



## AIR and WATER HEAT PUMP R833



Year 1  
study

### Features

- Vapour Compression Heat Pump that allows Performance Investigation from both Air and Water Sources.
- Rapid Stabilisation enables detailed Investigation in a Typical Laboratory Period
- Permits refrigerant pressure-enthalpy cycle diagrams to be drawn at all operating conditions
- Optional Computerised Data Acquisition Upgrade
- May be linked to Hilton Bench Top Cooling Tower H893 by addition of Reservoir System H060
- Optional RE590 Ground Source Simulator Available
- Emergency stop button

### Description

The vapour compression cycle is the most common form of refrigeration, transferring heat from the area being cooled to a higher temperature region. Heat Pumps use this effect to recover heat at a useful temperature for heating or some other process by upgrading low grade 'free' heat e.g. from ambient air or water. Due to concerns about the effects of global warming, awareness of energy conservation must

increase and heat pumps are an effective method of reducing energy consumption. Hence an understanding of their operation is relevant to many engineering disciplines. The unit enables students to plot the pressure enthalpy and performance graphs as conditions are changed, so enhancing their understanding of the theory. R134a refrigerant vapour is compressed in a hermetic compressor and then flows to a water cooled condenser. Heat is transferred to cooling water and the refrigerant vapour is condensed to a high pressure liquid which passes through a thermostatic expansion valve. A switch allows the user to direct the flow of the expanding vapour to either an air or water source evaporator where heat is extracted or the cycle is repeated. In order to recover waste heat from the compressor, the condenser cooling water also passes through a heat exchanger in the compressor casing. All components are mounted on a high quality ABS panel and base. Instrumentation includes pressure gauges, flowmeters, thermocouples and wattmeter allowing students to record all of the relevant parameters to create performance curves and refrigerant cycle diagrams.

#### Related Laws/Applications

- Refrigeration & Air Conditioning
- Building Services
- Mechanical Engineering
- Plant and Process Engineering
- Energy Conservation
- Energy Management
- Chemical Engineering
- Food Technology
- Marine Engineering
- Agriculture Engineering

#### Learning capabilities

- Determination of Power Input, Heat Output and Coefficient of Performance.
- Production of Heat Pump Performance Curves over a range of source and delivery temperatures.
- Plotting of Vapour Compression Cycle on the Pressure Enthalpy diagram, and comparison with the Ideal Cycle.
- Energy Balances for the Components and the Whole Cycle.
- Estimation of Compressor Volumetric Efficiency Over a Range of Pressure Ratios.
- Estimation of Overall Heat Transfer Coefficients in the Evaporator and Condenser.

#### Technical Specification

- Panel: High quality ABS.
- Controls: Operating parameters may be varied by manual adjustment of the evaporator and condenser water control valves, and selecting the air or water source evaporator by panel mounted switch.
- Gauges x 2: Evaporating and condensing pressures
- Multi-point Digital Temperature Indicator: 9 type K thermocouples. Resolution 0.1K
- Flowmeters x 3: For condenser cooling water and evaporator water flow rates and R134a flow rate.
- Digital Wattmeter for compressor electrical energy.
- Emergency stop button
- Condenser high pressure switch and compressor thermal overload switch.
- Residual current circuit breaker
- Combined double pole main switch and overload cut out.
- All electrical components connected to common earth conductor.

#### Recommended Ancillaries

- RE590
- R100

#### What's in the Box?

- 1 x R833
- 1 x Transformer (115V only)
- 4 x 3m Reinforced PVC tube
- 1 x 1m Drain hose
- 4 x Hose clips
- 1 x Power lead
- Instruction manual
- Packing list
- Test sheet

#### Weights & Dimensions

- Weight: 75 kg
- Weight: 79 kg (115V version)
- Length: 1300mm
- Width: 655mm
- Height: 465mm

#### Essential Services

- 700W, 220-240 Volts Single Phase, 50Hz (With earth/ground).
- 700W, 110-120 Volts Single Phase, 60Hz (With earth/ground).
- Water:
- 0.1 litres s-1 at a minimum of 10m head.
- This can be continuous to drain or recirculated via a chiller unit. Details available on request.

#### Ordering information

To order this product, please call PA Hilton quoting the following codes:  
R833/230  
R833/115  
R833/230/RC  
R833/115/RC

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COUNTRY OF ORIGIN - UK WARRANTY PERIOD - 5 YEARS