MECHANICAL HEAT PUMP
R515

Year 1
study

Features

- Stabilises in minutes allowing many tests to be conducted in a typical laboratory period.
- Allows a complete refrigerant pressure-enthalpy cycle diagram to be drawn at all operating conditions.
- Operates on CFC free R134a refrigerant
- Allows a complete energy balance to be performed between electrical input and thermal input/output.
- Allows generation of heat pump performance curves over arrange of conditions.
- Optional Data Acquisition Upgrade.

Description

A heat pump is a machine whose prime function is to absorb heat from a low grade source, and to deliver heat at a useful temperature, e.g. suitable for space heating or domestic hot water. The R515 Hilton Mechanical Heat Pump has been designed to allow students to obtain an overall understanding and appreciation of the performance and characteristics of a heat pump working on the vapour compression cycle and having an electrically driven compressor, and is suitable for all course levels, from vocational to undergraduate. The low grade heat source is air from the atmosphere. Heat delivered by the unit is in the form of water at up to 55°C depending upon source (air) temperature. The work input is in the form of electrical energy supplied to a hermetically sealed compressor. This unit also incorporates internal coupling points and adapters that allow installation of the Optional RC515A Computerised Data Acquisition Upgrade.

Related Laws/Applications

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

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 the vapour compression cycle on a p-h diagram and comparing this with the ideal cycle.
- Determination of energy balances for condenser and compressor.
- Production of heat pump performance curves based on R134a properties, at a variety of evaporating and condensing temperatures.
- Estimation of the effects of compressor pressure ratio on volumetric efficiency.

Technical Specification

- Refrigerant: R134a (HFC134a).
- Panel: High quality ABS.
- Compressor: Fully hermetic single cylinder reciprocating type. Displacement 8.85 cm^3 rev^{-1}
- Condenser: Refrigerant to water. Efficient plate type heat exchanger.
- Liquid Receiver: With valves. Contains entire refrigerant charge if required.
- Evaporator: Air to refrigerant. Serpentine copper tube with aluminium fins and with integral fan.
- Digital Thermometer: Resolution 0.1°C, with switch to select from six thermocouples.
- Flow Meters x 2: Variable area type – to indicate R134a and H2O flow rates.
- Pressure Gauges x 2: To indicate R134a pressures in evaporator and condenser.
- Electrical Energy Meter: Watt-hour type recording electrical input to the compressor using Digital Wattmeter
- Safety Features: - Condenser high pressure switch and compressor thermal overload switch. - Residual current circuit breaker. - Combined double pole main switch and overload cut out.

Recommended Ancillaries

- R100

What's in the Box?

- 1 x R515
- 1 x Transformer (115V only)
- 1 x 3m Reinforced PVC tube
- 1 x 3m Drain tube
- 1 x Power lead
- Instruction manual
- Packing list
- Test sheet

Weights & Dimensions

- Weight: 65 kg
- Weight: 69 kg (115V version)
- Length: 950mm
- Width: 650mm
- Height: 460mm

Essential Services

- 600W 220-240 Volts, Single Phase 50 Hz (with earth /ground).
- Line current up to 3.0A at 230v.
- 600W 110-120 Volts, Single Phase 60 Hz (with earth /ground).
- Line current up to 6.0A at 110V.
- Water: Cold water, continuous supply, 180 litres/Hour at 15 m head minimum.

Ordering information

To order this product, please call PA Hilton quoting the following codes:
R515/230
R515/115
R515/230/RC
R515/115/RC