REFRIGERATION LABORATORY UNIT
R715

Year 1
study

Features

- Complete analysis of the Vapour-Compression Refrigeration/Heat Pump Cycle.
- Adjustable evaporator load and condensing temperature.
- Clear display of all parameters including:
- - Electrical Input
- - Refrigerant Flow
- - Water Flow
- - Motor Torque and Rotational Speed
- - Pressures & Temperatures.
- Allows a complete refrigerant pressure-enthalpy cycle diagram to be drawn at all operating conditions.
- Optional Computerised Data Acquisition Upgrade.
- 220V, two phase, 50/60Hz option available

Description

The vapour compression refrigeration cycle is used in many industrial, medical and domestic situations throughout the world. Air conditioning, food and medical preservation and transport all rely on the use of refrigeration plant. It is essential therefore that student engineers intending to design or utilise such plant are fully aware of the parameters affecting the performance of the vapour compression refrigeration cycle. A refrigerator is defined as a machine whose prime function is to remove heat from a low temperature region. The most common type of refrigerator or heat pump operates on the Vapour Compression Cycle and requires a work input. The Hilton Refrigeration Laboratory Unit R715 is a fully instrumented refrigerant R134a vapour compression refrigerator of this form and has been designed to enable students to safely study the cycle in detail. It has a belt driven compressor, electrically heated evaporator, thermostatic expansion valve and water cooled condenser. Operating parameters can be varied by adjustment of condenser cooling water flow and electrically heated evaporator supply voltage. Components have a low thermal mass resulting in immediate response to control variations and rapid stabilisation. Instrumentation includes all relevant temperatures, condenser pressure, evaporator pressure, refrigerant and cooling water flow rates, evaporator and motor power, motor torque and compressor speed.

Related Laws/Applications

- Refrigeration
- Air Conditioning
- Building Services
- Mechanical Engineering
- Marine Engineering
- Plant and Process Engineering
- Food Processing
- Chemical Engineering.

Learning capabilities

- Production of a vapour compression cycle diagram under various conditions.
- Production of an energy balance for the refrigerator.
- Investigation of the variation in refrigerator “duty” or cooling ability for various condensing temperatures.
- Investigation of the variation in refrigeration Coefficient of Performance for the various condensing temperatures.
- Investigation of the variation in Coefficient of Performance based on electrical, shaft and indicated power.
- Determination of the overall heat transfer coefficient for the condenser cooling coil.
- Investigation of the performance of the thermostatic expansion valve.
- Investigation of the heat delivered to the cooling water with variation in condensing temperature.
- Investigation of the Coefficient of Performance as a Heat Pump for various condensing temperatures.
- Investigation of power input based on electrical, shaft and indicated power.

Technical Specification

- Panel: Aluminium.
- Refrigerant: R134a.
- Digital Thermometer: 6 way type K indicator with 0.1°C resolution.
- Wattmeter: Allows measurement of the power input to either evaporator or motor.
- Voltage Controller: To vary evaporator load.
- Variable Area Flowmeters x 2: Variable area types to indicator R134a and H20 flow rates.
- Pressure Gauges x 2: to indicate R134a pressure in evaporator and condenser.
- Spring Balance and Tachometer: Together allow measurement of power required to drive the compressor.
- Expansion Valve: Thermostatically controlled type.
- Evaporator: Electrically heated device.
- Compressor: (Internally mounted) Twin cylinder belt driven unit.
- Safety:
- - Condenser pressure and evaporator heater temperature limited by automatic cut-outs.
- - All electrical components connected to common earth.
- - Unit protected by miniature circuit breaker and residual current circuit breaker.

Recommended Ancillaries

- R100

What’s in the Box?

- 1 x R715
- Transformer (115V only)
- 2 x Reinforced hosing
- 1 x Spanner
- 1 x Power lead
- Instruction manual
- Packing list
- Test sheet

Weights & Dimensions

- Weight: 93 kg
- Weight: 97 kg (115V version)
- Length: 1060mm
- Width: 485mm
- Height: 920mm

Essential Services

- 2.5kW, 220-240 Volts, Single Phase, 50Hz (With earth/ground).
- 2.5kW, 110-120 Volts, Single Phase, 60Hz (With earth/ground).
- Water: 3 litres/min at 24m head.

Ordering information

To order this product, please call PA Hilton quoting the following codes:
R715/230
R715/115
R715/230/RC
R715/115/RC

COUNTRY OF ORIGIN - UK WARRANTY PERIOD - 5 YEARS