CONCENTRIC TUBE HEAT EXCHANGER

H953

Year 1
study

Features

- Plot classic 4 point temperature profiles through the heat exchanger in Concurrent and Counter–Current flow.
- Stabilises in minutes and allows rapid data collection.
- Investigate Logarithmic Mean Temperature difference, Overall Heat Transfer Coefficient and the Nusselt, Reynolds, Prandtl Relationship.
- Optional Computerised Data Acquisition Upgrade.

Description

The Hilton H953 Concentric Tube Heat Exchanger allows rapid measurement of surface and overall heat transfer coefficients in turbulent flow conditions. The unit is bench mounted and self-contained. It enables detailed temperature profiles, overall heat transfer coefficients and the important relationship between Nusselt, Reynolds and Prandtl Numbers to be established.

This is a classic concentric tube type with hot water flowing through the central tube while cooling water flows through the annular space. The heat exchanger has been divided into three equal sections in order to allow examination of the intermediate stream temperature conditions and temperature distribution through the heat exchanger. Thermocouples sense the hot and cold stream temperatures at the four stations and the wall temperatures on entry and exit.

Hot water provided by an electrical heater, is fed by a pump into the upper end of the central tube of the heat exchanger. The water cools as it flows through the heat exchanger, and on leaving passes through a flow meter and then back to the heating tank, where it is reheated.

Mains cold water passes through a combined flow control valve and flowmeter to a separate pair of valves mounted on the front panel. These valves direct the cold water to

either end of the heat exchanger and allow instantaneous flow reversal from concurrent to counter-current flow.

Related laws

- Nusselt, Reynolds, Prandtl Relationship
- Thermodynamics
- Heat Transfer
- Chemical Engineering
- Mechanical Engineering
- Building Services
- Marine Engineering
- Plant and Process Engineering
- Refrigeration
- Food Processing/Technology
- Air Conditioning

Learning capabilities

- Determination of heat transfer rate, logarithmic mean temperature difference, overall heat transfer coefficient and 4 point hot and cold stream temperature profiles.
- Determination of surface heat transfer coefficient inside and outside the tube, and of the effect of fluid velocity.
- Comparison of performance in concurrent and in counter-current flow.
- Investigation of the relationship between Nusselt (Nu), Reynolds (Re) and Prandtl (Pr) Numbers for Reynolds Numbers up to 65000 and for Prandtl Numbers between 2.5 and 5.0.
- Determination of the constants in Nu = k Rea Prb.

Technical Specification

- Panel: High quality GRP.
- Heat Exchanger: Concentric tube type. Area 0.0288m2.
- Water Heater: 3kW with electronic control .
- Pump: Continuous rated to circulate hot water.
- Flow Meters (1+1):- For hot and cold water.
- Digital Thermometer: 0.1ºC resolution, with multi-way selector switch.
- Cold water flow reversal valves: To establish concurrent and counter-current flow.

What's in the Box?

- 1 x H953
- 1 x Transformer (115V only)
- 1 x Funnel
- 1 x Reinforced hosing
- 2 x Blanking caps
- 1 x Power lead
- Instruction manual
- Packing list
- Test sheet

Weights & Dimensions

- Weight: 60 kg
- Weight: 64 kg (115V version)
- Length: 1060mm
- Width: 430mm
- Height: 920mm

Essential Services

- 3.2kW 220-240 Volts, Single Phase, 50Hz(With earth/ground).
- Line current up to 14A at 230v.
- 3.2kW 110-120 Volts, Single Phase, 60Hz(With earth/ground).
- Line current up to 28A at 110V.
- Cold Water: Continuous supply, 180 litres per hour at 20m head.

Ordering information

To order this product, please call PA Hilton quoting the following codes:
H953/230
H953/115
H953/230/HC
H953/115/HC