

F - THERMODYNAMICS



AC 03.1 - HEAT PUMP DEMONSTRATION (pag. F - 1)



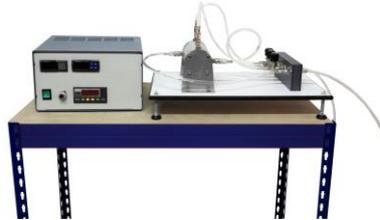
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AC 03.1 - HEAT PUMP DEMONSTRATION

The AC 03.1 equipment demonstrates clearly the operation of an air / water heat pump .

The system consists of: compressor, circulating pump, flow control valve, storage tank, condenser, filter / drier, expansion valve and evaporator fan, water flow meters, temperature sensors and pressure displays at strategic points circuit.

With this complete teaching unit, it can be studied with clarity the use of environmental energy to heat water.

The refrigerant absorbs ambient heat when passing through the evaporator with a fan, and subsequently transferred to the water in the condenser.

The hot water storage tank is equipped with an internal heat exchanger, which can be connected to the network, to exchange energy with the flow of water.

The heat absorbed by the water in the condenser, turn to hot water tank, where the heat energy can be exchanged with the flow of water.

The system is also ready to operate in open circuit, ie the mains water can enter directly to the condenser, which have instantaneous heating.

IT 03.2 - NATURAL AND FORCED CONVECTION HEAT TRANSFER

The IT 03.2 trainer is a very useful desktop unit for the study of heat transfer by natural or forced convection.

The equipment operation involves passing air through a duct, which is heated up by a series of elements with different geometric surfaces. A fan is installed for the study of forced convection .

The equipment has a hand-controlled module, and can also be connected to a computer by a USB. In addition to reading all the values, the equipment can be controlled from the software display on the PC (PC and software are not included).

The equipment to be used from a computer requires a 64-bit Operating System for Windows 7 or a later version.

TC 01.1 - HEAT EXCHANGER SUPPLY UNIT

The TC 01.1 equipment is the core of the whole heat exchanger. TC 01.1 is the module that provides hot and cold water to the heat exchangers, in addition to measuring the temperatures and flow rates for each device.

All connections are fast and self-sealant, allowing a quick and simple replacement of exchangers without any loss of fluid. The connections for hot and cold water are clearly differentiated to avoid mistakes.

The unit has a tank for hot water with 4,5 litre capacity, as well as electronic controllers both of temperature and water level. The water storage system is protected against overheating, low water level and overflowing.

TC 02.1 - WATER COOLING TOWER UNIT



The TC 02.1 unit operates a standard cooling method, used in the industrial sector. This method involves cooling hot water to environment temperature.

To this aim, air at environment temperature is blown in through the bottom of the tower by a fan. Meanwhile, the system sprays the hot water in the upper side of the tower, this water is cooled until environment temperature is achieved, then reheated and the process begins again.

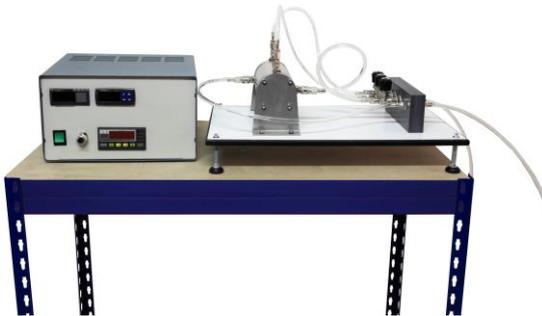
The water tank is equipped with a calibrated feeder that shows precisely how much water has evaporated during the process.

The unit is supplied with a computer that has the software already installed. This software can adjust the water and air flow through two PID controllers, while the screen shows the temperature and moisture degree in certain strategic points and at the push of a button all the relevant data is stored in a table.

The software displays the data for any given cooling tower, along with a diagram flow, to make the learning of the phenomenon easier.

Additionally, the software incorporates an automated calibration system.

TC 06.1 - HEAT CONDUCTION IN GASES AND LIQUIDS



One of the most commonly available systems to determine thermic conductivity for liquids and gas is the use of a cylinder with two adjacent, isothermal cylinders, separated by a small ring where the fluid under study is enclosed.

Training unit TC 06.1 simulates the same system, providing an opportunity for students to understand how thermal conductivity takes place whereas experimenting hands-on with the values for different samples of liquid and gas.

The tests allow to work out k thermic conductivity for samples of water, alcohol, oil, air, oxygen or carbon dioxide.

TD 01.1 - INTERNAL COMBUSTION ENGINE BENCH



The TD 01.1 equipment, has been designed for the study and understanding of the behavior of a gasoline four-stroke combustion engine.

With this equipment, the necessary tests can be carried out to obtain the data characteristic of the engine operation, thus familiarizing the students with the curves presented by the manufacturers of the same as a sample of their operation.

The internal combustion engine bench, has two engines, the engine to be tested, and therefore acts as such, in our case a four-stroke gasoline engine, and the braking system, which is constituted by a three-phase asynchronous engine controlled by a frequency inverter. The latter can function as both engine and generator.

COMPUTERIZED SYSTEM:

The Engine Test Bench (TD 01.1) is equipped with a complete computer system, which greatly streamlines the work of tests or experiments.

The system is able to control and register all the variables of the equipment.

The tests can be done manually or automatically, just indicate the required variables and indicate how many points we want the graph of results. This way you do not waste time in aiming results and drawing the graphs by hand.

TD 01.2 - DIESEL MOTOR ENGINE BENCH

Equipment designed for the study and understanding of the behavior of a four-stroke single cylinder diesel combustion engine.

The necessary tests can be carried out to obtain the data characteristic of the motor operation, familiarizing students with the curves presented by the manufacturers of the same as a sample of their operation.

The test bench for combustion engines has two motors, the motor to be tested, and therefore acts as such, and the braking system, which consists of a three-phase asynchronous motor controlled by a frequency inverter. The can function as both engine and generator.

COMPUTERIZED SYSTEM:

The Engine Test Bench (TD 01.2) is equipped with a complete computer system, which significantly streamlines the work of tests or experiments.

The system is able to control and register all the variables of the equipment.

The tests can be done manually or automatically, just indicating the required variables and indicate how many points we want the graph of results. This way you do not waste time in aiming results and drawing the graphs by hand.