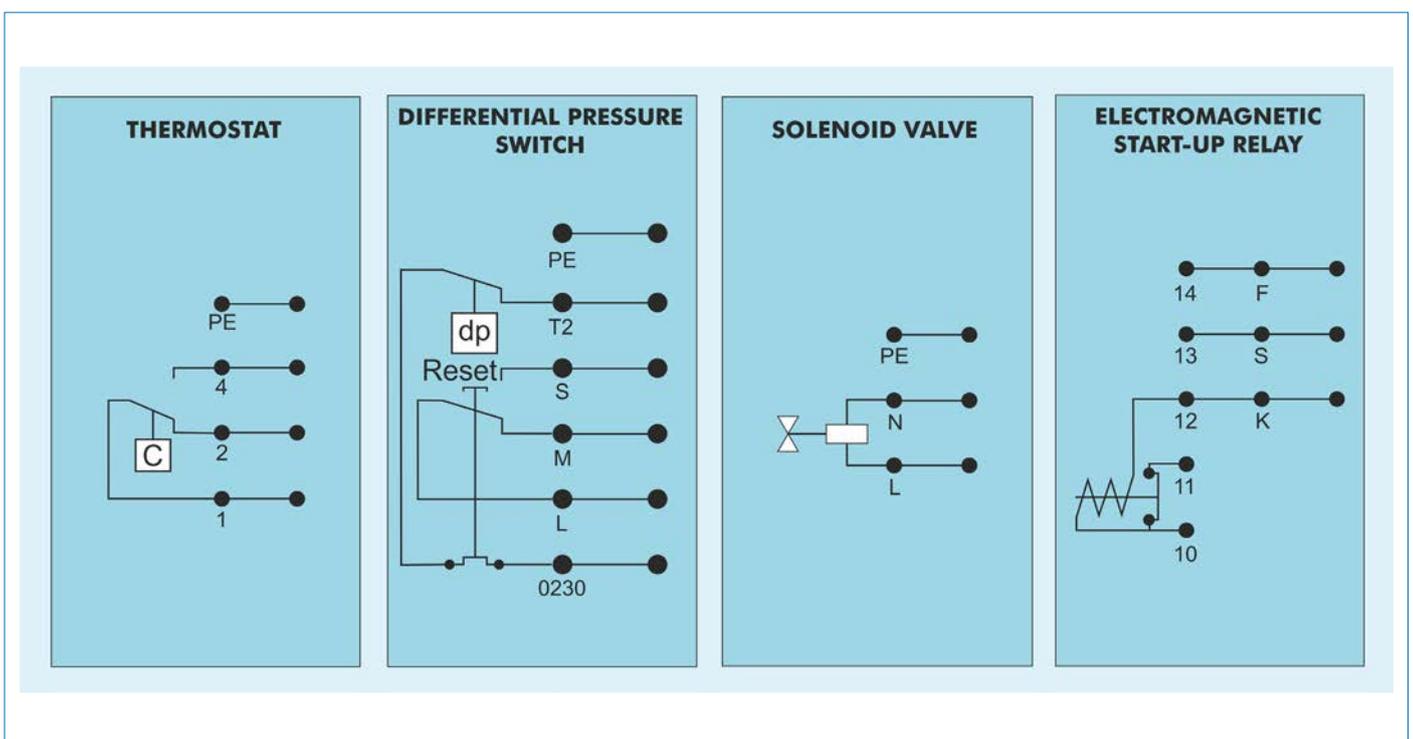




[www.edibon.com](http://www.edibon.com)  
 PRODUCTS  
 ↳ 90.- THERMODYNAMICS & THERMOTECHNICS

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



Certificate and Worlddidac Member

## INTRODUCTION

Refrigeration systems are essential to maintain certain elements in a temperature range. But it is very important to know how the wiring of the elements is carried out and how they interact with each other.

## GENERAL DESCRIPTION

For this purpose this unit has been designed to teach the students about different circuits and electrical devices associated with the refrigeration field, how to carry out the wirings of these types of installations, how the refrigeration components are mounted and how the interaction between them is.

The wiring of electrical components is a typical task in the field of refrigeration. One important learning objective is the design and operation of the individual components and knowledge about the interaction of these components in refrigeration circuits.

Safety aspects also play an important role. For this reason electrical components are distributed in a clear and visible manner, this way the user can gain experience and improve skills with all elements and wirings.

All the components are connected on terminal blocks and they are arranged on a front panel so that they are all accessible and very visible. In addition, through the cables and electrical elements included in this unit it is possible to set-up many circuits correctly and operationally.

In order to get more realistic operations, this unit includes lamps and other elements, such as resistors to simulate energy consumption. All elements are supplied with mains power in order to carry out real operations of wiring and working with refrigeration equipment to provide high relevance for practice.

This unit includes electrical components for the start and operation of refrigerant compressors, such as electromagnetic start-up relay and capacitor, timers, circuits which can be designed and examined for cyclical defrosting in refrigeration systems. Besides, the unit provides correct programming of the timer, safety components (pressure switches and thermostats) and circuit breakers for realistic operations about electrical circuits of refrigeration systems.

These components enable the design and examination of a typical safety chain for refrigeration.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

The following are the most important objectives and experiments which can be carried out with this unit:

- Read electrical circuits diagrams.

- Understand electrical circuits diagram.

- Wire and test of electrical circuits diagram.

- Design and testing of a safety chain.

- Study of Star/Delta connection.

- Change of rotation direction in a AC circuit.

- Safety considerations when handling mains voltage.

- Design, investigation and operation of electrical components in refrigeration systems:

  - Starting current limiter.

  - Safety switch.

  - Time relay.

  - Timer.

  - Pressure switch.

  - Starting capacitor.

  - Circuit breaker.

  - Starting relay.

  - Electromagnetic valve.

  - Service capacitor.

## SPECIFICATIONS

Unit mounted on an anodized aluminum frame and panels made of painted steel. The unit includes wheels to facilitate its mobility.

Main metallic elements made of stainless steel.

Diagram in the front panel with distribution of the elements similar to the real one.

Experimental unit for the training of apprentices in the refrigeration.

Design and investigation of circuits with electrical components from refrigeration field.

Electrical components mounted clearly visible and connected on terminal blocks.

A set of cables with wire end ferrules for wiring electrical components on terminal blocks.

Three pressure switches, two thermostats, a solenoid valve, a timer, four circuit breakers, five contactors, three relays, two capacitors.

Lamps and resistors to simulate energy consumption.

Main components of circuit:

- Two pressure switches.

- A differential pressure switch.

- A set of terminal blocks.

- A circuit breaker with start-up current limiter.

- A timer.

- A thermistor circuit breaker.

- A PTC (Positive temperature coefficient) star-up relay.

- A switch cabinet.

- Five lamps.

- Two capacitors.

- A bimetallic circuit breaker (overheat protection).

- An electromagnetic star-up relay.

- An adjustable protection relay.

- A time relay.

- Five contactors.

- A solenoid valve.

- Two thermostats.

Technical details of main components of circuit:

- Two pressure switches:

  - High pressure: 8 to 32 bar.

  - Low pressure: - 1 to 7 bar.

- A differential pressure: 0.2 to 5 bar.

- Two thermostats: -10 to 25 °C.

- A timer:

  - Two time switchable outputs.

  - Switching time: 0 to 60 min.

- Five contactors:

  - 2 x 3 NO, 1 NC.

  - 3 x 4 NO.

- Start-up and operating capacitor: 15 $\mu$ F, 80 $\mu$ F.

- Power: 380 VAC, 50Hz, 3 Phases.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Wiring and precautions of starting current limiter.
- 2.- Wiring and precautions of safety switch.
- 3.- Wiring and programming of time relay, starting relay.
- 4.- Wiring and precaution of service capacitor.
- 5.- Wiring of circuit breaker and electromagnetic valve.
- 6.- Star/delta wiring.
- 7.- Changing the rotation direction in an AC three phase circuit.
- 8.- Safety aspects about voltage operations.

### REQUIRED SERVICES

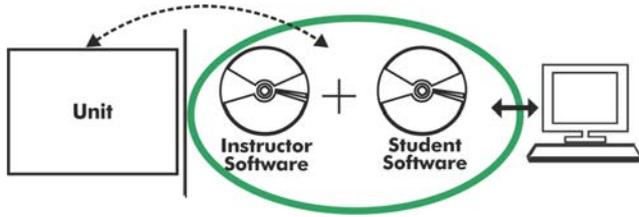
- Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 20 Kw.

### DIMENSIONS AND WEIGHTS

TEIR:

- Dimensions: 900 x 500 x 1070 mm. approx.  
(35.43 x 19.68 x 41.33 inches approx.)
- Weight: 47 Kg. approx.  
(103 pounds approx.)

**TEIR/ICAI. Interactive Computer Aided Instruction Software System:**



With no physical connection between unit and computer (PC), this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

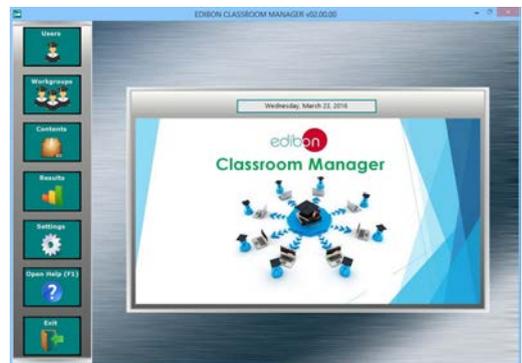
Instructor Software

**- ECM-SOF. EDIBON Classroom Manager (Instructor Software).**

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

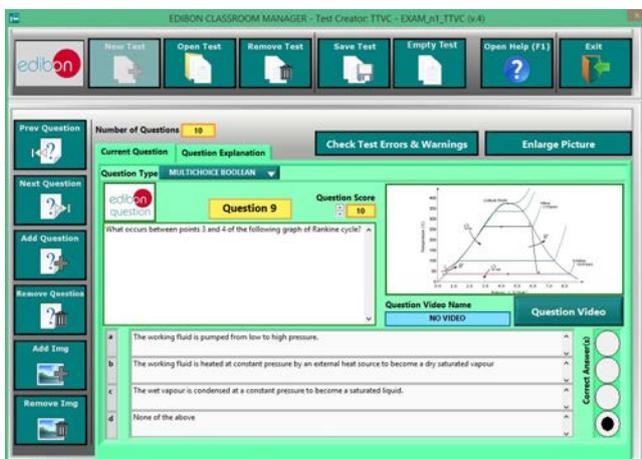
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional  
Student Software

- ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- Test self-correction.
- Calculations computing and plotting.
- Equation System Solver Engine.
- User Monitoring Learning & Printable Reports.
- Multimedia-Supported auxiliary resources.

For more information see ICAI catalogue. Click on the following link:

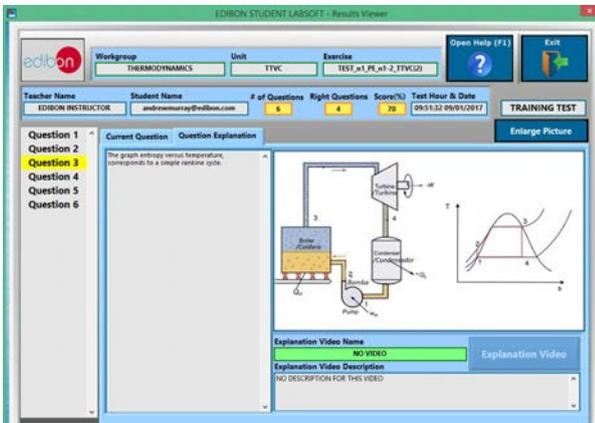
[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



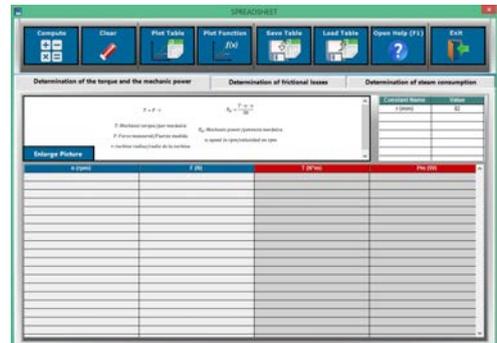
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

\* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



C/ Del Agua, 14. Polígono Industrial San José de Valderas.  
28918 LEGANÉS. (Madrid). ESPAÑA - SPAIN.  
Tel.: 34-91-6199363 Fax: 34-91-6198647  
E-mail: edibon@edibon.com Web: [www.edibon.com](http://www.edibon.com)

Edition: ED01/16  
Date: October/2016

REPRESENTATIVE:

