

PIONEER
ELECTRIC & RESEARCH

TPK-950

Instruction Manual

ELECTROMATIC

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Battery replacement : Your thermometer will display **BAT** when the internal battery voltage drops to a predetermined low level. The thermometer will still function properly for approximately 30 minutes, but the battery should be replaced as soon as possible. To replace the battery follow these steps:

1. Turn the thermometer off.
2. Remove the single battery cover screw located at the bottom rear of the thermometer.
3. Carefully slide the battery cover down.
4. Remove the old battery and install the new battery.
5. Carefully slide the battery cover onto the thermometer. Make sure the battery leads are not pinched between the two housings.
6. Insert and tighten the battery cover screw.

Cleaning your thermometer : Only use a mild detergent and a damp cloth to clean your thermometer. **DO NOT get the lens wet.**

Calibration : Pioneer Electric & Research recommends your thermometer be checked for proper calibration once per year. This can be performed by a calibration laboratory or by returning your thermometer to Pioneer Electric & Research.

VII. ACCESSORIES

Standard Accessories

Part Number	Description
BA9A	9V Alkaline Battery
STP129	K Type Thermocouple Probe

VIII. TROUBLE SHOOTING AND MAINTENANCE

Problem	Possible Cause
Will not power up	Dead battery. Battery not completely connected to battery snap. Broken or frayed wire from battery to circuit board.
All readings are high	Low battery. Battery may be so weak the low battery indicator won't turn on.
Powers off while trying to use	Trigger is not squeezed. Please refer to "Turning the thermometer ON/OFF" to set your meter.
Incorrect or no readings	Low or dead battery Meter not pointed at Object Under Test. Object Under Test obscured.

I. PREFACE

1. Thank you

Thank you for purchasing a Pioneer Electric & Research Infrared Thermometer. The thermometer you have purchased is simple to operate and will give you years of dependable service. Your thermometer carries a 3 year limited warranty.

2. Description

The Pioneer Electric & Research Gun Type Infrared Thermometer offers versatility, speed, and accuracy by measuring the infrared energy emitted by objects. Since the infrared thermometer measures emitted energy, the surface temperature of an object can be measured without having to come in contact with the object under test. The easy to read display, °C/°F selectable readout, Display Hold, MIN/MAX, Record, K-Type Thermocouple, Adjustable Emissivity, and laser sighting make this thermometer easy to use.

II. INSTRUCTION & GENERAL TESTING GUIDELINES

WARNING: When making measurements, always follow the manufacturer's test procedures for the Object Under Test.

- Never stare into the laser.
- Make sure the thermometer is aimed and held steady at the object you need to measure.
- Avoid getting the thermometer too close to a hot object.

VI. TECHNICAL INFORMATION

1. Specifications

• General

Power Supply	9 Volt Battery
Battery Life	Approx. 8hrs
Auto Power Off	≈7 seconds after trigger is released
Response Time	500m second
Distance / Size Ratio	8:1
Spectral Response	7 - 14μm
Emissivity	0.3 to 0.99 Adjustable
Repeatability	±2% of reading ±3.5°F (2°C)
Operating Temperature	32°F to 120°F (0°C to 50°C)
Relative Humidity	10% to 95% non-condensing
Storage Temperature	-13°F to 159°F (-25°C to 70°C)
Size (H x L x W)	200mm x 145mm x 42mm
Weight	283g

• Accuracy

Range	Resolution	Accuracy
0°~30°F(-18~-1°C)	0.1°F(°C)	±5°F or ±3°C
30°~950°F(-1°~510°C)	0.1°F(°C) / °F(°C)	±2% of rdg, ±3.5°F(2°C)

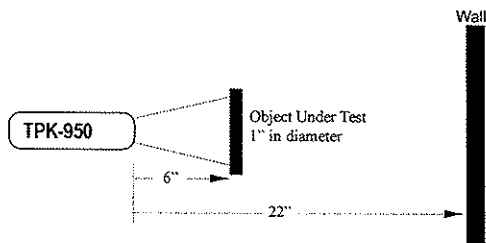


Figure 13A. Correct position of thermometer relative to the object

By moving the thermometer closer to the object the wall is taken out of the field of view and will not affect the temperature reading. Remember to point the thermometer in the center of the object.

3. Emissivity

Emissivity is the ratio of the energy an object emits at a given temperature to that energy emitted by a perfect radiator at the same temperature. A perfect radiator emits 100% (1.0) energy. All emissivity values are between 0.0 and 1.0. For example, an object with an emissivity of 0.85, emits 85% of it's available energy.

TPK-950 has adjustable emissivity between 0.3 to 0.99 which allows accurate measurements to be made in all applications.

4. Wavelength

Your thermometer reads the infrared energy emitted by objects. The wavelength of the energy has an affect on the measurement capabilities of your thermometer. The wavelengths in the infrared spectrum that your thermometer responds to is 7 μ m to 14 μ m. This wideband response enables temperature measurements to be made in most applications.

III. TPK-950 CONTROLS AND FUNCTIONS

1. Push buttons

Button	Function Performed
°C / °F	Selects Fahrenheit or Celsius readout.
LOCK	Locks your meter in the ON position
SEL	Selects Infrared Mode or K-Type Thermocouple.
ϵ	Adjustable Emissivity
REC	Recording Mode

2. Display Annunciators

Annunciator	Description
LOCK	Displayed when LOCK ON mode is enabled.
°C	Displayed when CELSIUS reading is enabled.
°F	Displayed when FAHRENHEIT reading is enabled.
BAT	Displayed when a low battery condition is detected.
Δ	Laser ON indicator
$\epsilon =$	Emissivity setting
	BACKLIGHT ON indicator

3. Lens and Laser

Your infrared thermometer is equipped with a lens. This lens is a critical part of the thermometer. Avoid touching the lens since the oil left from your finger will adversely affect accuracy. If the lens becomes dirty, gently wipe it with a clean, soft, lint free cloth. Using an eyeglass or camera lens cleaning cloth is ideal.



Your thermometer is equipped with a 645-660nm Class II Laser. The laser is used to help aim the thermometer at the Object Under Test. Never look directly into the laser.

IV. USING YOUR THERMOMETER



1. Turning The Thermometer ON and OFF

1. Squeeze the trigger. Your meter will turn on.
2. If required, the meter can be locked in the ON position by releasing the trigger and pressing the "LOCK" button. The lock annunciator will be displayed.
3. Other features can be enabled or disabled at this time. Please see sections 2 through 4.
4. To turn the meter off, release the trigger. If the lock feature was enabled, press the "LOCK" button. The meter will display the last reading for approximately 7 seconds prior to shutting off.

2. Turning The Laser ON and OFF

1. Squeeze the trigger and do not release.
2. To turn the laser on, press the "SEL" button until the  annunciator is displayed
3. To turn the laser off, press the "SEL" button until the  annunciator is not displayed.

3. Turning The Backlight ON and OFF

1. Squeeze the trigger and do not release.
2. To turn the backlight on, press the "SEL" button until the  annunciator is displayed
3. To turn the backlight off, press the "SEL" button until the  annunciator is not displayed.

2. Thermometer Position Relative to Object Size

Determining the optimal position of your thermometer in relation to the Object Under Test is important to achieve accurate readings. In Figure 12A, the Object Under Test is 1" in diameter and the thermometer is 20" away from the object. The distance to size ratio as explained earlier is 8:1, therefore the target size from 20" away is 2.5". Since the object is only 1" in diameter the thermometer reading will be a combination of the temperature of the object and the wall behind the object. The actual reading will depend on the relative areas of each that fill the field of view.

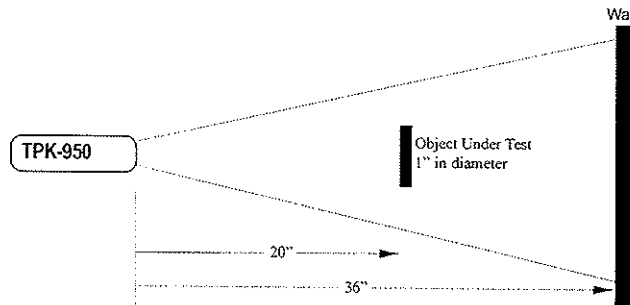


Figure 12A. Incorrect position of thermometer relative to the object

To achieve a more accurate reading of the object, the thermometer should be moved closer so the object will fill the field of view. See Figure 13A.

V. MEASUREMENT CONSIDERATIONS

There are several items to consider when taking measurements with your infrared thermometer. Listed below are the main items that will affect the accuracy and stability of your measurements.

1. Target Size and Distance

The target size and distance are very important factors when using an infrared thermometer. All infrared thermometers have a field of view. The field of view can be determined by the distance to size ratio of the thermometer. Your thermometer has a distance to size ratio of 8:1. Using this ratio, it is possible to determine if an object fully fills the field of view of your thermometer. The distance to size ratio can be seen in Figure 11A.

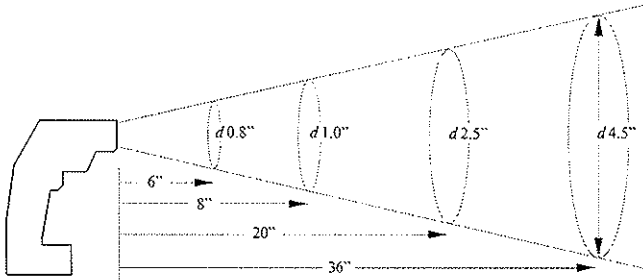


Figure 11A. The Target Size to Distance Ratio

For example, at a distance of 8 inches away from your thermometer the target size is 1 inch. The Object Under Test should be at least 1 inch in diameter to fully fill the field of view.

4. Selecting Celsius or Fahrenheit Display

Your thermometer can display readings in either Celsius or Fahrenheit. Pressing the °C/°F button selects the required display.

1. Turn your meter on as outlined in "Turning The Thermometer ON and OFF" on page 6.
2. Pressing the °C/°F button toggles between Celsius and Fahrenheit readings.
3. When Celsius is selected the "°C" annunciator will be displayed.
4. When Fahrenheit is selected the "°F" annunciator will be displayed.

5. Taking a Temperature Measurement

WARNING: Avoid getting the thermometer too close to hot objects being tested. Inaccuracy and/or damage may occur.

1. Turn your meter on as outlined in "Turning The Thermometer ON and OFF" on page 6.
2. Point the meter at the object under test. Use the laser sight to assist in aiming the thermometer. Point the laser slightly above the center of object being measured.
3. Select Fahrenheit or Celsius display.
4. Allow the reading to stabilize.
5. The temperature reading can be seen on the display.

6. Using the K-Type Thermocouple Touch Probe

⚠ WARNING: Avoid getting the thermometer and K-Type Thermocouple Touch Probe too close to hot objects being tested.

The K-Type Thermocouple Touch Probe allows the user the ability to take a temperature measurement by physically touching the object under test. This feature allows the user to calibrate the thermometer, take immersion temperatures of liquids, and adjust the emissivity.

1. With the thermometer off, insert the K-Type Thermocouple Probe subminiature connector in the jack input at the lower front of the thermometer handle.
2. Turn your meter on as outlined in "Turning The Thermometer ON and OFF" on page 6.
3. Press **SEL** button. **K** annunciator will be displayed and the reading will begin to be taken by the probe.

7. Adjusting the Emissivity

Adjustable emissivity allows the user the ability to adjust the Infrared Thermometer's emissivity ratio to a given percentage (0.3 to 0.99) based on the emissivity of the object under test.

A. IF THE EMISSIVITY IS KNOWN

(REFERENCE CHART FOR SPECIFIC MATERIALS ON PAGE 9)

1. Turn your meter on as outlined in "Turning The Thermometer ON and OFF" on page 6.
2. Press "**ε**" button and release. The **ε** annunciator will begin to flash.
3. Use the "**LOCK**" button to increase the emissivity percentage and the **°C/°F** button to decrease the emissivity percentage.
4. When the correct emissivity is displayed, press the "**ε**" button again and the emissivity will be locked in until it needs to be adjusted again.

B. IF THE EMISSIVITY IS NOT KNOWN OR REFERENCED IN THE CHART

1. Follow the steps in the "Using the K-Type Thermocouple Touch Probe" section of the manual. Take measurement of the object under test using the K-Type Thermocouple Touch Probe and record reading.
2. Now take a temperature measurement using the instruction in the "Taking a Temperature Measurement" section of the manual. Take measurement using the laser and infrared sensor.
3. Press "**ε**" button and release. The **ε** annunciator will begin to flash.
4. Use the "**LOCK**" button to increase the emissivity percentage and the "**°C/°F**" button to decrease the emissivity percentage. Until the temperature reading matches the reading you took with the touch probe.
5. When the correct temperature is displayed, press the "**ε**" button again and the emissivity will be locked in until it needs to be adjusted again.
Write down the emissivity reading for future reference.

EMISSIVITY TABLE OF COMMON MATERIALS

Material	Emissivity
Asphalt	0.93 to 0.95
Ceramics and Brick	0.80 to 0.95
Cloth	0.95
Concrete	0.94 to 0.95
Glass	0.76 to 0.85
Metals, unoxidized	0.02 to 0.21
Painted Surfaces	0.74 to 0.96
Paper	0.5 to 0.95
Rubber	0.95
Sand	0.90
Snow	0.82 to 0.89
Soil	0.90 to 0.98
Steel, Iron, oxidized	0.65 to 0.95
Steel, stainless	0.10 to 0.80
Water	0.93
Wood	0.89 to 0.94