

## HT SERIES

The Armfield Radial Heat Conduction accessories have been designed to demonstrate the application of the Fourier rate equation to simple steady-state conduction radially through the wall of a tube.



Radial Heat Conduction - HT12

Computer-Controlled Radial Heat Conduction – HT12C

### Hardware Description

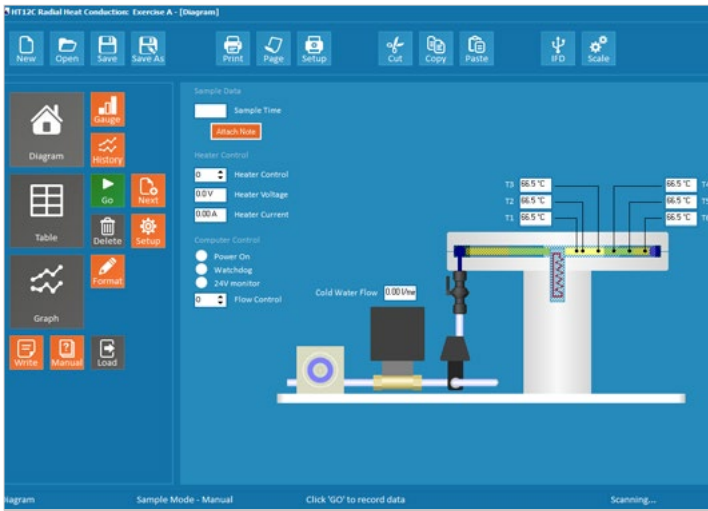
The arrangement, using a solid metal disk with temperature measurements at different radii and heat flow radially outward from the centre to the periphery, enables the temperature distribution and flow of heat by radial conduction to be investigated.

On the HT12C the heater power and the cooling water flow rate are controlled via the HT10XC, either from the front panel or from the computer software. On the HT12 these are controlled manually.

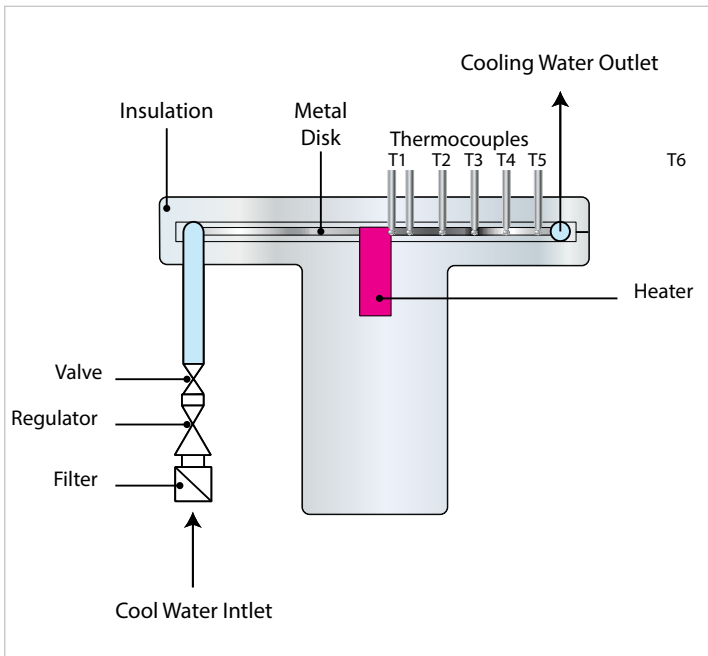
- ▶ The accessory comprises a solid disk of material, which is heated at the centre and cooled at the periphery to create a radial temperature difference with corresponding radial flow of heat by conduction.
- ▶ Six K-type thermocouples are positioned at different radii in the heated disk to indicate the temperature gradient from the central heated core to the periphery of the disk.
- ▶ The radial distance between each thermocouple in the disk is 10mm.
- ▶ Quick-release connections facilitate rapid connection of the cooling tube to a cold water supply. A pressure regulator is incorporated to minimise the effect of fluctuations in the supply pressure.
- ▶ A control valve permits the flow of cooling water to be varied, if required, over the operating range of 0-1.5 l/min.
- ▶ The cooling water flow rate is measured by a turbine type flow sensor (HT12C only).
- ▶ An optional cooling water flow rate sensor "SFT2" is available upon request for the HT12 connecting directly into the HT10XC service unit.

### Experimental Capabilities

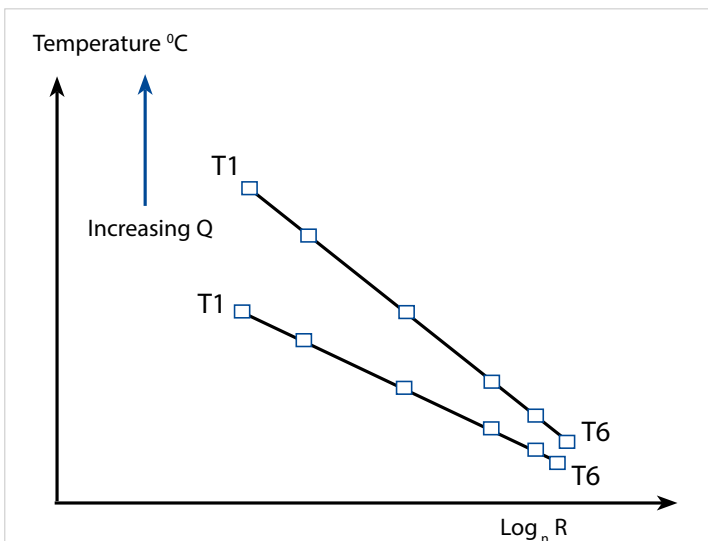
- ▶ Understanding the use of the Fourier rate equation in determining rate of heat flow through solid materials
- ▶ Measuring the temperature distribution for steady-state conduction of energy through the wall of a cylinder (radial energy flow)
- ▶ Determining the constant of proportionality (thermal conductivity  $k$ ) of the disk material



ArmSoft screenshot displaying mimic diagram of HT12



Schematic diagram showing construction of HT12



Temperature distribution for radial conduction through the wall of a cylinder

## Requirements

## Scale



**Cold water supply:** 1.5 l/min @ 1 bar

All electrical requirements are obtained from the service unit.

## Ordering specification

A small-scale accessory to introduce students to the principles of linear heat conduction, and to enable the conductivity of various solid conductors and insulators to be measured

Comprises a heating section, a cooling section, plus four intermediate section conductor samples and two insulator samples

The heating section, cooling section and one of the intermediate sections are fitted with thermocouples (eight in total) evenly spread along the length of the assembled conduction path

All sections are thermally insulated to minimise errors due to heat loss

Includes a water pressure regulator and a manual flow control valve

Computer-controlled unit includes an electronic proportioning solenoid valve to control the cooling water flow rate and a water flow meter

Heater power variable up to 60W

Water flow rate variable up to 1.5 l/min

Heating and cooling sections, 25mm diameter

A comprehensive instruction manual is included



## Essential accessories

HT10XC Computer-Controlled Heat Transfer Service Unit

## Overall dimensions

Model	HT12	HT12C
Length	0.35m	0.43m
Width	0.18m	0.18m
Height	0.19m	0.19m
Packed and crated shipping specifications		
Volume	0.03m <sup>3</sup>	0.04m <sup>3</sup>
Gross weight	5kg	6kg

## Ordering codes

HT12  
HT12C

Issue: 4

URL: <http://www.armfield.co.uk/ht10xc>

Applications

Me ChE CE IP

We reserve the right to amend these specifications without prior notice. E&OE © 2020 Armfield Ltd. All Rights Reserved

[armfield.co.uk](http://armfield.co.uk)