

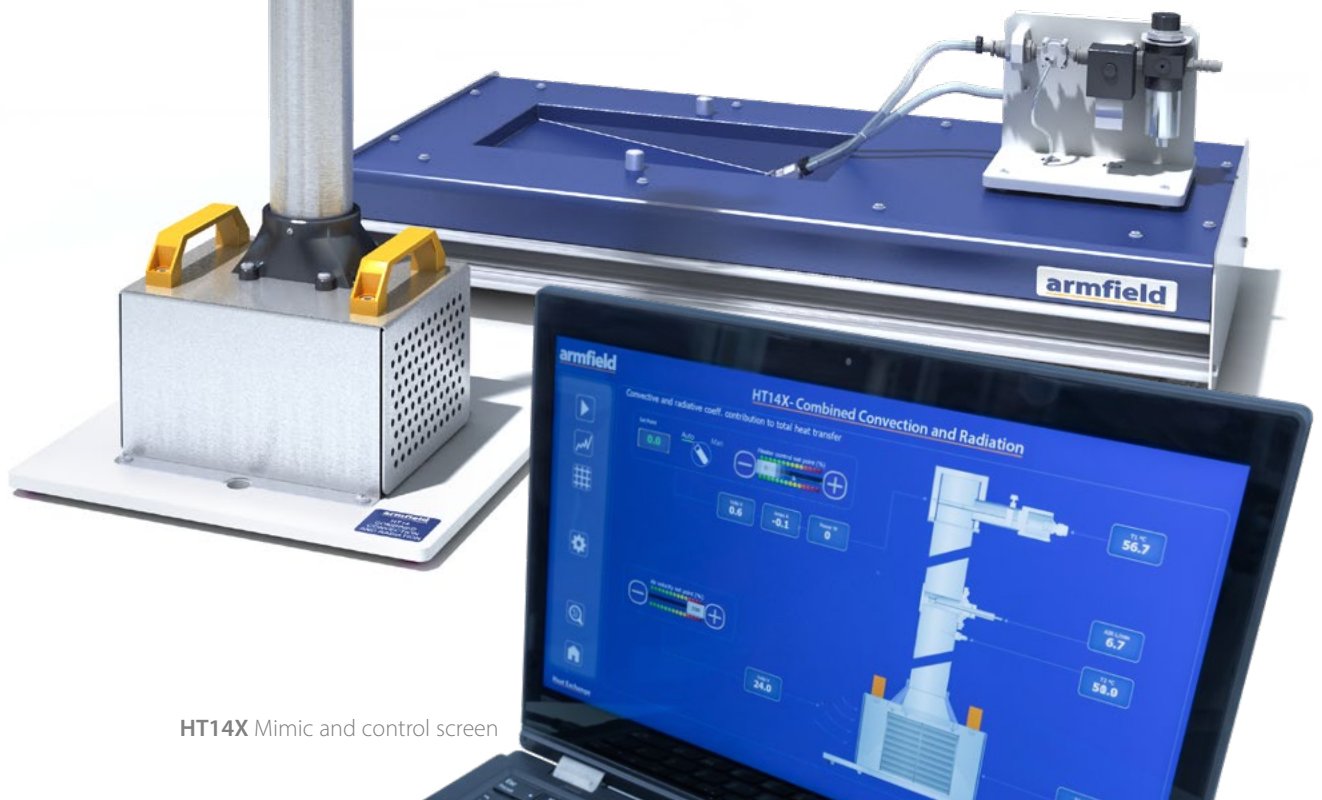
**HT  
SERIES**

The HT14X is one of a range of small scale heat transfer laboratory teaching accessories which demonstrate the basic modes of heat transfer (conduction, convection and radiation).

**Combined Convection and Radiation – HT14X**



HT14X Heated Cylinder with Guard



HT14X Mimic and control screen

**Hardware Description**

The equipment consists of a centrifugal fan with a vertical outlet duct. At the top of the duct there is a heated cylinder.

The mounting arrangement for the cylinder in the duct is designed to minimise loss of heat by conduction to the wall of the duct.

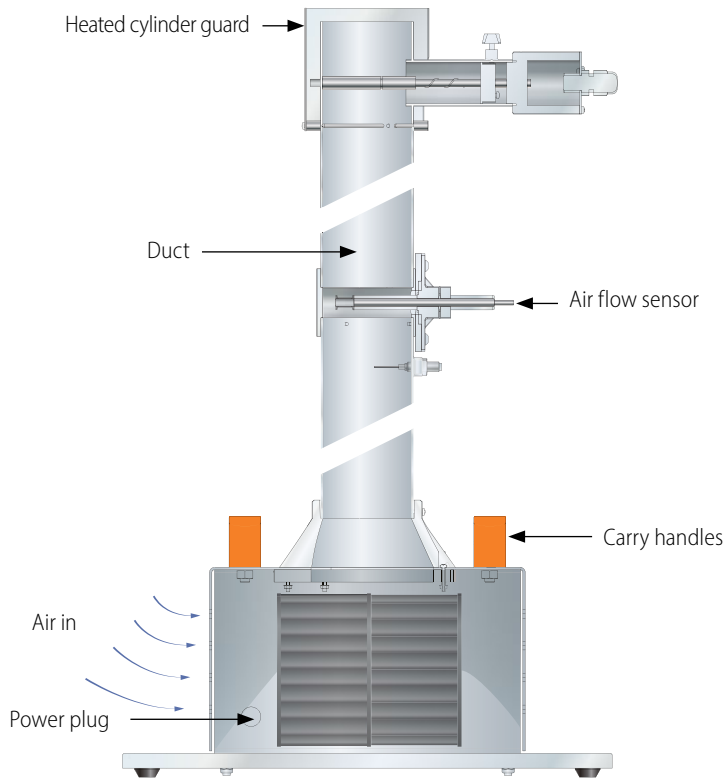
The surface of the cylinder is coated with heat-resistant paint which provides a consistent emissivity close to unity. A K-type thermocouple (T10) attached to the wall of the cylinder, at mid position, enables the surface temperature to be measured under the varying operating conditions.

ArmBUS controlled variable-speed fan blows air through the outlet duct. A vane-type anemometer within the fan outlet duct enables the air velocity in the duct to be measured. Air velocity can be set within the accuracy of  $\pm 0.05\text{m/s}$ .

A K-type thermocouple (T9) in the outlet duct allows the ambient air temperature to be measured upstream of the heated cylinder. PID controller allows rapid heater's temperature set-point achievement and control to  $\pm 0.1^\circ\text{C}$ .

## Experimental Capabilities

- ▶ Determining the combined heat transfer ( $Q$  radiation +  $Q$  convection) from a horizontal cylinder in natural convection over a wide range of power inputs and corresponding surface temperatures
- ▶ Measuring the domination of the convective heat transfer coefficient  $h_c$  at low surface temperatures and the domination of the radiation heat transfer coefficient  $h_r$  at high surface temperatures
- ▶ Determining the effect of forced convection on the heat transfer from the cylinder at varying air velocities



Schematic diagram showing construction of HT14X



Features include 6 axis customisable graph screen

## Requirements

## Scale

HT  
10X



All electrical requirements are obtained from the service unit

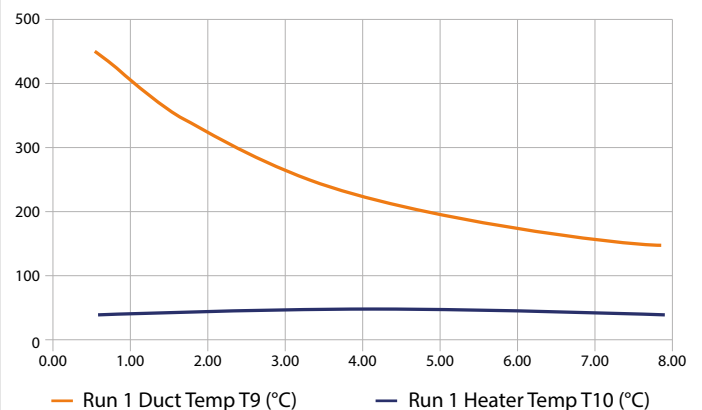
## Essential accessories

HT10X Computer Controlled Heat Transfer Service Unit

## Ordering specification

- ▶ A small-scale accessory to introduce students to the principles of combined convection (free and forced) with radiation from horizontal heated cylinder
- ▶ Comprises a heated cylinder mounted in a vertical air duct, with a fan at the base of the duct, which can be used to provide a variable air flow over the cylinder
- ▶ Heater rating 100W at 24V DC
- ▶ K-type thermocouples measure the air temperature upstream and the surface temperature of the cylinder
- ▶ Air flow velocity through the duct, under computer control
- ▶ A comprehensive instruction manual is included

Graph to show Duct Temp against Corrected Air Velocity  $U_c$  (m/s)



Typical result showing the effect of changing the air velocity obtained using Armfield educational software

## Overall dimensions

Length	0.35m
Width	0.30m
Height	1.20m
<b>Packed and crated shipping specifications</b>	
Volume	0.2m <sup>3</sup>
Gross weight	29kg

## Ordering codes

HT14X

Issue: 1

URL: <http://www.armfield.co.uk/ht10x>

Applications

Me ChE CE IP

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