

**United States Department of Agriculture  
Agricultural Marketing Service, Science & Technology  
Microbiological Data Program**

SOP No: MDP-LABOP-01		Page 1 of 7
Title: Infrared (IR) Thermometer Use		
Revision: 01	Replaces: 09/01/01	Effective: 04/15/03

**1. Purpose:**

To provide standard procedures for the use of the infrared (IR) thermometer by all laboratories participating in the USDA/AMS Microbiological Data Program (MDP).

**2. Scope:**

This standard operating procedure (SOP) shall be followed by all laboratories conducting microbiological studies for MDP, including support laboratories conducting non-routine activities that may impact the program.

**3. Outline of Procedure:**

- 5.1 Equipment and Materials
- 5.2 Checking the Unit's Calibration/Calibration Test Procedure
  - 5.2.1. Cold calibration check
  - 5.2.2. Medium calibration check
- 5.3 Measuring Temperature
  - 5.3.1 Measurement
  - 5.3.2. Switching °C and °F; changing the battery; laser and backlight on/off
- 5.4 Maintenance
  - 5.4.1. Lens cleaning
  - 5.4.2. Cleaning the housing

**4. References:**

- 4.1 Raynger® ST™ Operating Instructions, Raytek Corporation, 1201 Shaffer Road, PO Box 1820, Santa Cruz, CA 95061-1820.

**5. Specific Procedures:**

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5.1 Equipment and Materials

- 5.1.1 Raytek Portable IR Sensor
- 5.1.2 Insulated container suitable for ice/water mixture
- 5.1.3 Crushed ice
- 5.1.4 NIST calibrated probe thermometer

5.2 Checking the Unit's Calibration/Calibration Test Procedure

Annually check the unit's calibration, to ensure the most accurate temperature measurement is obtained. The cold calibration method is more reliable because the cold water holds a more stable temperature. Alternatively, the unit may be sent to an independent calibration facility for calibration. If the non-contact thermometer is not measuring surface temperature correctly, or if other difficulties are encountered, contact the company at the following address:

Raytek Corporation  
RPD Service Department  
1201 Shaffer Road, Building #2  
Santa Cruz, CA 95060  
888-286-1578

5.2.1. Cold calibration check

5.2.1.1. Fill a large insulated container halfway to the surface with crushed ice.

5.2.1.2. Add cold tap water to fill over the level of the ice.

5.2.1.3. Immerse the tip of an accurately calibrated contact probe thermometer, that has been calibrated to a National Institute of Standards (NIST) thermometer, into the water and vigorously stir the



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water's surface with the probe for one minute, or until contact probe temperature stabilizes.

5.2.1.4. When the probe temperature has stabilized, continue stirring the water, while taking simultaneous temperature measurements with the IR thermometer.

5.2.1.5. Hold the IR thermometer within 3 inches of the surface of the water for the most accurate measurement. Infrared temperature measurement should be within  $\pm 2^{\circ}\text{C}$  ( $\pm 3^{\circ}\text{F}$ ) of probe reading at  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ).

5.2.2. Medium calibration check

Use the same procedure as cold calibration, substituting lukewarm water.

5.2.2.1. Fill a large insulated container with lukewarm water (approximately  $15^{\circ}\text{C}/59^{\circ}\text{F}$ ).

5.2.2.2. Repeat steps in 5.2.1.3 and 5.2.1.4 above. Important: The surface of the water must be agitated while taking the IR temperature measurement.

5.2.2.3. Infrared temperature measurement should be within  $\pm 2^{\circ}\text{C}$  ( $\pm 3^{\circ}\text{F}$ ) of probe reading at  $-18$  to  $+23^{\circ}\text{C}$  ( $0$  to  $73^{\circ}\text{F}$ )

5.3 Measuring Temperature

The unit cannot measure through transparent surfaces such as glass or plastic. It will measure the surface temperature of these materials instead. Therefore, open the bag and take the temperature through the opening. Steam, dust, smoke, or other particles can prevent accurate measurement by obstructing the unit's optics.

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As the distance from the object increases, the spot size of the area measured by the unit becomes larger. The relationship between distance and spot size is 12:1 at the focus point (0.914 m/36 inch).

#### 5.3.1 Measurement

5.3.1.1 To measure a temperature, point the unit at an object, and pull the trigger. Make sure that the target is larger than the unit's spot size. The unit should be closer when measuring smaller objects.

#### 5.3.2. Switching °C and °F; laser and backlight on/off; changing the battery

5.3.2.1. To open the unit's handle, push the button near the trigger on the underside of the unit and pull the handle down and forward.

5.3.2.2. To select °C or °F, slide the top switch up for Celsius and down for Fahrenheit.

5.3.2.3. To activate the laser and backlight, slide the lower switch down. The laser and backlight will turn on when the trigger is pulled. The laser will turn off when the trigger is released. The backlight will remain on for 7 seconds after the trigger is released.

5.3.2.4. To change the 9V battery, insert it with positive side toward the rear of the battery compartment.

#### 5.4 Maintenance

##### 5.4.1. Lens cleaning

5.4.1.1. Blow off loose particles using clean compressed air.

5.4.1.2. Gently brush remaining debris away with a camelhair brush.

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5.4.1.3. Carefully wipe the surface with a moist cotton swab. The swab may be moistened with water. NOTE: DO NOT use solvents to clean the plastic lens.

5.4.2. Cleaning the housing

5.4.2.1. Use soap and water on a damp sponge or soft cloth. NOTE: DO NOT submerge the unit in water.



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Revision 1

December 2002

Kurt Mangione

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- Renumbered subsections for conformance with other SOPs
  - Removed Principle section
  - Removed Hot Calibration section
  - Changed calibration frequency from quarterly to annually based on manufacturer's recommendation
  - Changed OEC accuracy from " 1EC to " 2EC based on Operator's Manual statement
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