XTRALIS VIS-IR™ THERMOGRAPHY DETECTOR BLACK BODY APPLICATION NOTE

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Contents

1 Introduction

The purpose of this document is to explain how to use an external temperature reference source (Black Body) for commissioning and servicing a thermographic detector.

A Black Body offers a reference temperature value with high precision. It is useful to check the operation of the detector, as well as to use this reference to apply a correction in the measured temperature value by the detector. The temperature value measured by the detector may be different from the real temperature of a surface object. That is because the environmental working conditions differ from the calibration conditions of the detector. The calibrated Black Body provides a reliable reference to set the correct environment parameters.

2 Device Description

The external temperature reference source is a compact Black Body, that is, it has an emission window with high emissivity (>0.96) of 100x100mm. This allows the user to use this on site, as portable equipment, when required.

The VIS-IR Thermography Detector Black Body includes the 24VDC power supply. For technical specifications of recommended black body, please refer to the Technical Data Sheet (Doc. No. 36684).

VIS-IR Thermography Detector Black Body

DC Power Supply Cable

Figure 1: Components

In the Black Body front part, there is a PID (Proportional Integral Derivative) Control Process. The top display is continuously showing the actual temperature in the emission window. The button display shows the programmed reference temperature for the emission window. The user can modify the temperature value using the PID buttons.

The surface of the emission window will have the selected temperature value after the stabilization time.

Figure 2: PID (Proportional Integral Derivative) Controller

3 Device Installation and Configuration

Install the Black Body in a fitting position (see Table 1 for maximum distances). The position and orientation of the Black Body must be perpendicular to the detector. Connect the Black Body to the electric power using the included accessories. Set the reference temperature to the chosen temperature value. To do this, use the ▼ and ▲ buttons of the PID controller. Once the desired temperature is selected, it is necessary to wait until the temperature stabilizes at the programmed value. This heating process will take seconds or minutes depending of the ambient temperature and the selected temperature value.

Please, wait for the complete temperature stabilization in the emission window before performing any test.

The maximum distance between the Black Body and the detector for the test is given by the detector model (resolution and lens). In order to obtain correct results in the test, it is necessary that the emission window occupies at least 5x5 pixels on the sensor detector. In the following table there are the maximum recommended distances between detector and Black Body for the test.

Table 1: Maximum distance for the test according to the detector

Detector Model	Maximum Distance (5x5 pixels)
384x288 pixels Lens: 4.3mm (88°x65°)	5 meters
384x288 pixels Lens: 8.9mm (42°x31°)	10 meters
384x288 pixels Lens: 17mm (22°x16°)	20 meters

The FNC and SET buttons are used only during the manufacturing process to do the adjustment of the thermal control. When the Black Body is ready in the last stage of production, the FNC and SET buttons operation are changed to limit their function. So do not use/touch these buttons as they have no more function.

4 Operation Mode for Check

The operation of a thermographic detector can be checked using the Black Body, since the temperature in the emission window of the Black Body is known. For that, install the camera perpendicularly to the Black Body, monitoring the total emission window of the Black Body.

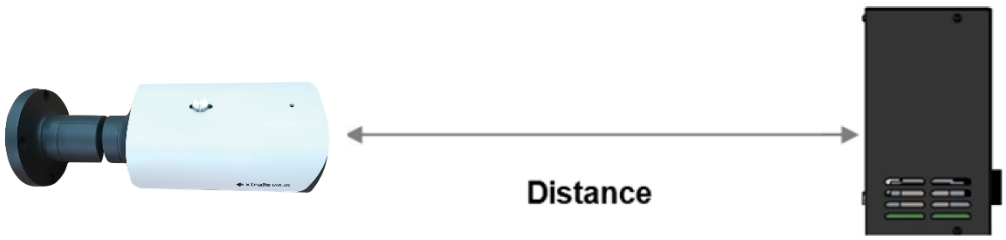

Figure 3: Operation Mode for Check

It is important to know that, according to the ambient conditions and distance between the thermal camera and the Black Body, the measured temperature can be different to the actual value in the Black Body. It is because the ambient transmissivity changes according to the test conditions. The Black Body reading will allow to tune the environmental settings in such way that the reading matches the Black Body temperature.

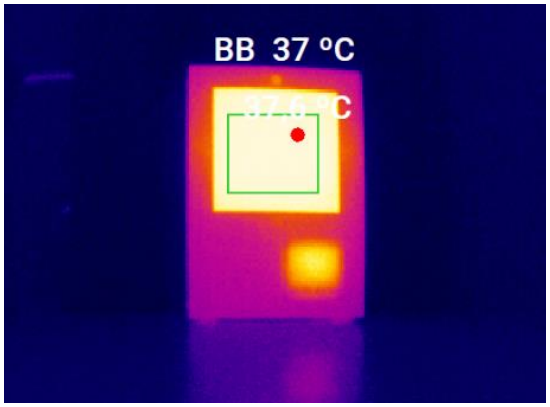

Figure 4: Thermal Camera Monitoring the Black Body

In the above figure, the detector is monitoring a Black Body with the temperature fixed at 37ºC. To do so, create a Region of Interest (green rectangle in the thermal image) covering the emission window of the Black Body. This region will be the Region of Interest (ROI) for the test. It is recommended that the selected working mode for the area is set to Mean. Make sure that the ROI shape is defined inside the Black Body emission window, see Figure 5. Set the emissivity value of the detector to 0.96.

If the test is meant to check the correct detector operation, it is needed to apply the correct configuration to the detector before the test, as well as the ambient parameters.

If the ambient conditions are unknown, the Black Body can be used to set the environmental parameters by doing a real field test. For that, install the Black Body in the position where the temperature must be measured, taking account the maximum distances.

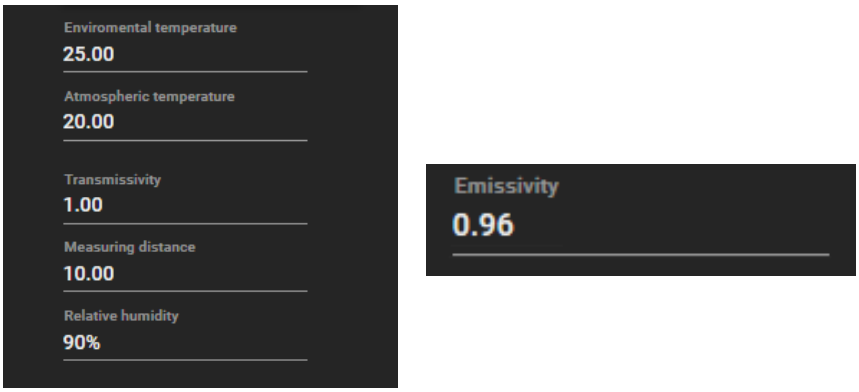

Figure 5: Ambient Configuration Parameters for the Detector (left) and Emissivity for the Region (right)

Modifying in real time the values that affect to the ambient transmissivity value for the detector, the measured temperature value will change. When the detector is measuring the same temperature as the actual temperature in the Black Body, the configured ambient parameters are correct.

The above figure displays the parameters that can be modified to obtain the correct temperature in the software.