

## TWO STAGE AIR COMPRESSOR



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### Experimental capabilities

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- Study and analyze the thermodynamic aspects of a two-stage air compressor
- Determine the overall efficiency, polytropic, isentropic and isothermal
- Heat balances on intermediate air-water exchangers
- Influence of the rotational speed on the efficiency
- Air flow rate measurement by a diaphragm

## Operating principle

The PCB200 bench allows to study the operating principle of a two-stage air compressor.

The ambient air is drawn at the level of a filter where a diaphragm is found allowing to measure the incoming air flow by means of a manometer column.

The air passes successively through two air-water exchangers (1st stage and 2nd stage) connected to the water network of the institution.

At the output of second exchanger, the air returns in the tank then at the level of a pressure reducer connected to an output of air flowmeter to measure the output flow rate.

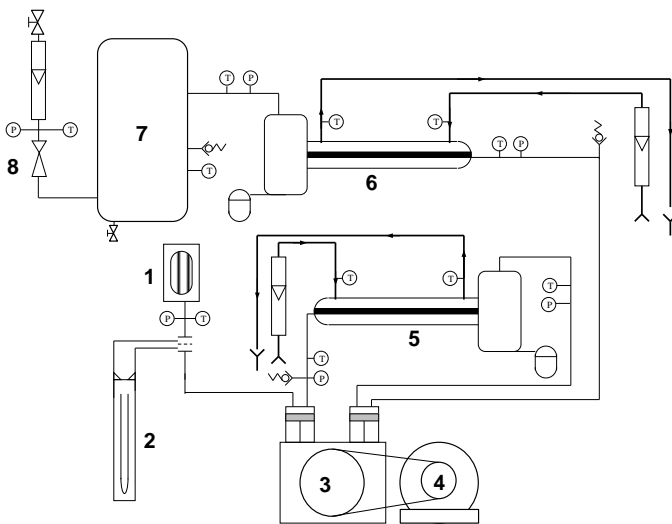
The robust design of this equipment makes it suitable for use in schools.

Its anodized aluminum structure on multidirectional wheels with brakes gives it a very robust as well as a high flexible integration into your premises.

The manufacturing of this equipment meets European machine directive

## Illustrations

## Technical details



### 9. Instrumentation

- Ten air temperature sensors and water at different points of the installation with a multi-line digital indicator
- Six pressure manometers (at the suction and discharge of each stage, for example)
- Three safety valves
- A differential pressure manometer
- A diaphragm
- An air float flowmeter
- Two cooling water flowmeters 30 - 300 L/h
- A wattmeter
- An engine rotational speed sensor with digital indicator
- An engine torque sensor with digital indicator
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### 1. Air filter

### 2. Measure of air flow intake for diaphragm and manometer in U

### 3. Air compressor

- Compressor with two-stage piston
- Volume sucked to treat: 39 m<sup>3</sup>/h
- Maximum pressure: 11 bars
- Rotational speed 1450 rev/min

### 4. Electric engine

- Power: 4 kW
- Rotational speed: 3000rev/min
- Engine in balance for torque measurement
- Control of the speed of rotation by variator (from 1800 to 3000 rev/min)

### 5. Exchanger air-water first stage

- Tubular exchanger cooled by water (exchange at counter-current)
- Water separator with automatic drainer at the output

### 6. Exchanger air-water second stage

- Identical to the 1st stage

### 7. Compressed air storage tank

- Conforms to requirements of pressurized equipment
- Volume 100L
- Purge valve at the bottom part and safety valve

### 8. Measurement of the flow rate of compressed air

- Automatic pressure reducer for the output pressure control (3 bar)
- Float flowmeter
- Control valve at the output and exhaust silencer

# PCB200



## Services required

- Electrical supply : 400 Vac – 50 Hz – 10 A
- Electrical network : 3 phases + Neutral + Earth.
- Water supply : 15 L/min – 2 bars
- Water drain : on the floor
- Tank air volume: 100 L
- Dimensions: (LxWxH mm): 2500 x 800 x 2000
- weight (Kg): 250

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

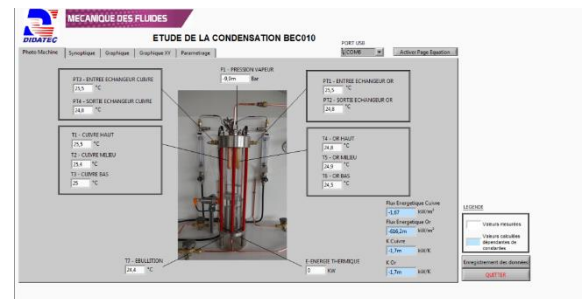
- User's manual
- Pedagogical manual
- Technical documentation of the components
- Lab exercises
- Software
- Certificate of conformity CE

## Supervision

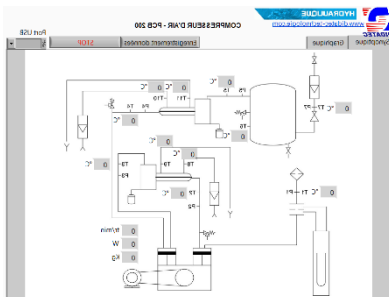
The bench is also originally equipped with a supervision and parameter setting software. The connection to the PC is made by a standard USB port. The software is divided into three parts:

### MACHINE PHOTO:

We find in this window the photo of the machine with the location of the different measures of the process and their values.



### BLOCK DIAGRAM :



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

### GRAPH :

We find in this graph window, the possibility of drawing the measurements curves depending of time by selecting the desired quantities.

