Hydrostatics Bench & Fluid Properties

BHI

Engineering and Technical Teaching Equipment

www.edibon.com
PRODUCTS
8.- FLUID MECHANICS

INTRODUCTION

We call liquid those substances whose molecules due to the lack of cohesion between them, they move freely without tendency to separate. Thus, when a force is applied to such substances, even when that force is low, they adapt their own form to the form of the vessel containing them.

Hydrostatics is the branch of fluid mechanics that studies fluids at rest, in other words, when there are no forces that alter their motion or position.

The Hydrostatics Bench & Fluid Properties, "BHI", enables the study of the main properties and the behavior of such liquids under hydrostatic conditions, with the aid of some accessories to make the different experiments.

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)

"Worlddidac Quality Charter" and Platinum Member of Worlddidac

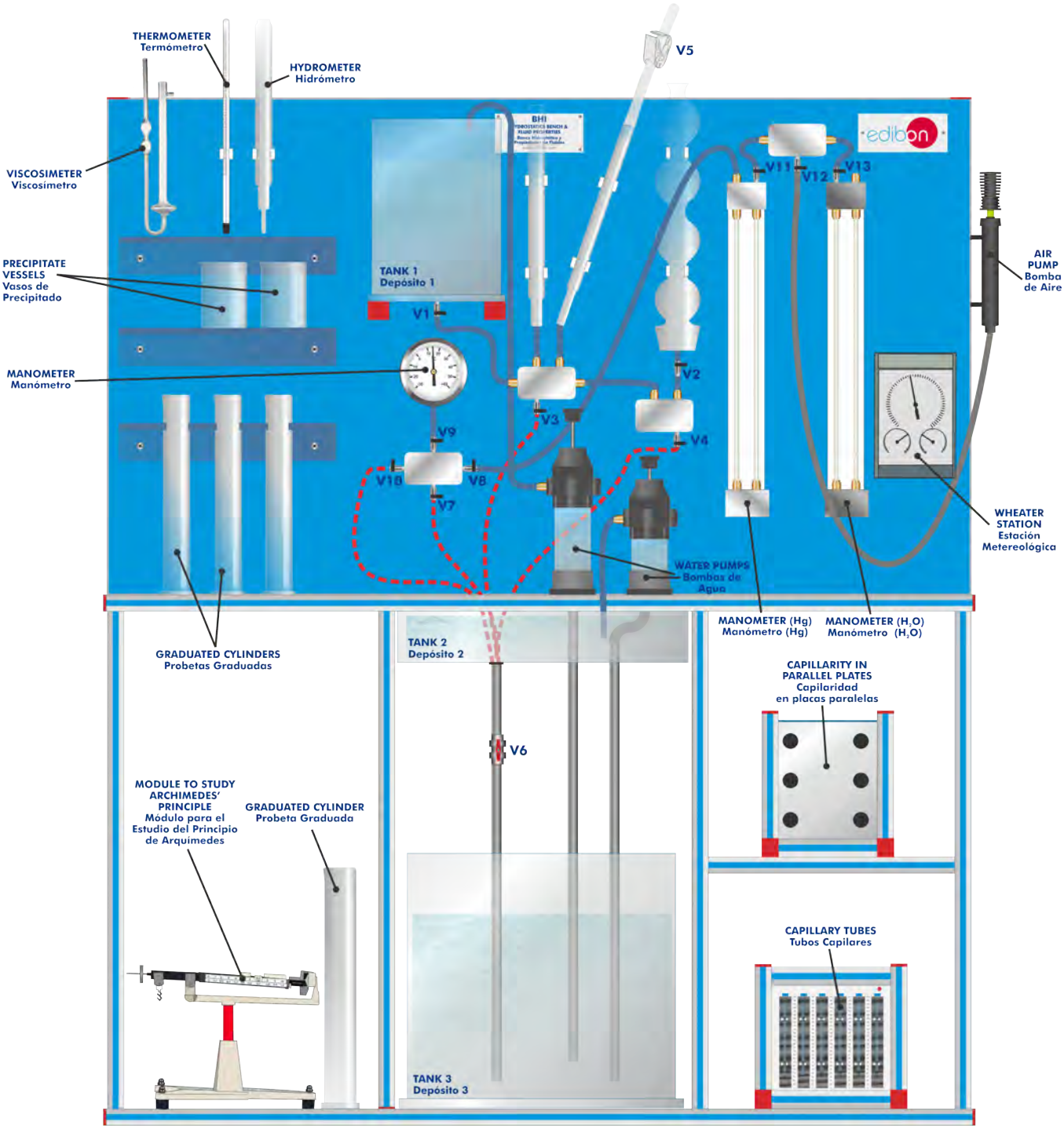
GENERAL DESCRIPTION

The Hydrostatics Bench & Fluid Properties, "BHI", is a compact, mobile and independent unit.

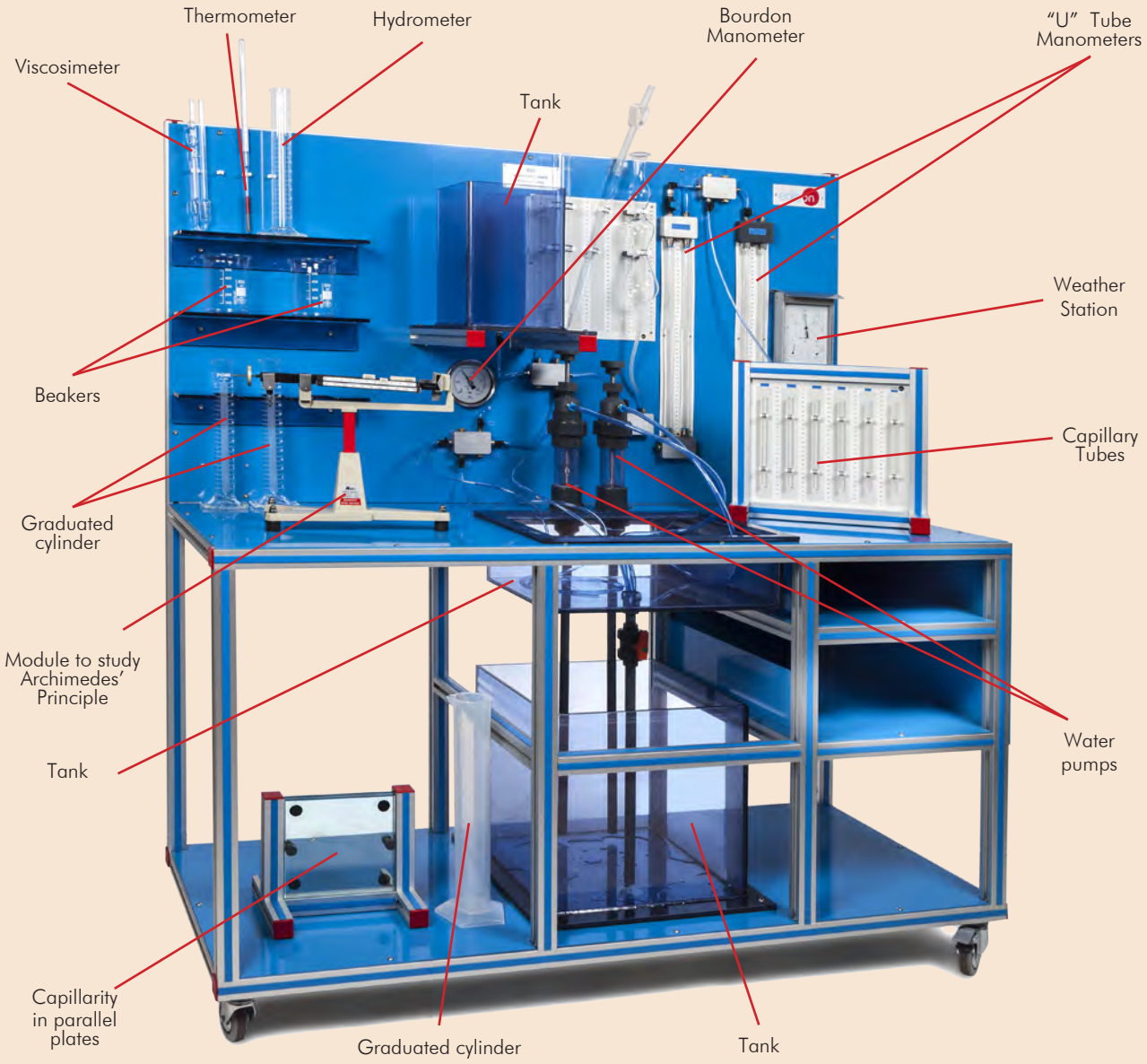
There is a water storage tank, to work in a closed system, at the bottom of the bench. The water is distributed by hand pumps from this tank to two upper tanks, which are connected to different accessories and measuring elements for its study. All excess water is returned to the storage tank through a drain.

With these connections and the elements included, the Hydrostatics Bench and Fluid Properties, "BHI", allows the performance of experiments related to some areas of hydrostatics, such as the measurement of pressure on the ground, the study of the capillary effect, buoyancy studies, surface tension measurement, metacentric height determination, measurement of hydrostatic pressure, etc.

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



The Hydrostatics Bench & Fluid Properties, "BHI", includes:



Elements included in the standard supply of the BHI:

FME02. Flow over Weirs

FME08. Hydrostatic Pressure

FME10. Dead Weight Calibrator

FME11. Metacentric Height

SPECIFICATIONS

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.

PVC water storage tank glass, in the lower part of the bench.

Two PVC tank glass, to work with the different accessories.

Manual air pump.

Two manual water pumps.

Alcohol thermometer, range: -10 – 50 ° C.

Hydrometer (0 – 70 Baumé, 0.700 – 2.000 Sp/gr).

Ubbelhode capillary viscosimeter: 0.6 – 3 cp.

Ubbelhode capillary viscosimeter: 2 – 10 cp.

Ubbelhode capillary viscosimeter: 10 – 50 cp.

Ubbelhode capillary viscosimeter: 60 – 300 cp.

BHI detail

Three graduated cylinders 250 ml glass.

Cylinders graduated 1000 ml plastic.

Two 600 ml glass beakers.

Three glass elements for demonstration of free surface in static conditions.

Bourdon manometer, range: 0 – 2.5 bar.

Two "U" tube manometers, range: 0 – 450 mm.

Module to study Archimedes' Principle (lever balance with displacement vessel, bucket and cylinder).

Weather Station:

- Barometer up to 1040 hPa.
- Thermometer:-40 – 60° C.
- Hygrometer: 0 – 100 %.

Stop clock.

Bleed valves and circuit selection valves.

Module of capillarity in parallel plates.

Module of tubular capillary tubes.

Elements included:

- FME02. **Flow over Weirs:**

  A level meter consisting on a "nonius" adjusted to a mast, where the heights are pointed out on a caliber coupled to it. A small hook or point is attached to the bottom of the mast to carry out the measures. Two drains (a rectangular neckline and a V-shape).

  Scale of the level meter: 0 – 160 mm.

  Dimensions of the weirs: 160 x 230 x 40 mm.

  Neckline angle in the V-shape weir: 90°.

  Dimension of rectangular notch: 30 x 82 mm.

- FME08. **Hydrostatic Pressure:**

  The module consists of a quadrant assembled to the arm of a scale that swings around an axis. When the quadrant is immersed in the water tank, the force that acts on the flat rectangular front surface, exerts a momentum with respect to the supporting axis. The swinging arm is fitted with a tray and an adjustable counter balance. The tank has adjustable supporting legs for a right levelling. It has a drainage valve. The level reached by the water inside the tank is indicated by a graduated scale.

  Tank capacity: 5.5 l.

  Distance between suspended masses and the support point: 285 mm.

  Area of the section: 0.007 m^2.

  Total depth of submerged quadrant: 160 mm.

  Height of support point on the quadrant: 100 mm.

  Set of masses of different weights.

- FME10. **Dead Weight Calibrator:**

  This module consists of a hollow cylinder in whose interior a precision piston fits and slips. Using a system of calibrated weights, we produce predetermined pressures inside the cylinder. The Bourdon manometer that must be contrasted is connected to the cylinder by means of a flexible pipe.

  Pressure manometer: Bourdon type. 0 – 2.5 bar.

  Set of masses of different weights.

  Piston diameter: 18 mm. Piston weight: 0.5 Kg.

  Module levelling through adjustable feet.

- FME11. **Metacentric Height:**

  This module consists of a floating methacrylate prismatic base, with a vertical mast placed on it. An adjustable mobile mass has been added to alter the position of the center of gravity. An adjustable traverse mass lets modifying the inclination of the floating base. A plumb line, attached to the upper part of the mast is used to measure the inclination angle of the floating base with help of a graduated scale.

  Maximum angle: +/- 13.

  Corresponding lineal dimension: +/- 90 mm.

  Dimension of the float: length = 353 mm, width = 204 mm, total height = 475 mm.

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.- Density and specific gravity measurements.
2.- Viscosity measurement.
3.- Capillarity effect observation.
4.- Capillarity raising measurement.
5.- Free surface of a static liquid.
6.- Effect of a liquid on a free surface.
7.- Measurement of liquid levels.
8.- Pressure center in a smooth surface.
9.- Center of pressures for partial immersion.
10.-Center of pressures for total immersion.
11.-Calibration of a Bourdon manometer.
12.-Hysteresis curve determination.
13.-Use of a water manometer.
14.-Use of an air manometer.
15.-Use of a U-shaped manometer for determining the differential pressure.
16.-Arquimedes' Principle.
17.-Determination of the metacentric height.
18.-Study of stability of a floating body. Angular displacements.
19.-Study of stability of a floating body. Different positions of the center of gravity.
20.-Operation and comparison of results obtained with different measuring instruments.

Additional practical possibilities:

21.-Table of the atmospheric pressure in function of the height.
22.-Use instructions of the scale of Archimedes.

REQUIRED SERVICES

- Water supply and drain.

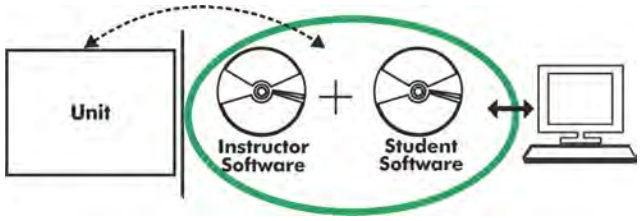
DIMENSIONS AND WEIGHTS

BHI:

-Dimensions: 1500 x 800 x 1900 mm approx.
(59.05 x 31.49 x 74.80 inches approx.)

-Weight: 200 Kg approx.
(440 pounds approx.)

BHI/ICAI. Interactive Computer Aided Instruction Software System:



With 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.

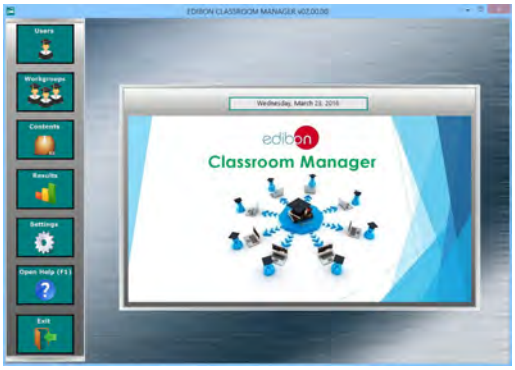
Instructor Software

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

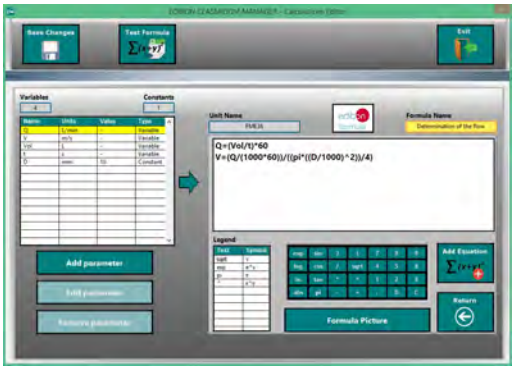
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

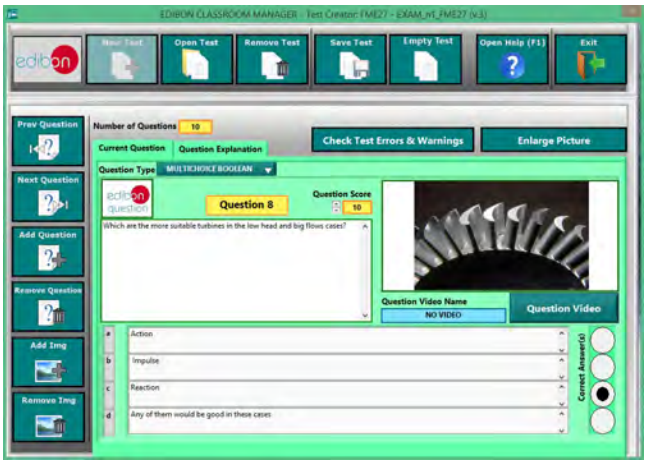
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation 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.

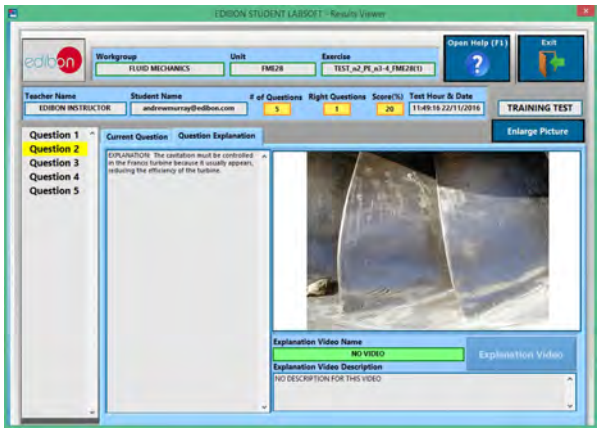
Innovative features:

- **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.**

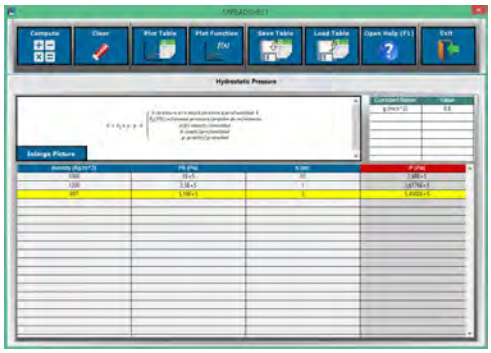
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

For more information see **ICAI** catalogue. Click on the following link:
www.edibon.com/en/files/expansion/ICAI/catalog

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: