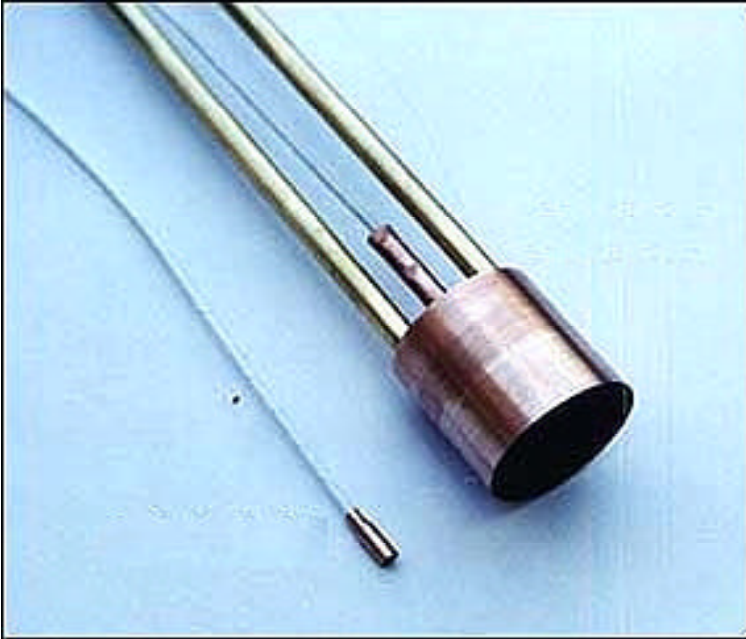


THE MORGAGE ?

Circular Foil

Heat Flux Gages

Rugged, all metal construction



1000 Series, Water Cooled

ADVANTAGES

- ? Continuous Cooling- Infinite Exposure Time
- ? Output Linear, unaffected by Temperature
- ? Wide Range of Sensor and Housing Combinations
- ? Guaranteed Quality- Warranted for 1 year

2000 Series, Conduction Cooled

ADVANTAGES

- ? Small Size
- ? Output Linear, unaffected by Temperature
- ? Wide Range of Sensor and Housing Combinations
- ? Guaranteed Quality- Warranted for 1 year

9000 Series, Radiometer (water-cooled)

ADVANTAGES

- ? Measures heat transfer from specific spectral wavelengths
- ? Output Linear, unaffected by Temperature
- ? Wide Range of Sensor and Housing Combinations
- ? Guaranteed Quality- Warranted for 1 year

Bezel Angles: From 0° to 171°

Typical lens materials:

Lens Material	% Transmission	Spectral Limit (microns)
Quartz	90	0.3 - 3
Salt	90	0.3 - 12
Sapphire	85	0.3 - 5
Calcium Fluoride	92	0.2 - 8
Zinc Selenide	70	0.6 - 17

Transducer Specifications

Housing Options

Diameter	Length	Flange
Water tube angles	Threaded	O-rings
Wrench flat/ hex	Nose Shape	Array
View angles	View direction	

Ranges for Full Scale Output (10mV):

0 to 5 Watts/cm² to 0 to 5000 Watts/cm²

Response Time (95% of a step function):

Varies with heat flux range.

0 to 5000 Watts/cm² => 3 milliseconds

0 to 5 Watts/cm² => 1 sec

Transducer Calibration Accuracy: ±3%

Repeatability: 1%

Sensitivity: Up to 2 mV/(W/cm²)

Transducer Coating: The factory applied base coat is high temperature black paint. It is selected for temperature stability and flat spectral absorbancy. Other coatings are available.

Operating Principles:

The Transducer is a differential thermocouple measuring the temperature difference between the center and the circumference of a thin circular foil disk. The disk is bonded to a circular opening in a cylindrical heat sink. The standard foil is made of Constantan and the heat sink is copper. These materials produce an output which is directly proportional to the absorbed heat flux.

1000 Series:

Water cooled circular foil heat flux gages are designed for applications with longer measurement times. The water removes the absorbed heat continuously. Water cooled units and conduction cooled units have identical specifications except that mounting conditions for the water cooled units are not critical, and exposure may be for an infinite duration.

2000 Series:

Conduction cooled circular foil heat flux gages are designed for applications with short measurement times in which the total amount of heat absorbed by the gage will not raise its temperature beyond 200°C.

9000 Series:

When constructed as a radiometer, convective heat flux is blocked from reaching the sensor by a window. The type of lens used in the window will determine the radiation bandwidth that reaches the sensor. The window is placed directly on the water-cooled copper surface to minimize its heating.

Output:

All transducers are designed for 10mV maximum output. Units may temporarily be overdriven to 15mV without damage or loss of calibration. Overdriving beyond 20mV will, however, damage the gage.

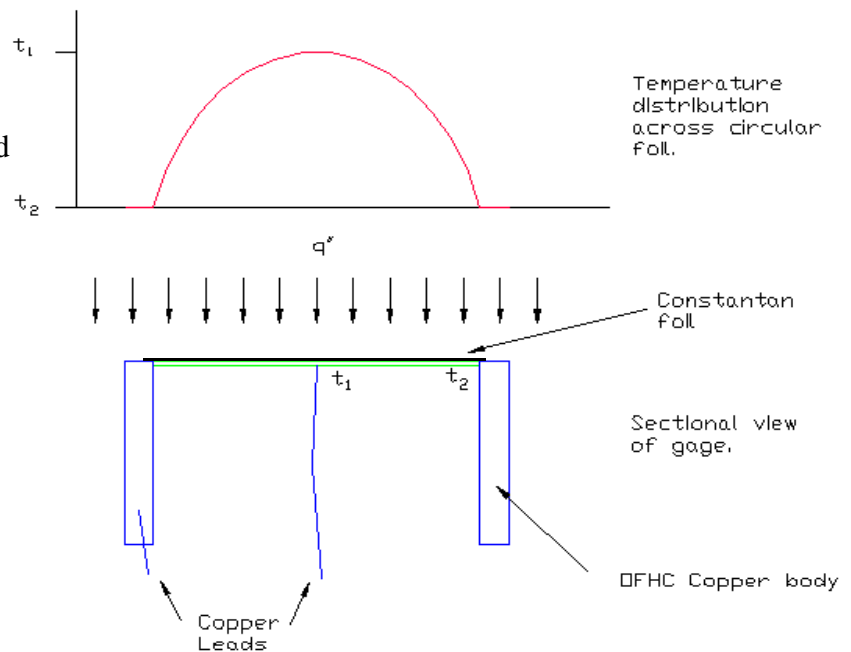
Calibration:

A continuous x-y calibration curve graph and NIST traceable calibration certificate are furnished with each transducer.

Amplifier:

AMP-11 can be used with many Thermogage™ Heat Flux Transducers to increase the transducer sensitivity. A frequent application is when fast response phenomena are to be measured. The fastest Thermogage™ Heat Flux Transducer has a response time of 0.003 seconds. However, this transducer has an extremely low sensitivity of 3,000 to 10,000 W/cm² for 10mV linear output. Measuring heat fluxes in lower ranges therefore requires use of the amplifier. For example, if we use such a transducer with a sensitivity of 3,000 W/cm² for 10mV output and connect it to the amplifier at 100 gain, the resulting sensitivity is 3W/cm² per mV output. Going to the other extreme, the most sensitive Thermogage™ Heat Flux Transducer has a sensitivity of 5W/cm² for 10 mV

output. This transducer can be used with the amplifier at 1,000 gain to produce a sensitivity of 0.0005W/cm² per mV and is sensitive enough to measure moonlight and other feeble heat sources such as the heat from the human body.



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