

**Computer Controlled Air Conditioning Unit – RA2**

The RA2 is a fully instrumented bench mounted air conditioning duct for teaching all aspects of air conditioning systems.

**REAL-TIME DATA LOGGING  
BENCH TOP UNIT**



**Features**

- ▶ Transparent duct for visibility of the process and the components
- ▶ Pre-heaters, humidifier, chiller/dehumidifier and reheaters
- ▶ Temperature and relative humidity (RH) sensors at every stage of the process, plus an air flow sensor
- ▶ RH sensors calibrated for maximum accuracy
- ▶ Suitable for both vocational training and academic analysis of the thermodynamic principles involved
- ▶ Computer controlled with real time data logging of results (requires a PC not supplied by Armfield)
- ▶ Capability of using PID control for preheat, humidity and reheat allows stable conditions to be set up for investigations

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URL: <http://www.armfield.co.uk/ra2>

Applications

ChE ME CE IP

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## Description

The RA2 duct is a bench top unit fabricated from clear acrylic and mounted on a painted mild steel support frame.

An axial fan moves air through the duct. Heating elements are used to heat the air. Humidification is provided by steam from the boiler.

The steam boiler for the humidifier, the compressor and condenser for the refrigeration system and the electronic control box are all mounted beneath the duct.

Temperature and RH sensors record the temperature and relative humidity at every stage of the operation.

The air flow is measured by an electronic sensor. The mains supply voltage is monitored in the equipment to allow calculation of effective heater powers.

## Experimental content

- ▶ Gain an in-depth understanding of an air conditioning system by demonstrating the effects of essential air conditioning processes: cooling, heating, humidifying and dehumidifying
- ▶ Simulate different air conditioning environments and perform measurements to allow psychrometric data analysis
- ▶ To investigate and understand the use of psychrometric charts, understand relative humidity (RH) measurements and the effect of temperature on RH and understand the Humidity Ratio
- ▶ To investigate sensible heating of air in a duct
- ▶ To investigate the humidification of air
- ▶ To investigate the effect of vapour content and temperature on relative humidity
- ▶ To investigate dehumidification of air by cooling
- ▶ To investigate and understand the effect on enthalpy, understand relative humidity (RH) measurements and the effect of temperature on RH and understand the Humidity Ratio

## Technical specification

Transparent duct	200mm x 200mm
Pre-heater	400w
Re-heater	200w
Humidifier total volume	5ltr
Humidifier unit	2kW
Evaporator	500w @20°C
Air velocity sensor Hot film anemometer	0-10m/s
Temperature / Relative humidity sensor x 4: 10 to 100% relative humidity	Duct inlet
	Before the evaporator
	After the evaporator
	Duct outlet

## Overall dimensions

Length	1.72m
Width	0.40m
Height	0.62m
<b>Packed and crated shipping specifications</b>	
Volume	1.2m <sup>3</sup>
Gross weight	150Kg

## Requirements



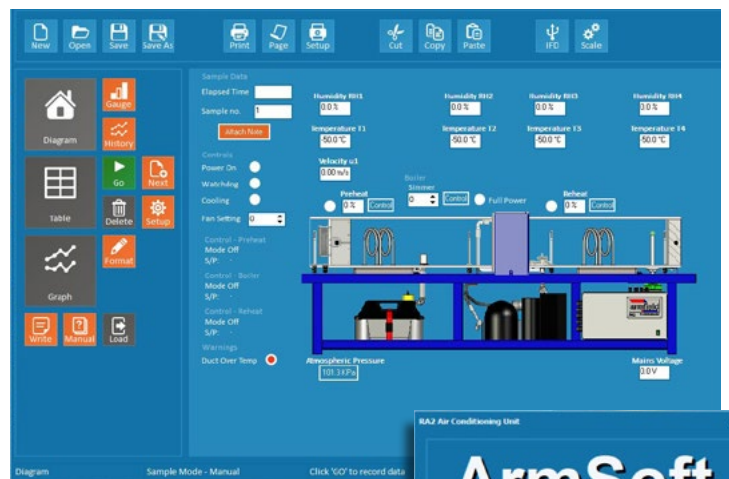
## Scale



- ▶ Electricity supply: Single phase (see ordering codes)
  - ▶ Distilled water required
- Software requires the user to have a PC running Windows 7 or above with a USB port.

## Ordering specification

- ▶ Air conditioning teaching system, complete with initial heating stage, humidifier, chiller/dehumidifier and final heating stage
- ▶ Transparent duct (200mm x 200 mm) for process visibility
- ▶ Computer controlled via USB interface
- ▶ Educational software including real-time data logging, graphics and data export
- ▶ Educational software, replicating the psychrometric chart calculations
- ▶ 4 sets of temperature and relative humidity measurements at the various stages of the process
- ▶ RH sensors come with calibration values which can be entered into the software for accuracy
- ▶ Electronic flowmeter to measure the air flow in the duct
- ▶ Dual control of boiler setting with a fast heat up setting and a gentle setting for control



*Powerful software is supplied with detailed mimic diagram and instructional help texts.*

*Comprehensive data logging and graph plotting facilities, together with sensor calibrations and a wide variety of display and data export options.*

## Ordering codes

- ▶ RA2-MKII-A: 220-240V/1ph/50Hz 13 Amps
- ▶ RA2-MKII-B: 110V/1ph/60Hz 25 Amps
- ▶ RA2-MKII-G: 220V/1ph/60Hz 13 Amps

**Armfield standard warranty applies with this product**

## Knowledge base

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

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

An ISO 9001:2015 Company



Products CE certified

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## Aftercare

Installation  
Commissioning  
Training  
Service and maintenance  
Support: [armfieldassist.com](http://armfieldassist.com)