

## Operating Instructions



Fig. 1: Moll type thermopile with shielding tube 08479.01 and slit 08479.02

### 1 PURPOSE AND DESCRIPTION

The Moll thermopile serves as radiation sensor for a wide spectral region, from UV to far into longwave IR. The sensitivity is thereby constant in the wavelength range from 150 nm to 15  $\mu\text{m}$ . Fig. 2 shows a diagrammatic longitudinal section through the thermopile. The blackened detector area consists of thermoelements connected in series. The comparison soldered joints belonging to them are thermally embedded in the solid metal casing. The conical reflector increases the cross-section of the bundle of radiation which reaches the detector.

### 2 HANDLING

Connect the outlet sockets of the thermopile to a sensitive voltmeter. According to the experimental conditions, measurement ranges of between 30  $\mu\text{V}$  and 10 mV are suitable. As the protective window only has a low permeability, especially in the IR and UV regions, it must generally be removed when measurements are to be made. When measurements are made with strong light sources (visible region), it can be of advantage in exceptional cases to use the protective glass to suppress interfering thermal radiation. The thermopile is an exceptionally sensitive detector for thermal radiation. When an object which is only a few degrees warmer than the casing of the thermopile is placed in front of the thermopile opening, it causes a clearly measurable thermovoltage. Correspondingly, an object which is colder than room temperature (e.g. a vessel containing iced water) results in a thermovoltage of opposite polarity. Because of the large band width of the sensitivity, it can easily come to disturbing superpositioning of the actual measurement signal by, for example, the infrared radiation emitted from the body of the person carrying out the experiment. It must be clearly understood that every surface which is within the „visibility“ of the thermopile, and is warmer or colder than the casing of the thermopile, makes a contribution

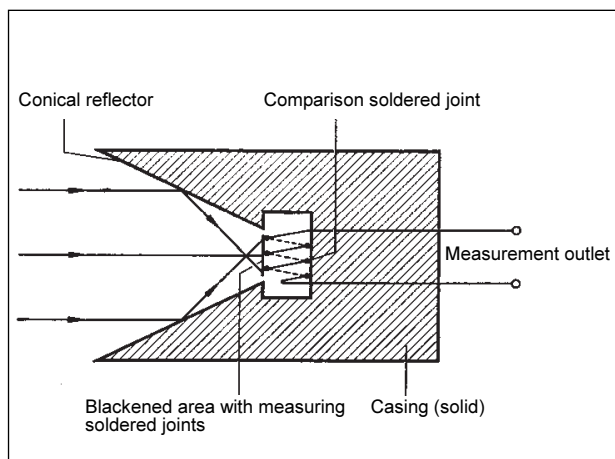


Fig. 2

to the outlet voltage. We therefore recommend the following measures to avoid faulty measurements:

- Narrow the spatial angle which the thermopile covers by attaching the shielding tube 08479.01, available as accessory, to it.
- At the start of measurement, ensure that the casing of the thermopile is at ambient temperature and that the zero point drift is as low as possible. Only take hold of the rod of the thermopile, never the casing.
- First screen off the source of radiation which is to be examined from the thermopile, e.g. with a metal screen (08062.00) which is at room temperature, and use the adjusting knob „Compensation“ to set the display on the amplifier used to „0“.
- After freeing the source of radiation, wait about 5 s before reading the measurement value, so that thermal equilibrium is reached at the sensor area of the thermopile.
- With long measurement series, regularly repeat the zero point compensation.



A slit which can be fitted onto the thermopile is available for the measurement of spectra. It has a white screen on which those parts of the spectrum which are not being measured are visible on each side of the slit.

### 3 >LITERATURE

University Laboratory Experiments, Physics: „3.17 - Stefan Boltzmann's Law of Radiation“ 00067.72

### 4 SPECIFICATIONS

|                               |                              |
|-------------------------------|------------------------------|
| Circular detector area        | $d = 10 \text{ mm}$          |
| Number of thermocouples       | 16                           |
| Interior resistance           | $10 \Omega$                  |
| Adjusting time                | $< 5 \text{ s}$              |
| Sensitivity                   |                              |
| (thermovoltage/radiant power) | approx. $0.16 \text{ mV/mW}$ |
| Distance, axis-rod end        | 180 mm                       |
| Casing diameter               | 34 mm                        |
| Length of casing              | 80 mm                        |

### 5 LIST OF EQUIPMENT

|                                  |          |
|----------------------------------|----------|
| Shielding tube for 08479.00      | 08479.01 |
| Slit, attachable, for 08479.00   | 08479.02 |
| Moving coil instrument           | 11100.00 |
| Range multiplier, 30 mic.V-10 mV | 11110.01 |
| or                               |          |
| Universal measuring amplifier    | 13626.93 |