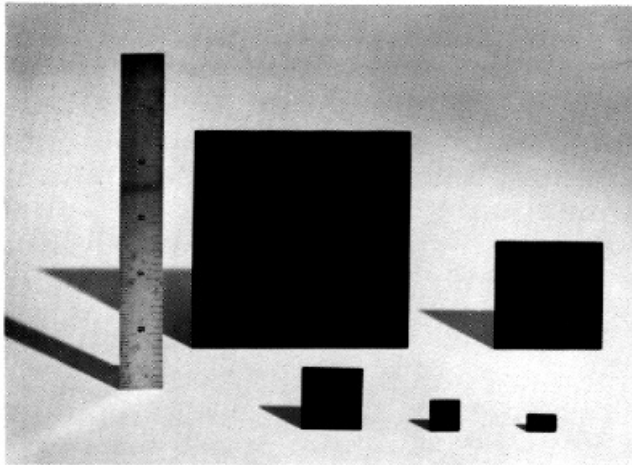


THERMAL FLUX METERS



APPLICATION

The Thermal Flux Meter is a solid state, flat -plate transducer designed to measure heat flow directly. This meter is placed upon any surface through which the heat flow is to be measured. The unit will measure either heat flow to, or from the surface being tested. In many cases, the meters may also be installed internally within any barrier with no loss of accuracy.

Application Areas Include:

- Building Heat Determination and "K" Factors
- Medical and Physiological Heat Flow
- Micrometeorology and Earth Heat Transfer
- Air Conditioning and Refrigeration
- Aeronautical and Space Technology
- Physical Property Measurements in Laboratory

OPERATION

The meter is attached to the heat transfer surface by the use of a suitable adhesive, tape, or clamp. The D.C. signal generated by the meter from the heat flow is conducted to the galvanometer or readout by means of a suitable cable. Measurements of heat losses from objects such as pipes can usually be accomplished by the use of the "C", "D", or "E" models, together with thermally conducting paste. When the meter attains thermal equilibrium with the heat transfer surface, the generated voltage will be proportional to the heat flux. When this output voltage (in millivolts) is multiplied by a specific calibration constant, which is supplied with

each meter, the resulting value will be the heat loss,/gain in terms of BTU/hr ft², or Watts/M².

For precise measurement of heat fluxes:

- Solid State Transducer
- Wide Temperature Range
- Linear Output
- High Accuracies
- Sensitivities to 7 BTU/HR FT² MV
- No Power Supply Required

PRINCIPLE

The flow of heat from, or to the surface whose heat flow rate is to be measured creates a small temperature difference between the upper and lower surfaces of the meter. These surfaces are in thermal contact with a special, miniature, high temperature thermopile which generates a direct current signal from the temperature difference. The signal is directly proportional to the heat flux through the meter. The hundreds of thermoelectric elements in each thermopile unit yield multi-millivolt signals which may be measured by a portable potentiometer, or recorder. Because each unit is self-powered, no external source of voltage , or power supply is required. The thermal resistance introduced by the meter is normally negligible for most practical applications.

CALIBRATION

ITI Thermal Flux Meters are individually calibrated at a base temperature of 70°F. An absolute calibration technique is used to determine the meter constant to the required accuracy. Each meter is supplied with its constant of calibration.. and a temperature correction curve for use at cryogenic and elevated temperatures.

SPECIFICATIONS

Temperature Range.....-425°F. to 600°F.
Material.....Polyimide-Glasses
Maximum Flux Density.....10⁵ BTU/hr ft²
Time Constant.....1 Second (approx)
Output Impedance.....30 to 1000 Ohms
Sizes.....1/4" x 1/2" to 12" x 12"
Accuracies.....10% to 1%
Sensitivities.....1 .7 to 1500 BTU/hr ft² mv.



STANDARD MODELS

Model No.	Accuracy	Nominal ³ Sensitivity (BTU Hr./ft ² Mv)	Temperature ² Range	Response Time	Thickness (Inches)	Length (Inches)	Width (Inches)	Material ¹
A	1%	7	-425°F to 550°F	1.0	0.055	4	4	Polyimide
B	3%	7	-425°F to 550°F	1.0	0.055	2	2	Polyimide
C	5%	50	-425°F to 550°F	1.0	0.055	1	1	Polyimide
D	10%	200	-425°F to 550°F	1.0	0.055	1/2	1/2	Polyimide
E	10%	200	-425°F to 550°F	1.0	0.055	1/2	1/4	Polyimide

CUSTOM MODELS

Many heat flux measurement requirements necessitate special thermal flux meter geometries. International Thermal Instrument Company specializes in custom meter manufacturing. Quotations will be sent upon receipt of specifications.

Meters are normally supplied with a baked, black enamel finish for high temperature operation. Most models may also be clad with stainless steel For other special coatings.

On request, all models may be supplied with a special, high absorptivity coating for radiation sensing applications.

- Note 1 . Each meter is supplied with recessed electrical connections in edges for attachment of lead wires. For use at 400° F. and above, a high temperature solder should be used to attach lead wires.
- Note 2. A copper-Constantan thermocouple can be installed in models "A", "B", "C", or Custom meters on request.
- Note 3. Large area (12" x 12" and 24"x24") meters with sensitivities to 1 .7 BTU/hr ft²mv. are available on special order.

Specifications for ITI Model ASP-10 High Response Heat Flux Transducer

Dimensions.....0.025" x 1.50" x 1.50"
 Sensitivity.....15 uv/BTU/hr ft²
 Materials.....Polyimide/glass/gold/Const.
 Accuracy.....2%
 Response Time.....0.25 Secs.
 Temperature (max).....500°F
 Thermal Conductivity.....0.115 BTU/hr ft²F
 Max. Flux Density.....2 x 10⁴ BTU/hr ft²
 Solvents.....No ordinary solvents
 Calibration.....ASTM C177-76

Specifications for ITI Model AHT-12-SP Heat Flux Transducer

Sensitivity.....5 BTU/hr ft² millivolt
 Dimensions.....0.120" x 12" x 12"
 Temperature (max.).....300°F, or 600°F (max.)
 Internal Resistance.....1000 Ohms
 Time Constant.....15 Secs. (Approx.)
 Material.....Polyimide/Glass (Waterproof)
 Heat Flow.....Bi-directional
 Accuracy.....1%
 Readout Required.....Portable Potentiometer or Recorder
 Cable.....Leads to be attached by customer to Binding posts provided.
 Equivalent Conductivity.....0.14 W/M²K

OTHER THERMAL INSTRUMENTS

Thermoelectric Calorimeters, Radiometers, Thermal Flux Standards, Thermal Conductivity Apparatus, Thermopile Modules, HEATPROBE™

