

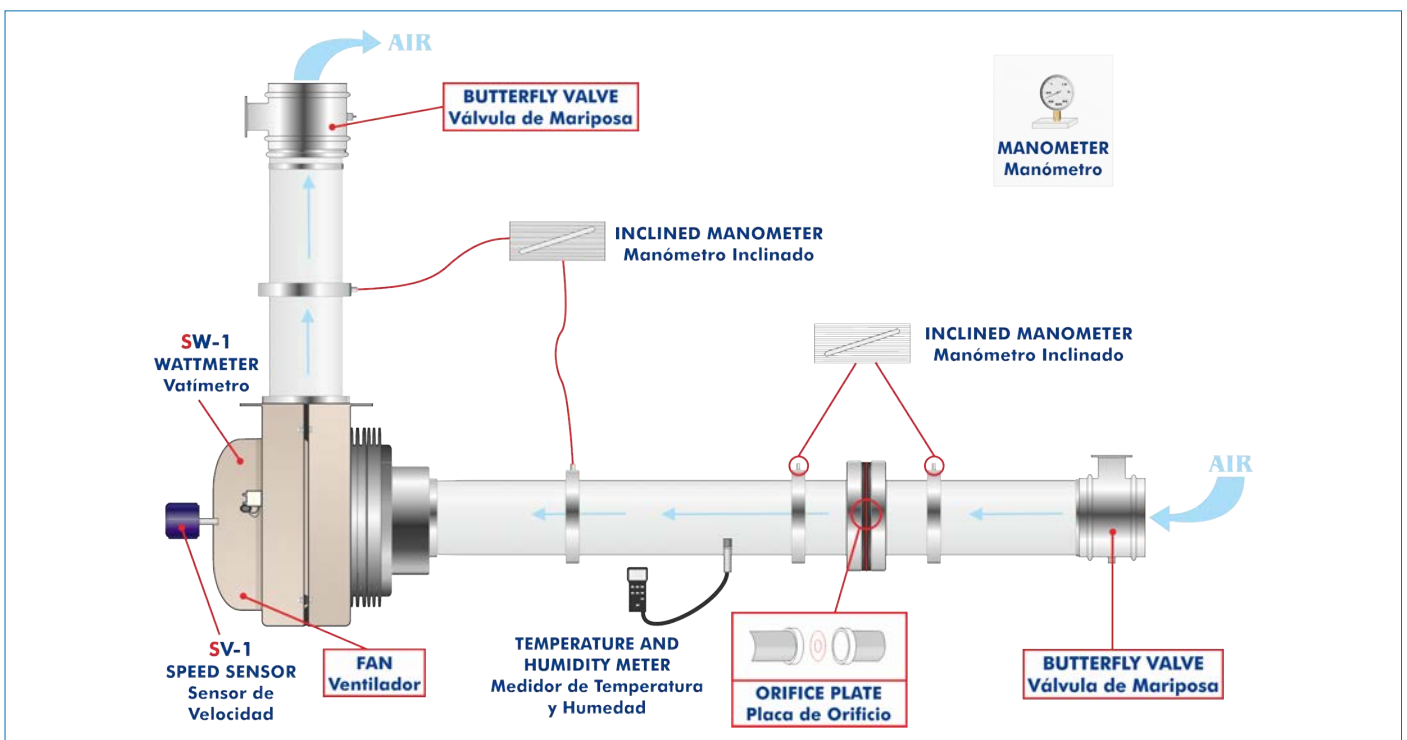


Detail of the set of turbines supplied with the units



Electronic console

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

Fans are mechanical instruments that allow to move great gas flows as a result of the pressure increase generated. There are two basic types of air moving devices: the centrifugal fan or blower, and the axial flow fan. Generally, centrifugal fans are more suitable for lower flows at higher pressures than their axial counterparts.

The centrifugal fan is a radial flow machine that produces the necessary pressure to move gas by the centrifugal force built up inside the fan casing. The gas comes out in a radial way in relation to the shaft of the fan.

Centrifugal fans are usually employed for ventilating duties.

The Centrifugal Fan Teaching Trainer, "HVCB", allows the students to study the operation characteristics of a centrifugal fan.

GENERAL DESCRIPTION

The Centrifugal Fan Teaching Trainer, "HVCB", allows the students to study the operation characteristics of a centrifugal fan. For that purpose, the unit carries out the measurements of flow, speed, temperature and humidity. Multiple tests related to air flows can be performed with the accessories.

The main element of this unit is a variable speed centrifugal fan, which is measured through a speed sensor, and a wattmeter determines the power consumed by the fan.

The unit also includes an aspiration duct and a discharge duct, both transparent. Two butterfly valves, placed in the inlet of the aspiration duct and at the outlet of the discharge duct, regulate the air flow.

The transparent aspiration duct has an orifice plate to calculate the air flow through a inclined manometer.

There is other inclined manometer to measure the differential pressure between inlet and outlet.

The unit is supplied with a set of three interchangeable turbines to study and analyse the influence of the blades shape:

- With the blades curved forwards.

- With the blades curved backwards.

- With perpendicular blades.

There are also humidity, pressure and temperature measurements to know the inlet air conditions.

SPECIFICATIONS

Bench-top unit.

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.

The unit includes:

- Centrifugal fan with speed regulation, speed range: 0 - 3000 rpm.

- Aspiration transparent duct:

 - Inner diameter: 114 mm.

 - Includes a butterfly valve to regulate the air flow and an orifice plate with air flow measurement.

- Discharge transparent duct:

 - Inner diameter: 144 mm.

 - Includes a butterfly valve to regulate the air flow.

- The unit is supplied with a set of three interchangeable turbines:

 - With the blades curved forwards.

 - With the blades curved backwards.

 - With perpendicular blades.

- Two inclined manometers:

 - Manometer to measure the differential pressure between inlet and outlet, range: 0 - 3 inches H₂O (0 - 76 mm H₂O).

 - Manometer to measure the pressure fall through the orifice plate, range: 0 - 1 inch H₂O (0 - 25 mm H₂O).

- Speed sensor, range: 0 - 3000 r.p.m.

- Wattmeter.

- Temperature and humidity meter to know the inlet air conditions:

 - Temperature range: -20 – 60°C.

 - Humidity range: 10 - 95 % relative humidity.

- Manometer to know the inlet air conditions, range: 0 - 15 PSI.

- Electronic console:

 - Metallic box.

 - Fan speed controller.

 - Speed sensor connector.

 - Digital display for the speed sensor.

 - Digital display for the wattmeter.

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). (See page 3).



HVCB detail

Optional Models and Accessories (Not included)

Accessories with pressure takings



HVCC-C2TP.
114 mm. diameter duct with two static pressure takings



HVCC-C1TP.
114 mm. diameter duct with one static pressure taking



HVCC-CTPP.
64 mm. diameter duct and pressure taking with Pitot



HVCC-CTPG.
114 mm. diameter duct and pressure taking with Pitot

Straighteners



HVCC-EFCG.
114 mm. diameter flow straightener by cells



HVCC-EFCP.
64 mm. diameter flow straightener by cells



HVCC-EFS.
Flow straightener by sectors

Accessories to couple ducts of 64 mm. diameter



HVCC-AA7.
Angle adapter (less than 7°)

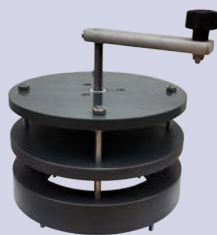


HVCC-AA3.
Angle adapter (less than 3°)

Other accessories



HVCC-CDP.
Cylinder pressure distribution accessory



HVCC-OS.
Symmetrical shutter



HVCC-T2D.
Nozzle with two diameters: 64 mm. and 114 mm.



HVCC-TC.
Heat transfer model



HVCC-TA.
Pipe fittings

EXERCISES AND PRACTICAL POSSIBILITIES

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| <p>1.- Calculation of the flow with the orifice plate.</p> <p>2.- Calculation of the typical curve of a fan at a constant turning speed (turbine with blades curved forwards).</p> <p>3.- Calculation of the typical curve of a fan at a constant turning speed (turbine with blades curved backward).</p> <p>4.- Calculation of the typical curve of a fan at a constant turning speed (turbine with perpendicular blades).</p> <p>5.- Study of the dependency on the type of turbine. Comparison of the results of the different types of blades.</p> <p>6.- Calculation of the efficiency of the fan.</p> <p>7.- Introduction to affinity laws for fans.</p> <p>8.- Study of the static pressure increase.</p> <p>Additional practical possibilities:</p> <p>9.- Measurement of performance at constant speeds.</p> <p>10.- Study and comparison of the practical results and the results calculated by the students.</p> <p>Other possible practices (to be done with the Optional Models and Accessories):</p> <p>11.- Measurement of the static pressure in a duct with one or two static pressure takings (HVCC-C1TP or HVCC-C2TP accessories).</p> <p>12.- Measurement of the flow in a duct with one pressure taking with Pitot (HVCC-CTPP or HVCC-CTPG accessories).</p> <p>13.- Study of the influence of straighteners (HVCC-EFCG, HVCC-EFCP or HVCC-EFS accessories).</p> | <p>14.- Study of the influence of a symmetrical shutter (HVCC-OS accessory).</p> <p>15.- Measurement of the flow in a duct with a nozzle (HVCC-T2D accessory).</p> <p>16.- Measurement of the pressure distribution around a cylinder subjected to transverse incident flow (HVCC-CDP accessory).</p> <p>17.- Measurement of the pressure losses in different pipe elements (HVCC-TA accessory).</p> <p>18.- Study of the effect of differently shaped pipe inlets (HVCC-TA accessory).</p> <p>19.- Study of a cooling curve (HVCC-TC accessory).</p> <p>20.- Determination of the heat transfer coefficients from the cooling curve (HVCC-TC accessory).</p> <p>Additional practical possibilities (Optional Models and Accessories):</p> <p>21.- Measurement of the total pressure in the wake of a cylinder (HVCC-CDP and HVCC-CTPG accessories).</p> <p>22.- Determination of the drag coefficient from the pressure distribution in the wake of a cylinder (HVCC-CDP and HVCC-CTPG accessories).</p> <p>23.- Demonstration of the wake depression (HVCC-CDP and HVCC-CTPG accessories).</p> |
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REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

- HVCB:
Unit:
- Dimensions: 1200 x 600 x 700 mm. approx.
(47.24 x 23.62 x 27.56 inches approx.)
 - Weight: 60 Kg. approx.
(132 pounds approx.).
- Electronic console:
- Dimensions: 490 x 330 x 310 mm. approx.
(19.29 x 12.99 x 12.20 inches approx.)
 - Weight: 10 Kg. approx.
(22 pounds approx.).

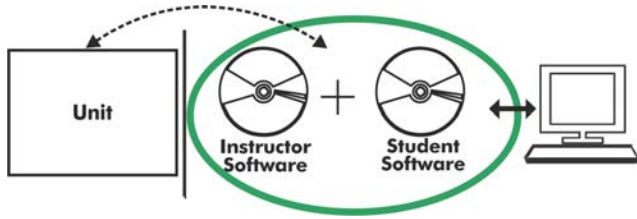
OPTIONAL MODELS AND ACCESSORIES (Not included)

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|---|--|
| <ul style="list-style-type: none"> - HVCC-C2TP. - HVCC-C1TP. - HVCC-CTPP. - HVCC-CTPG. - HVCC-EFCG. - HVCC-EFCP. - HVCC-EFS. - HVCC-AA7. - HVCC-AA3. - HVCC-CDP. - HVCC-OS. - HVCC-T2D. - HVCC-TC. - HVCC-TA. | <ul style="list-style-type: none"> 114 mm. diameter duct with two static pressure takings. 114 mm. diameter duct with one static pressure taking. 64 mm. diameter duct and pressure taking with Pitot. 114 mm. diameter duct and pressure taking with Pitot. 114 mm. diameter flow straightener by cells. 64 mm. diameter flow straightener by cells. Flow straightener by sectors. Angle adapter (less than 7°). Angle adapter (less than 3°). Cylinder pressure distribution accessory. Symmetrical shutter. Nozzle with two diameters: 64 mm. and 114 mm. Heat transfer model. Pipe fittings. |
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AVAILABLE VERSIONS

- Offered in this catalogue:
- HVCB. Centrifugal Fan Teaching Trainer.
- Offered in other catalogue:
- HVCC. Computer Controlled Centrifugal Fan Teaching Trainer.

HVCB/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.

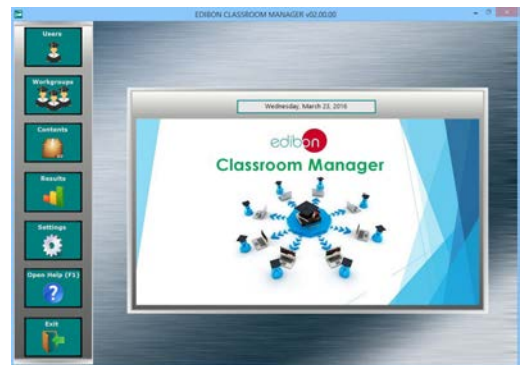
Instructor Software

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

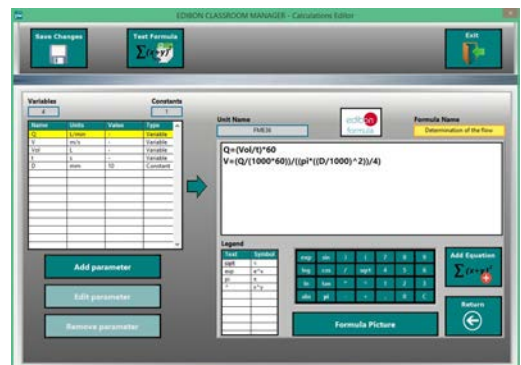
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

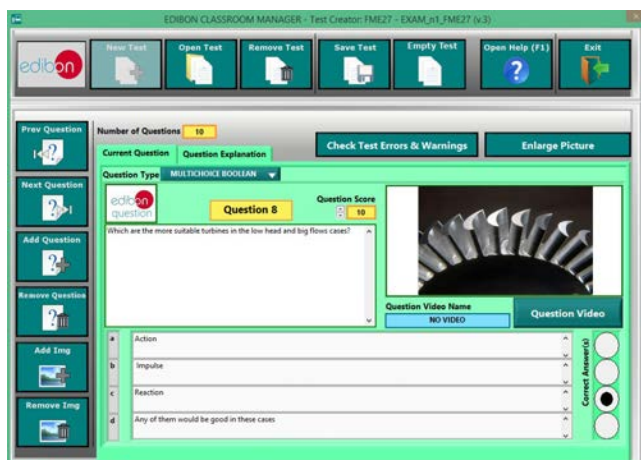
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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

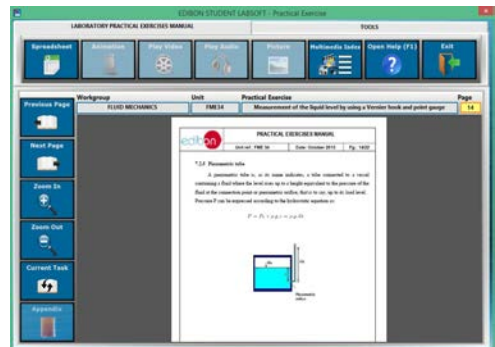
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- 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:

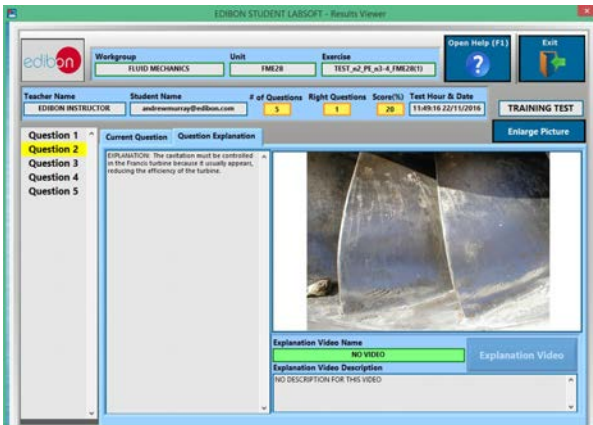
www.edibon.com/en/files/expansion/ICAI/catalog



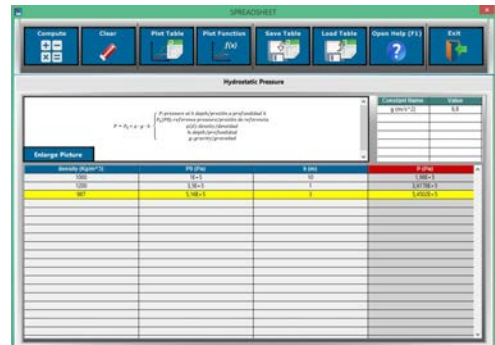
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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:

