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FLUKE ®

566/568
Infrared Thermometers

Users Manual

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Infrared Thermometers

Introduction

The 566 and 568 Infrared Thermometers ("the thermometers") are for non-contact temperature measurement. These thermometers determine an object's surface temperature by measuring the amount of infrared energy radiated by the object's surface. The thermometers also support contact-temperature measurement via K-type thermocouple. Note that the Japanese models indicate Celsius only.

Contacting Fluke

To contact Fluke, call one of the following telephone numbers:

- USA: 1-888-44-FLUKE (1-888-443-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-3434-0181
- Singapore: +65-738-5655
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's Web site at www.fluke.com.

To register your product, visit http://register.fluke.com

Safety Information

⚠Warning

A Warning identifies conditions and actions that pose hazards to the user. To avoid personal injury, follow these guidelines:

- ⚠**Do not point laser directly at eye or indirectly off reflective surfaces.**

- **Replace the batteries as soon as the low-battery indicator appears.**

- **Do not use the thermometer if it operates abnormally. Protection may be impaired. When in doubt, have the thermometer serviced.**

- **Do not operate the thermometer around explosive gas, vapor, or dust.**

- **Do not connect the optional external probe to live electrical circuits.**

- **To avoid a burn hazard or fire, know that reflective objects may be much hotter than the indicated temperature reading.**

- **Do not leave the thermometer on or near objects of high temperature.**

- **Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.**

- **If the thermometer is used in a manner not specified by the manufacturer, the protection provided by the thermometer may be impaired.**

⚠Caution

To avoid damaging the thermometer or the equipment under test, protect them from the following:

- **EMF (electro-magnetic fields) from arc welders, induction heaters, etc.**

- **Static electricity**

- **Thermal shock (caused by large or abrupt ambient temperature changes- for highest accuracy, allow 30 minutes for thermometer to stabilize before use).**

Symbols and Markings

Table 1 and Figure 1 show various symbols and safety markings that are on the thermometers and in this manual.

Table 1. Symbols

Symbol	Explanation
⚡	Hazardous voltage. Risk of electrical shock.
⚠	Risk of danger. Important information.
☀	Warning. Laser.
CE	Conforms to requirements of European Union and European Free Trade Association (EFTA)
°C	Celsius
°F	Fahrenheit
▐+	Battery
🗙	Do not dispose of this product as unsorted municipal waste. Go to Fluke's web site for recycling information.
MC 沪制01120009号	China metrology certification mark for measuring instruments manufactured in the Peoples Republic of China (PRC).
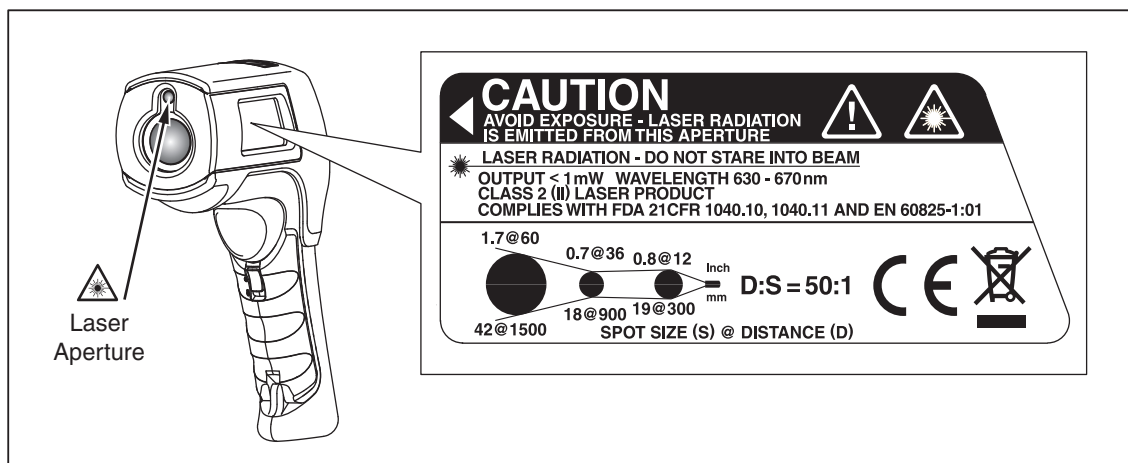
Figure 1. Laser Safety Markings

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Features

The thermometers include:

- Single-spot laser sighting
- Infrared and thermocouple temperature display
- 12 or 24 hour clock
- Celsius or Fahrenheit temperature display
- Last reading Hold (20 seconds)
- Multi-language interface
- Adjustable backlit display
- Hard case
- Tripod mount
- Auto off
- MAX, MIN, DIF, AVG temperature displays
- Adjustable emissivity and predefined emissivity table
- High and low alarm
- Data storage and review
- Trigger lock
- Standard miniature K-type thermocouple connector input
- 80PK-1 K-type thermocouple probe
- Two AA batteries
- USB 2.0 computer interface cable (568)
- FlukeView Forms Documenting Software (568)
- Printed *566/568 Getting Started Guide*
- *566/568 Manuals CD*

Display Language

The thermometer display can show data in the following languages:

- English
- Spanish
- French
- German
- Portuguese
- Japanese
- Simplified Chinese

To change the displayed language, refer to "Setup".

Menu Overview

There are many settings that can be easily changed by using the menu. Figure 2 shows the LCD and menu interface. Selecting the **Menu** softkey advances the menu to the next level. Table 2 is a top-level description of the menu.
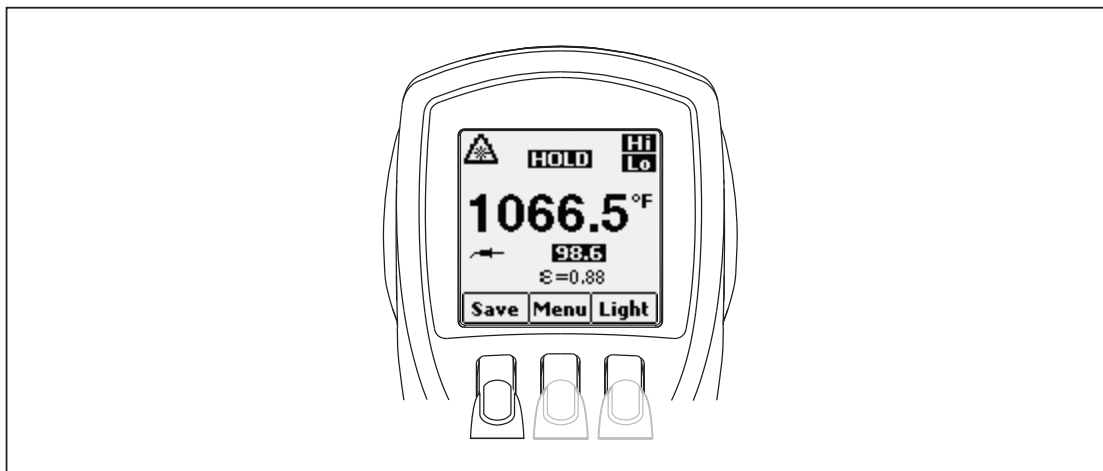
eyl01.eps

Figure 2. Menu Navigation

Table 2. Top-Level Menu Description

Level	Left Softkey	Description	Center Softkey	Right Softkey	Description
1	**Save**	Save reading to memory	**Menu**	**Light**	Adjust backlight brightness
2	**Mem**	Review/delete memories	**Menu**	**ε**	Set emissivity
3	**MnMx**	Enables Min/Max	**Menu**	**Avg**	Enable Avg/Diff
4	**°C/°F**	Toggle between C and F	**Menu**	**Alarm**	Set and enable alarms
5	**🔒 (Lock)**	Lock the thermometer on	**Menu**	**Laser**	Toggle the laser on/off
6	**Setup**	- Turn off/on backlight - Change Time/Date - Change Language	**Menu**	**-**	-

Each menu item and function is explained in greater detail in the following sections.

Save

To save readings:

1. Pull the trigger to take a measurement.
2. Release the trigger to stop taking the measurement.
3. Press the **Save** softkey to enter the Save menu.
4. Press the **Yes** softkey to save the reading.

The reading is assigned a memory location and a time and date stamp.

The reading includes:

- IR temperature

- Thermocouple temperature (if connected)

- Emissivity

- Min/Max/Avg/Dif (if either Min/Max or Avg/Dif is enabled)

- Date/Time

You may also press the **Cancel** softkey to abort saving the reading.

Light

The thermometers are equipped with a backlit display with two brightness levels. The **Light** softkey is used to adjust the backlight brightness. The backlight is on each time the trigger is pulled.

To toggle the backlight brightness, press the **Light** softkey.

The backlight can be disabled using the Setup menu. See "Setup" for more information.

Memory

The thermometers can store measurement records including time, date, emissivity, and measurement record numbers (see "Save" for more information). The 566 can store 20 records and the 568 can store 99.

To access records stored in memory:

1. Press the **Menu** softkey until **Mem** appears as the left softkey function.

2. Press the **Mem** softkey to access the Memory menu. Saved readings can be read.

Emissivity Menu

The Emissivity menu includes a list of pre-defined materials and lists their typical emissivity values, see Table 3. For further information, see "Emissivity".

Note
Default emissivity is 0.95.

To access the Emissivity menu:

1. Press the **Menu** softkey until E (emissivity) appears as the right softkey function.

2. Press the E softkey.

The Emissivity list may be accessed by pressing the **Table** softkey or a material's typical emissivity may be entered manually by pressing the **No.** softkey.

- If the Emissivity table is accessed, a listing of materials and their suggested emissivity is shown.

  1. Use the down arrow to navigate through the list.

  2. Press the **Enter** softkey to choose the desired material.

- To enter an emissivity value manually:

  1. Press the **No**. softkey.

  2. Use the down or up arrow softkey to change the entry. Hold down the up or down arrow softkey to increase the rate of change.

  3. Press the **Done** softkey when finished to return to the main menu.

Table 3. Nominal Surface Emissivity

Material	Value		Material	Value
Default****	0.95		Glass (plate)	0.85
Aluminum*	0.30		Iron*	0.70
Asbestos	0.95		Lead*	0.50
Asphalt	0.95		Oil	0.94
Brass*	0.50		Paint	0.93
Ceramic	0.95		Plastic**	0.95
Concrete	0.95		Rubber	0.95
Copper*	0.60		Sand	0.90
Food - Frozen	0.90		Steel*	0.80
Food - Hot	0.93		Water	0.93
			Wood ***	0.94

* Oxidized
** Opaque, over 20 mils
*** Natural
**** Factory Setting
Highlighted items may also be found in the emissivity table built into the thermometer.

°C and °F

To toggle between °C (Celsius) and °F (Fahrenheit) measurements, press the **Menu** softkey until **°C** or **°F** appears as the left softkey function. Press the corresponding softkey to change between the measurements.

Min, Max, Avg, Differential

The thermometers can measure minimum (MIN), maximum (MAX), average (AVG), or differential (Δ) temperatures each time a reading is taken. These values are not shown if a thermocouple is plugged into the thermometer.

To turn on the Min Max mode:

1. Press the **Menu** softkey until **MnMx** (Min Max) appears as the left softkey function.

2. Press the **MnMx** softkey.

The display shows the present reading, maximum and minimum readings, and the emissivity setting.

To turn on the Avg/Dif mode:

1. Press the **Menu** softkey until **Avg** appears as the right softkey function.

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2. Press the **Avg** softkey.

The display shows the present reading, average reading, the differential reading between max and min (designated by Δ), and the emissivity setting.

Note

Min, Max, Avg, and Differential readings are saved as part of the saved data when either Min/Max or Avg/Dif mode is enabled.

Alarm

The thermometers have a programmable high and low alarm to designate high or low readings depending on the thresholds entered. When the alarm level is reached, an alarm will sound and the display will flash orange and white. To set either the high or low alarm:

1. Press the **Menu** softkey until **Alarm** appears as the right softkey function.

2. Press the **Alarm** softkey to access the Alarm menu.

3. Press either the **Hi** or **Lo** softkey, depending on which alarm will be set.

4. Press the **ON** softkey to turn the alarm on.

5. Press the **OFF** softkey to turn the alarm off.

6. Use the **Set** softkey to access the Hi or Lo Alarm Set menu.

7. Use the down or up softkeys to change the alarm setting.

8. Once the desired settings have been entered, press the **Done** softkey.

Trigger Lock

The thermometer trigger can be locked on for continuous measurement. To lock the trigger:

1. Press the **Menu** softkey until the lock symbol (🔒) appears as the left softkey function.

2. Press the 🔒 softkey to lock the trigger. The lock symbol appears on the display to designate a locked trigger. When the trigger is locked, the 🔒 softkey changes to 🔓. Press this softkey to unlock the trigger.

Laser

⚠⚠ Warning
To avoid injury, do not point the laser directly at eye or indirectly off reflective surfaces.

The thermometer is equipped with a laser used for aiming purposes only. The laser turns off when the trigger is released.

To enable or disable the laser:

1. Press the **Menu** softkey until **Laser** appears as the right softkey function.

2. Press the **Laser** softkey to enable or disable the laser. ⚠ appears on the display when the laser is enabled.

Setup

From the Setup menu, the backlight, time and date, and display language can be changed.

Backlight

In normal use, the backlight is always on. Use this menu to change the backlight setting from on to off. Turning the backlight off conserves battery power.

1. Press the **Menu** softkey until **Setup** appears as the left softkey function.
2. Press the **Setup** softkey.
3. **Backlight** has an indicator next to it. To enter the backlight menu, press the **Enter** softkey.
4. Press the **OFF** softkey to turn the backlight off, press the **ON** softkey to turn it on.
5. Press the **Back** softkey to return to the Setup Menu.

Time/Date

To change the time on the thermometer:

1. Press the **Menu** softkey until **Setup** appears as the left softkey function.
2. Press the **Setup** softkey to enter the Setup menu.
3. Press the down arrow softkey to select **Time/Date**.
4. Press the **Enter** softkey.
5. Select the **Time** softkey.
6. Select the desired time format softkey (**24hr** or **12hr**).
7. Use the up and down softkeys to change the selected hour to the desired hour.
8. Press the **Next** softkey to select the minutes.
9. Use the up and down softkeys to change the selection to the desired minute.
10. When in 12 hour mode, press the **Next** softkey to highlight the **am/pm** parameter.
11. Use the up and down softkey to change to **am** or **pm**.
12. Press the **Done** softkey when finished. The display reverts to the first page of the Time/Date menu.

To change the date on the thermometer:

1. From the main menu, press the **Menu** softkey until **Setup** appears as the left softkey function.
2. Press the **Setup** softkey.
3. Press the down arrow softkey to select **Time/Date**.
4. Press the **Enter** softkey.
5. Press the **Date** softkey.
6. Select the date format: Day/Month/Year (**dmy**) or Month/Day/Year (**mdy**).
7. Use the up and down softkeys to change the selected parameter.
8. Press the **Next** softkey and the arrow softkeys to select the month, date, or year parameters.
9. Use the up and down softkeys to change the selected parameter.

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10. Press the **Next** softkey to move through each parameter.

11. Press the **Done** softkey when finished. The display reverts to the beginning of the Time/Date menu.

Language

To change the displayed language:

1. From the main menu, press the **Menu** softkey until **Setup** appears as the left softkey function.
2. Press the **Setup** softkey.
3. Use the down arrow softkey move the indicator to **Language**.
4. Press the **Enter** softkey.
5. Use the down arrow to move the indicator desired language.
6. Press the **Enter** softkey to complete the language selection or press the **Back** softkey to return to the Setup Menu.

Deleting Data

To delete stored data from the thermometer, from the main menu, press the **menu** softkey until **Mem** shows as the left softkey function. The last memory location appears on the display. To access the Delete menu, press the **Delete** softkey. From here, either all of the thermometer memory can be deleted or individual records.

Deleting All Data

To delete all of the records, press the **All** softkey. At the confirmation screen, press the **Yes** softkey.

Deleting Individual Data Records

To delete individual records, press the **View** softkey and then use the down and up arrow softkeys to access the desired record. Once the desired record is shown, press the **Yes** softkey to delete the record. To cancel data deletion, pull the trigger.

How the Thermometers Work

Infrared thermometers measure the surface temperature of an object. The thermometer's optics sense emitted, reflected, and transmitted energy, which is collected and focused onto a detector. The unit's electronics translate the signal into a temperature reading which the unit displays (see Figure 3).
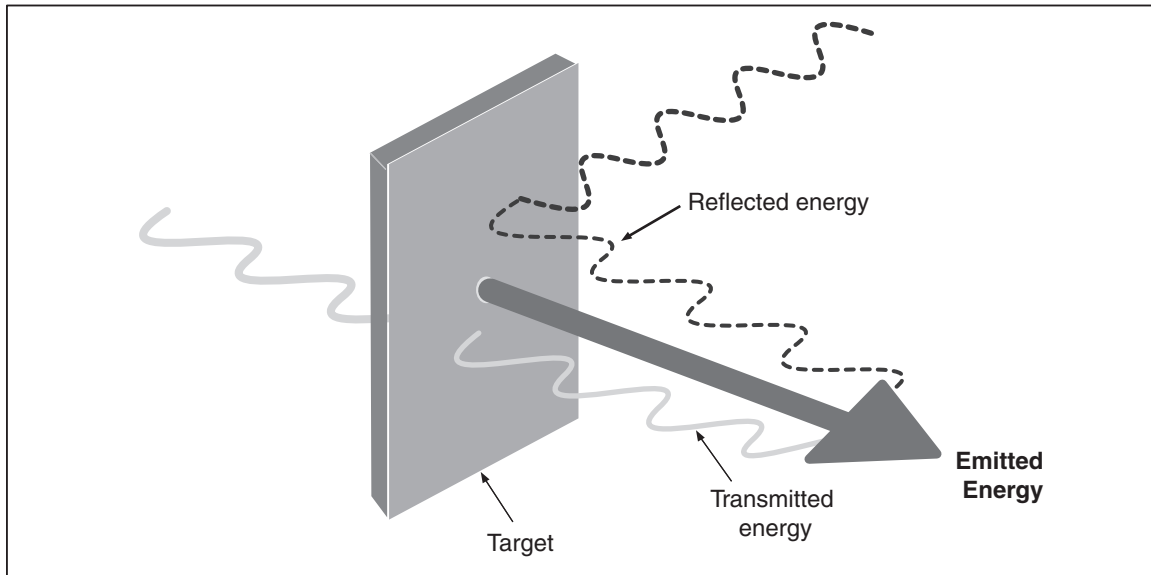

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Figure 3. How the Thermometer Works

Operating the Thermometer

Temperature Measurement

To measure temperature, point the thermometer at an object and pull the trigger. You can use the laser pointer to help aim the thermometer. You may also insert the K-type thermocouple probe for contact measurement. Be sure to consider distance-to-spot size ratio and field of view (see "Distance and Spot Size" and "Field of View"). The temperature appears on the display.

> *Note*
>
> *The laser is used for aiming purposes only and is not related to temperature measurement.*

The thermometer features an auto off function that automatically powers down the thermometer after 20 seconds of inactivity. To turn the thermometer on, pull the trigger.

Locating a Hot or Cold Spot

To find a hot or cold spot, aim the thermometer outside the desired area. Then, slowly scan across the area with an up and down motion until you locate the hot or cold spot (see Figure 4).
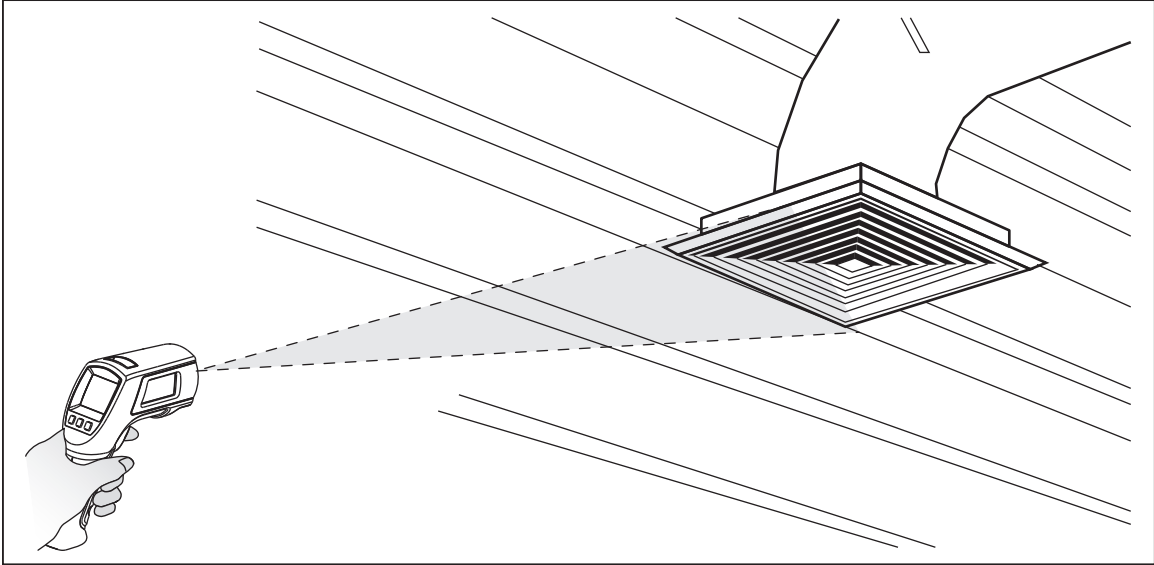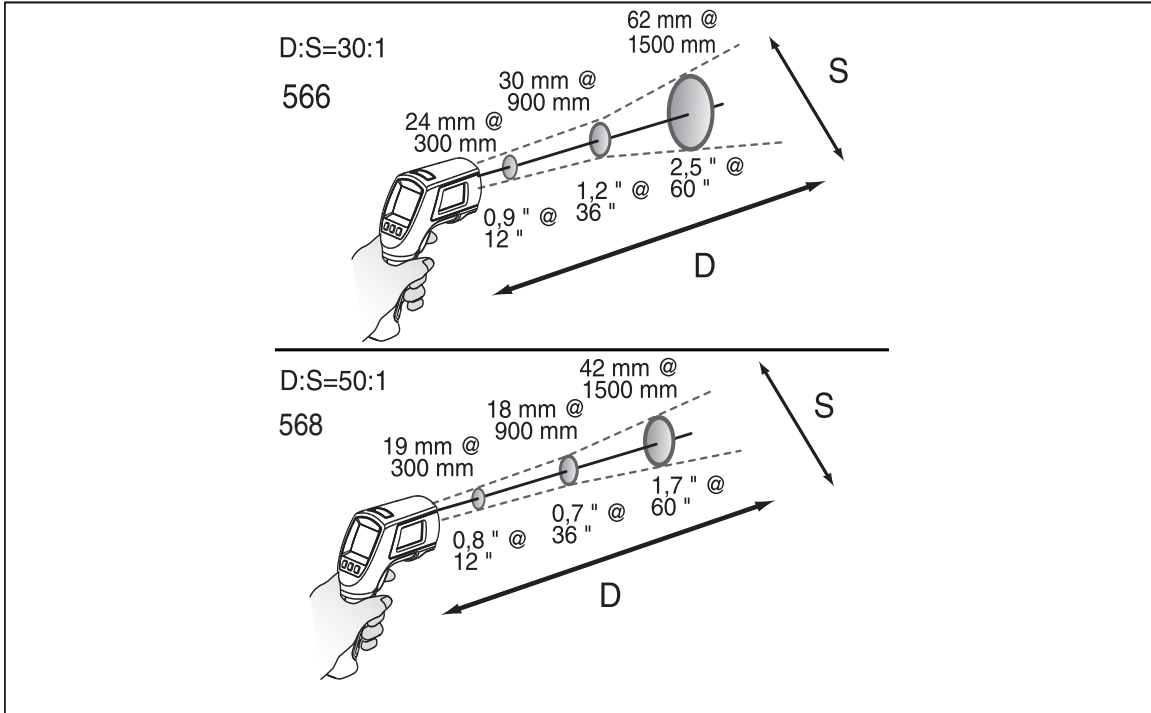

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Figure 4. Locating a Hot or Cold Spot

Distance and Spot Size

As the distance (D) from the object being measured increases, the spot size (S) of the area measured by the unit becomes larger. The relationship between distance and spot size (D:S) for each unit is shown in Figure 5. The spot sizes indicate 90 % encircled energy.

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Figure 5. Distance and Spot Size

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Field of View

For accurate measurements, make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it (see Figure 6).
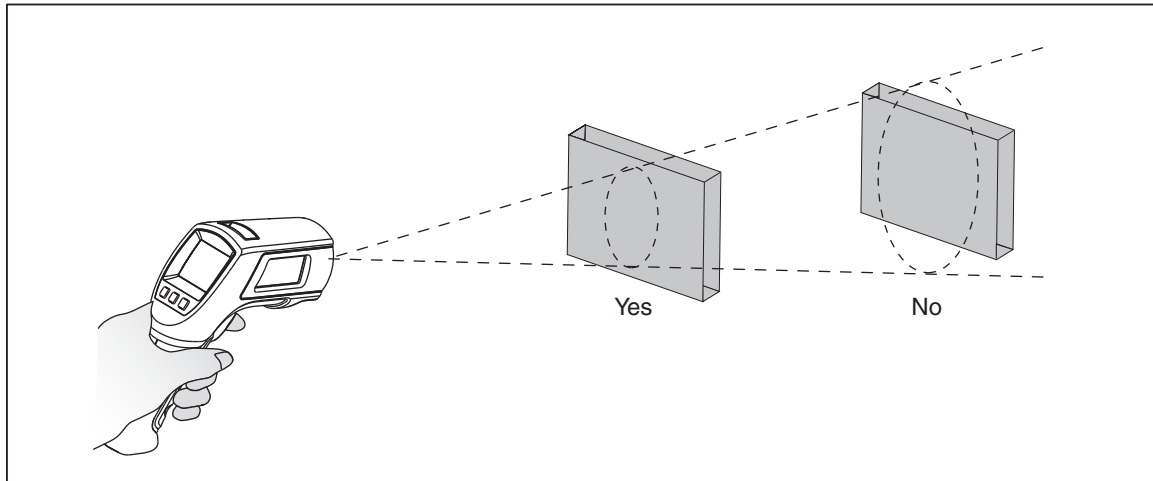

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Figure 6. Field of View

Emissivity

Emissivity describes the energy-emitting characteristics of materials. Most organic materials and painted or oxidized surfaces have an emissivity of approximately 0.95, the default setting for the thermometer.

To compensate for inaccurate readings that may result from measuring shiny metal surfaces, you can cover the surface to be measured with electrical tape or flat black paint (<148 °C/300 °F) with emissivity set to 0.95. Allow time for the tape or paint to reach the same temperature as the surface beneath it. Measure the temperature of the tape or painted surface.

If you cannot paint or use tape, then you can improve the accuracy of your measurements by either numerically adjusting emissivity or by using the Emissivity Menu to access a table of some common materials. The thermometers have numerically adjustable emissivity from 0.10 to 1.00 that can be used in conjunction with the emissivities in Table 3. Also, the thermometers have a built-in table of the most common materials that can be set from the Emissivity Menu. The built-in values are indicated in Table 3.

HOLD

The display retains its last infrared measurement for twenty seconds when the trigger is released, with **HOLD** appearing on the display. With the probe inserted, the contact thermometer remains on. To freeze the infrared temperature when a probe is not inserted, release the trigger until **HOLD** appears on the display.

Storing Data

The 566 thermometer can store up to 20 data records. The 568 thermometer can store up to 99 data records. The following information is stored in each record:

- Record number

- IR and probe temperature in °F or °C

- Date/Time

- Emissivity

- Max/Min/Avg/Dif Temperature (if enabled)

For more information, see "Save".

Downloading Data

The stored data of the 568 can be downloaded to a personal computer (PC) via the included USB cable and the included FlukeView® Forms Documenting Software. See the FlukeView® Forms documentation for details. The USB input ② is located on the top of the thermometer next to the external probe input ① (see Figure 7).
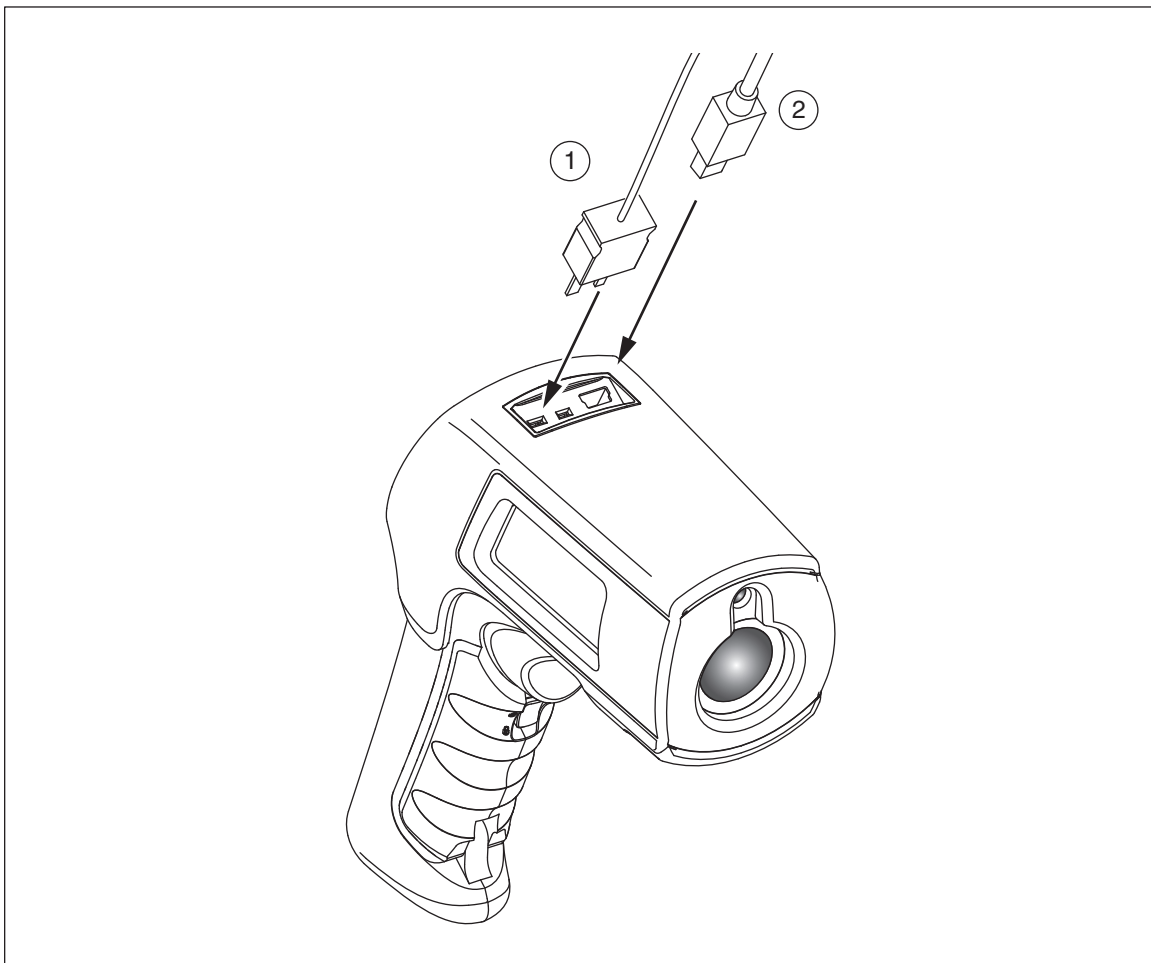

eyl03.eps

**Figure 7. Thermocouple and USB Connections**

External Contact Probe

⚠️⚠️Warning
To avoid electrical shock or personal injury, do not connect the external contact probe to live electrical circuits.

The thermometers come with a bead K-type thermocouple probe. The probes attach to the thermometers via the probe input located on the top of the thermometer (see Figure 7).

With the probe installed, the probe symbol ( ) appears on the display. The probe can be used simultaneously while the thermometer is taking non-contact measurements. The probe readings are shown below the non-contact measurements. The thermometer will stay on when there is a probe inserted. When used with a personal computer and FlukeView Forms (568 only), the auto off feature is disabled.

Troubleshooting

Use the following table to remedy possible problems when using the thermometer.

Table 4. Troubleshooting

| Symptom	Cause	Action
--- (on display)	Target temperature is over or under range.	Select target within specifications
▯▭	Low batteries	Replace Batteries
Blank display	Thermometer is asleep	Pull trigger
	Possible dead batteries	Replace batteries
Laser does not work	Low or dead batteries	Replace batteries
	Ambient temperature is above 40 °C (104 °F)	Use in area with lower ambient temperature
Failed communication via USB	Unit is off	Pull the trigger
	FlukeView Forms is not running	Start FlukeView Forms
Inaccuracy	Possible incorrect emissivity setting, field of view, or spot size	See "Emissivity", "Field of View" and "Distance and Spot Size" sections.
Settings such as emissivity, date/time, F/C, and saved data lost	Battery dead or not replaced in <1 minute of removal	Reset settings. Replace batteries as soon as low battery indicated; Exchange the batteries within one minute of removal. Refer to "Changing the Batteries".

Maintenance

Battery Charge

Use the battery charge symbols to gauge the approximate level of charge left on the batteries.

Notes

When in low battery mode, the thermometer does not store values. "Err" appears on the display if attempted.

[battery icon]   Batteries are at 5 %. Before taking further readings, the batteries must be changed.

Changing the Batteries

Note

The batteries should be replaced in less than one minute after removal to avoid manually re-initializing the thermometer clock and date.

To install or change the two AA batteries (see Figure 8):

1. Slide the locking tab on the battery door to the "unlock" position and then open the handle.
2. Insert the batteries noting their correct polarity.
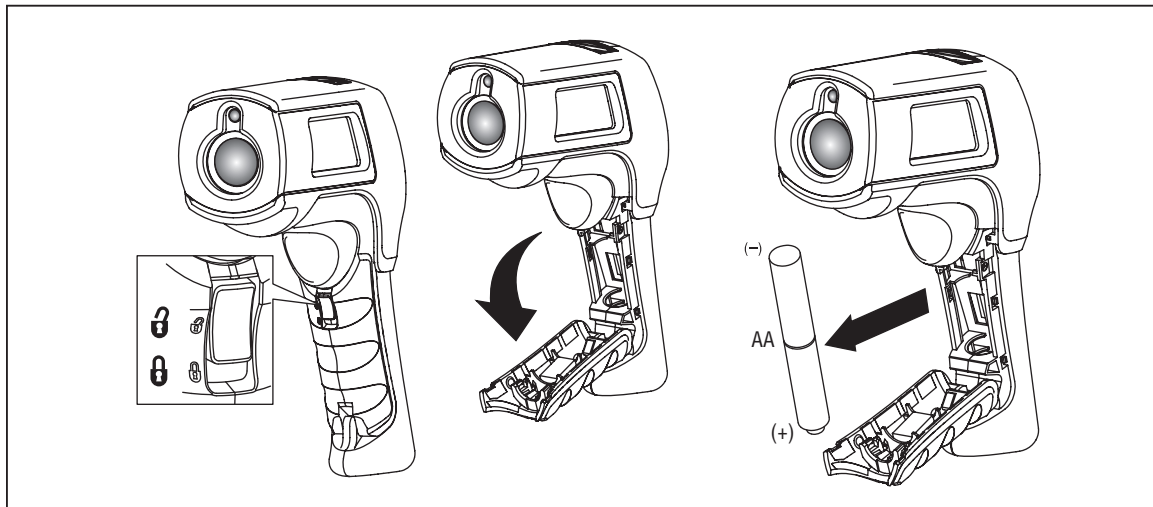3. Close and lock the handle.

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Figure 8. Battery Replacement

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