

BLIQ

Liquid cooled blackbodies



Fig.1. Photo of BLIQ-12D blackbody

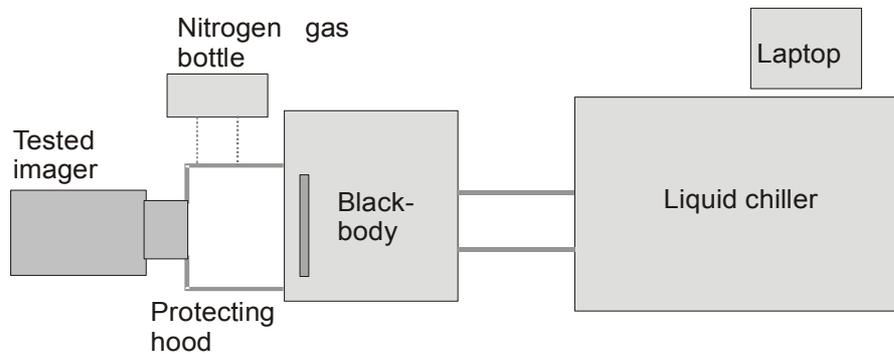


Fig.2. Block diagram of BLIQ-12D blackbody

BASIC INFORMATION:

TCB blackbodies are most popular blackbodies manufactured by Inframet. These are precision, differential, area blackbodies built using a single stage thermoelectric cooler/heater. Emitter size vary from 50x50mm to 500x500mm (option 1000x1000mm). They are designed to simulate cold/warm targets at temperatures from about 0°C to 100° C (optionally up to 170° C) when blackbody is working at typical ambient temperature about 20°C. When TCB blackbodies are used in temperature chambers at ambient temperature below -20C temperature then temperatures as low as -40C can be achieved.

BLIQ blackbodies are special version of TCB blackbodies designed to extend temperature range to sub-zero temperatures as low as -40°C when blackbody is working at typical ambient temperature about 20°C.

BLIQ blackbodies are built using three temperature regulators. First, standard Peltier element enables precision temperature regulation in range from

about 0°C to about 100°C. Second, liquid cooler is used to lower blackbody temperature to sub-zero region. Third, optional heater is activated when temperatures over 100°C are to be achieved.

Next, special hood is attached to BLIQ blackbody. This hood when filled using dry nitrogen gas and protects blackbody emitter against frosting or vapor condensation.

BLIQ blackbodies can be used to eliminate the need for expensive, big size and slow temperature chambers needed to achieve Earth temperature range including sub-zero temperatures.

The BLIQ blackbodies are characterised by excellent temperature resolution, temporal stability, temperature uniformity, and temperature uncertainty. All these features makes BLIQ blackbodies an ideal choice for blackbodies to be used as sources of infrared radiation in systems for testing/calibration thermal imagers/IR FPA modules or as temperature standards in national standard laboratories.

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LIMITATIONS:

BLIQ blackbodies eliminate potentially the need for expensive, big size and slow temperature chambers needed to achieve sub-zero temperatures needed in case of TCB blackbodies. However, there are several limitations.

1. Special hood attached to BLIQ blackbody is needed (delivered by Inframet). This hood must be filled with dry nitrogen gas to protect blackbody emitter against frosting or vapor condensation. Customer is expected to deliver dry nitrogen gas source.
2. There cannot be any holes in the hood where hot humid air can get inside the hood. The optics case of tested imager must fully cover the input hole in the hood.
3. The hood length must be at least equal the size of blackbody emitter. It means that the tested imager cannot be located at a very short distance to the emitter of the BLIQ blackbody.

FEATURES:

- Extremely wide temperature range
- Extremely good temporal stability: ± 2 mK (standard) and 1 mK (option)
- High speed, easy control from PC
- Very high resistibility to EMI (blackbody is integrated with controller)

SPECIFICATIONS

| Model | BLIQ-4D | BLIQ-6D | BLIQ-12D |
|-------------------------------------|--|--|--|
| Aperture | 100× 100 mm | 150× 150 mm | 300× 300 mm |
| Absolute temperature range | -40°C ÷ +100°C -40°C ÷ +170°C (option) | -30°C ÷ +100°C -30°C ÷ +170°C (option) | -30°C ÷ +100°C -30°C ÷ +170°C (option) |
| Set point and resolution | 1 mK | 1 mK | 1 mK |
| Emissivity | 0.97±0.01 | 0.97±0.01 | 0.97±0.01 |
| Temperature uniformity ¹ | <0.002x(T-25)+0.02 °C | <0.005x(T-25)+0.02 °C | <0.01x(T-25)+0.02 °C |
| Regulation stability | ±2 mK @ $\Delta T=10^\circ\text{C}$ | ±2 mK @ $\Delta T=10^\circ\text{C}$ | ±3 mK @ $\Delta T=10^\circ\text{C}$ |
| Total temperature uncertainty | (T-25°C)+12 [mK] | (T-25°C)+12 [mK] | (T-25°C)+12 [mK] |
| Approximate Heating Rate | +0.40°C/sec. at 25°C | +0.40°C/sec. at 25°C | +0.40°C/sec. at 25°C |
| Approximate Cooling Rate | +0.20°C/sec. at 25°C | +0.20°C/sec. at 25°C | +0.20°C/sec. at 25°C |
| Settling Time | <50 sec | <90 sec | <120 sec |
| Computer control | RS-232 (USB 2.0) RS485 (option) | RS-232 (USB 2.0) RS485 (option) | RS-232 (USB 2.0) RS485 (option) |
| Power requirements | 230VAC 110VAC - option | 230VAC 110VAC - option | 230VAC 110VAC - option |
| Max power consumption | 800 W | 1400 | 2600 |
| Operating temperature | 5°C to 40°C | 5°C to 40°C | 5°C to 40°C |
| Storage temperature | -10°C ÷ +60 °C | -10°C ÷ +60 °C | -10°C ÷ +60 °C |
| Relative humidity | 5% to 95%, non-condensing | 5% to 95%, non-condensing | 5% to 95%, non-condensing |
| Approximate mass | 12 kg - blackbody 22 kg - liquid cooler | 22 kg - blackbody 35 kg - liquid cooler | 25 kg - blackbody 48 kg - liquid cooler |

¹ Uniformity is measured for central part of the blackbody emitter of size equal to 90% of area of the emitter.

OPTIONS

| Option code | X | Y | Z |
|-------------|--|---|---------------------------------------|
| Description | extended temperature range up to 170°C | long range communication via RS485 up to 50 m | 110VAC power supply instead of 230VAC |

Version 1.3

CONTACT: Tel: +48 604061817

Fax: +48 22 3987244

Email: info@inframet.com

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