



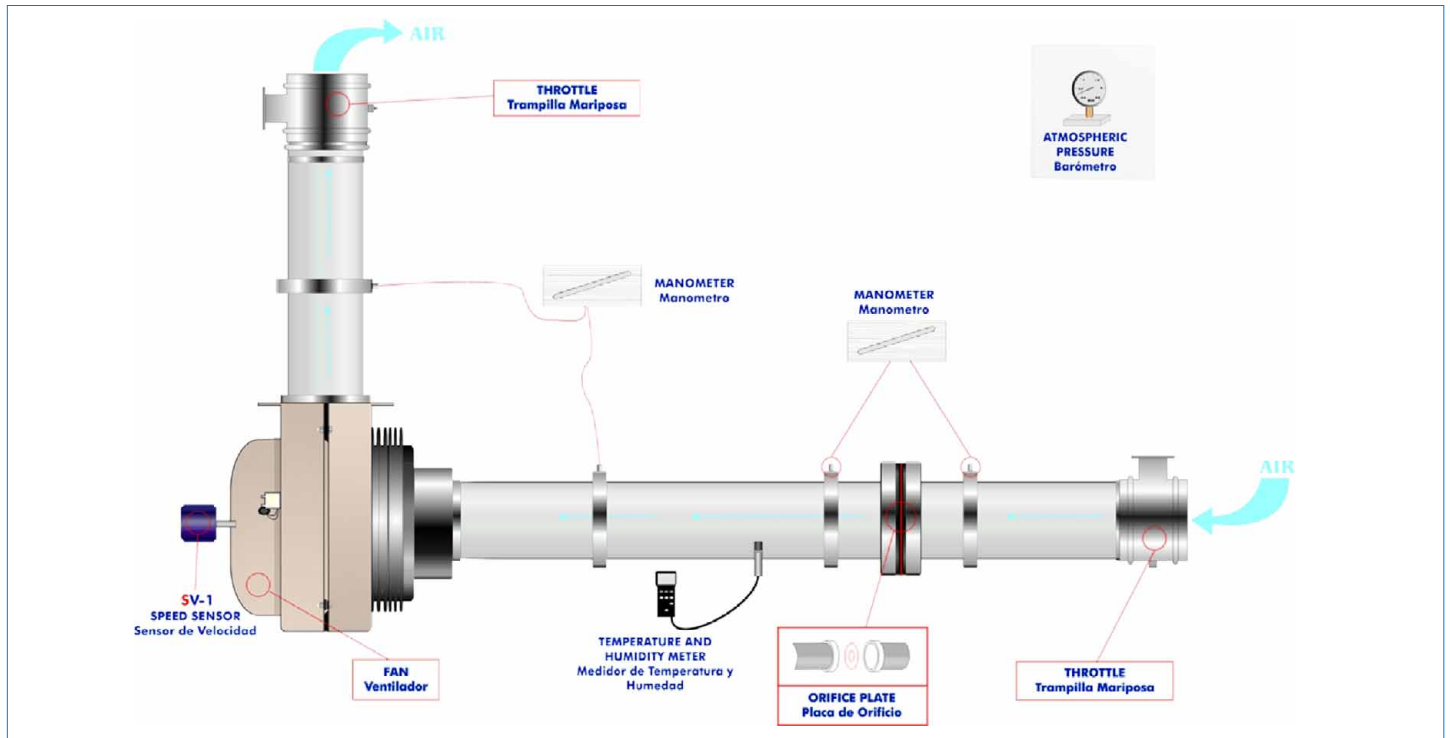
Detail of the set of turbines supplied with the unit

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Electronic Console

### PROCESS DIAGRAM AND ELEMENTS ALLOCATION



## DESCRIPTION

A fan is a machine that can move or drive a gas as a consequence of the pressure increase that it causes.

Centrifugal fans are radial, so that the gas comes out in a radial way in relation to the shaft of the fan.

Centrifugal fans are usually used for implementations in which a bigger working pressure than in axial fans is required.

This centrifugal teaching trainer "HVCB" is mainly formed by a centrifugal fan, aspiration and discharge transparent ducts, speed controller to change the speed of the fan, a speed sensor, an orifice plate to measure the differential pressure (in order to obtain the flow), butterfly valves to regulate the flow and pressure measuring devices to know the pressure. Moreover, there are a temperature and humidity meter to know the air conditions.

This unit is supplied with a set of 3 interchangeable turbines: with the blades forwards, with the blades backwards and with flat blades.

This unit also includes an electronic console with the necessary instrumentation for regulating and measuring (fan regulator, speed sensor display, wattmeter, etc).

## SPECIFICATIONS

**Bench-top unit.**

**Anodized aluminium structure and panels in painted steel (epoxy paint).**

**Main metallic elements in stainless steel.**

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

**Centrifugal fan, with speed regulation:**

Maximum power consumption: 180 W.

Maximum pressure: 60 mm. W.C. (2.2 inches W.C.).

Maximum flow rate: 1000 m<sup>3</sup>/h.

Speed range: 0-3000 rpm.

**Aspiration and discharge transparent ducts.**

**Orifice plate to measure the differential pressure (in order to obtain the flow).**

**Butterfly valves, placed in the inlet and the outlet of the system, for regulating flow and pressure.**

**Manometers:**

A manometer for measuring the inlet and outlet pressures. This manometer might measure the static inlet and outlet pressures and the differential pressure between inlet and outlet. Range: 0-75 mm. W.C. (0-3 inches W.C.).

A manometer to measure the pressure fall in the orifice plate. Range: 0-25 mm. W.C. (0-1 inch W.C.).

**Set of valves to facilitate the measurements of the fan pressure, the fan aspiration and the differential pressure.**

**Temperature and humidity meter:**

Temperature range: from -20 to 60°C.

Humidity range: from 10 to 95% relative humidity (RH).

**Speed sensor, range: 0-3000 rpm.**

**Wattmeter sensor of 0-200W.**

**Atmospheric pressure meter.**

**The unit is supplied with a set of 3 interchangeable turbines: with the blades forwards, with the blades backwards and with flat blades.**

**Electronic Console:**

Metallic box.

Fan speed controller.

Speed sensor connector.

Speed sensor digital display.

Wattmeter sensor digital 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 Set of Accessories:

- HVCB-C2TP. 144mm. duct with two static pressure takings.
- HVCB-C1TP. 144mm. duct with one static pressure taking.
- HVCB-CTPP. 94mm. duct and pressure taking with Pitot.
- HVCB-CTPG. 144mm. duct and pressure taking with Pitot.
- HVCB-EFCG. 144mm. flow straightener by cells.
- HVCB-EFCP. 94mm. flow straightener by cells.
- HVCB-EFS. Flow straightener by sectors.
- HVCB-OS. Simmetrical shutter.
- HVCB-AA7. Angle adapter (less than 7°).
- HVCB-AA3. Angle adapter (less than 3°).
- HVCB-T2D. Nozzle of two diameters: 94mm. and 144 mm.
- HVCB-CDP. Cylinder pressure distribution.
- HVCB-TC. Heat transfer model.
- HVCB-TA. Pipe fittings.



HVCB-C2TP.  
144mm. duct with two  
static pressure takings



HVCB-C1TP.  
144mm. duct with one  
static pressure taking



HVCB-CTPP.  
94mm. duct and  
pressure taking with Pitot



HVCB-CTPG.  
144mm. duct and  
pressure taking with Pitot



HVCB-EFCG.  
144mm. flow straightener  
by cells



HVCB-EFCP.  
94mm. flow straightener  
by cells



HVCB-EFS.  
Flow straightener  
by sectors



HVCB-OS.  
Symmetrical shutter



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



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



HVCB-T2D.  
Nozzle of two  
diameters: 94mm. and 144 mm

Other accessories:

- HVCB-CDP. Cylinder pressure distribution.
- HVCB-TC. Heat transfer model.
- HVCB-TA. Pipe fittings.

## EXERCISES AND PRACTICAL POSSIBILITIES

### Some Practical Possibilities of the Unit:

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| <ul style="list-style-type: none"> <li>1.- Measurement of constant-speed machine performance in terms of static and total pressures, rotor speed and motor shaft power, as a function of inlet flow.</li> <li>2.- Calculation of flow with and orifice plate.</li> <li>3.- Calculation of the fan efficiency.</li> <li>4.- Introduction to similarity laws for scale-up.</li> <li>5.- Calculation of the flow by static pressure measurement, dynamic pressure measurement and total pressure depending of the test.</li> <li>6.- Practices with the different turbines: with the blades forwards, with the blades backwards and with flat blades.</li> <li>7.- Determination of the fan characteristics curves.</li> <li>8.- Calculation of the typical curve of a fan at a constant turning speed (turbine with blades forwards).</li> <li>9.- Calculation of the typical curve of a fan at a constant turning speed (turbine with blades backwards).</li> <li>10.- Calculation of the typical curve of a fan at a constant turning speed (turbine with flat blades).</li> <li>11.- Measurement of performance at constant speeds.</li> <li>12.- Static pressure increasing.</li> </ul> <p>Other possible practices (with the optional Set of Accessories):</p> <ul style="list-style-type: none"> <li>13.- Calculation of flow. Test with discharge duct and nozzle.</li> <li>14.- Calculation of flow. Test with aspiration duct and nozzle.</li> <li>15.- Calculation of the differential flow according to the turbines position in the discharge duct.</li> <li>16.- Calculation of the differential flow according to the turbines position in the aspiration duct.</li> </ul> | <ul style="list-style-type: none"> <li>17.- Determination of the fan characteristics curves (with the optional Set of Accessories).</li> <li>18.- Measuring a cooling curve.</li> <li>19.- Determination of the coefficient of heat transfer from the cooling curve.</li> <li>20.- Measurement of the pressure distribution around a cylinder in a transverse flow.</li> <li>21.- Measurements behind a cylinder in a transverse flow.</li> <li>22.- Pressure loss measurements at a bend.</li> <li>23.- Pressure loss measurements on pipe sections.</li> <li>24.- Pressure loss measurements at an elbow.</li> <li>25.- To investigate the influence of different shaped pipe inlets.</li> </ul> |
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### REQUIRED SERVICES

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

### DIMENSIONS & WEIGHTS

HVCB:

Unit:

-Dimensions: 1000 x 600 x 700 mm. approx.

-Weight: 50 Kg. approx.

Electronic Console: -Dimensions: 490 x 330 x 310 mm. approx.

-Weight: 10 Kg. approx.

### AVAILABLE VERSIONS

Offered in this catalogue:

- **HVCB. Centrifugal Fan Teaching Trainer.**

Offered in other catalogue:

- **HVCC. Computer Controlled Centrifugal Fan Teaching Trainer.**

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



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