TIR-1™ Thermometer

Product Training
**Intended Use**

TIR-1™ Thermometer is an infrared thermometer intended for the measurement of human body temperature in people of all ages without contact to the body and is to be used by medical professionals.

**Features of TIR-1 include:**
- Fast measurement that meets ASTM and ISO standards.
- Simple 1-button operation, no scanning required.
- Audible and visual indication of completed temperature.
- Backlit LCD display and Low Battery indication.
- Long Battery Life of more than 10,000 temperatures (typical).
- Memory recall of up to 30 temperature readings (with date and time stamp).
About Body Temperature and Fever

Body temperature can vary from one person to the next and also varies by location on the body and time of day. Temperatures measured from different sites, even at the same time, should not be directly compared.

Fever indicates that body temperature is higher than normal. This may be caused by a number of conditions including infection, overexertion, overdressing or immunization. Some people may not experience fever even when they are ill.

These include, but are not limited to, infants younger than 3 months old, persons with compromised immune systems, persons taking antibiotics, steroids or antipyretics (aspirin, ibuprofen, acetaminophen), or persons with certain chronic illnesses.
Device Components & Setup
TIR-1 Display

1. Low battery indicator
2. Date Indicator
3. Date/Time
4. Temperature Reading
5. Object Surface Temperature Indicator
6. Body Temperature Indicator
7. Room Temperature Indicator
8. Bluetooth indicator
9. Memory Mode
10. Temperature Unit °F/°C
11. Error Warning
Device Controls

1. Power/Start Measurement
2. Bluetooth LED
3. Infrared Sensor
4. Change Scale °F/°C
5. SET: Set Date/Time
6. Battery Compartment
7. MEM: Recall Stored Temperature
8. MODE: Body, Surface, or Room

Power ON/OFF
- TIR-1 is powered on by pressing the Power button.

**NOTE:** The same button is used to start a temperature measurement
- TIR-1 automatically powers down after 30 seconds of non-use.
Initial Setup

1. To remove Battery Cover, press down at the arrow mark and also on the center of the cover, and SLIDE it in the direction of the arrow as shown in Figure 1.

2. Install (2) AA alkaline batteries with polarity as shown in the battery compartment. All LCD display segments will briefly illuminate during self-test, and you will hear a “beep”.

3. Close the battery cover by pressing down both the arrow mark and the bottom of the cover, SLIDING the cover in the opposite direction of the arrow as shown in Figure 2.

Do NOT press the battery cover to force it closed if the battery cover doesn’t close tight as shown in Figure 3. If this happens, remove the battery cover by SLIDING as described in step 1. Repeat step 3 to close the battery cover tight.

- Caution: Closing the battery cover by force may damage the battery cover latch and result in battery damage. Always follow the instructions and close the battery cover by SLIDING only.

NOTE: If TIR-1 will be stored for a long period, remove the batteries.
Taking a Temperature Measurement
Body Temperature Measurement

1. Remove the protective cap (if installed) and inspect the sensor.
2. Remove any debris and clean the sensor as necessary.

Remove hair and perspiration from center forehead area as shown in Figure 1.*

1. Aim at center forehead area 1/2" to 2" (1.2 to 5 cm) away from skin surface.
2. Be sure thermometer is perpendicular to skin surface (at right angle) as shown in Figure 2.

1. Press and release the Power/Start Measurement button.
2. Hold thermometer in place until a double beep is heard and the temperature is displayed on the LCD.
3. Ensure the Body temperature icon is displayed.

1. If properly paired to a Masimo device, the TIR-1 reading also displays in the Temperature window on the Main Screen.

*NOTE: If patient is lying face down or is wearing a hat or garment covering the skin, allow the forehead to be exposed to the air in the room for 5 minutes prior to taking reading.

Relocate patient if in drafty environment.
Bluetooth Connectivity
Bluetooth Connectivity

- **NOTE:** Bluetooth functionality is implemented differently by the various connected-device manufacturers and incompatibility between the TIR-1 and your external device may occur.
- **NOTE:** If pairing TIR-1 to a Root with noninvasive blood pressure and temperature, the temperature probe must be disabled.
- **NOTE:** Bluetooth connectivity is currently only available on Root and Root with noninvasive blood pressure and temperature with software version 1.9.8.3 or higher.

Bluetooth Indicator and LED

The Bluetooth indicator on the display remains solid and does not indicate connection status. The Bluetooth LED indicates connection status.

- **Flashing:** Bluetooth function ON and waiting for connection
- **Solid:** Bluetooth connection is established
When attempting to pair TIR-1 to a Root with noninvasive blood pressure and temperature, **the temperature channel must be disabled in order to use TIR-1 with Root** (if not, Unable to handle Temperature channel on bluetooth message displays).

- **NOTE:** On Root (without noninvasive blood pressure and temperature) active Active Channel, menu changes are **not necessary** for TIR-1 operation.

To disable the temperature channel

1. On the Masimo device, at the bottom right corner of the touchscreen, press the Main Menu icon.
2. Select Layout from the Main Menu.
3. Select Active Channels [1].
To pair TIR-1 with a Masimo device:

1. On the Masimo device, at the bottom right corner of the touchscreen, press the Main Menu icon.
2. Select the Device Settings menu icon.
3. Select the Bluetooth menu icon.
4. On the Bluetooth screen, set “Bluetooth” to ON and press OK.
5. The MAC address for Root will populate when the device is ready to be paired with TIR-1.
6. Press PAIR next to “thermometer” to begin pairing.
To pair TIR-1 with a Masimo device:

7. To place TIR-1 into pairing mode, take a measurement while close to the Masimo device. The Bluetooth indicator appears on the display and the Bluetooth LED blinks.

- **NOTE:** To exit pairing mode, press the MODE, SET, MEM or C/F buttons.

8. TIR-1 should appear under the Devices Found list on the Masimo device screen. Select the TIR-1 thermometer under the Devices Found list and select the Pair button. The TIR-1 will pair with the Masimo device.

9. After successfully pairing, each measurement taken using TIR-1 is displayed in the Temperature window on the Main Screen of the Masimo device.
Temperature Window on Root

After successfully pairing TIR-1 with the Masimo device, the temperature and scale data are transmitted with each measurement taken.

The reading is displayed in the Temperature window on the Main Screen of the Masimo device, and the TIR-1 name is displayed at the top of the window (Root shown in the example).

- **NOTE:** The action menu does not allow any functional changes.
Disconnecting TIR-1 from the Masimo Device

1. On the Masimo device, at the bottom right corner of the touchscreen, press the Main Menu icon.
2. Select the Device Settings icon.
3. Select the Bluetooth menu icon.
4. In the Bluetooth menu, select the thermometer info icon.
5. Touch the Forget button [1].

**NOTE:** If utilizing Root with noninvasive blood pressure and temperature, the user will need to enable the temperature channel to use the built-in temperature feature.
TIR-1 Settings
## Settings

<table>
<thead>
<tr>
<th>Mode Change</th>
<th>Scale Change</th>
<th>Memory</th>
<th>Setting Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Mode Button" /></td>
<td><img src="image2" alt="Temperature Scale Button" /></td>
<td><img src="image3" alt="Memory Button" /></td>
<td><img src="image4" alt="Date/Time Button" /></td>
</tr>
</tbody>
</table>
| - Press and hold button for 5sec for current mode  
- Press button again to cycle to next mode | - Press the button for current scale  
- Press button again to change scale | - Press MEM button and hold to view most recent measurement number ‘01’  
- Release button to view measurement details  
- Press and hold button again to move to next measurement, ‘02’ | **To View:**  
- Press and hold SET button for 5sec for current date  
- Digits flash per section (Month, Day, Year, etc.)  
- To change section press SET button |
Modes of Operation

Body Temperature Mode

- In Body temperature mode, the icon above is shown on the display and temperature is adjusted to an oral (sublingual) temperature approximation. See Display. Normal oral temperature is typically 95.0°F to 100.7°F (35.0°C to 38.2°C) but varies by age, gender and time of day\(^1\). **Body is the default mode of operation.**


Surface and Room Temperature Modes

- **Surface temperature mode** measures the surface temperature of an object placed within the Field Of View (FOV) of the thermometer. At 2" (5cm) away, the FOV is a 0.84" (2.1cm) circle (± 8° cone angle FOV). Accuracy varies with the type of object being measured and the temperature of the surrounding environment.

- **Room temperature mode** measures the temperature of the room in which the thermometer is located. Allow 20 minutes for the thermometer to adjust to abrupt changes in room temperature.
Temperature Recall

Up to 30 temperature measurements are stored in TIR-1’s memory and can be viewed at a later time. Once 30 is reached, the oldest is deleted with each new measurement thereafter. If only 10 temperature readings are stored, only 10 stored temperatures can be recalled and displayed.

- **NOTE:** The stored temperature measurements on TIR-1 cannot be recalled on the Masimo device. The Masimo device records temperature measurements separately.

1. Press the Power button to turn TIR-1 ON.
2. Press and hold the MEM button. The date and a number from 1 to 30 displays indicating the stored temperature number.
   - **Example 1:** DATE 01/01/11; 01
     (01 is the most recent temperature measurement and 30 is the oldest).
3. Release the MEM button. The time, temperature reading and mode displays.
   - **Example:** 1:20AM; 98.4 ºF;
4. Press and release the MEM button to cycle through the stored temperatures.
5. Press the Power/Start Measurement button to exit this function.
Troubleshooting & Cleaning
# TIR-1 Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Explanation</th>
<th>Next Step</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Battery Low" /></td>
<td>Low Battery</td>
<td>Replace batteries as soon as practical.</td>
</tr>
<tr>
<td><img src="image" alt="Battery Very Low" /></td>
<td>Very Low Battery</td>
<td>Replace batteries prior to further use.</td>
</tr>
<tr>
<td><img src="image" alt="Error E-1" /></td>
<td>Ambient temperature too LOW</td>
<td>Allow TIR-1 to warm to temperature above 50° F (10° C).</td>
</tr>
<tr>
<td><img src="image" alt="Error E-2" /></td>
<td>Ambient temperature too HIGH</td>
<td>Allow TIR-1 to cool to temperature below 104° F (40° C).</td>
</tr>
</tbody>
</table>
| ![Error E-4](image) | Sensor error or ambient temperature unstable | - Allow TIR-1 to equilibrate to the current room temperature for 20 minutes.  
- Contact Masimo Support if this error persists. |
| ![Error LO](image) | Body Mode temperature is below 94° F (34.4° C) | Remove Sensor Lens cap. Allow patient to warm up in ambient room temperature above 50° F (10° C). |
| ![Error HI](image) | Body Mode temperature is above 108° F (42.2° C) | - Repeat the temperature.  
- If this condition persists, the ambient temperature of the thermometer may be outside the acceptable limits. Allow to cool for 20 minutes. |
| ![Error --](image) | Displayed temperatures appear to be too low | - Remove sensor lens cap. Allow thermometer and patient to adjust to room temperature for 20 minutes.  
- Remove perspiration, oil and makeup from forehead. |
## TIR-1 Troubleshooting

<table>
<thead>
<tr>
<th>Message</th>
<th>Explanation</th>
<th>Next Step</th>
</tr>
</thead>
</table>
| TIR-1 does not take a measurement when the Power/Start Measurement button is pressed. | - The batteries in TIR-1 may be depleted.  
- Internal failure.                                                     | - Replace the batteries in TIR-1.  
| Cannot pair TIR-1 to Root.                                             | - Root Bluetooth may be off.  
- TIR-1 may be out of Bluetooth range with Root.  
- Internal failure.                                                     | - Ensure Bluetooth on Root is turned on.  
- Ensure TIR-1 is within range of Root when pairing.  
| When the Power/Start Measurement button is pressed, a measurement displays on TIR-1 but not on Root. | - TIR-1 may be out of Bluetooth range with Root.  
- TIR-1 is not paired with Root.  
- Root Bluetooth may be off.  
- Internal failure.                                                     | - Ensure TIR-1 is within range of Root.  
- Ensure TIR-1 is paired with Root.  
- Ensure Bluetooth on Root is turned on.  
# Root Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Explanation</th>
<th>Alarm Priority</th>
<th>Next Step(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to handle Temperature:</td>
<td>A TIR-1 is paired, with the temperature channel enabled, to a Root with noninvasive blood pressure and temperature.</td>
<td>High</td>
<td>On Root with noninvasive blood pressure and temperature, disable the temperature channel before pairing TIR-1.</td>
</tr>
<tr>
<td>Bluetooth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unable to handle Temperature:</td>
<td>The temperature channel is enabled, with a TIR-1 paired, to a Root with noninvasive blood pressure and temperature.</td>
<td>High</td>
<td>On Root with noninvasive blood pressure and temperature, unpair TIR-1 before enabling the temperature channel.</td>
</tr>
<tr>
<td>Internal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Storage & Cleaning

- TIR-1 has no user serviceable internal parts except battery replacement.
- Always replace Sensor Cap when not in use.
- Store in a dry location free of dust and away from direct sunlight.
- Use a soft dry cloth to clean the plastic housing or a cloth dampened with a solution of water and mild detergent. Occasionally, 70% isopropanol solution may be used.
- Never submerge in liquid.
- The sensor window is recessed to assist in keeping it clean and free of debris. Inspect the lens and remove any debris. Smudges may be cleaned by gently wiping the window with a small foam-tipped swab (non-linting) moistened with 70% alcohol. Wait 10 minutes prior to taking temperature.