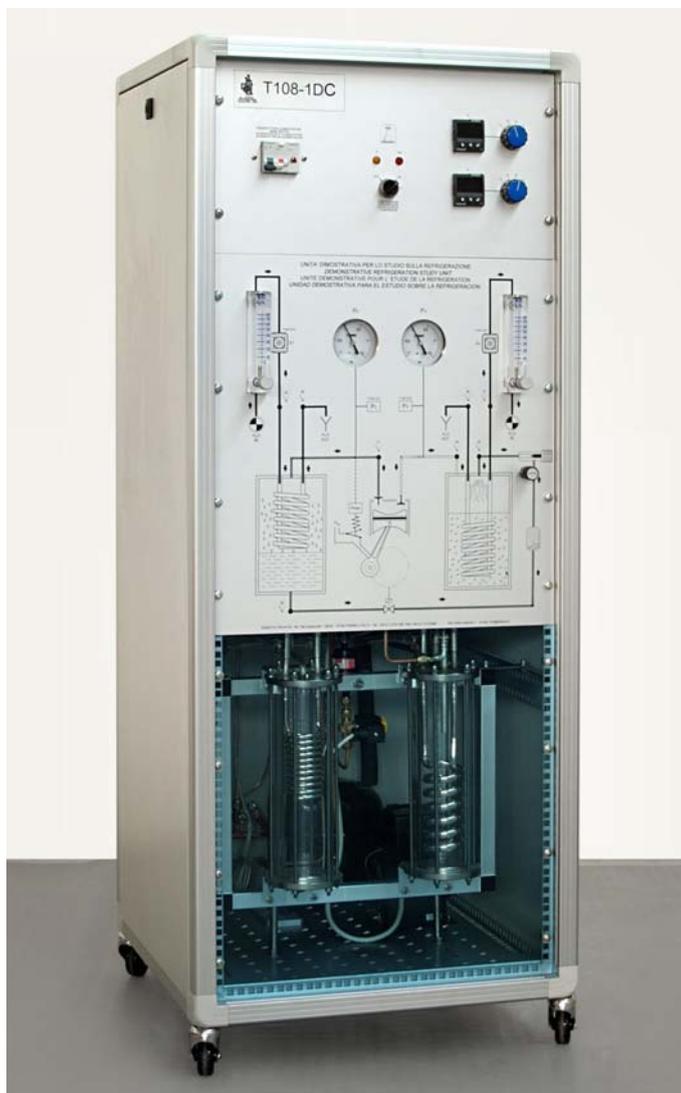


# CONDITIONING AND REFRIGERATION



## T108/1D/C - Computerized Demonstrative Refrigeration Study Unit - Code 953811



### 1. Generality

The T108/1D/C is an extremely easy-to use and functional unit able to clearly visualize all the determinant phases of a compression frigorific cycle, particularly the condensation and evaporation phenomena.

A front panel with mimic diagram and instrumentation allows to keep the most significant thermodynamic quantities under control, so facilitating the students' understanding and the teacher's task. Moreover, the transducers and the dedicated software allows the data acquisition of the main thermodynamic quantities and to obtain or as a table or as a graph, the acquired values and the thermodynamic calculated quantities.

The unit is supplied with manuals which describe the components, the installation and utilization procedures as well as many exercises with experimental results.

### 2. Composition

The unit includes:

- hermetic motor/compressor unit, piston type
- water/R134 evaporator
- water/R134 condenser
- manual isenthalpic expansion valve
- dehydrator filter

- flow meter with control valve of the H<sub>2</sub>O delivery at the condenser
- flow meter with control valve of the H<sub>2</sub>O delivery at the evaporator
- pressure gauge for condensation pressure
- pressure gauge for evaporation pressure
- maximum pressure switch
- N. 2 temperature digital indicators
- N. 2 temperature selectors
- N. 8 temperature probes type Pt100
- N. 8 temperature signal transducers with analog outlet for PC data acquisition
- N. 2 flow meter signal transducers with analog outlet for PC data acquisition
- N. 2 pressure signal transducers with analog outlet for PC data acquisition
- N. 1 A/D conversion card with USB interface
- magnetothermic differential switch, manual controls, signaling lamps and protection fuses.
- data acquisition and analysis software

### 3. Description

The main characteristic of the unit is that to enable the student to observe the effect of the cooling fluid on the condenser and the evaporator being glass realized.

A piston type hermetic compressor provides the compression work. The cooling fluid is R134, which combines good thermodynamic characteristics with a high safety degree, while the evaporating and condensing fluid is network water. The cooling gas isenthalpic expansion is realized by a manual micrometrical valve in order to allow the student to verify the influence of the expansion on the thermal balance of the cycle.

The instrumentation is inserted into the actual cycle and allows to constantly check all the main parameters: two digital instantaneous thermometers with switches visualize one the inlet temperatures and the other the outlet temperatures, two flow meters visualize the evaporation and condensation water flow rates and two pressure gauges visualize the condensation and evaporation pressures. The instrumentation comes with a complete synoptic panel allowing the immediate understanding of the frigorific cycle.

The data acquisition and analysis software works in MS-Windows environment and acquires real time data, elaborates them and stores them. It can display and print the data acquired and the quantities obtained by calculation and processes graphics which describe the trend of the calculated quantities. Moreover, instead of acquiring data from transducers, it is possible to insert data from the keyboard, allowing an independent use of the software.

### 4. Technical features

- compressor power 270 W, capacity 538 kcal/h with evaporation  $-40^{\circ}\text{C}$
- condenser capacity 1200 cm<sup>3</sup> approx.
- evaporator capacity 1200 cm<sup>3</sup> approx.
- water consumption 200 l/h approx.

### 5. Experiences

- study of the compression frigorific cycle
- study and visualization of condensation and evaporation
- heat balance of the evaporator and the condenser
- theoretic and real efficiency of frigorific cycle
- study of expansion effect on frigorific cycle
- construction of frigorific cycle on a state diagram lg(p) vs h

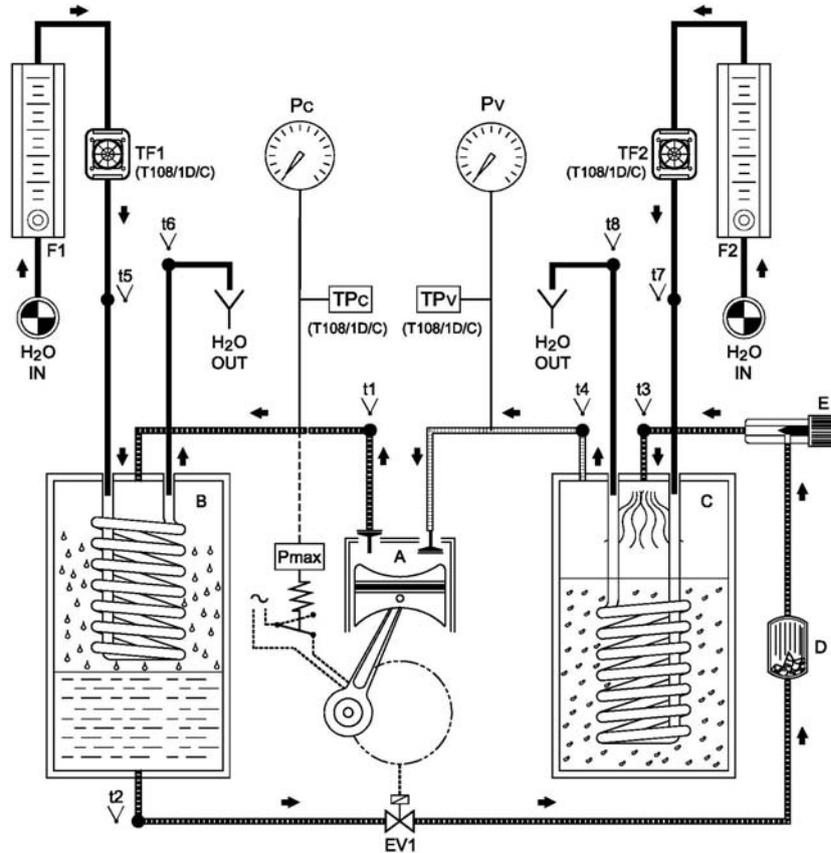
### 6. Services required

- Electric supply: 220V single-phase, 50Hz
- Water supply: net water, maximum pressure 3 bar
- PC minimum Pentium with HD >10Gb, CD drive, SVGA graphic card minimum, mouse, 32MB RAM, USB port
- Windows XP or following
- Graphic printer

### 7. Weight and dimensions

- Dimensions: 600 x 600 x 1530 h mm
- Net weight: 115 kg

## 8. Synoptic



### Keys:

- A. hermetic motor/compressor unit, piston type
- B. water/R134 condenser
- C. water/R134 evaporator
- D. dehydrator filter
- E. manual isenthalpic expansion valve
- EV1. safety solenoid valve for the R134 circuit
- t1. temperature sensor: condenser coolant inlet
- t2. temperature sensor: condenser coolant outlet
- t3. temperature sensor: evaporator coolant inlet
- t4. temperature sensor: evaporator coolant outlet
- t5. temperature sensor: condenser water inlet
- t6. temperature sensor: condenser water outlet
- t7. temperature sensor: evaporator water inlet
- t8. temperature sensor: evaporator water outlet
- F1. flow meter with control valve of the condenser H<sub>2</sub>O flow rate
- TF1. flow transducer for the condenser H<sub>2</sub>O flow rate (on T108/1D/C only)
- F2. flow meter with control valve of the evaporator H<sub>2</sub>O flow rate
- TF2. flow transducer for the evaporator H<sub>2</sub>O flow rate (on T108/1D/C only)
- Pc. pressure gauge for condensation pressure
- TPc. pressure transducer for condensation pressure (on T108/1D/C only)
- Pv. pressure gauge for condensation pressure
- TPv. pressure transducer for evaporation pressure (on T108/1D/C only)
- Pmax. maximum pressure switch.

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In any time and without notice, Didacta Italia can carry out any appropriate modification on the product details, always maintaining their main features, according to the designing and teaching necessity.