

REFRIGERATION TROUBLESHOOTING TRAINER 15 FAULTS



Experimental capabilities

- Identification of the components of a refrigeration system with two evaporators
- Commissioning and verification of operation
- Study of the basic concept of a refrigeration installation using R134A, with double evaporation.
- Study of the thermodynamic cycle on enthalpic diagram.
- Calculation of heating power of the condenser and evaporators.
- Goal and adjustment of constant pressure valves
- Study of the oil circuit
- Faults simulation on the refrigeration and electrical circuit with touch screen control:
 - Fault due to lack of refrigerant charge
 - Fault due to excess of refrigerant charge
 - Wrong exchanges in the condenser
 - Wrong exchanges in the evaporators
 - Clogged dehydrator
 - Leaking of the solenoid valve
 - Malfunction of the expansion valve
 - Malfunction of the constant pressure valve
 - Overcurrent on the compressor motor
 - Loss of a phase to the motor
 - Stopping of the condenser fan
 - Stopping of the evaporators fan
 - Fault of the solenoid valve coil
 - Fault of the safety switches
 - Fault of the anti-short cycle relay
- Study of the different modes of expansion and their faults

Operating principle

The trainer CRC115 has been designed to study the faults simulation on a refrigeration circuit. It is based on a commercial refrigeration installation with two evaporators and a semi hermetic condensing unit. Students will start by identifying the components of the circuit and understand how the system works. They can then switch it on and check operation using the fixed instrumentation (manometers and flow meters) and portable instrumentation (thermometer).

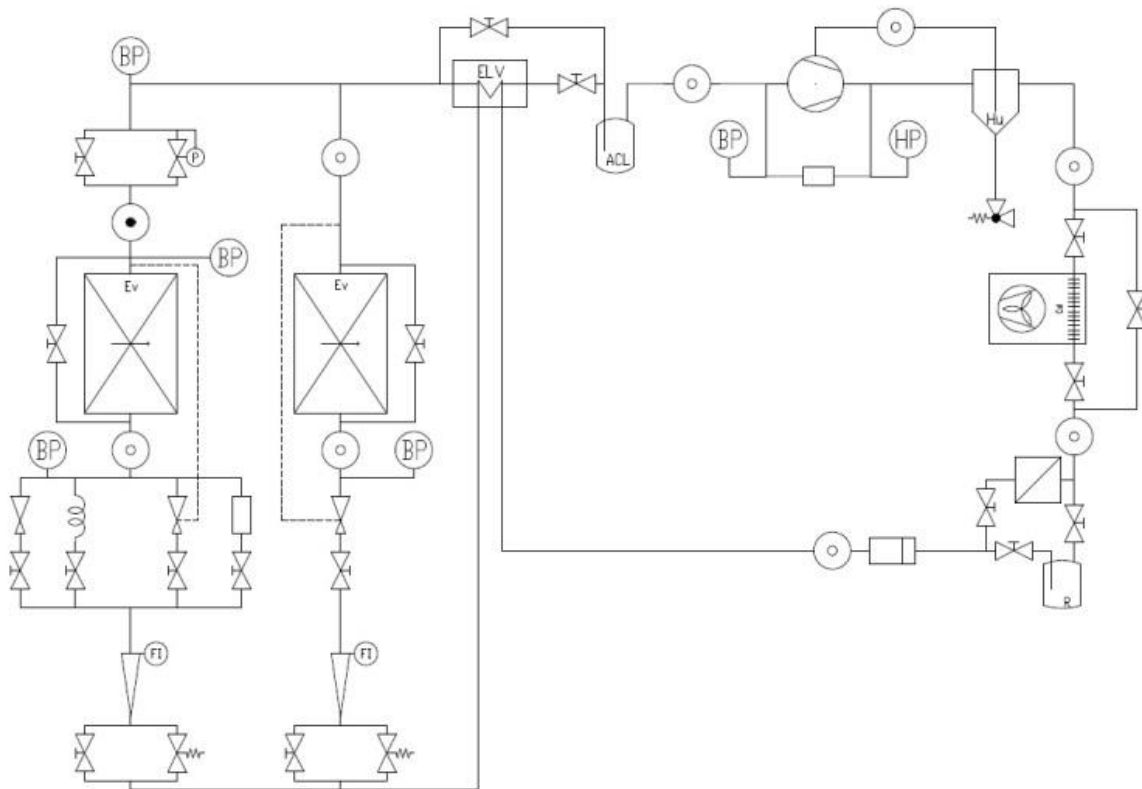
When the installation is in normal operation, the teacher can then cause electrical faults (by screen control) or fluidic faults (manual valves). Students will then do the troubleshooting using their knowledge and instrumentation at their disposal.

To go further in the study of the installation, students can also study the refrigeration cycle of the system and calculate the cooling power.

The robust design of this equipment makes it perfectly suited for use in schools.

Its anodized aluminum structure on feet gives it great robustness as well as great flexibility of integration into your premises. The manufacturing of this equipment meets the European machine directive.

Fluidic diagram



Technical specifications

1. Semi-hermetic compressor, cooling power 2140 W (5°C / 45°C) equipped with anti-vibration piping and two service valves
2. Low pressure gauge R134a with double scale temperature / pressure at the compressor suction
3. HLP pressure switch (LP control-HP safety)
4. High pressure gauge R134a with double scale temperature / pressure to the backflow of the compressor
5. Safety valve set to 16 bars
6. Oil separator with sight glass on the return line to the compressor
7. Air condenser
8. A pressostatic controller for regulating the high pressure
9. sight glass at the inlet and outlet of the condenser
10. Receiver tank with service valve volume 1.5L
11. Drier filter and sight glass on the liquid line
12. Liquid/vapor heat exchanger mono tubular
13. Evaporator No. 1 piping composed of:
 - a regulating solenoid valve
 - a refrigerant flow meter 7.5 to 65kg/h
 - a thermostatic expansion valve with internal pressure equalization
 - a R134a low pressure gauge with double scale temperature / pressure at evaporator inlet
 - a sight glass at the inlet of the evaporator
 - an evaporator with air fan (410W for $dT = 10K$)
 - a sight glass at the inlet of the evaporator
14. Evaporator No. 2 piping composed of:
 - a regulating solenoid valve
 - a refrigerant flow meter 7.5 to 65kg/h
 - a thermostatic expansion valve with internal pressure equalization
 - a capillary expansion valve
 - a constant pressure expansion valve
 - a constant pressure expansion valve faulty
 - a low pressure gauge R134a with double scale temperature / pressure at the evaporator inlet
 - a sight glass at the inlet of the evaporator
 - an evaporator with air fan (410W for $dT = 10K$)
 - a sight glass at the inlet of the evaporator
 - a constant pressure valve
15. A suction line accumulator. (volume: 2.3L)
16. A low pressure manometer R134a with double scale temperature / pressure at the outlet evaporators
17. A set of manual valves allowing to create the fluidic failures detailed in educational applications
18. An electric power box including:
 - the mandatory protective elements (emergency stop button, main switch, differential circuit breaker)
 - circuit breakers and relays required for operation
 - an electronic card for simulating faults with control by a touch screen
19. The trainer is supplied with a portable thermometer, two thermocouple wired probes and contact probe.
20. The trainer is supplied with a removable tray for collecting the condensates.

Services required

- Power supply : 230 Vac – 50 Hz – 20 A
- Power supply type: 1 phase(s) + Neutral + Earth.
- Dimensions: (LxWxH mm): 1500 x 650 x 1750
- weight (Kg): 210

Note : if the equipment installation is operated by our staff, all supplies and exhaust connections required must stand at less than 2m from the machine

Documentation

- User's manual
- Pedagogical manual
- Technical documentation of the components
- Lab exercises
- Fluidic diagram
- Wiring diagram
- Enthalpic diagram
- Certificate of conformity CE

Recommended equipment

- Data acquisition and real time enthalpic diagram box
- Ref : SUP 120