



With this equipment, the industrial refrigeration phenomena is studied and visualized. It integrates all the essential components that a installation has in a bench top equipment. It is built with modular systems, and prepared for a freezing temperatures until -30°C .

The equipment consists of a refrigeration chamber with a forced flow evaporator, thermostatic expansion valve and a 250 W condenser unit. Transparent and heated access panel. Cooling circuit with refrigerant flow display, and with heat exchanger for the under cooling of the liquid and solenoid valve. Electric defrost system and control through programmable PLC y function timer. Filter-dryer and liquid tank.

The use of independent controllers to control de equipment allows to simulate different faults on the operation. The "liquid anti-shock" system on the compressor ensures a reliable operation under extreme requests. The steam overheating can be regulated through the thermostatic valve adjustments.

LEARNING OBJECTIVES

Several experiments to develop in the following areas of knowledge:

- Heat transfer and thermal insulation.
- Refrigeration cycles and steam compression.
- Refrigerant fluids.
- Calculation of thermal loads.
- Psychrometric processes (low temperature).
- Cooling chambers and industrial refrigeration.
- Automatic control and instrumentation.

TECHNICAL DATA**Refrigeration chamber:**

- Polyurethane insulation 50mm thick.
- Dimensions: 570 x 580 x 760 mm

Evaporator:

- Evaporator in the refrigerator, with fan.

Condenser:

- Hermetic reciprocating compressor for low temperature.
- Power: 3/8 CV

Defrost:

- The equipment has two defrost systems:
 - By electric resistances positioned inside the chamber, on the evaporator.
 - By refrigerator gas, and regulated by a solenoid valve.

Expansion valves:

- Two different expansion valves in parallel, to study the difference in the operation of both:
 - Conventional mechanical expansion valve.
 - Electronic expansion valve.

Pressure:

- 2 independent pressure switches for high and low pressure.

Liquid display:

- Liquid viewer to quickly control the conditions of the refrigerant in liquid phase, the regularity of the flow and the absence of humidity in the circuit. It also allows the inspection of oil return to the compressor crankcase.

Dimensions and weight of the machine:

- Length: 1000 mm
- Maximum height: 1000 mm
- Width: 1300 mm
- Weight: 87kg

Control panel:

- The control panel features:
 - Selectors to manipulate all modes of operation.
 - Cooling temperature control with LCD display.
 - Control unit of the electronic valve.

REQUIREMENTS

- Input 230V / 50Hz.
- Eventually, waste water connection for defrost.