabinet doors are key locked for security.

For unit without oven, specify **Model 262-19-1**

262-19X
Air Conditioning and Refrigeration Test Bench

The Hampden **Model 262-19X** provides a convenient work surface, storage facilities, and the most often used auxiliary and test equipment for the refrigeration and air conditioning shop. The bench and panel are constructed of code gauge steel. The front panel is finished in white enamel, the panel housing and bench are finished in instrument tan texture enamel, and the face of the lockable drawer is white laminate.

Panel-mounted equipment includes: A charging cylinder, a manifold gauge set, a vacuum manifold, a vapor charger, a refrigerant valve, an electronic vacuum gauge, a compressor analyzer, an electrical multimeter, three AC receptacles, a 3-phase 20A receptacle, a 208V single phase 15A refrigeration receptacle, and a 3 pole main circuit breaker with pilot lamp. Also supplied is a vise, a torch kit, and a refrigeration hose set.

MODEL 262-19X
Dimensions: 66"H x 72"W x 30"D
Shipping Weight: 735 lbs

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

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Environmental Systems Trainer

Educational Training Equipment for the 21st Century

Bulletin 234J

H-SPT-AC-1
Solar Photovoltaic Trainer

The Hampden **Model H-SPT-AC-1** contains two solar photovoltaic modules with a nominal voltage output of 15.5V DC at 2.26A, an inverter that converts the DC to single-phase AC, a high-capacity solar battery, controls to monitor power from solar modules and to switch to battery power when necessary, four test points, two power take-off points (12V DC and 120V AC), a 0-20V DC voltmeter, a multi-range DC ammeter, and a 0-150V AC voltmeter. The mobile frame is constructed of code gauge furniture stock steel with four swivel casters, two with locks. Furnished complete with a set of interconnecting cords.

MODEL H-SPT-AC-1
(Front View at left,
back view right)
Dimensions:
74"H (max tilt) x 54"W x 26"D
Shipping Weight:
450 lbs

H-DSCT-1
Dual Speed Compressor Trainer

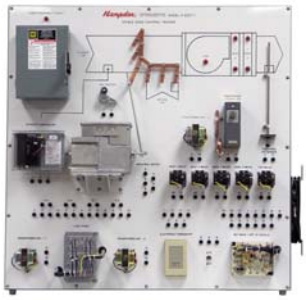
The Hampden **MODEL H-DSCT-1** facilitates the study and troubleshooting of the electrical and control circuits of a three-phase, dual-speed hermetic compressor. Standard commercial components are wired into an operating electrical control system, while the compressor is simulated with pilot lights and sound. Up to 16 malfunctions may be inserted via the fault switches mounted on the side of the trainer. Input power is single-phase AC. Three-phase power to operate the trainer is obtained from a built-in converter.

Dimensions: 36"H x 36"W x 13"D.
Shipping weight: 260 lbs.

H-EHST-1A
Electric Heat Service Trainer

The Hampden **MODEL H-EHST-1A** facilitates the study and troubleshooting of the electrical and control circuits of an electric heat furnace. Standard commercial components are wired into an operating electrical control system, while the heaters and blower are simulated by pilot lights and resistors. Up to 34 malfunctions may be inserted via the fault switches mounted on the side of the trainer. Power input is single-phase AC. The 240V for the simulated heaters is obtained from a step-up transformer.

Dimensions: 36"H x 36"W x 13"D.
Shipping weight: 260 lbs.



H-SZCT-1
Single Zone Control System Trainer

The Hampden **MODEL H-SZCT-1** contains all of the control components of a roof top, two-stage, heating/cooling commercial air conditioning system, including outside air damper control, heating setup and cooling setup, enthalpy control, transformers, electronic thermostat, single-zone logic panel, thermistor sensor, and control relays. Students wire these components with patch cords into a fully operational system. Fault switches mounted on the side of the trainer permit the instructor to insert up to 16 malfunctions.

Dimensions: 36"H x 36"W x 13"D.
Shipping weight: 260 lbs.

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

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HVAC Electrical System Trainers

Educational Training Equipment for the 21st Century

Bulletin 236-1H

MODEL HEE-11A-FT-1
Dimensions: 36"H x 36"W x 11"D
Shipping Weight: 230 lbs

HEE-11A-FT-1
Intermediate Electricity Trainer

The Hampden **Model HEE-11A-FT-1** Intermediate Electricity Trainer provides students with the opportunity of wiring actual heating and cooling control components into realistic electrical circuits. Further, the instructor may insert up to 15 faults to provide students with troubleshooting experience. Connections to all of the components terminate at Hampden HR-1S color coded socket receptacles. The student uses interconnecting cords to construct real control systems. Pilot lights are used to simulate the compressor, resistance heater, and the blower fan motors. Input power standard 120V AC 1Ø 60Hz. This model is also available to mount on a mobile A-frame. Specify Hampden **Model HEE-11A-FT-1-MCI-1000** when ordering.

HEE-11
Heating & Air Conditioning Electrical Wiring Trainer

The Hampden **Model HEE-11** Heating & Air Conditioning Electircal Wiring Trainer is designed to cover low voltage pilot circuits as well as series and parallel circuits. Consists of a fused disconnect, four resistance load lamp sockets complete with lamps, one step down 24 volt AC control transformer, one relay with 24 volt AC coil with one normally open and one normally closed contact, two SPST switches, and two SPDT switches. With these components, basic furnace and air conditioning circuits can be wired and tested. The Lexan® control panel shows all components via silkscreen symbols. All the components are wired to Hampden HR-1S color coded socket receptacles.

Provided with a 6 foot power cord and interconnecting cords. Input power standard 120V AC 1Ø 60Hz.

MODEL HEE-11
Dimensions: 8½"H x 19"W x 8½"D
Shipping Weight: 35 lbs

HEE-11R
Basic Electricity Relay Trainer

The Hampden **Model HEE-11R** Basic Electricity Relay Trainer facilitates the study and troubleshooting of the control components and circuits used in refrigeration and air conditioning systems. Included on the trainer are two pushbuttons (one N.O.; one N.C.), two SPST switches, a control transformer, a DPDT relay, a contactor, a time delay relay, a current relay, a potential relay, a resistor, a rheostat, four pilot lights, and an ON/OFF circuit breaker. Furnished complete with interconnecting cords. Up to 21 malfunctions may be inserted via the fault switches mounted on the rear of the trainer. Input power standard 120V AC 1Ø 60Hz.

MODEL HEE-11R
Dimensions: 16⅝"H x 19"W x 10"D
Shipping Weight: 80 lbs

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

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A/C & Refrigeration System Trainers

Educational Training Equipment for the 21st Century

Bulletin 237I

MODEL H-RST-6
Dimensions: 80"H x 48"W x 28"D
Shipping Weight: 700 lbs

H-RST-8

Heat Pump Trainer

The Hampden **Model H-RST-8** Heat Pump Trainer provides students with an introduction to the principal components of heat pump systems. The instructor is able to insert eighteen electrical faults, including: defective fan motor, switches, relay and compressor faults.

The Hampden **Model H-RST-8** contains one environmental enclosure, fan cooled evaporator, emergency heat, thermal cutout switch, digital programmable thermostat, digital thermostat, defrost timer, reversing valve, hermetic compressor with condenser, liquid receiver, gauges, valves, check valves, high and low pressure switch, filter-drier, sight glass moisture indicator, thermostatic expansion valve and capillary tube for each coil, and lockable storage cabinet. Charged with R-134a HFC refrigerant.

Option

H-RST-8-CDL Heat Pump Trainer with Computer Data Logging Package, allows monitoring of the following:

- temperature
- pressure.

Option must be specified at time of original order.

Power Required: 120V AC 1Ø 60 Hz.

H-RST-6

Basic Refrigeration Trainer

The Hampden **Model H-RST-6** Basic Refrigeration Trainer provides students with an introduction to the principal components of basic refrigeration systems. The instructor is able to insert ten electrical faults, including: defective motors, switches, and relays for electrical troubleshooting, as well as three mechanical faults.

The Hampden **Model H-RST-6** contains one evaporator and condenser with the front coils of clear tempered glass, three metering devices, electric reversing valve, hermetic compressor with liquid receiver and suction accumulator, fan speed controller, pilot lights, gauges, filter-drier, sight glass moisture indicator, flowmeter, high and low pressure controls, digital temperature indicator with thermocouple transfer switch, solenoid, hand valves, flow diagram, and lockable storage cabinet. Charged with R-134a HFC refrigerant.

Option

H-RST-6-CDL Basic Refrigeration Trainer with Computer Data Logging Package, allows monitoring of the following:

- temperature
- pressure

Option must be specified at time of original order.

Power Required: 120V AC 1Ø 60 Hz.

MODEL H-RST-8
Dimensions: 75"H x 48"W x 30"D
Shipping Weight: 850 lbs

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

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A/C & Refrigeration System Trainer

Educational Training Equipment for the 21st Century

Bulletin 238-1J

H-CRT-2
Commercial Refrigeration Trainer

Model H-CRT-2 shown with **CDL option**
Computer and workbench available separately
Dimensions: 83½"H x 72"W x 38"D
Shipping Weight: 1260 lbs

The Hampden **Model H-CRT-2** Commercial Refrigeration Trainer provides students with an introduction to the principal components of commercial refrigeration systems. The instructor is able to insert eighteen electrical faults, such as defective capacitors, motors, and switches for practical electrical troubleshooting as well as two mechanical defective component faults.

The Hampden **Model H-CRT-2** contains two evaporators, (either may be operated singly) and three types of liquid control devices (capillary tube, TEV, and AEV). Sight glasses at the inlet and outlet of the evaporators and condenser allow students to monitor changes in refrigerant state. Also included with the unit are pressure gauges, thermocouples, temperature and pressure controls, heat exchanger, flowmeters, receiver, oil separator, accumulator, instrumentation and mobile storage bench. Charged with R-134a HFC refrigerant. Furnished complete with operating instructions, experiment and teacher's manuals.

Option

H-CRT-2-CDL Commercial Refrigeration Trainer with Computer Data Logging Package allows the user to monitor the following:

- temperature
- pressure

Option must be specified at time of original order.

Power Required: 120V AC 1Ø 60Hz

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

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Commercial Refrigeration Trainer

Educational Training Equipment for the 21st Century

Bulletin 238-3C

H-CRT-4A

Commercial Multi-Compressor Rack Refrigeration System Trainer

Purpose

The Hampden **Model H-CRT-4A** Commercial Multi-Compressor Rack Refrigeration System Trainer was designed to provide students with a thorough understanding of the refrigeration cycle, including measurement of pressure, vacuum, flow rate, and temperature.

Description

The system components are panel mounted to provide easy access for testing and troubleshooting. When specified, the Hampden **Model H-CRT-4A** is supplied with an integral Fault Package, comprised of preset electrical faults mounted in a locking box on the side of the trainer.

Specifications

The Hampden **Model H-CRT-4A** Commercial Multi-Compressor Rack Refrigeration System Trainer consists of the following:

- Scroll Compressors (3)
- Evaporators (2), w/ Temperature Sensors
- T.E.V. Valves (2)
- Air-cooled Condenser
- Oil Separator
- Oil Filter
- Oil Reservoir with (2) sight glasses
- Oil Level Solenoid, (3)
- Oil Differential Check Valve
- Liquid Receiver
- Cartridge Type Filter-Drier
- Take apart suction line for Filter-Drier Cartridge
- Sight Glass
- Suction Accumulator
- Suction Shell
- Pressure Transducer, (1) high and (1) low
- Suction Pressure Gauge
- Discharge Pressure Gauge
- High / Low Pressure Switch (3)
- Head Pressure Control Valve

MODEL H-CRT-4A Commercial Multi-Compressor Rack Refrigeration System Trainer
Dimensions: 75.25"H x 104"W x 31.25"D
Shipping Weight: 1,600 lbs.

- Controller
- O/I Board Box
- Load Center
- Lexan® Enclosed Cold Box
- Heat Load Shutters (4)
- Factory-charged with R-404A HFC refrigerant

Power Required: 220V.AC 1Ø 60Hz

Options

H-CRT-4-FP Fault Package - Electrical

Options must be specified at time of original order.

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

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H-RST-11

Red Dot Air Conditioner Trainer

Purpose

The Hampden **Model H-RST-11** Red Dot Air Conditioner Trainer Provides a hands-on introduction to the principal components of a Red Dot Brand air conditioning system. This trainer utilizes the air conditioning system incorporated in a HMMWV military vehicle.

Specifications

Frame:
2" mechanical steel tubing finished in instrument tan texture.

Panels:
11-gauge furniture stock steel finished in instrument white enamel.

Casters:
Two fixed and two swivel with locks

Nomenclature:
Silkscreen, black kem enamel.

Instrumentation:
Pressure and compound gauges (3)
Digital temperature indicator
Thermocouple switch
Thermocouples (9)
Site glass

Controls:
Pilot Light
Circuit breaker
Variable Frequency Drive

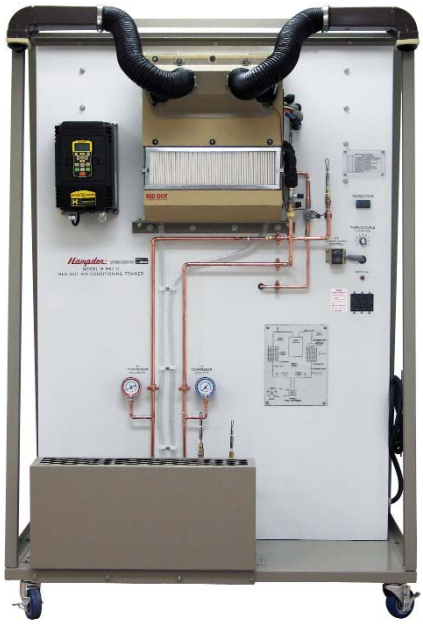
Electrical Faults:
8 located in locked compartment

Motor:
5Hp - 1750 RPM Located behind protective enclosure

Air Conditioning System:
Red Dot Model RD-2-4233-OP

Service Requirements

Electrical:
120/208 VAC, 3Ø, 60Hz



Model H-RST-11 Red Dot Air Conditioner Trainer - Front View

Model H-RST-11 Red Dot Air Conditioner Trainer - Rear View
Dimensions: 76" H x 64" W x 31" D
Shipping Weight: 1,030 lbs.

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

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Mobile Refrigeration Trainer

Educational Training Equipment for the 21st Century

Bulletin 238J

H-CRT-1
Commercial Refrigeration Trainer

The Hampden **MODEL-H-CRT-1** Commercial Refrigeration Trainer contains two evaporators, which may be operated singly or in parallel. Three types of liquid control devices are included: capillary tube, thermostatic expansion valve, and an automatic expansion valve. Sight glasses at the inlet and outlet of the evaporators and condenser allow students to monitor the changes in refrigerant state. The unit also includes pressure gauges, thermometer wells, temperature and pressure controls, heat exchanger, flowmeters, receiver, oil separator, and accumulator. Factory-charged with R-134a HFC refrigerant (other refrigerants available). Furnished complete with operating instructions, experiment and teacher's manuals.

The Hampden **MODEL H-CRT-1** Commercial Refrigeration Trainer consists of refrigeration components completely piped and wired for demonstration of Commercial Air Conditioning and Refrigeration Systems
including:

A. Domestic Refrigerators

B. Freezers

C. Multiple Compartment Refrigerators

D. Air Conditioners

Options

H-RST-MP Instrument Package, volts, amperes, and watts

H-CRT-FP-18E Fault Package - Electrical

H-CRT-FP-M Fault Package - Mechanical

H-CRT-TC Digital Temperature Module with Thermocouples

H-CRT-1-VC Variable Compressor Option

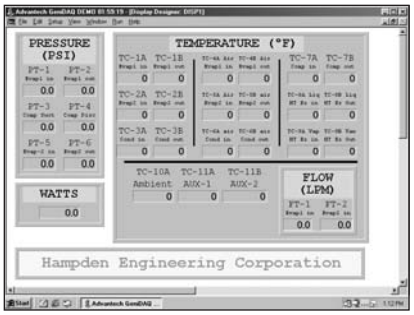
H-CRT-1-CDL Commercial Refrigeration Trainer with Computer Data Logging package

H-CRT-1-CDL-LT Commercial Refrigeration Trainer with Computer Data Logging Sensors only (No I/O Modules or Software)

Options must be specified at time of original order.

Power Required: 120V AC 1ϕ 60Hz

MODEL H-CRT-1 shown with
H-CRT-FP-18E/M Fault Package options
Dimensions: 76"H x 64"W x 31"D - Shipping Weight: 750 lbs



Sample Screenshot of Hampden CDL Software

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

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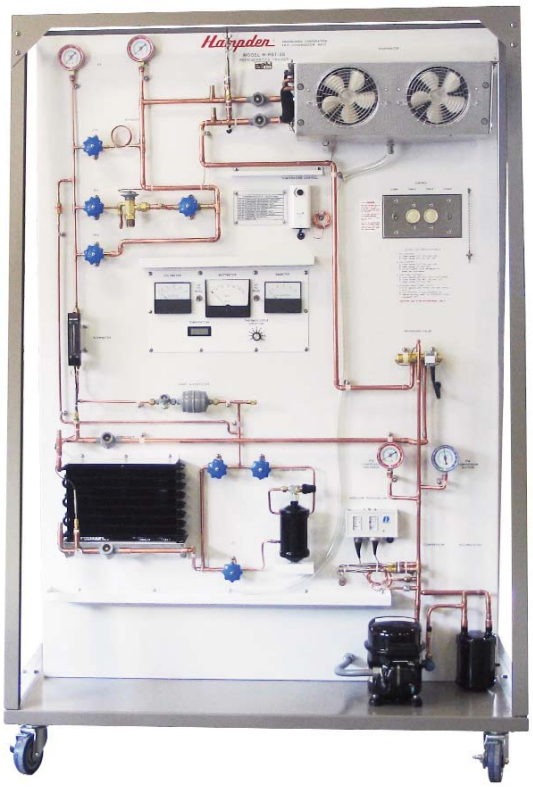
Mobile Refrigeration Trainer

Educational Training Equipment for the 21st Century

Bulletin 239-1J

H-RST-3B

Basic Refrigeration Trainer



MODEL H-RST-3B shown with **H-RST-MP** Instrument Package, **H-RST-FP-10E/M** Fault Package, and **H-RST-TC** Digital Temperature Package options
Dimensions: 76"H x 51"W x 31"D
Shipping Weight: 500 lbs

Purpose

The Hampden **Model H-RST-3B** was designed to provide students with a thorough understanding of the refrigeration cycle, including measurement of pressure, vacuum, flow rate, and temperature.

The system components are panel mounted to provide easy access for testing and troubleshooting. When specified, Hampden Refrigeration Training Systems are supplied with an integral Fault Package, comprised of preset mechanical and electrical faults mounted in a locking box on the rear of the trainer.

Also available with all Hampden Refrigeration Training Systems is a Panel-Mounted Meter Package that permits monitoring of the system voltage, current and watts.

Description

The Hampden **Model H-RST-3B** Basic Refrigeration Trainer contains a reversing valve so that the system may be run as a heat pump in addition to operation as a refrigeration system. Three types of liquid control devices are included: capillary tube, thermostatic expansion valve, and hand expansion valve. Sight glasses at the inlet and outlet of the evaporator and condenser allow students to monitor changes in refrigerant state. The unit also includes pressure gauges, thermometer wells, temperature and pressure controls, flowmeter, and receiver. Factory-charged with R-134a HFC refrigerant. Furnished complete with operating instructions, experiment and teacher's manuals.

Options

H-RST-MP Instrument Package, volts, amperes, and watts

H-RST-FP-10E Fault Package - Electrical

H-RST-FP-M Fault Package - Mechanical

H-RST-TC Digital Temperature Module with thermocouples (H-RST-3B only)

H-RST-3B-CDL Basic Refrigeration Trainer with Computer Data Logging and Software Package (includes H-RST-TC)

H-RST-3B-CDL-L Basic Refrigeration Trainer with Computer Data Logging Package – LabVIEW

Options must be specified at time of original order.

Power Required: 120V AC 1Ø 60Hz

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

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Refrigeration Training Systems

Educational Training Equipment for the 21st Century

Bulletin 239-2A

MODEL H-RST-9
Shown with **H-RST-MP** Option
Dimensions: 76"H x 51½"W x 31"D
Shipping Weight: 500 lbs

H-RST-9

Reverse Cycle Refrigeration Trainer

The Hampden **Model H-RST-9** Reverse Cycle Refrigeration Trainer provides students with a hands-on training introduction to the principal components of refrigeration, both primary and reverse cycle applications. The student will be required to evacuate, charge and troubleshoot the system.

The panel on which the components and interconnecting tubing are mounted rests on an A-frame stand. The system utilizes a 1/3 HP hermetic compressor, two condensers, two evaporators, four metering devices– automatic expansion valve, two thermostatic expansion valves, capillary tube–control panel with power control, operating instructions, and experiment manual. Charged with R-134a HFC refrigerant (other refrigerants available).

Options

H-RST-9-CDL Reverse Cycle Refrigeration Trainer with Computer Data Logging and Software Package, allows monitoring of the following:

- temperature
- pressure.

H-RST-9-MP Instrument Package

Options must be specified at time of original order.

Power Required: 120V AC 1Ø 60 Hz.

H-CRT-3

Advanced Commercial Refrigeration Trainer

The Hampden **Model H-CRT-3** Advanced Commercial Refrigeration Trainer provides students with a hands-on introduction to the principal components of a small scale cold room. This advanced system incorporates ten instructor-controlled programmed switchable faults inside a lockable compartment.

The Hampden **Model H-CRT-3** consists of a control panel with compressor switch, variable heater control, and variable fan control - evaporator, cold box (insulated) with heater, compressor (semi-hermetic ½ HP), fan-cooled condenser, evaporator with defrost, TEV (1 internal, 2 external). Charged with R-134a HFC refrigerant (other refrigerants available).

Options

H-CRT-3-TK Tool Kit

H-CRT-3-TS Test & Service Package

H-CRT-3-MPP Maintenance & Practice Package

Options must be specified at time of original order.

Power Required: 120V AC 1Ø 60 Hz.

MODEL H-CRT-3
Dimensions: 57"H x 50"W x 26"D
Shipping Weight: 600 lbs

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

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Refrigeration Training Systems

Educational Training Equipment for the 21st Century

Bulletin 239-106-1B

H-RST-10

Refrigeration Trainer

Purpose

The Hampden **Model H-RST-10** Refrigeration Trainer is a commercial refrigeration component completely plumbed and wired for student operation. This unit consists of refrigeration components rate for a one ton (12000 BTU) system.

Specifications

Mobile Frame:
- 2" square mechanical steel tube finished in instrument tan texture
- Enclosure shall be 14-gauge furniture stock steel finished in instrument tan texture
- Panel shall be 11-gauge furniture stock steel finished in instrument white enamel
- Four swivel casters, two with locks

Compressor:
- 1-HP Open Compressor
- 1-HP Squirrel Cage Induction Motor, trunnion mounted

Condenser:
- Water cooled

Evaporator:
- 12000 BTU with high wall air handler and tangential fan with PSC type motor. Constructed of seamless copper tubing with enhanced aluminum fins.
- Clear Lexan® Cold Box.

Refrigeration Components:
- Filter-Drier
- Suction Accumulator
- Liquid Receiver
- Sight Glass with moisture indicator
- Sight Glass, (4 places)
- Pressure Gauge, (4 places)
- Compound Gauge (3 places)
- EPR Valve
- Pressure Operated Water Valve
- Dual Pressure Control

MODEL H-RST-10
Dimensions: 46"H x 46"W x 34"D
Shipping Weight: 800 lbs.

Flowmeter:
- Refrigerant
- Water

Variable Frequency Drive:
- Motor RPM

Metering Device:
- TEV

Heat Load:
- 2000 Watts, variable

Other Components:
- Ball Valves (3 required)
- Hand Valves (3 required)
- Pilot Lights (4 places)
- Circuit Breakers
  - Main - Motor
  - Heat Load - Fan
- Relay with base
- Torque Load Cell with signal conditioning board
- Transformer

Thermocouples:
- Type T (11 required)

Refrigerant:
- R-134a

Instruments:
- Analog Wattmeter - Heat Load 0-2000 Watts
- Digital Temperature Indicator
- Temperature Selector Switch
- Analog Voltmeter - Compressor Volts 0-300
- Analog Ammeter - Compressor Amps 0-15
- Digital Torque Indicator
- Digital Tachometer - (compressor)

Fault Program:
- Selectable Electrical Faults (10)
- Mechanical Faults (2)
  - Filter Dryer (Clogged)
  - TEV (with Clogged Filter)

Nomenclature:
- Black Enamel

Course Ware:
- Operator's Instruction Manual
  - Fault Guide
  - Pressure Enthalpy Chart - R-134a

Voltage:
- 208 VAC 3Ø 60Hz
- 380 or 415 VAC 3ϕ 50Hz available

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

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Refrigeration Training Systems

Educational Training Equipment for the 21st Century

Bulletin 239J

H-RST-2

Mobile Refrigeration System Trainer

MODEL H-RST-2 with -Meters
Dimensions: 76"H x 51"W x 31"D
Shipping Weight: 500 lbs

Purpose

The Hampden **Model H-RST-2** was designed to provide students with an actual working model of a refrigeration system, complete in every detail.

Description

The Hampden **Model H-RST-2** Mobile Refrigeration System Trainer helps students to develop a thorough understanding of the refrigeration cycle. It can operate in five different modes, allowing testing & troubleshooting experience for various types of refrigeration systems. By opening and closing the appropriate valves and switches, a student may operate the trainer as one of the following refrigeration systems:

1. Direct expansion system, controlled manually by the hand expansion valve.
2. Direct expansion system, controlled automatically by the thermostatic expansion valve (TEV).
3. Direct expansion system, controlled automatically by the capillary tube.
4. Reverse cycle (heat pump) Direct Expansion System, controlled by the capillary tube.
5. Flooded evaporator system, controlled by the low pressure float.

The trainer provides measurements of pressure, vacuum, flow rate and temperature. Its unique clear glass design gives dramatic illustration to the complete refrigeration cycle—students can observe the changing refrigerant states—from liquid to gas in the evaporator and from gas to liquid in the condenser.

The unit is furnished complete with operating instructions, experiment and teacher's manuals. It is completely piped, wired, and charged, ready for use. Power input is standard 120V AC 1ϕ 60Hz through a grounding-type power cord. All components are mounted and clearly identified on a steel panel, housed within an A-frame stand. Refrigerant is R-123 (other refrigerants available) which permits operation at low pressure. Should recharging become necessary, a convenient charging port is supplied.

Options

H-RST-2-CDL Mobile Refrigeration System Trainer with Computer Data Logging Package

H-RST-MP Instrument Package

H-RST-FP-10E Electrical Fault Package

Options must be specified at time of original order.

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

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