BEC010

CONDENSATION STUDY UNIT

Experimental capabilities

- **Visualization of the condensation in drops on the gold condenser and into a film on the copper condenser**
- **Study of heat transfer**
- **Study of the relation temperature / pressure for the water at saturation**
- **Measurement of the effect of increasing the rate of flow of cooling fluid on the heat transfer coefficient.**

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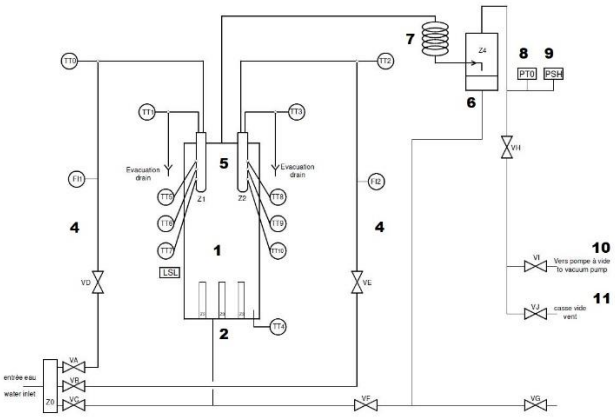
Operating principle

The BEC 010 allows the study of condensation. It consists of a main tank containing water. This water is heated and transformed into vapor.
The vapor will surround two condensers of different material (a copper condenser and a second with a gold coating) and to transform in liquid again.
Each condenser is designed to produce a different type of condensation: film and droplets.
The installation is very instrumented and can measure all the operating parameters (temperature, flow rate, pressure) to derive the heat exchanges according to several configurations. It is also equipped of a data monitoring with Didatec interface included.
The robust design of this equipment makes it perfectly suited for use in schools.
Its anodized aluminum frame with legs gives it great robustness as well as a great flexibility of integration into your premises.
The manufacturing of this equipment meets the European machine directive.

Illustrations



The bench is installed on an aluminum profile structure equipped with four directional braked casters.
It has an electrical box with a main power disconnect switch and a 30mA differential circuit breaker.

1. Glass test cylinder V = 1.7 L

2. Heating resistors P = 900 W with low level detection sensor (safety)

3.adjustment of the heating power of the resistors by potentiometer

4.water flow meters with needle adjustment valve for the flow to the exchangers
Scales: 0.2 to 1.5 L / min (gold); 0.3 to 3.0 L / min (copper)

5. Two condensers
Material of 1st copper condenser: film
Material of 2nd gold-plated condenser: Drops

Technical details

6. Liquid / vapor separator

7.vapor cooling coil (ambient air)

8.Digital pressure sensor with display on the touch screen

9. Test cylinder safety valve and safety pressure switch

10.Electric vacuum pump

11. Empty break valve

Integrated instrumentation:
-pressure sensor: -1 to 10bars
-water flowmeter (gold): 0.2 to 1.5 L / min
-water flowmeter (copper): 0.3 to 3.0 L / min
-t thermocouple temperature probes (X7): -20 to + 100 ° C
- Pt100 temperature probes (X4): -20 to + 100 ° C
-wattmeter heating resistance power: 0 to 1150W

The temperature and power measurements are displayed on a 7 "touch screen:

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Services required

- Electrical supply: 230 VAC - 50 Hz - 20 A
- Electrical supply Type: 1-Phase + Neutral + Earth.
- Water supply network: 3 L/min - 3 bars
- Evacuation of water: on the floor
- Dimensions: (LxWxH mm): 1000 x 650 x 700
- weight (Kg): 55

Note : if the equipment installation is operated by our staff, all supplies and exhaust connections required must stand at less than 2m from the machine

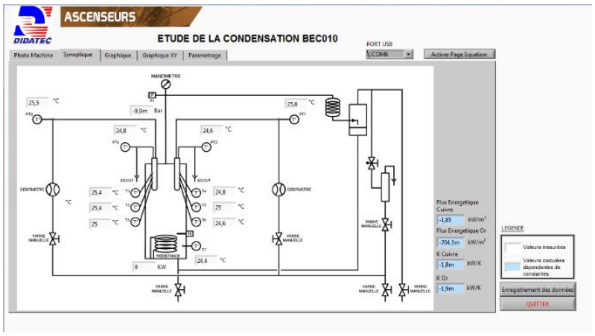
Documentation

- User's manual
- Technical documentation of the components
- Lab exercises
- Wiring diagram
- Hydraulic diagram
- Certificate of conformity CE

Data acquisition: Parameter setting, Plot of curve

The bench is also originally equipped with supervision and configuration software. The connection to the PC is made by WIFI. The software is divided into four parts:

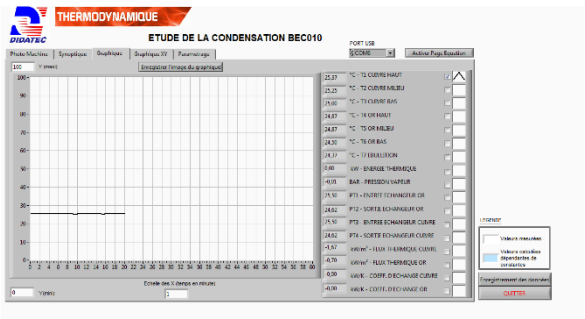
BLOCK DIAGRAM:



We find in this window the block diagram of the machine with the location of various measures of process and their values.

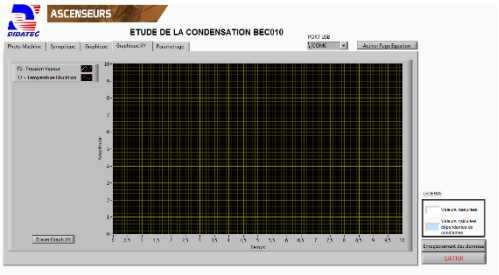
GRAPHICS:

We find in this graph window, the possibility of drawing the measurement curves as a function of the time by selecting the desired quantities.



GRAPHIC XY:

We find in this XY graph window, the possibility to draw a curve with two parameters. For example, the Pressure depending on the boiling point of water. The curve is drawn step by step depending on the evolution of the process.



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PARAMETER SETTING:

We find in this parameter setting tab, the option of changing the constant values that would not be measured (and necessary to the calculation)