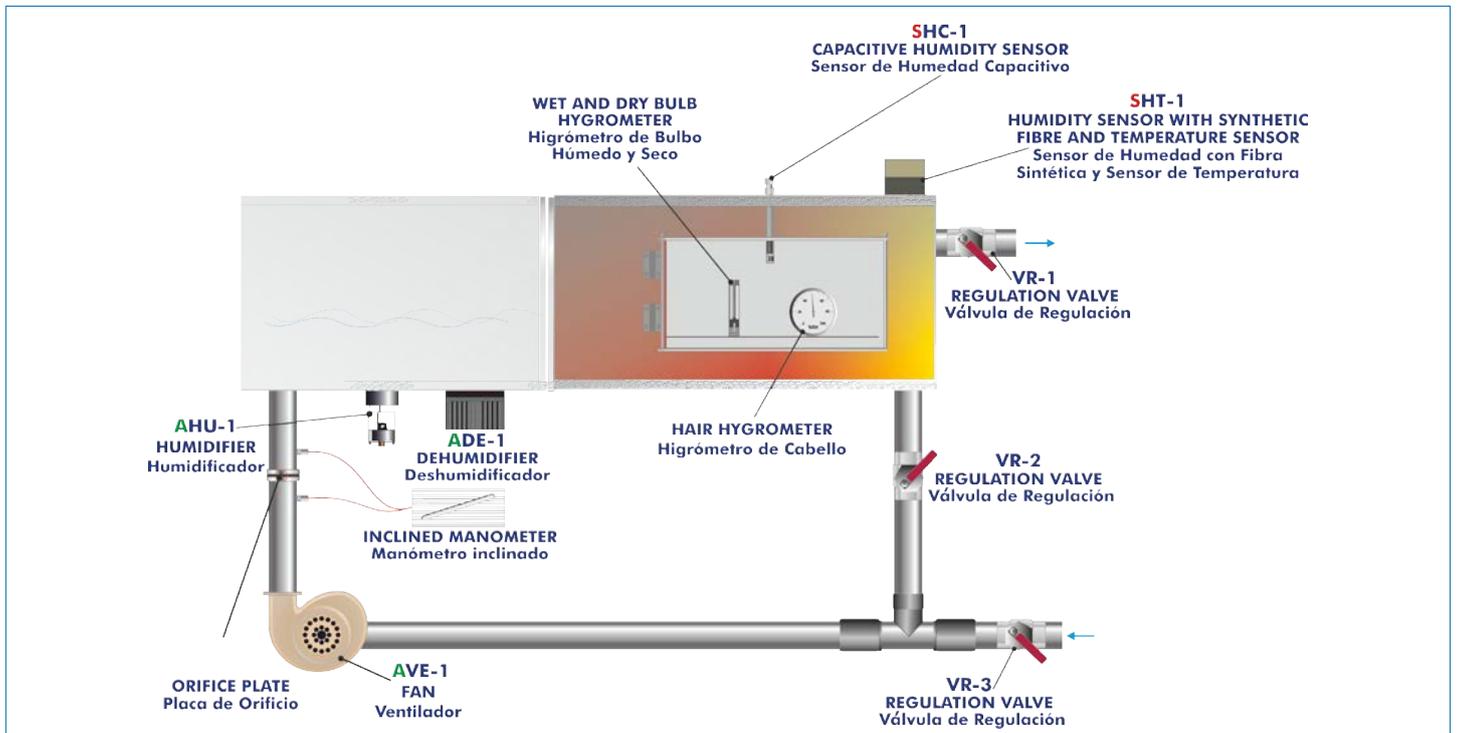


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Electronic console

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



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INTRODUCTION

Air humidity is defined as the amount of water vapor in the air. Humidity can be measured in three different ways: absolute, relative and specific. Relative humidity is the percentage between the actual amount of water vapor contained in the air and the amount of water vapor that air should contain to saturate to the same temperature.

The Air Humidity Measurement Unit "TMHA" enables the measurement of air humidity with different methods and their comparison.

GENERAL DESCRIPTION

The Air Humidity Measurement Unit "TMHA" shows the differences in accuracy between different instruments to measure the air relative humidity. It also includes a fan to show the effects of airflow on the different instruments.

A mobile metallic frame holds a duct and a fan. The main part is the stainless steel duct, which contains a selection of instruments to measure the air humidity and temperature. A transparent window in the duct allows the access for students to take readings. Instruments are changed through that window too. This duct can be humidified and dehumidified. An ultrasonic atomizer is used for humidification and a Peltier cooling element is used for dehumidification.

A variable flow rate fan mounted underneath the duct supplies an airflow. This allows to show the effects of an airflow on different instruments and to ensure a good mixing. Using several regulation valves, the unit can work in two different configurations: the air can be recycled inside the duct or taken from the room air. The airflow rate is controlled with those valves too.

The airflow can be varied with the electronic console and the flow rate is calculated with the pressure drop produced on the orifice plate located at the fan outlet. That pressure drop is measured with an inclined manometer.

The unit includes several mechanical and electronic instruments to measure relative humidity and temperature: a hair hygrometer, a humidity sensor with synthetic fiber and temperature sensor, one capacitive humidity sensor, and a wet and dry bulb hygrometer.

SPECIFICATIONS

Unit mounted on an anodized aluminum structure and panels made of painted steel. It includes wheels for its mobility.

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

Main metallic elements made of stainless steel.

Duct:

Material: stainless steel.

Length: 1900 mm, approx.

It includes two transparent windows: one is located in the left side to visualize the humidification and dehumidification processes and the other is located in the front side to allow the access for students to take readings and to change the instruments.

The duct includes different elements to adjust the air humidity:

Humidifier:

Type: ultrasonic atomizer.

Minimum water level: 45mm.

Low water cut-off.

Dehumidifier:

Peltier cooling element.

Cooling capacity: 74.5 W.

It includes a heat sink. Thermal resistance: 0.75 K/W.

Fan to show the effects of airflow on different instruments and to ensure a good mixing, maximum air flow rate: 380 m³/h, max. speed: 2760 r.p.m.

An orifice plate located at the fan outlet.

An inclined manometer to measure the pressure drop in the orifice plate, range: 0 - 3" water column.

Three regulation valves to work with the unit in two configurations (the air can be recycled inside of the duct or taken from the room air) and to change the airflow rate:

One is situated in the right side of the duct.

Another is situated between the right side of the duct and the room air inlet.

Finally, the last valve is situated in the room air inlet.

Measuring methods for air humidity:

A wet and dry bulb hygrometer, range: - 5...50°C, precision: ±0.5%.

A hair hygrometer, range: 0-100% R.H.

A capacitive humidity sensor, range: 0-100% R.H.

A humidity sensor with synthetic fiber and combined temperature sensor: humidity range: 30-100% R.H., temperature range: 5-80°C.

Electronic console:

Metallic box.

A humidity sensor with synthetic fiber and temperature sensor connector.

A capacitive humidity sensor connector.

ON/OFF controller for the humidifier.

ON/OFF controller for the dehumidifier.

ON/OFF controller for the fan.

Fan speed controller.

Two digital displays for the temperature and the humidity for the humidity sensor with synthetic fiber and temperature sensor.

Digital display for the capacitive humidity sensor.

Digital display for the speed of the fan.

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.- Study of different measuring methods for air humidity: hair hygrometer, humidity sensor with synthetic fiber, capacitive humidity sensor and wet and dry bulb hygrometer.
- 2.- Calculation of the flow with the orifice plate.
- 3.- Study of the state of the air humidity in the h-x diagram (psychometric chart).
- 4.- Determination of the room air humidity using different types of instruments.
- 5.- Determination of the air humidity using different types of instruments and varying the humidity of the air with a humidifier and a dehumidifier.
- 6.- Comparison of different measuring methods for accuracy and ease of use.
- 7.- Study of the effect of the air flow in the humidity measurement of the air room.
- 8.- Study of the effect of the air flow in the humidity measurement of the air and varying the humidity of the air with a humidifier and a dehumidifier.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.
- Water for the humidifier and the wet and dry bulb hygrometer.

DIMENSIONS & WEIGHTS

TMHA:

Unit: -Dimensions: 2400 x 700 x 1600 mm. approx.
(94.48 x 27.55 x 62.99 inches approx.)

-Weight: 100 Kg. approx.
(220 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.)

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



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