

## FLUID DYNAMICS AND STUDY OF PUMPS



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### Experimental capabilities

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- Study of regular pressure losses
- Piping of different diameters (DN15, DN25)
- Piping smooth or rough of the same diameter (DN15)
- Study of singular pressure losses
- Elbows of different angles (180°, 135°, 45°)
- Short radius elbow (180°)
- Long Radius elbow (180°)
- Three different types of valves (diaphragm, bushel and needle)
- Sudden increase in diameter (DN15 - DN25)
- Sudden decrease in diameter (DN25 - DN15)
- Bernoulli's Theorem
- Study of a venturi Plexiglas
- Study of a Plexiglas diaphragm
- Study of the characteristic curve of a centrifugal pump
- Study of a pump network in series or in parallel
- Influence of rotational speed
- Yield curve of a pump

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## Operating principle

The BCD350 bench allows the study of the pressure losses of the various piping components (elbows, fittings, valves and pipings).

A pump sucks water from a tank and sends it in a hydraulic circuit comprising all the components.

It is equipped with a measurement outlet differential pressure with quick connectors and a water column manometer with scale.

Users will need to vary the flow rate of water and measure the pressure losses of the components.

The bench is equipped with a precision flowmeter which allows to study the relation between flow rate and pressure drop for each element.

It also allows the study of centrifugal pumps of the same characteristics.

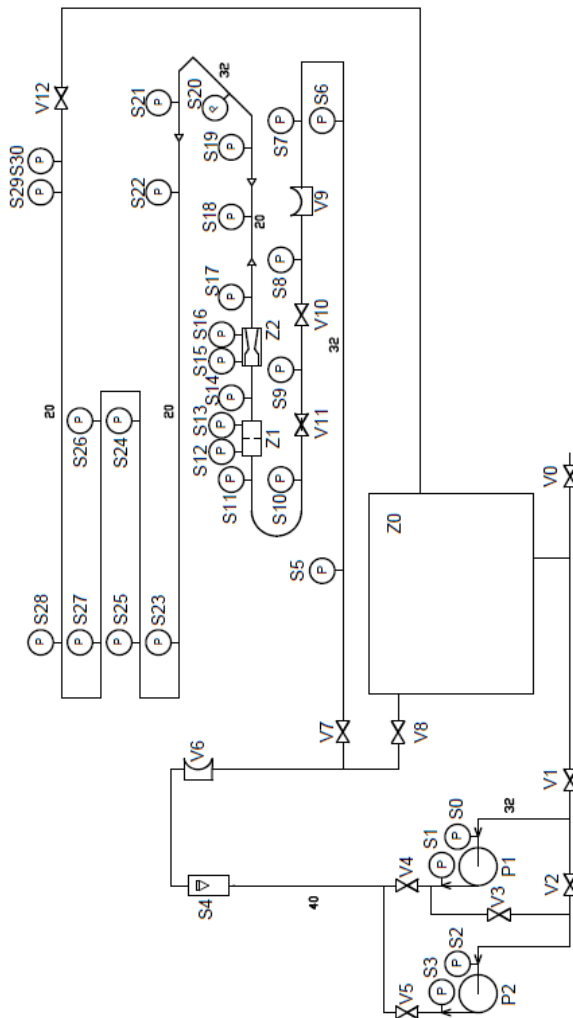
It is also equipped with two pumps, the latter can be studied alone, coupled in series or in parallel. Users will select different couplings and measure the following characteristics: flow rate, suction pressure, discharge pressure, rotational speed electrical power for different operating points. The robust design of this equipment makes it perfectly suited for school use.

Its anodized aluminum structure on wheels makes it very robust as well as a great flexibility of integration into your premises.

The manufacturing of this equipment meets the European machine directive.

## Illustrations

## Technical details



### Translucent PVC piping

Membrane flow rate control valve  
Valve of circuit pressurization

### Horizontal working plane

Piping of different diameters DN15, DN25 1 m  
Piping smooth or rough of the same diameter (DN15) 1 m  
Elbows of different angles (180°, 135°, 45°)  
Three different types of valves (diaphragm, bushel, needle)  
Sudden increase in diameter (DN15 - DN25)  
Sudden decrease in diameter (DN25 - DN15)  
Study of a venturi Plexiglas and plexiglas diaphragm

### Water tank in polypropylene

Volume: 75 L

### Multistage centrifugal pumps

Body, wheel and axle in stainless steel  
8 m<sup>3</sup>/h, 0.75kW, 45 mCE  
Variation in the speed by potentiometer  
Set of valves allowing the study of a pump alone, two pumps in series / parallel

### Electromagnetic flowmeters

Scale : 5-300 L/min

### Manometer at the circuit output

Scale : 0-4 bar

### Four sensor pressure

Scale : - 1-10 bars  
Pressure at suction and discharge of each pump

### Differential pressure sensor

Scale : 0-4 bars, self sealing quick connectors in stainless steel

### Measuring the rotational speed of the pumps

Numerical indicator of the rotational speed

### Measuring the electrical power

Digital power indicator used by the operating pump(s)

### Water column manometer

Scale up to 800 mm, self sealing quick connectors in stainless steel

# BCD350



## Services required

- Power supply: 230 VAC – 50 Hz – 20 A
- Electrical supply Type: 1 phase + Neutral + Earth.
- Water supply: 15 L/min – 3 bar (tank of 75 L)
- Dimensions: (LxWxH mm): 2700 x 800 x 1800
- weight (Kg): 160

## Documentation

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

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

## Illustrations



*Illustration self sealing quick connectors in stainless steel*

## Included with the installation: Touch Pad of supervision

<p>The screenshot shows the 'PAGE MESURES' interface for the BCD350. It features a large digital display for 'Débit' (Flow rate) showing '12345 l/h'. Below this, there are two pump control panels, 'POMPE 1' and 'POMPE 2'. Each panel includes a status indicator for 'Etat Variateur' (Prêt, Marche, Défaut), a 'RAZ DEFAULT VARIATEUR' button, and a speed control slider for 'Vitesse Pompe' ranging from 0% to 100%. A red emergency stop button labeled 'ARRET' is also visible for each pump.</p>	<p>Display and control of the evolution of measures process</p> <p><b>On/Off pump 1</b> Control speed of rotation of the pump 1</p> <p><b>On/Off Pump 2</b> Control speed of rotation of the pump 2</p> <p>The state of the drives of each pump</p> <p>The measurement of the water flow in L / h</p>
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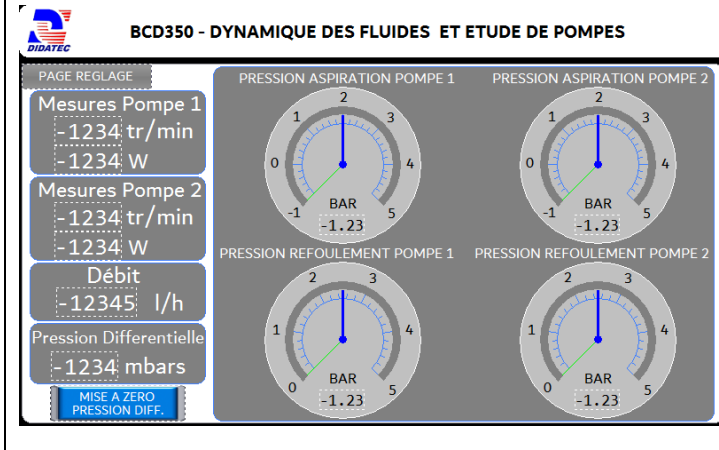
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Illustrations non contractuelles / Illustrations not contractual

version : FT-BCD350-STD-C

# BCD350



On the setting page we find the following information:

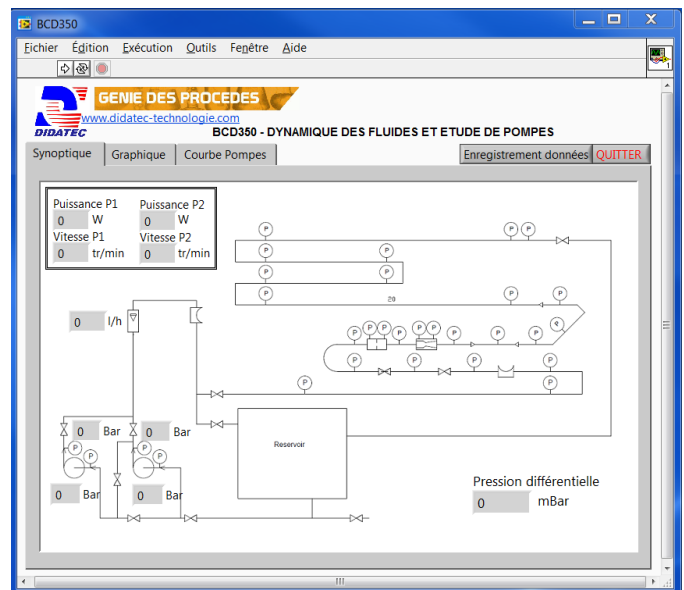
- Suction manometer of the pump 1
- Discharge manometer of the pump 1
- Suction manometer of the pump 2
- Discharge manometer of the pump 2
- Measuring pressure drops in mbar pipes
- Measurement of the electrical power of pumps 1 and 2
- Measurement of rotational speed of pumps 1 and 2
- Measurement of the water flow in L / h

## Monitoring: Parameter setting, Plot of curve

The bench is also equipped as standard with a monitoring and configuration software. The connection towards the PC is made via a standard USB port. The software is divided into three parts:

### Synoptic:

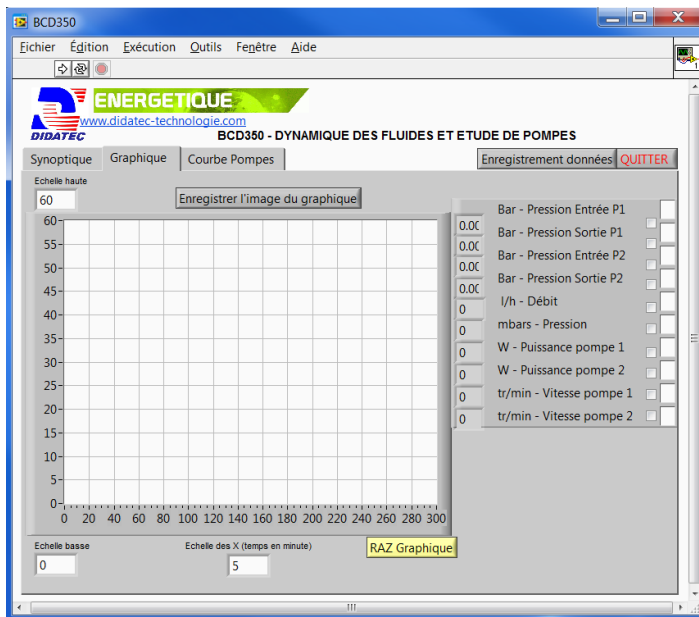
We found in this window the hydraulic diagram of the machine with the location of various measures of the process and their values.



# BCD350



## 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.

## CURVES QH OF THE PUMPS:

In this window, there is the possibility of drawing a pump curve QH in automatic mode.

Select a pump and set the flow rate on the machine using the control valve. After the flow rate is set, the student records the measurement by clicking directly on "point taking". The curve is constructed automatically.

