

RADIATION HEAT TRANSFER RIG

MODEL: HE 155



THE Radiation Heat Transfer Rig (Model: HE 155) has been specifically designed to provide students with sound grounding in the fundamental laws governing heat transfer by radiation. The unit is self-contained and suitable for bench-top use. The unit mainly consists of a mounting rack, radiant and light sources, accessories, instruments and control panel. Because of the similarities between the light transmission and thermal radiation, both are used in this unit so that a wide range of experiments can be covered.

DESCRIPTION

Most of the components found in this unit are mounted on a horizontal double rail track with adjustable feet supports. At one end of the track is a “plane black body” radiation source consisting of an electrically heated plate mounted in a casing so that its exposed face is in a plane perpendicular to the track. At the other end of the track is a diffused light source mounted in a casing which may be rotated about a vertical axis. Between these sources students may place either a heat radiation meter (radiometer) or a light meter, according to the

source in use. These meters indicate the intensity of heat or light received at their locations.

In addition, a number of accessories may be fitted to the track for a variety of experiments. The accessories include:

- i) Metal plates with attached thermocouple.
- ii) Two metal plates mounted so that the aperture between them can be varied.
- iii) Three acrylic filters.

The meter and all accessories are mounted in suitable carriers which position them about the centre line of the sources and a linear scale on the track assists accurate positioning. Electrical power for either the radiant or light source is supplied from a solid state regulator in the instrument panel.

The panel also includes a digital indicator displaying the temperature sensed by either of the thermocouples, and a digital indicator displaying the intensity of radiation received by the radiometer.

A standard industrial type light meter is supplied with this unit to be used in conjunction with the light source.

EXPERIMENTAL CAPABILITIES

- ◆ Demonstration of Inverse Square Law.
- ◆ Investigation of the relationship between the temperature of a surface and the rate at which heat is radiated.
- ◆ Demonstration of Kirchhoffs law applied to radiation.
- ◆ Effect of interconnecting geometry between radiating surfaces.
- ◆ Demonstration of Lamberts Cosine Law.

SPECIFICATIONS

A bench top unit for the demonstration of the fundamental laws governing thermal radiation by using both heat and light sources.

Mounting Track:

Parallel rails with adjustable feet and linear scale.

Radiant Source:

400 W heater embedded in a flat plate to provided a "black body" emitter.

Light Source:

40 W lamp with glass diffuser.

Accessories:

- Two metal plates with thermocouples
- Two aperture plates
- Three acrylic fillers

Instrumentations:

Radiometers : Moll type thermopile with digital indicator.

Range: 0 to 2,000W/m²

Thermometer : Digital display

Range: 20 to 600°C x 1°C.

Light meter : 0 to 20,000 lux, and
0 to 50,000 lux.

OPTIONAL ITEMS

- EI

DIGITAL INSTRUMENTATIONS

- i) 2 units of digital indicator
- ii) 1 unit of temperature sensor
- iii) 1 unit of radiometer

-DAS

SOLDAS DATA ACQUISITION SYSTEM

- i) A PC with latest Pentium Processor
- ii) An electronic signal conditioning system
- iii) Stand alone data acquisition modules
- iv) Windows based software
 - ◆ Data Logging
 - ◆ Signal Analysis
 - ◆ Process Control
 - ◆ Real-Time Display
 - ◆ Tabulated Results
 - ◆ Graph of Experimental Results

- CAL

SOLCAL COMPUTER AIDED LEARNING SOFTWARE

- i) Interactive multimedia features
 - ii) Graphical simulation
 - iii) Experiment results samples
 - iv) Full experiment manuals
-

REQUIREMENTS

Electricity supply : 240VAC/1-phase/50Hz

OVERALL DIMENSIONS

Height : 0.50m

Width : 1.40m

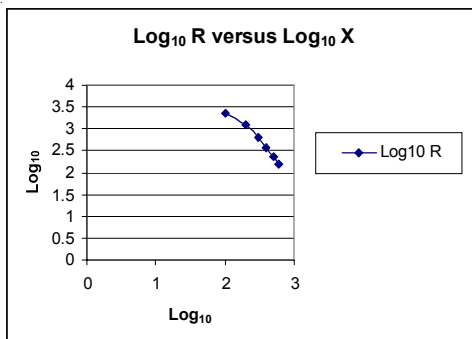
Depth : 0.30m

MANUAL

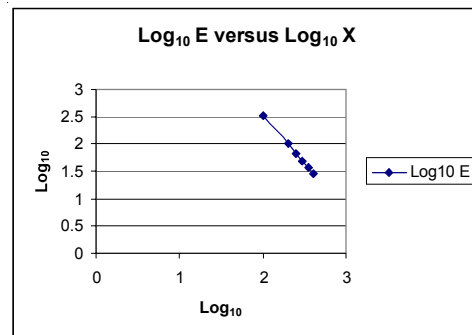
The unit is supplied with Operating and Experiment Manuals in English giving full descriptions of the unit, summary of theory, experimental procedures and typical experimental results.

TYPICAL EXPERIMENT RESULTS

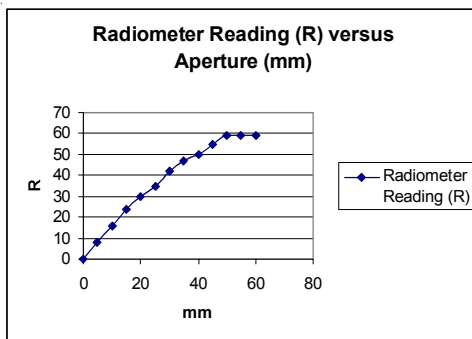
i) $\text{Log}_{10} R$ versus $\text{Log}_{10} X$



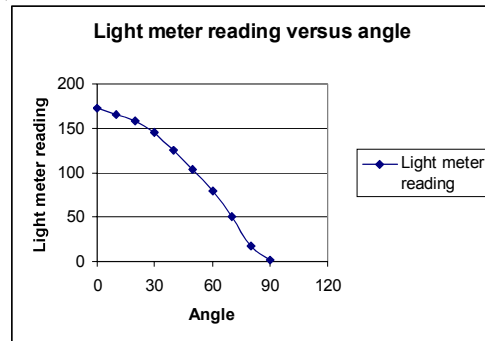
iii) $\text{Log}_{10} E$ versus $\text{Log}_{10} X$



ii) Radiometer reading (R) versus aperture (mm)



iv) Light meter versus angle

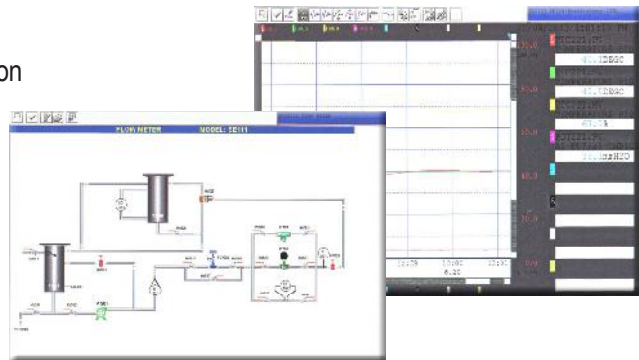


SOFTWARE & E - LEARNING

Our range of teaching equipment can be complemented with our SOLDAS and SOLCAL software.

SOLDAS™ - Supervisory Control & Data Acquisition

- Data Logging
- Signal Analysis
- Process Control
- Real-Time Display
- Tabulated Results
- Graph of Experimental Results

**SOLCAL™** - Computer Aided Learning

- Multimedia Features
- Interactive
- Graphic Simulation
- Experiment Result Samples
- Full Experiment Manuals



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