



## FEATURES

- > Transparent Duct for full visibility of the process and the components
- > Includes pre-heaters, humidifier, chiller/dehumidifier and reheaters
- > Fully instrumented, with temperature and Relative Humidity sensors at every stage of the process, plus an air flow sensor.
- > RH sensors calibrated for maximum accuracy.
- > Suitable for both vocational training and for rigorous academic analysis of the thermodynamic principles involved
- > Fully 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

### Additional Features with RA3

- > Enclosed climate control chamber
- > Adjustable recirculation of air leaving the chamber back into the conditioning duct
- > Additional sensors, including refrigerant pressures and flow

## INSTRUCTIONAL CAPABILITIES

- > Understanding and using psychrometric charts, Relative Humidity and Humidity ratios
- > Sensible Heating and Cooling of air
- > Humidification and Dehumidification
- > Understanding Enthalpy

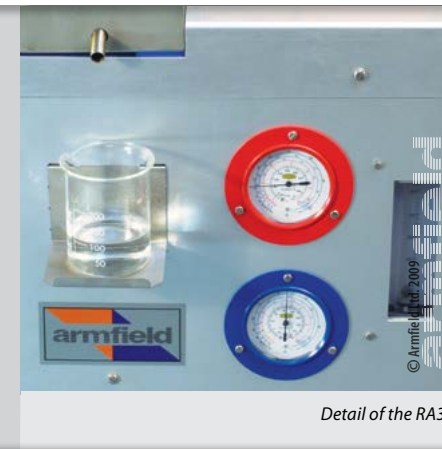
### Additional Instructional Capability with RA3

- > Energy savings with recirculation
- > Heat transfer across the evaporator

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

*RA3 is a floor standing unit, with all the facilities of RA2 plus a recirculation facility via an enclosed chamber. Some of the air exiting the chamber can be recycled back into the conditioning duct.*





## DESCRIPTION

The RA2 duct is fabricated from clear acrylic for visibility and mounted on a painted steel frame.

Air is drawn into the duct by a variable speed fan, and is passed through a flow straightener to the preheat heating elements. The air is then passed over a nozzle from a steam boiler, which allows the air to be humidified.

The next component in the duct is the evaporator of the integral refrigeration unit. As the air passes through the evaporator it is cooled down. The evaporator housing also allows any water which condenses from the air to be collected in an external vessel.

After the evaporator the air passes over the reheat elements and out through a louvered exit.

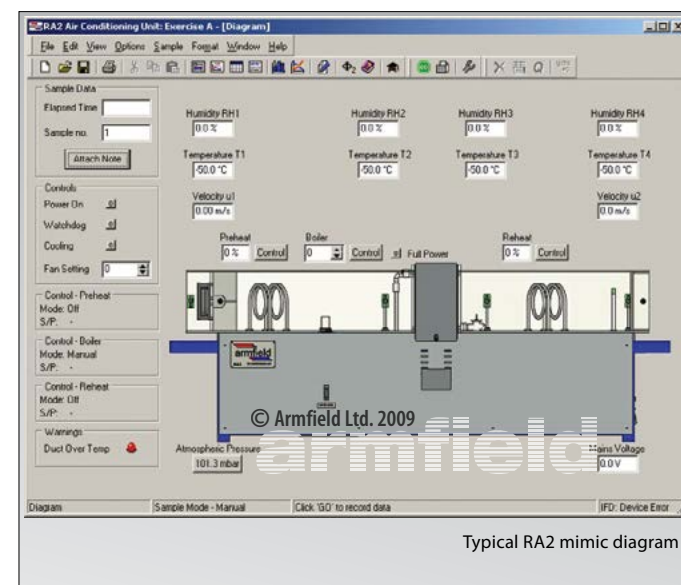
Temperature and RH sensors are provided at the air inlet, after the preheat and humidifier, after the evaporator and after the reheat. The air flow is measured by an electronic sensor. The mains supply voltage is monitored in the equipment to allow calculation of effective heater powers. Underneath the duct are mounted the steam boiler for the humidifier, the compressor and condenser for the refrigeration system and the electronic control box.

On RA3 the air out of the duct is passed into a chamber to demonstrate climate control. The exit duct from the chamber is fitted with adjustable vents allowing some of the air to be recirculated back to the duct inlet. Additional sensors measure the temperature and RH at the chamber outlet and after the recirculated air is mixed with the inlet air. Also the flow rate of the recirculated air.

The RA3 also includes pressure gauges and temperature sensors to allow the refrigerant temperature change across the condenser and evaporator to be established. The refrigerant flow rate is also measured using a variable area flowmeter.

## SOFTWARE DETAILS

*The RA2 and RA3 are controlled from a personal computer (not supplied) using a USB interface. Powerful software is supplied with detailed mimic diagrams, and full instructional help texts, comprehensive data logging and graph plotting facilities, together with sensor calibrations and a wide variety of display and data export options.*



Typical RA2 mimic diagram

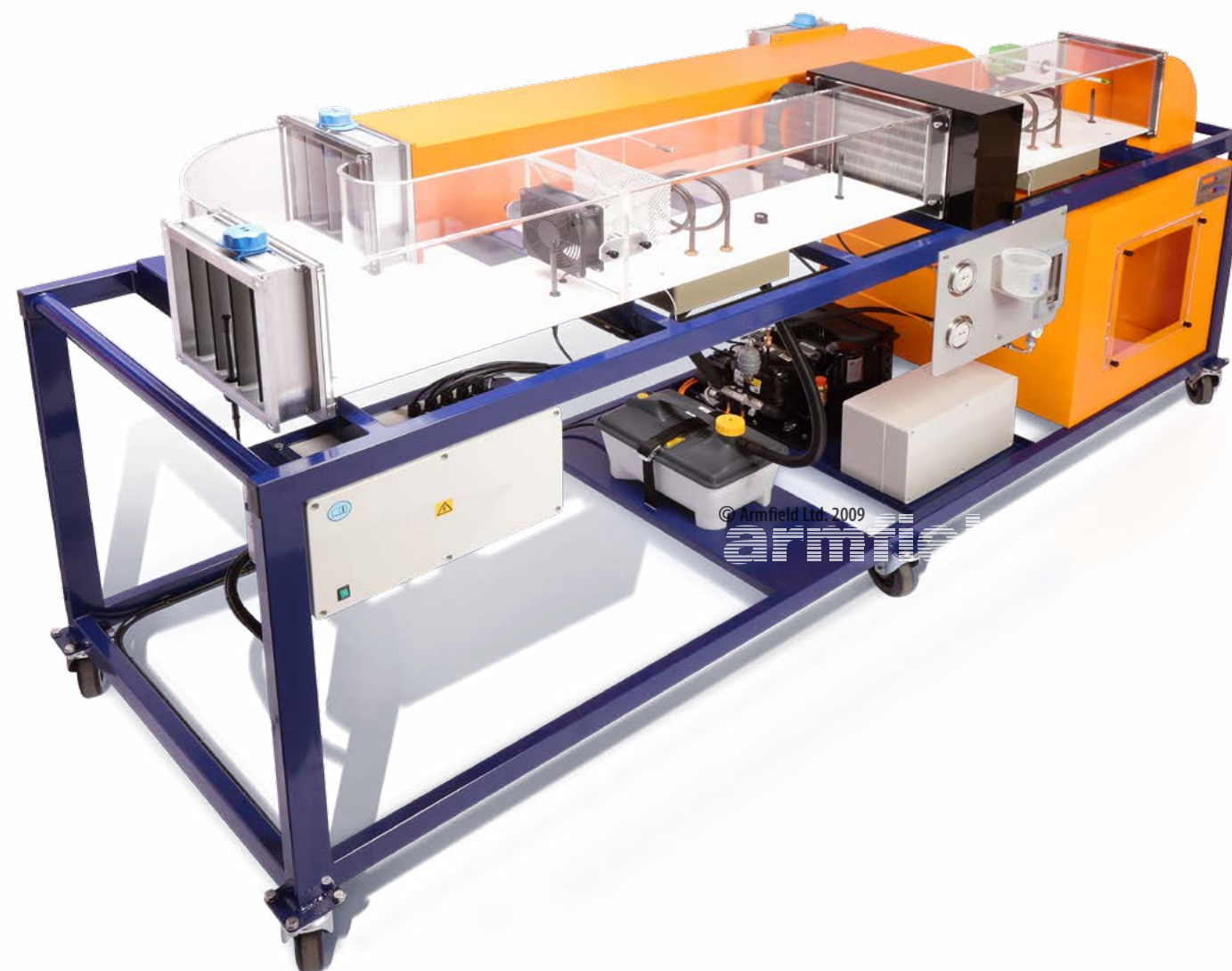
FOR FURTHER INFORMATION ON THE ADVANCED FEATURES OF THE SOPHISTICATED ARMFIELD SOFTWARE VISIT:  
[www.discoverarmfield.co.uk/data/armsoft](http://www.discoverarmfield.co.uk/data/armsoft)

## TECHNICAL DETAILS

Duct Size	200mm x 200mm
Air speed	variable to > 1m/s
Preheaters	400W
Final Heaters	200W
Refrigerant	R134a
Boiler Power	2KW nominal
Chiller Power	500W nominal
Chamber Volume (RA3)	230 litre

## COMPLEMENTARY PRODUCTS

- RA1 Vapour-Compression Refrigeration Unit
- TH1 Temperature Measurement and Calibration
- TH2 Pressure Measurement and Calibration
- TH3 Saturation Pressure
- TH4 Recycle Loops
- TH5 Expansion Processes of a Perfect Gas



## ORDERING DETAILS

RA2-A/B/G  
RA3-A/B/G

## ESSENTIAL ACCESSORIES

Personal Computer (PC), running Windows XP or above, with spare USB port (not supplied).

## REQUIREMENTS

Electrical supply:

Single phase electrical supply:

RA2-A/RA3-A:	220-240V	50Hz	13A
RA2-B/RA3-B:	115V	60Hz	25A
RA2-G/RA3-G:	230V	60Hz	13A

## OVERALL DIMENSIONS

	RA2	RA3
Length:	1.72m	2.45m
Width:	0.40m	0.71m
Height:	0.62m	1.20m

## SHIPPING SPECIFICATION

	RA2	RA3
Volume:	1.2m <sup>3</sup>	4.5m <sup>3</sup>
Gross weight:	150kg	250kg

## ORDERING SPECIFICATION RA2

- Air Conditioning teaching system, complete with initial heating stage, humidifier, chiller/dehumidifier and final heating stage
- Transparent duct (200mm x 200 mm) for complete visibility of the process
- Computer controlled via USB interface, with complete educational software including data logging, graph plotting with real time updates, mimic diagrams, 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 best 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

## ORDERING SPECIFICATION RA3

- Complete Air Conditioning teaching system, complete with initial heating stage, humidifier, chiller/dehumidifier, final heating stage, climatic chamber with window, return duct and adjustable recirculation
- Transparent conditioning duct (200mm x 200 mm) for complete visibility of the process
- Computer controlled via USB interface, with complete educational software including data logging, graph plotting with real time updates, mimic diagrams, data export
- Educational software, replicating the psychrometric chart calculations
- 6 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 best accuracy
- Electronic flowmeters (2) measure the flow in each duct
- Measurement of refrigerant pressures, temperatures and flow
- Dual control of boiler setting with a fast heat up setting and a gentle setting for control



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