



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

The temperature concept is just a little bit difficult to be understood. The temperature is an indicator of the molecular activity in a body. The Temperature Measurement Unit, "TMT", is a laboratory-scale design to study the different ways in which temperature can be measured.

GENERAL DESCRIPTION

The Temperature Measurement Unit, "TMT", works as a temperature meter that uses different temperatures measuring devices to compare, check and analyze the temperature and how is the precision for the measure and for the device that the student has used. This unit is used to study the different types of temperature devices, the temperature phenomenon when the student works with these types of devices (Peltier's thermoelectric effect and Seebeck's thermoelectric effect between others) and the difference when the student works with different device disposition (Direct measurement thermocouple, parallel association of thermocouples or series association of thermocouples, between others).

SPECIFICATIONS

Bench-top unit.

Anodized aluminum frame and panels in painted steel.

Main metallic elements in stainless steel.

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

Platinum resistance thermometer with digital instrument: use this device to obtain temperature or volts data.

Thermistor thermometer: used to obtain volts data.

Bi-metal dial thermometer, range: 0 - 120°C.

Vapour pressure thermometer which works following the relation between the temperature in a liquid and its vapour pressure, range: 0 - 120°C.

Alcohol glass thermometer, maximum temperature: 110°C.

Wet and dry bulb hygrometer. The dry bulb shows the air temperature, the wet one shows the temperature after evaporating the humidity, range: -5 to 50°C.

Thermostatic bath with power regulator and thermostatic protection, used to heat the water until boiling point and check the temperatures with different temperature measuring devices, power: 600 W.

Vacuum flask, used to reach temperatures close to 0°C and check the temperatures with different temperature measuring devices, capacity: 2 l.

Fan, used to cool the thermocouples and the thermostatic bath, range of air flow: 86 m³/h., 2550 r.p.m.

Self-adhesive patch temperature indicator. It changes colour depending on the temperature. This is reversible, it means, changes its colour although the temperature decreases.

Temperature sensors (for measuring the temperature through the digital temperature indicator or directly by a voltmeter):

Six "K" type thermocouple.

"J" type thermocouple.

"T" type thermocouple.

Connections:

Shortcircuit connectors: three units to make parallel/series arrangements.

Thermocouple "J", "K", and "T" type: eight connections.

Switched polarization connection.

Four connections for parallel arrangement.

Four connections for series arrangement.

Connection for thermistor.

Connection for platinum resistance thermometer.

Selector switch for enabling up to eleven sensors or thermocouples circuits to be connected to a digital temperature display.

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.

Optional Models and Accessories: (Not included)

- TMT/DAS. Data Acquisition System.

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Determining concepts of temperature measurements and scales:
- 2.- Temperature scales: alcohol thermometer.
- 3.- Demonstration of thermometric properties and characteristic behaviour of different sensors:
 - Peltier's thermoelectric effect.
 - Seebeck's thermoelectric effect.
 - Intermediate metals Law.
 - Intermediate temperatures Law.
- 4.- Working with different temperature indicator devices:
 - Vapour pressure thermometer.
 - Bimetallic thermometer.
 - Wet and dry bulb thermometer.
- 5.- Measuring precision, sensitivity and measuring errors of the different thermometers:
 - Direct measurement thermocouple.
 - Parallel association of thermocouples.
 - Series association of thermocouples.
- 6.- Dynamic response:
 - Platinum resistance thermometer.
 - Thermistor.
- 7.- Introduction to calibration techniques of each system.
- 8.- Errors associated to a bad electrical connection.
- 9.- Calibration errors.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.

DIMENSIONS AND WEIGHTS

- Dimensions: 800 x 600 x 700 mm. approx.
(31.49 x 23.62 x 27.55 inches approx.)
- Weight: 50 Kg. approx.
(110 pounds approx.).

OPTIONAL MODELS AND ACCESSORIES (Not included)

- TMT/DAS. Data Acquisition System.

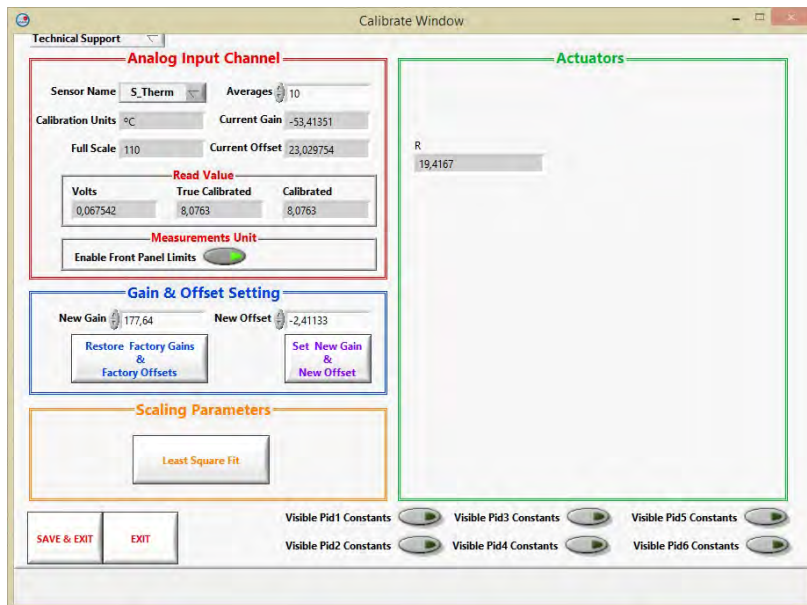
Main screen



- I Main software operation possibilities.
- II Sensors displays, real time values, and extra output parameters. Sensors: S_RTD=Platinum resistance thermometer. S_Therm=Thermistor. S_Type_K="K" type thermocouple.
- III Actuators controls.
- IV Channel selection and other plot parameters.
- V Real time graphics displays.

Software for Sensors Calibration

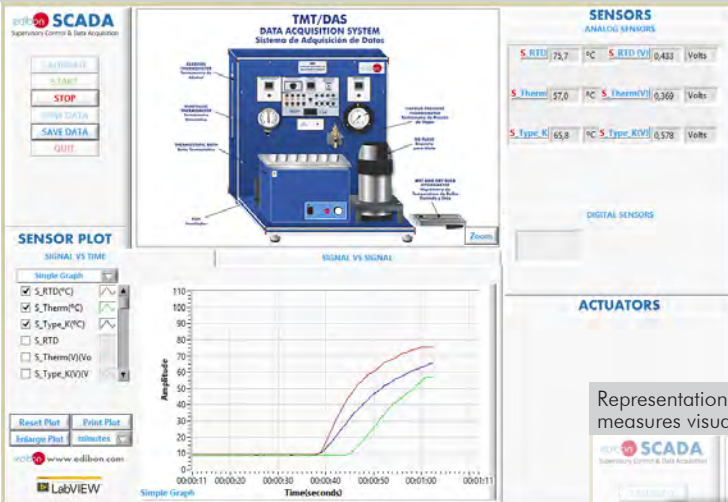
Example of screen



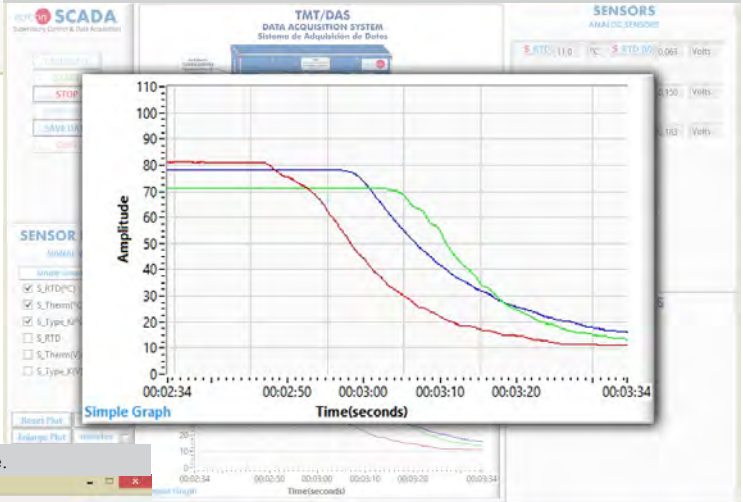
The teacher and the students can calibrate the unit with a password provided by EDIBON.
The teacher can restore the factory calibration any time.

SOME REAL RESULTS OBTAINED FROM THIS UNIT (TMT/DAS)

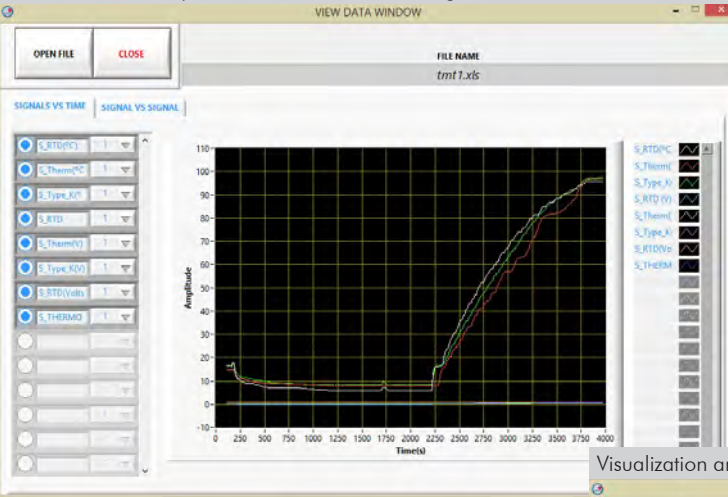
Representation in real time of the measured magnitudes. Graph with temperature measures visualization.



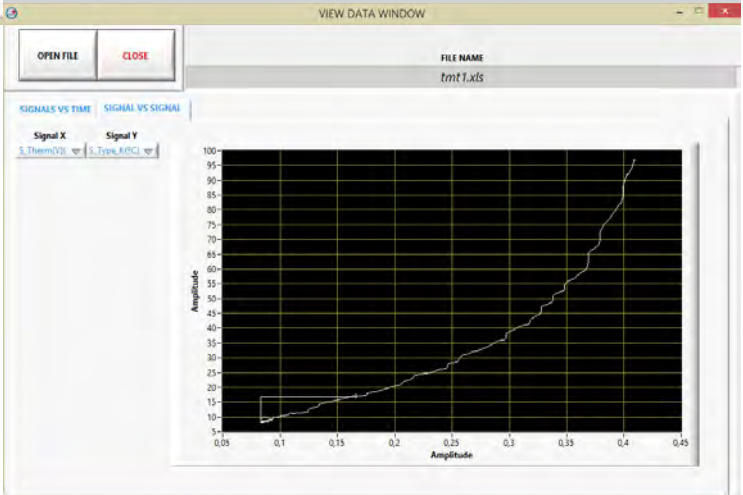
Representation in real time of the measured magnitudes. Graph with temperature measures visualization.



Visualization and representation of saved data. Signal versus time.

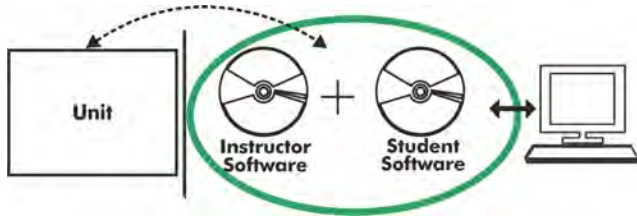


Visualization and representation of saved data. Signal versus signal.



Optional

TMT/ICAI. Interactive Computer Aided Instruction Software System:



Without no physical connection between unit and computer, 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 Workgroups, Tasks and Training sessions.

Creation and Integration of Practical Exercises and Multimedia Resources.

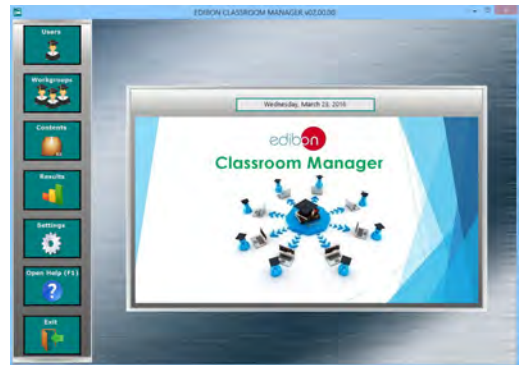
Custom Design of Evaluation Methods.

Creation and assignment of Formulas & Equations.

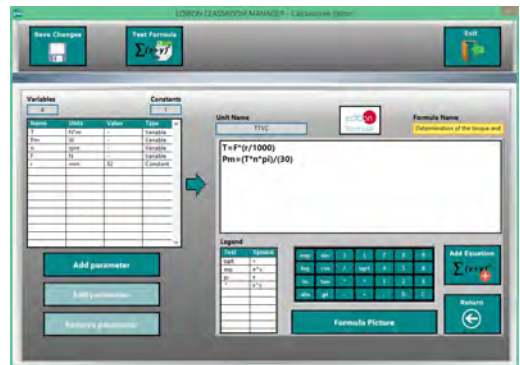
Equation System Solver Engine.

Updatable Contents.

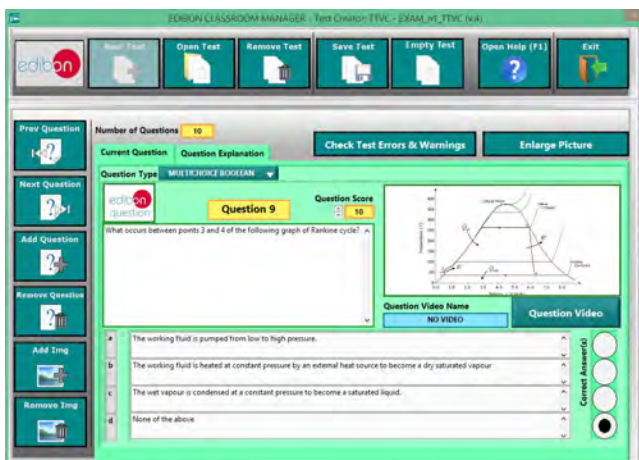
Report generation, User Progression Monitoring and Statistics.



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

-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.

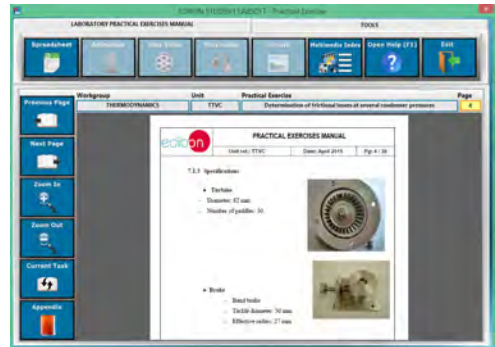
Innovative features:

- 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.**

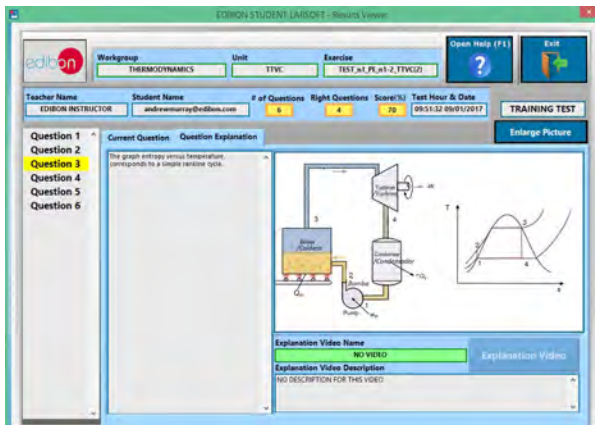
For more information see ICAI catalogue. Click on the following link:
www.edibon.com/products/catalogues/en/ICAI.pdf



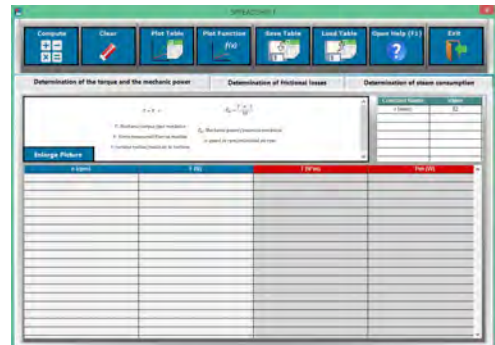
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



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.



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REPRESENTATIVE:

