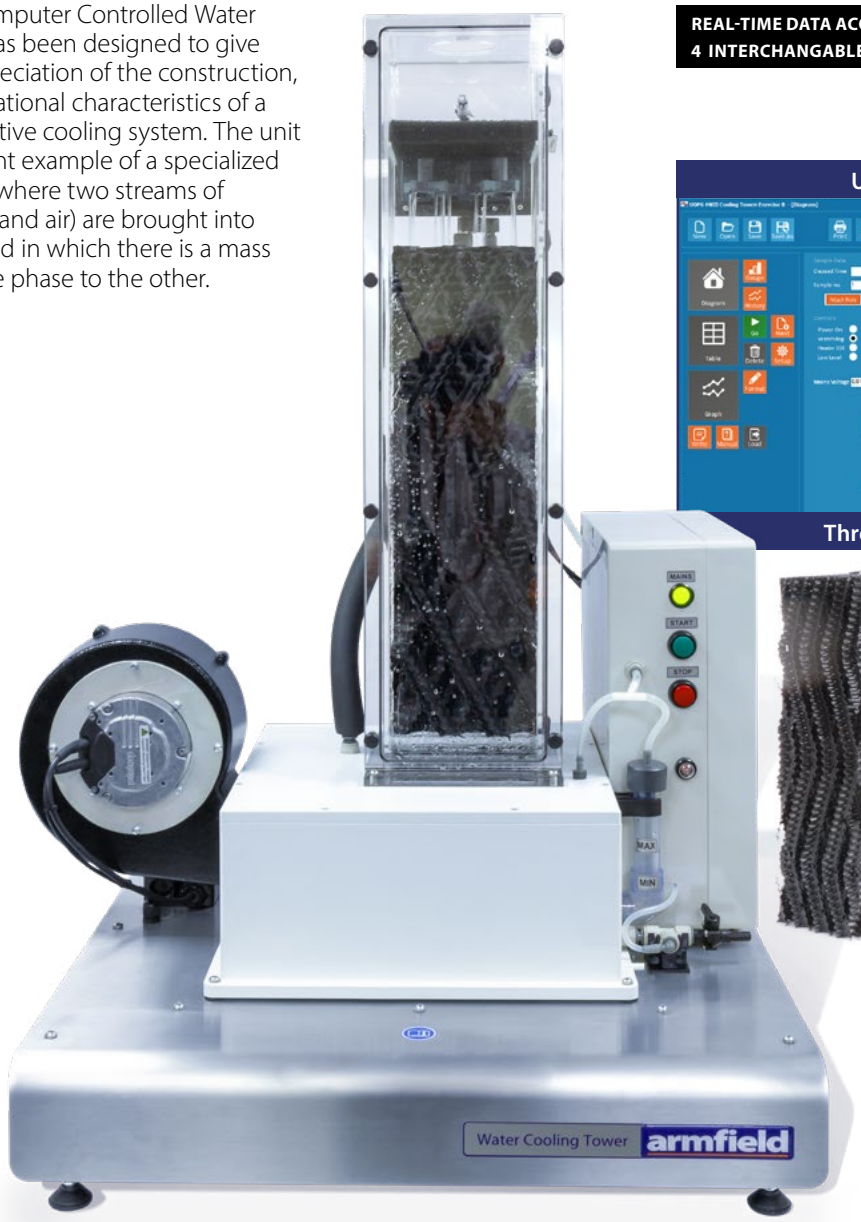
UOP SERIES

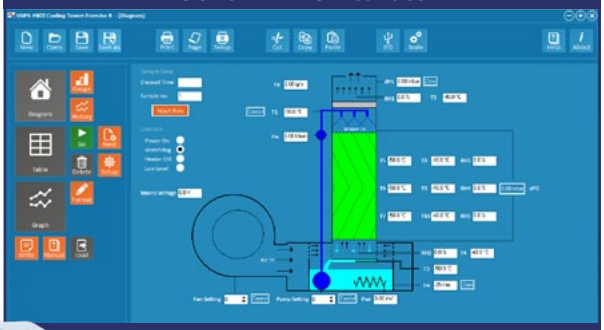
Computer Controlled Water Cooling Tower – UOP6 MkII

The Armfield Computer Controlled Water Cooling Tower has been designed to give students an appreciation of the construction, design and operational characteristics of a modern evaporative cooling system. The unit is also an excellent example of a specialized heat exchanger, where two streams of fluid flow (water and air) are brought into direct contact and in which there is a mass transfer from one phase to the other.

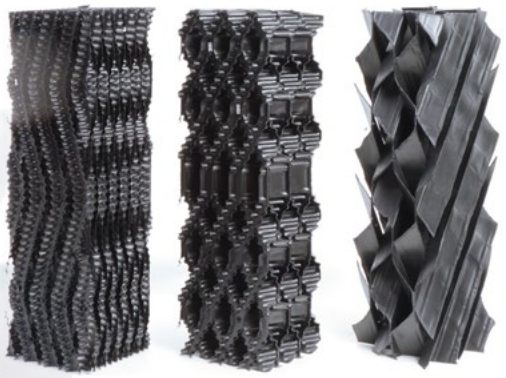
REAL-TIME DATA ACQUISITION
4 INTERCHANGABLE PACKING MATERIALS SUPPLIED AS STANDARD



UOP6-MKII-23 interface



Three densities of packaging



UOP6 MKII-23 accessory

Benefits of the new UOP6 MKII

- Measurements, computer control and data logging via USB port as standard
- Closed loop PID control of water temperature at entry to the tower for more versatile operation and more accurate results
- Four interchangeable sections of tower packing material supplied
- Two densities of packing material included for comparison
- Three different heights of packing can be compared
- User supplied material can easily be fitted into the tower for project work
- Uses true industrial packing material for more representative demonstrations
- Improved distribution of water onto the packing using an array of spray nozzles
- Electronic (software) control of water recirculation, air flow and heater power
- Electronic sensors measure flow of air and water, temperature of air and water and humidity entering and leaving the packing
- Modern electronic humidity sensors utilized, eliminating the need for high maintenance wet and dry bulb thermometers
- Water loss due to evaporation measured electronically
- Can be operated as a simple spray tower with no packing installed
- Optional Packing Characteristics Accessory UOP6-MKII-23 connected via second USB port

UK office - email: sales@armfield.co.uk tel: +44 (0) 1425 478781 (for ROW)
USA office - email: info@armfield.inc tel: +1 (609) 208-2800 (USA only)

Issue: 2
URL: http://www.armfield.co.uk/uop6mkii
Applications ChE IP

Requirements

Electrical supply:
UOP6-MkII-A: 220-240V/1ph/50Hz, 10A
UOP6-MKII-B: 120V/1ph/60Hz, 20A
UOP6-MKII-G: 220-240V/1ph/60Hz, 10A
Demineralised Water

Scale

Ordering specification

- Bench top unit to demonstrate operation of a forced draught cooling tower
- Computer controlled, supplied with Windows software
- Clear acrylic tower for visibility, dimensions 700 mm x 150 mm x 150 mm
- Removable front panel on the tower, allowing different packing materials to be tested
- Supplied with four blocks of industrial packing material giving two different packing densities and three different packing heights
- Full height of packing 500 mm
- Water reservoir with 1.75 kW (nominal) electrical heater
- Closed loop PID control of water temperature or constant power operation of the heater, variable from 0 to 1.75 kW (nominal)
- Software controlled variable speed water pump adjustable from 0 to 2.4 l/min
- Software controlled variable speed air blower adjustable from 0 to 65 g/s
- Electronic instrumentation includes flow of air and water, temperature of air and water and RH of air entering and leaving the packing
- Optional instrumented column available measuring water temperature, air temperature and RH at three different heights within the packing

Essential accessories / equipment

Windows PC (not supplied by Armfield)
Windows 7 or above with a USB port.
The software is provided on a USB.

Ordering codes

UOP6-MkII-A
UOP6-MKII-B
UOP6-MKII-G

Overall dimensions

Length	0.850m
Width	0.630m
Height	0.990m
Packed and crated shipping specifications	
Volume	1.1m^3
Gross weight	36.5Kg

Description

The UOP6-MkII comprises a cooling tower mounted on top of a heated water reservoir. The cooling tower is manufactured from clear acrylic for visibility, and has an easily removable front face to allow different packing materials to be inserted.

Two blocks of different density material and two blocks at reduced height are supplied as standard, but other material can be used for more advanced investigations.

Water is pumped from the reservoir to the top of the tower using a variable speed pump. An array of spray nozzles ensures an even distribution of the water throughout the column section.

As the water descends through the packing material it is cooled by the air flow from the variable speed fan, which blows air upwards through the tower.

Measurements of temperature and RH of the air at the inlet and outlet of the packing allow the change in moisture content of the air to be derived and the mass transfer due to the evaporative cooling to be calculated.

The water is heated by an electrical heater in the sump tank. This can be operated in a closed loop mode to control the water at a specific temperature, or it can be operated at a user defined power (continuously variable across the range) to simulate a fixed load system.

All controls and displays are incorporated in the software supplied with the unit. This can be run on any modern Windows PC (not supplied) and communicates to the hardware using the integral USB interface. From the software it is possible to change the pump and fan speeds, to control the heater and to display all the sensor values.

An optional Packing Characteristics Accessory UOP6-MkII-23 is available. This comprises a divided section of the standard packing, mounted onto a separate column. At three equal distance points within the packing, instrumentation is fitted to measure the water temperature, the air temperature and the RH of the air.

This option is supplied with its own electronic interface module and requires a second USB port on the computer.

Demonstration Capabilities

- Air flow rate on the performance of a cooling tower
- Air temperature on the performance of a cooling tower
- Water flow rate on the performance of a cooling tower
- Water temperature on the performance of a cooling tower
- Cooling load on the performance of a cooling tower
- Packing density on the performance of a cooling tower
- Packing height on t he performance of a cooling tower
- Operation at constant power (constant cooling load)
- Energy and mass balance across the air and water streams

Ordering options

UOP6-MkII-23: Packing Characteristics Accessory

Armfield standard warranty applies with this product