

**Computer Controlled Tray Dryer – UOP8-MKIIe**

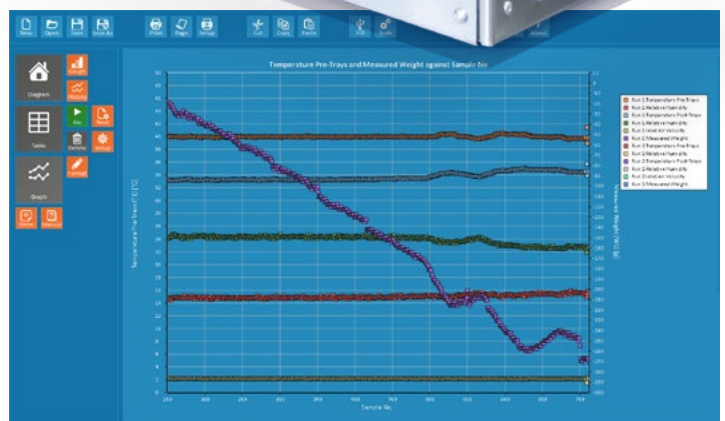
This small-scale benchtop tray dryer dries solids by passing a stream of hot air over trays of wet material, a method commonly used in industry.

It is applicable to the unit operations laboratory and also to food technology education and research.

**DEMONSTRATION OF DRYING RATE REGIMES  
HEAT AND MASS TRANSFER  
DRYING TESTS ON SOLIDS FOR INDUSTRIAL USE**



Control screen showing the mimic diagram, the UOP8MKIIe can be controlled remotely



Typical drying graph using the UOP8MKIIe datalogger (secondary axis shows the drop in moisture)

**Experimental content**

- ▶ Demonstration of drying rate regimes
- ▶ Heat and mass transfer
- ▶ Drying tests on solids for industrial use
- ▶ Effect of temperature and air velocity on drying rates
- ▶ Use of psychrometric charts

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Applications  
**ChE IP**

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## Description

The UOP8-MKIIe comprises a square air duct fabricated from stainless steel. Air is drawn into the duct through a mesh guard and flow damper by an axial flow fan. The fan speed can be controlled to produce a range of air velocities in the duct. The air passes over an electrically heated element with electronic closed-loop control, which provides stable air temperatures at the user-selected value.

A tray carrier is located in the central section of the duct, which can hold up to three trays of material to be dried. The UOP8-MKIIe is supplied with three lightweight coated aluminium trays suitable for food applications. The trays are inserted or removed from the duct through a latched side door with an acrylic panel for viewing purposes. The total weight of the trays and the carrier is measured using three load cells and is displayed on the software. A graph of weight against time allows the drying regimes to be displayed and understood. From the rate of change (slope) of this graph the drying rate can be determined.

Comprehensive instrumentation is included and the measured values recorded on the computer:

- ▶ Weight of trays plus contents (with tare function)
- ▶ Temperature (dry bulb) and relative humidity of the heated air before the trays
- ▶ Temperature and relative humidity of the air after passing over the trays
- ▶ Air velocity

From each pair of temperature and relative humidity readings the full thermodynamic properties of the air can be determined using a psychrometric chart, ie the wet bulb temperature, the moisture content and the changes in enthalpy. This allows for a more in-depth analysis for project or research work, for example comparing the change in moisture content of the air with the rate of moisture loss from the trays. The user must have a PC with a USB port, running Windows 7 or above.

## Requirements

## Scale



### ▶ Electrical supply:

UOP8-MKIIe-A: 220-240V / 1ph / 50Hz, 13 amp

UOP8-MKIIe-B: 120 / 1ph / 60Hz, 13 amp

UOP8-MKIIe-G: 220-240V / 1ph / 60Hz, 13 amp

## Ordering specification

- ▶ A compact desktop tray dryer suitable for laboratory use
- ▶ Computer control of temperature and air flow rate, with sophisticated data logging and analysis software
- ▶ Capacity: up to 2.1kg of wet material
- ▶ Flow rates 0.4 to 3.0 m/s over trays
- ▶ Temperatures up to 80°C at 0.4 m/s (less at higher flows)
- ▶ Integrated electronic weight measurement to determine drying rate
- ▶ Electronic measurement of temperature and humidity before and after the drying trays
- ▶ Electronic measurement of air flow
- ▶ Stainless steel construction

## Overall dimensions

Length	1.78m
Width	0.340m
Height	0.315m
Net weight	60kg

## Packed and crated shipping specifications

Volume	0.5m <sup>3</sup>
Gross weight	100Kg

## Software

The unit is supplied with a powerful educational software package, which includes a wide range of facilities and functions.

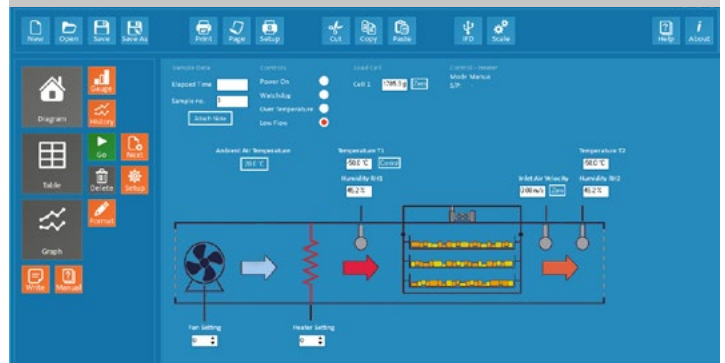
The computer is the primary interface between the user and the equipment.

A mimic diagram displays the process in real-time with readings from the relevant sensor inputs and control outputs displayed numerically.

Results can be displayed graphically, or in tabular format, with full control over the displayed graphs, including scaling, axes and which variables are displayed.

The data is exportable to general purpose spreadsheets or word processors as applicable.

### Mimic diagram for the computer-controlled UOP8MKIIe Tray Dryer



## Features

- ▶ Stainless steel construction
- ▶ Computer control of air flow rate and temperature
- ▶ Full data logging
- ▶ Integrated electronic weight measurement to determine drying rate
- ▶ Electronic measurement of temperature and humidity before and after the drying trays
- ▶ Electronic measurement of air flow



## Essential Accessories

Software requires the user to have a PC running Windows 7 or above with a USB port.

## Ordering codes

- ▶ UOP8-MKIIe-A: 220-240V / 1ph / 50Hz / 13 amp
- ▶ UOP8-MKIIe-B: 120V / 1ph / 60Hz / 13 amp
- ▶ UOP8-MKIIe-G: 220-240V / 1ph / 60Hz / 13 amp

**Armfield standard warranty applies with this product**

## Knowledge base

- > 28 years expertise in research & development technology
- > 50 years providing engaging engineering teaching equipment

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