



FLUID MECHANICS

POWER SUPPLY FOR HEAT EXCHANGERS



DL DKC011

This unit represents the main element of the whole heat exchange system. With this module, it is possible to provide hot and cold water to heat exchangers. It is also possible to measure temperatures and flow rates in each element.

All the connections used in this equipment are self-sealant type, quick couplings allow a fast and simple change of different exchangers avoiding possible losses of fluid. The connections of hot and cold water are different to avoid a wrong connection.

TRAINING OBJECTIVES

- Heat transfer demonstration.
- Comparison between different types of heat exchangers.
- Comparison of results between converge-current flows and counter-current flows.
- Transfer coefficient measurement and effects of flow rate and temperature differential measurement.
- Calculation of energy balances and efficiency.

Note:

- The plate heat exchangers are not included in this module. (At least one exchanger is necessary for the correct use of the system)

TECHNICAL DESCRIPTION

The module has a hot-water tank with a capacity of 4.5 liters, with an electronic controller of temperature and level. An electromechanical valve fills in the tank automatically when necessary. The system water storage is protected against overheating, low water level and tank overflow.

The pumping system has a bypass that can facilitate the operating of the pump and can allow a better stabilization of the conditions in the tank.

TECHNICAL DATA

- Computer controllable heater from 0 to 1.5kW
- Peripheral pump:
 - Maximum flow: 10l/min (5M WC)
 - Power consumption: 180W
- Hot water circuit with bypass
- Maximum hot water temperature: 70°C
- Maximum hot water flow rate: 5l/min
- The unit is supplied with computer and an electronic control system.
- Dimensions: 730x1100x530 mm

Requirements:

- Power supply: 230V/50 Hz.
- Tap water supply: (minimum 5l/min)
- Sewage



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NECESSARY ACCESSORIES

PLATE HEAT EXCHANGER



DL DKC012

TECHNICAL DATA

- Dimensions: 440x250x150mm
- Number of plates: 20
- Heat transfer surface: 0,25 m²

TECHNICAL DESCRIPTION

In the plate heat exchanger, hot and cold flows pass through alternating chambers usually thin in depth, separated at their largest surface, producing heat transfer.

The advantage of this type of heat exchanger is the compact size, and therefore, its suitable use in small spaces. The supplied plates have a geometry that creates turbulence in the fluid, improving heat transfer.

TRAINING OBJECTIVES

- Balance of energies in the heat exchanger.
- Calculating the logarithmic average temperature difference.
- Determination of the overall transmission heat coefficient.
- Calculation of effectiveness.

SHELL AND TUBE HEAT EXCHANGER



DL DKC013

TECHNICAL DATA

- Dimensions: 440x250x110 mm
- Number of plates: 7
- Heat transfer surface: 0,021 m²

TECHNICAL DESCRIPTION

The shell and tube heat exchanger is one of the most used type in industry.

In this exchanger, the cold fluid passes through a number of parallel tubes and the hot fluid goes through a chamber containing the small cold tubes, thus producing heat transfer.

The advantage of this type of heat exchanger is the compact design and the possibility to work at higher pressures than other types.

This exchanger can operate with current or countercurrent flows.

TRAINING OBJECTIVES

- Balance of energies in the heat exchanger.
- Calculating the logarithmic average temperature difference.
- Determination of the overall transmission heat coefficient.
- Calculation of effectiveness.

TUBULAR HEAT EXCHANGER

TECHNICAL DESCRIPTION



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(concentric tubes)



DL DKC014

TECHNICAL DATA

- Dimensions: 440x250x100 mm
- Number of plates: 2
- Heat transfer surface: 0,0186 m²

The heat exchanger with concentric tubes is the simplest type. Its advantage is the easy design.

The module has two parallel tubes through which cold fluid flows; inside these tubes there is a smaller tube through which the hot fluid flows. The exchanger is made in two halves and it has thermocouples at the midpoints.

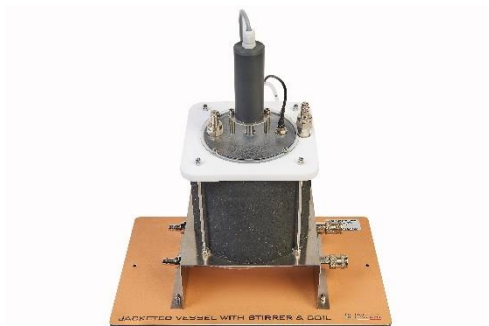
The learning process is very trouble-free thanks to the possibility to clearly see the temperature variation throughout the exchanger.

This exchanger can operate with current or countercurrent flows.

TRAINING OBJECTIVES

- Balance of energies in the heat exchanger.
- Calculating the logarithmic average temperature difference.
- Determination of the overall transmission heat coefficient.
- Calculation of effectiveness.

JACKETED VESSEL WITH STIRRER AND COIL HEAT EXCHANGER



DL DKC015

TECHNICAL DATA

- Dimensions: 440x250x430 mm
- Vessel inner volume: 1.840 cm³
- Serpentine length: 290 cm
- Heat transfer surface (vessel-coil): 0.044 m²
- Vessel outer volume: 1.691,5 cm³
- Heat transfer surface between inner and outer vessel: 0,0899 m²

TECHNICAL DESCRIPTION

This type of heat exchanger is commonly used in the process and chemical industries, when a well defined fluid temperature is required.

The exchanger can operate with a double wall vessel or a coiled tube; the module can also operate with a continuous flow in the vessel or heating a defined quantity of a liquid.

The exchanger includes a thermocouple that continuously measures the fluid temperature within the vessel and it includes also a variable-speed stirrer to test the effects in heat exchanger.

TRAINING OBJECTIVES

- Balance of energies in the heat exchanger.
- Calculating the logarithmic mean temperature difference.
- Determination of the overall transmission heat coefficient.
- Calculation of effectiveness.