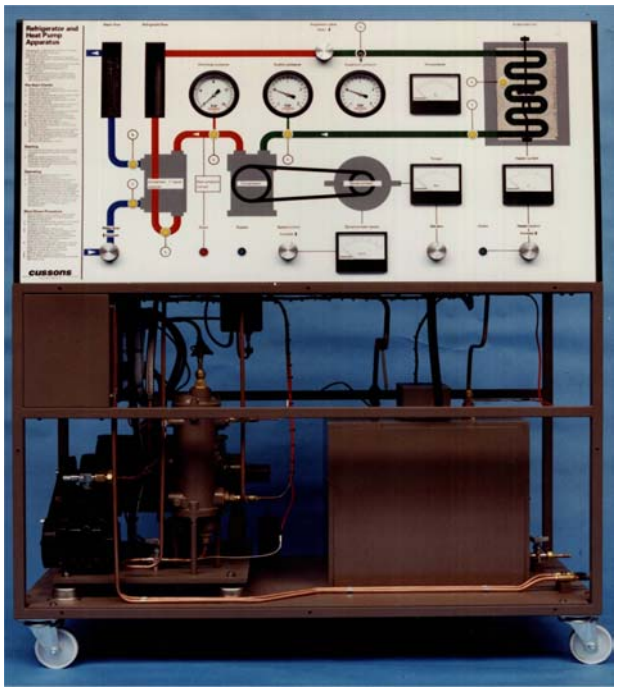
cussons
TECHNOLOGY



P5750/3

VAPOUR COMPRESSION REFRIGERATOR AND HEAT PUMP APPARATUS

With Auto expansion

FEATURES

- Rapid stabilisation allowing the effect of operating changes to be demonstrated directly
- Compact, self-contained and movable
- Infinitely variable speed dynamometer drive
- All temperature measurements by multi-point electronic thermometer
- Quiet operation via anti-vibration mountings
- Direct flow measurement of refrigerant
- Infinitely variable heating in water glycol bath
- Automatic and Manual expansion values
- Reverse cycle operation facility

INTRODUCTION

Cussons Refrigerator and Heat Pump Apparatus has been specially developed for the study of the thermodynamics of the vapour compression cycle operating as either a refrigerator or as a heat pump. It is self-contained and carries instrumentation to enable a comprehensive series of experiments to be carried out, including refrigerant cycle evaluation and thermodynamic energy balances of the condenser, evaporator and compressor. The front panel displays the circuit diagram and measuring points with maximum clarity.

DESCRIPTION

The unit is designed for the use of refrigerant such as R134a (R407 if specified) and uses a twin cylinder reciprocating compressor of modern design, belt driven by a variable speed dynamometer motor.

Refrigeration circuitry includes a water cooled condenser complete with isolating valves, manual and automatic expansion valves, evaporator, variable area flow meter for mass flow of refrigerant, filter/drier unit, sight glass and over pressure cut-out for unit protection.

The evaporator coil is mounted in an electrically stirred water/glycol mixture in a thermally insulated stainless steel tank. Heaters with infinitely variable controls are mounted in the tank to enable balanced conditions over a wide range of temperatures to be obtained.

The water-glycol mixture is protected by a thermostat in case the heater should be left on when the compressor is not working.

The swinging field DC dynamometer is energised by a thyristor speed control unit and gives a compressor speed infinitely variable in the range 8 - 16 rev/s. The thyristor speed control unit incorporates over current protection and 'soft start' circuitry to give a controlled start should the unit be switched on with the speed control set at maximum. Dynamometer torque is measured using a strain gauge load cell with readout in newton metres on an electrical meter on the front panel.

Refrigeration capacity depends on the temperature level maintained in the water-glycol mixture, but has a maximum value of about 1.8 kW.

The remaining instrumentation includes 3 pressure gauges,

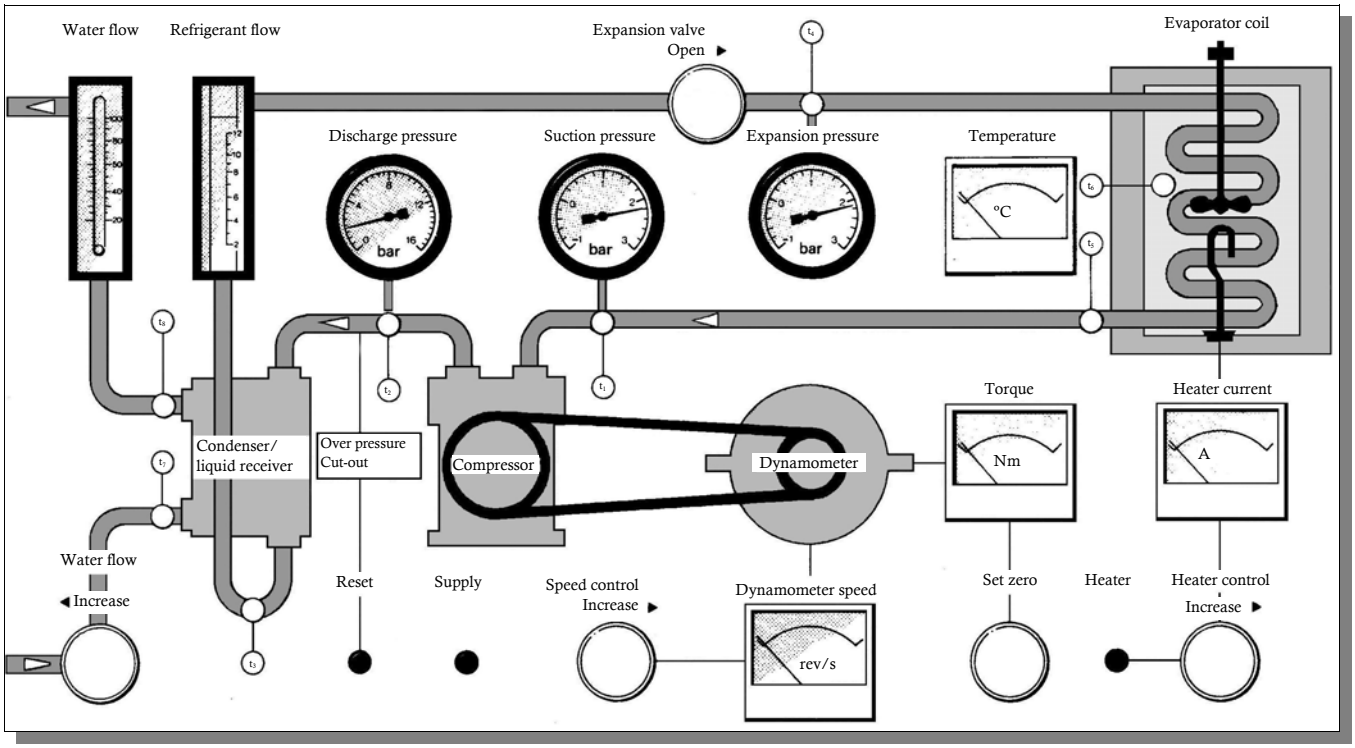


FIG. 1 FLOW DIAGRAM

temperature measurement at 8 points, selected by pushbutton and readout on a single analogue meter scaled -30 to +70°C, tachometer calibrated for compressor speed, analogue meter for heater current, variable area flowmeter for cooling water mass flow.

All instrumentation and controls have been integrated into a multicolour flow diagram, (see Fig. 1 overleaf), to enable immediate correlation between a measurement and its position in the refrigeration circuit.

The unit is mounted on a wheeled stand and can pass through any normal doorway. It requires services of cold water and single phase AC supply (3 kW only). The dynamometer/compressor assembly is resiliently mounted and vibration is negligible. The unit with its instrumentation permits analysis of a widely used refrigeration system. Analysis may be carried out at different speeds and therefore output levels, and at different temperature levels. Heat balance tests may be carried out and conditions in each component investigated. Particular attention has been given to ensuring that operating conditions stabilise rapidly, so that any preparatory period is kept to the minimum and the effect of changes to the operating conditions can be quickly evaluated. The compressor is prepared for fitting Cussons electronic indicating equipment so that indicator diagrams may be readily obtained. The panel is available in English, French, German and Spanish.

TENDER SPECIFICATION

Vapour Compression Refrigerator and heat pump for R134a (alternatively R407) with two cylinder reciprocating compressor tapped for pressure transducer, dynamometer drive by DC machine with AC solid state control unit, water cooled condenser manually controlled expansion valve, evaporator and water-glycol bath with electrical heating (2 kW). Instrumentation includes pressure gauges (3), multi point direct reading electronic thermometer for all temperatures under push button control, variable area flowmeters (2), meter for heating element current, meter for torque readout and tachometer, the instrumentation carried on five colour instrument panel with flow diagram.

SERVICES

220/240 volt 50/60 Hz single phase operation. Other voltages to special order.
Supply of cold water.

OPTIONAL ACCESSORIES

P5751 Data acquisition module together with medium specification personal computer, to allow display of live data on a computer mimic diagram. The software package allows the calculation of results. P5751 can only be factory fitted to P5750/3. It provides additional pressure transducers and thermocouples.

PHYSICAL DETAILS

	Nett Weight		Length		Width		Height	
	kg	lb	m	in	m	in	m	in
P5750	320	707	1.37	54	0.7	24	1.6	63

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