

## Calibration source BR 400



### Features:

- Radiator temperature up to 400 °C
- Excellent homogeneity, precision & long-term stability
- Compact and rugged design
- Perfect for calibrating and testing infrared sensors
- Scope of supply: Calibration source, power supply cable, calibration certificate, manual

### General Specifications

|                        |   |
|------------------------|---|
| Ambient temperature    | 0 °C ... 50 °C (during operation)                                       |
| Weight                 | 4.5 kg  |
| Dimensions (H x W x D) | 325 mm x 230 mm x 230 mm  |
| Scope of supply        | Calibration source, power supply cable, calibration certificate, manual |

### Electrical Specifications

|                    |  |
|--------------------|--|
| Temperature sensor | Pt100  |
| Controller         | PID  |
| Power supply       | 230 V/ AC (±10 %)<br>(optional: 110 V/ AC model) |
| Power consumption  | Max. 1000 W                                      |

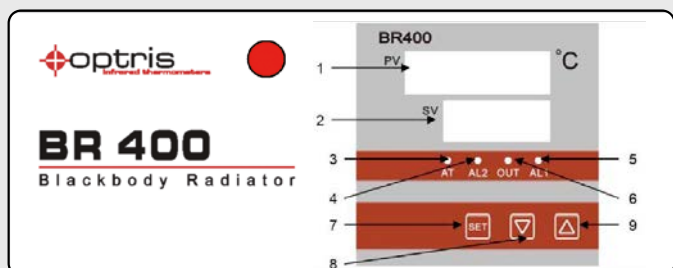
### Measurement Specifications

|  |   |
|--|---|
| Temperature range (at $T_{Amb} = 23\text{ °C}$ ) | $T_{Amb} + 5\text{ °C} \dots 400\text{ °C}$   |
| Accuracy   | $\pm 0.5\text{ °C}$ at 50 °C <sup>1)</sup><br>$\pm 1.0\text{ °C}$ at 100 °C <sup>1)</sup><br>$\pm 1.3\text{ °C}$ at 250 °C <sup>1)</sup><br>$\pm 2.0\text{ °C}$ at 400 °C <sup>1)</sup> |
| Temperature resolution                           | 0.1 °C  |
| Aperture   | 128 mm  |
| Emissivity                                       | 0.97 ± 0.02 (for 8–14 μm)   |
| Warm-up time                                     | 15 Min. (from 25 °C to 100 °C)<br>40 Min. (from 25 °C to 400 °C)  |
| Cool-down time                                   | 60 Min. (from 100 °C to 50 °C)<br>90 Min. (from 400 °C to 50 °C)  |

<sup>1)</sup> For exact temperature determination of calibration source we recommend the use of a reference infrared thermometer (e.g. optris CTlaser DCI).

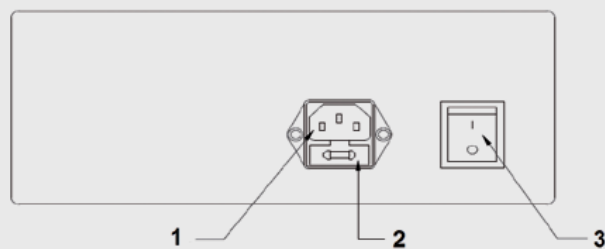
### Connection options

#### Bedienelemente Vorderseite: PID-Regler



- |                              |                   |
|------------------------------|-------------------|
| 1 Upper display (PV)         | 6 LED for heating |
| 2 Lower display (SV)         | 7 Function key    |
| 3 LED for auto adjust        | 8 Down key        |
| 4 LED for lower alarm output | 9 Up key          |
| 5 LED for upper alarm output |                   |

#### Bedienelemente / Anschlüsse Rückseite:



- 1 – Netzanschluss / 2 – Sicherung / 3 – Netzschalter

## How are infrared thermometers calibrated at Optris?

Infrared thermometers are calibrated with the help of reference radiation sources, so called black bodies. These radiant sources are able to produce different temperatures with a high stability (see also section The Black Body).

Knowing the exact value of the radiation temperature is essential for the calibration process. It can be measured by either using a contact thermometer (in combination with the determination of the emissivity) or a transfer standard infrared thermometer. This value can then be used to determine the device constant for an initial calibration of the infrared sensors. In order to conduct a post-calibration by customers or local calibration facilities, the calibration temperature should be near the temperatures which occur at the respective applications.

Optris makes use of a **transfer standard radiation thermometer CTlaser-PTB** (see figure) to measure the radiation temperature of a reference source. The CTlaser-PTB is based on the IR thermometer optris CTlaser. The CTlaser-PTB needs to be traceable to the international temperature scale from 1990 (ITS-90). Thus, it is calibrated by the PTB (German national metrology institute) on a regular basis.

ITS-90 is a very good approximation of thermodynamic temperature. It is based on 17 well-reproducible fixed values such as melting points of highly pure metals. Within the framework of ITS-90 the CTlaser-PTB is compared to national temperature standards from the PTB. This comparison within a closed chain of comparative measurements with a known uncertainty in measurement takes place on a regular basis.

Based on the CTlaser-PTB, Optris produces the **CTlaser-DCI as a high-precision reference IR thermometer for its customers**. The DCI units are produced with pre-selected components supporting a high stability of measurement. In combination with a dedicated calibration at several calibration points the CTlaser-DCI achieves a higher accuracy than units from series production.



Automated calibration stations at Optris GmbH

The optics of an IR thermometer is described by the distance-to-spot-ratio (D:S). Depending on the quality of the optics a certain amount of radiation is also received from sources outside the specified measurement spot. The maximum value here equals the radiation emitted by a hemispheric radiant source. The respective signal change in correlation with a resize of the radiation source is described by the Size-of-source effect (SSE).

As a result of this correlation all manufacturers of IR thermometers use accurately defined geometries for the calibration of their units; meaning depending on the aperture of the radiation source (A) a distance (a) between the IR thermometer and the reference source is defined. Thus, the value specified in datasheets and technical documentation as measurement field is in general a certain defined percentage of this radiation maximum – values of 90 % or 95 % are common.

Optris GmbH has **up-to-date in-house laboratories** which fulfill the mandatory requirements for calibration stations. When issuing calibration certificates it is not only the laboratory temperature and humidity that is documented but also the measurement distance and source diameter (calibration geometry).



optris CTlaser-PTB



certificates of PTB institute

