

TCB blackbodies

Precision differential area blackbodies



Fig.1. Photo of three exemplary TCB series blackbodies

BASIC INFORMATION:

TCB series blackbodies are ultra precision, differential, area blackbodies designed to simulate cold and moderate warm targets. Radiator temperature is controlled using a thermoelectric element. Absolute temperature of the blackbody radiator can be regulated from -40°C to 150°C . Emitter area depending on model can vary from 50×50 mm to 500×500 mm:

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

APPLICATION AREA

No	Application area	Typical requirements
1	Modules of systems for testing complete surveillance thermal imagers	Ability to simulate with high resolution and temporal stability targets in the temperature range: ambient temperature $\pm 10^{\circ}\text{C}$ needed to measure important parameters of thermal imagers
2	Testing/calibration of high end measurement thermal imagers for non contact temperature measurements in energy sector, medical applications, environment research, etc	Ability to simulate high accuracy blackbody targets in the temperature range from about -10°C to 150°C
3	Calibration (spatial noise correction) of thermal engines (IR FPA modules) and surveillance thermal imagers carried out in temperature chambers	Ability to simulate targets in the temperature range from -40°C to 80°C while working in variable ambient temperature from -30°C to 70°C
4	Calibration of thermal engines and surveillance thermal imagers carried out in laboratory conditions	Ability to simulate targets in the temperature range from -30°C to 80°C

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SPECIFICATIONS OF STANDARD VERSIONS

Model	TCB-2D	TCB-4D	TCB-5D/TCB-6D	TCB-14D	TCB-20D
Aperture	50× 50 mm	100× 100 mm	125× 125 mm 150× 150 mm	350× 350 mm	500× 500 mm
Differential temperature range	-25°C ÷ + 75 °C	-20°C ÷ + 60 °C	-20°C ÷ +40°C		
Absolute temperature range	0°C ÷ +100°C at 25°C ambient temperature	5°C ÷ +85°C at 25°C ambient temperature	5°C ÷ +65°C at 25°C ambient temperature	5°C ÷ +120°C at 25°C ambient temperature	10°C ÷ +80°C at 25°C ambient temperature
Set point and resolution	1 mK	1 mK	1 mK	1 mK	1 mK
Emissivity	0.97±0.01	0.97±0.01	0.97±0.01	0.98±0.01	0.98±0.01
Temperature uniformity ¹	0.01 °C	<0.01 °C	<0.02 °C	<0.02 °C	<0.02 °C
Settling time ²	<60sec @ ΔT=10°C	<75 sec @ ΔT=10°C	< 90 sec @ ΔT=10°C	< 60 sec @ ΔT=10°C	< 60 sec @ ΔT=10°C
Regulation stability	±2 mK @ ΔT=10°C	±2 mK @ ΔT=10°C	±2 mK @ ΔT=10°C	±4 mK @ ΔT=10°C	±4 mK @ ΔT=10°C
Total temperature uncertainty	(T-25°C)+12[mK]	(T-25°C)+12 [mK]	(T-25°C)+12 [mK]	(T-25°C)+12 [mK]	(T-25°C)+12[mK]
Computer control	RS-232 (USB 2.0)	RS-232 (USB 2.0)	RS-232 (USB 2.0)	RS-232 (USB 2.0)	RS-232 (USB 2.0)
Power supply	115-230VAC 50/60Hz	115-230VAC 50/60Hz	115-230VAC 50/60Hz	230VAC 50/60Hz	230VAC 50/60Hz
Operating temperature	+5°C ÷ +45°C (non condensing)	+5°C ÷ +45 °C (non condensing)	+5°C ÷ +45 °C (non condensing)	+5°C ÷ +45 °C (non condensing)	+5°C ÷ +45 °C (non condensing)
Storage temperature	-10°C ÷ +60 °C	-10°C ÷ +60 °C	-10°C ÷ +60 °C	-10°C ÷ +60 °C	-10°C ÷ +60 °C
Dimensions	160×230×180mm;	160× 230×180 mm;	230× 320×240 mm	430x450x280	620x630x320
Mass	5 kg	5 kg	8 kg	28 kg	47 kg

¹ Uniformity values are for 1°C temperature difference from ambient temperature at 90% of blackbody area. For other temperatures please multiply by 0.7 ΔT.

² Settling time is to getting 0.01°C temporal standard uncertainty from the desired temperature.

OPTIONS

Model	TCB-2D	TCB-4D	TCB-5D/TCB-6D
<i>Extended temperature range (EX)</i>			
Absolute temperature range	-10°C ÷ +150°C		
<i>Ultra high emissivity (HE)</i>			
Emissivity	0.99 ±0.01	0.99 ±0.01	0.99 ±0.01
<i>Ultra high temporal stability (HS)</i>			
Temporal stability	±1 mK @ ΔT=10°C	±1 mK @ ΔT=10°C	±1 mK @ ΔT=10°C
<i>Temperature chamber optimization (TC)</i>			
Chamber temperature range	-30°C ÷ +60°C	-30°C ÷ +60°C	-30°C ÷ +60°C
Absolute temperature range	-40° C to 80° C	-40° C to 80° C	-40° C to +80° C
Differential temperature range	-10°C÷+40°C	-10°C÷+40°C	-10°C÷+40°C
Humidity (not condensing)	up to 90%	up to 90%	up to 90%
<i>Low temperature range (LT)</i>			
Absolute temperature range	-30°C ÷ +100°C	-20°C ÷ +80°C	-20°C ÷ +70°C
Dry air enclosure	yes	yes	yes

*specifications are subject to change without prior notice

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