

REFRIGERATION CYCLE DEMONSTRATION UNIT (WATER/WATER OR AIR/WATER)



Experimental capabilities

- Identify the components of a refrigeration installation with exchanger water/ water or air / water
- Commissioning and setting a heat pump installation
- Establish an energy balance on the various elements of the thermodynamic cycle (compressor, condenser, expansion valve and evaporator)
- Record the experimental points (temperature and pressure) of the thermodynamic cycle
- Determine the C.O.P. for different water flow rates

CRD500



Operating principle

The CRD500 bench allows the study of refrigerating cycle.

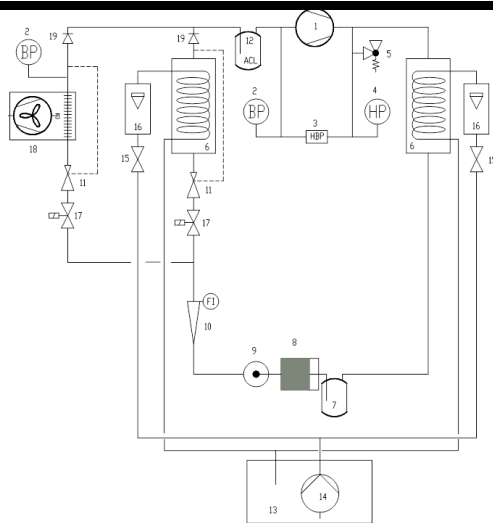
The bench is made of standard elements of a refrigerating circuit. The compressor will first elevate the pressure and the gas temperature (R134a). The water condenser will then transform this high pressure gas in the high pressure liquid. Students visualize the transformation because the refrigerant condenses between the glass grille and the cooling coil.

The high-pressure liquid will then be stored in a bottle and then be sent to the expansion valve. This will change the state of the fluid, it will go from a high pressure liquid to a low pressure liquid. This low pressure liquid is now in the evaporator and will draw its energy to the water coil (and thus cooling it) or on the air following the selected evaporator. Students visualize the transformation (for water evaporator) because the refrigerant evaporates between the glass grille and the cooling coil. At the outlet of the evaporator, the fluid is in the form low pressure steam, it goes through a suction line accumulator and be compressed again by the compressor.

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

Illustrations



The bench is set up on an aluminum profile structure equipped with four directional castors with brakes.

It includes an electrical box with main power disconnecter and 30mA GFCI.

1. Hermetic reciprocating compressor 408W for 7.2 ° C / 55 ° C
2. Low pressure gauge R134a with double scale temperature / pressure
3. HP and BP safety pressure switch
4. Pressure gauge R134a with double scale temperature / pressure
5. Safety valve set at 16 bar
6. Exchangers (X2):
 - shell made of resistant glass (pressure and temperature)
 - copper coil
 - Volume of the exchanger: 1.19L
 - Circulation of the fluid between the shell and the coil
 - Neon back lighting (improves visualization)
7. liquid receiver with service valve volume 0.7L
8. Filter drier

Technical details

9. sight glass
10. R134a Fluid Flowmeter with Magnetic Transmission
11. expansion valve with internal pressure equalization
12. suction accumulator volume 0.3L
13. Cooling water tank with lid:
 - material: white polyethylene
 - volume: 75L
 - draining valve at the bottom
14. Submersible pump, body, suction strainer and turbine made of techno polymer
 - Power: 0.37KW-Maximum flow: 6m³ / h
 - maximum head: 9mWC
15. Water flow control valve
16. water flow meter (X2)
17. Operation mode solenoid (air / water or water / water)
18. Air Evaporator
 - Forced ventilation
 - 400W power approx
19. Check valves

Integrated instrumentation:

- low pressure gauge (x2): -1 to 10bar
- High pressure gauge: -1 to 30bar
- R134a flow meter: 40 to 250mL / min
- water flow meter (X2): 0.2 to 1.5 L / min
- thermocouple temperature sensor T (X13): -20 to + 100 ° C
- compressor power meter : 0 to 1150W

The temperature and power measurements are displayed on a 7 "touchscreen:

CRD500 - DEMONSTRATION CYCLE FRIGORIFIQUE		
TEMPERATURE FLUIDE ENTREE CONDENSEUR	TEMPERATURE FLUIDE ENTREE DETENDEUR	TEMPERATURE FLUIDE SORTIE EVAP AIR
20.3°C	31.2°C	11.0°C
TEMPERATURE FLUIDE ENTREE CONDENSEUR	TEMPERATURE FLUIDE ENTREE EVAP FLU	TEMPERATURE AIR ENTREE EVAPATEUR
29.4°C	15.3°C	65.0°C
TEMPERATURE FLUIDE SORTIE CONDENSEUR	TEMPERATURE FLUIDE SORTIE EVAP FLU	TEMPERATURE AIR SORTIE EVAPATEUR
11.0°C	8.9°C	35.0°C
TEMPERATURE FLUIDE SORTIE COMPRESSEUR	TEMPERATURE FLUIDE ENTREE COMPRESSEUR	PUISSANCE COMPRESSEUR
65.0°C	20.3°C	215W
TEMPERATURE FLUIDE SORTIE CONDENSEUR	TEMPERATURE FLUIDE ENTREE EVAP AIR	
35.0°C	29.4°C	

CRD500



Services required

- Power supply : 230Vac – 50 Hz – 10 A
- Power supply type: 1 phase(s) + Neutral + Earth.
- Water capacity : 50 L
- Dimensions: (LxWxH mm): 1000 x 800 x 1510
- weight (Kg): 110

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
- Wiring diagram
- Fluidic diagram
- Enthalpic diagram
- Certificate of conformity CE

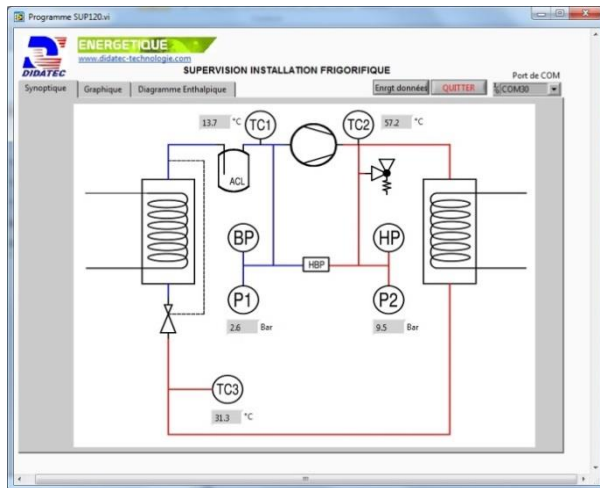
Options

Data acquisition system and real time drawing of the enthalpic diagram 3 temperature sensors and 2 pressure sensors (HP and LP)

- Full Data acquisition system and real time drawing of the enthalpic diagram 13 temperature sensors, 3 pressure sensors (HP and LP), 3 flow sensors (water and frigorific fluid)

- Ref : CRD501

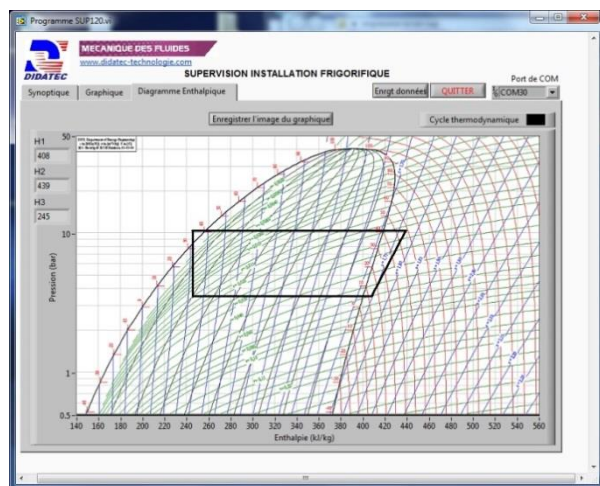
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Schematic diagram with real time display



Real time trend



Real time enthalpic diagram