

INV-EF100

**Dual Mode Digital Infrared Thermometer
Instruction Manual Ver 1.1**



Copyright © Innovo Medical
2014-2016. All rights reserved.

Innovo Medical owns and reserves all of the rights comprised in the copyright of this document. No part of this document may be changed, excerpted, copied, reproduced, or imitated in any form or by any means without prior written consent of Innovo Medical.

All statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied. The information in this document is subject to change without notice. Innovo Medical reserves the right of final interpretation of this document.

Version 1.1

Issuing Date: June 2016



To download the latest manual for the thermometer, simply scan the QR code above or visit
<http://innovo-medical.com/products/innovo-dual-thermometer>

Contact Us

Questions or Comments?

Call: 858-888-9781

Email: cs@innovogroups.com

Visit: www.innovo-medical.com

Introduction

Thank you for purchasing the Innovo INV-EF100 Dual Mode Digital Infrared Thermometer. The INV-EF100 has passed numerous rigorous clinical tests and has proven to be safe, reliable and accurate when used in accordance with the operation manual.

We want to make a thermometer that is capable of accompanying your child from infancy to adulthood. That is why the INV-EF100 Dual Mode Digital Infrared Thermometer is designed to be BOTH an ear thermometer AND a forehead thermometer, offering users the freedom to choose between two modes. We recommend that you use the forehead measurement mode if your child is less than 1 yr old. The eardrum measurement mode can be used when they are older and more comfortable with a foreign object in their ear.

**Please read the instructions carefully before using the product.
Keep user manual in a safe place for future reference.**

Contents

1.	Features of Dual Mode Infrared Thermometer INV-EF100	1
2.	Warnings and Precautions.....	2
3.	Care and Cleaning	3
4.	Note on Body Temperature	5
5.	Product Designs.....	6
6.	Measuring Forehead Temperature	7
7.	Measuring Temperature via Eardrum	7
8.	Instructions for Display and Operation	9
9.	Troubleshooting	12
10.	Technical Specifications.....	13
11.	Warranty and After-Sale Service.....	16
12.	Symbols	16

1. Features of Dual Mode Infrared Thermometer INV-EF100

The INV-EF100 thermometer is able to measure both forehead and ear temperatures by detecting the infrared heat emitted by the respective areas. The forehead mode is activated by pressing the F1 button and the eardrum mode is activated by pressing the F2 button.

Convenient and easy to use

- Easy mode of operation – Take measurement with the press of a button
- Can be used anytime – even when your child is asleep
- Obtain reading faster than an oral thermometer and more comfortable than a rectal thermometer
- Ergonomic design
- Color coded display for fever detection

Accurate and quick

Utilize the latest infrared technology – accurate, precise and instant readings.

Safe and hygienic

- Unlike traditional thermometers, there is no glass or mercury that could pose as a potential health hazard. The thermometer is made up of ABS and TPR plastics, an infrared sensor, an infrared temperature measuring element, a microcomputer controlled circuit and a LCD screen.
- BPA and latex free.

Memory Recall

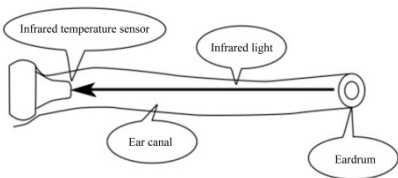
Has a Memory Mode that can recall 20 previous readings to track changes in temperature.

Convenient Fever warning

When the temperature exceeds 99.5°F/37.5°C, the thermometer will warn the user that he/she may have a fever by 7 rapid short beeps and a flickering reading with a red backlit on the LCD screen for 3 seconds. (For normal body temperature, the signal is a long beep with a green backlit.)

Operating principle

The infrared temperature sensor detects infrared energy emitted by the eardrum. A built-in lens focuses the collected energy, which is then converted into a temperature reading by the thermopiles and measurement circuits.



2. Warnings and Precautions

This product is not intended to substitute advice from a physician, pharmacist, or other licensed health-care professional. You should not use this product for self-diagnosis or for treating a health problem. Contact your health-care provider immediately if you suspect that you have a medical problem.

- Do not use the thermometer for purposes not specified in this User Manual. Follow the instructions stated herein and operate the thermometer carefully when measuring children's temperature.
- Do not use the thermometer if any part, especially the sensor, shows any sign of damage. Do not attempt to repair the thermometer. Please contact your distributor.
- The thermometer is not designed to be used for newborn babies. Please consult with a doctor before using the thermometer on a newborn.
- The device is not a continuous monitoring device.
- Do not use the thermometer under an ambient temperature higher than 40.0°C (104.0°F) or lower than 10.0°C (50.0°F), which is beyond the operating temperature range of the thermometer.

- The thermometer is not waterproof. Do not immerse in water or other liquids. For cleaning and disinfecting, please follow instructions in the 'Care and Cleaning' section.
- Certain parts of the thermometer are lined precisely in order to perform properly. Do not drop the thermometer or twist the thermometer sensor. The thermometer is not designed to withstand intense impact or vibration.
- The thermometer is not a toy. Please keep out of children's reach.
- **Do not touch the tip of the thermometer probe. This may damage the infrared sensor inside.**

3. Care and Cleaning

CAUTION! The thermometer sensor is extremely sensitive. The sensor lens has to be perfectly clean to ensure accurate readings.

CAUTION! Any debris and/or facial oil on the sensor lens will prevent an accurate measurement. Always check the sensor before use. The lens should be reflective and gleaming. If it looks dull and lackluster, please clean the lens before use.

- To clean the lens, gently swab the surface with a cotton swab moistened with rubbing alcohol (70% Isopropyl). Do not exert too much pressure as it may damage the delicate sensor.
- Wait for the alcohol to evaporate completely before using the thermometer. This may take about 5-10 minutes. Any residual alcohol will prevent accurate readings.
- To clean the thermometer body and display, wipe with a soft cloth slightly moistened with water or rubbing alcohol. Allow to air dry or gently dry with a piece of tissue paper.

Temperature taking tips for accurate measurement

- Always start with a clean probe and sensor to maintain accuracy and hygiene.

- Make sure that both user and thermometer have stayed in steady-state room condition for at least 30 minutes. Recent exposure to hot or cold temperatures will impact your reading.
- If taking multiple readings, it is advised to wait at least 10 seconds between readings. The thermometer is very sensitive to small changes in temperature. Repeated use with no pause may impact your reading.
- Before taking forehead measurement, remove hair, sweat, debris/oil.
- Before taking eardrum measurement, make sure that the ear canal is free from obstructions or excess earwax build-up.
- **As with any thermometer, proper technique is critical to obtaining accurate measurements. Failure to follow instructions will result in inaccurate measurements.**
- **Normal body temperature is a range and varies by site. Therefore, measurements from forehead and eardrum should not be compared directly.**
- In general, an ear temperature is usually 0.5-1°F (0.3-0.6°C) higher than an oral temperature, whereas a forehead temperature is usually 0.5-1°F (0.3-0.6°C) lower than an oral temperature. Therefore, it is NORMAL to get 1-2°F (0.6-1.2°C) difference between an ear measurement versus a forehead measurement. This is NOT due to the inaccuracy of the thermometer.

●Battery Installation:

1. Slide the battery cover off along the marked direction.
2. Put two AAA batteries into the battery compartment according to the stated polarities.
3. Slide the battery cover horizontally until it snaps back in place.

Notes:

- ☆ Prior to using the thermometer for the first time, pull the plastic tab off the battery, if any.
- ☆ Batteries should be installed according to the stated polarities.

Otherwise, the device bracket might be damaged.

- ☆ Please remove the batteries if you will not be using the thermometer for an extended period of time.

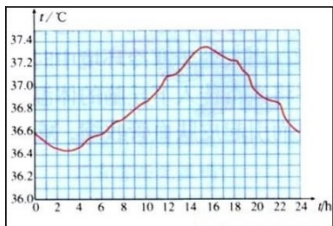
4. Note on Body Temperature

- The normal body temperature is a range.
- The normal range varies from person to person and can fluctuate throughout the day.
- The normal range also varies by body site. Therefore, measurements from different sites should not be compared directly.

To determine if an individual is experiencing an elevated body temperature and/or having a fever, it is critical to know the individual's normal body temperature when he/she is well. Take multiple readings to obtain the normal body temperature range and note the specific body site measured, for example: forehead or eardrum temperature.

Body Site	Normal Temperature Range
Forehead	94.5°F- 99.1°F (34.7°C-37.3°C)
Eardrum	96.4°F-100.4°F (35.8°C-38.0°C)
Mouth	95.9°F- 99.5°F (35.5°C-37.5°C)
Armpit	94.5°F- 99.1°F (34.7°C-37.3°C)
Rectal	97.9°F-100.4°F (36.6°C-38.0°C)

* The normal body temperature range varies slightly with age and gender. Generally, newborns or children have higher body temperatures than adults, and adults have higher body temperatures than the elderly. Women's body temperatures are approximately 0.3°C (0.5 °F) higher than men's.



Normal body temperature fluctuates throughout the day and is also affected by external factors. The body temperature of an individual is the lowest between 2:00 a.m. and 4:00 a.m. and the highest between 2:00 p.m. and 8:00 p.m. An individual's body temperature typically changes by less than 1°C (1.8 °F) each day.

5. Product Designs



- (1) Probe cover (shown unattached to thermometer)
- (2) Ear probe
- (3) F1: Button for measuring forehead temperature
- (4) F2: Button for measuring eardrum temperature and access Menu options
- (5) LCD display
- (6) Battery cover

6. Measuring Forehead Temperature

1. With the probe cover attached, point the thermometer at the center of the forehead.
2. Move the thermometer towards the forehead until the probe cover touches the skin. The probe cover acts as a distance guide and ensures that the measuring distance between the thermometer and the forehead is correct.
3. Press and release the F1 button. The temperature will be displayed on the screen instantly.

Note:

- You can take another measurement by pressing the F1 button at any time although it is recommended that you wait 10 seconds between readings.
- Make sure that the forehead is free of hair and perspiration.
- The probe cover is attached out of the box.

7. Measuring Temperature via Eardrum

1. Gently remove the probe cover to reveal the ear probe.
2. Insert the ear probe into the ear canal.
3. Press and release the F2 button. The temperature will be displayed on the screen instantly.

Note:

- Do not press the F2 button for more than 3 seconds as you will activate the memory retrieval mode.

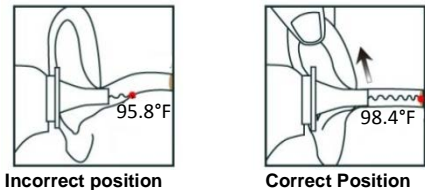


Figure 1

For children older than 1 year old, gently pull the ear up to ensure that the

ear canal is straight (See Figure 1). Position the ear probe carefully so that it is aligned with the eardrum to ensure accurate measurement readings. This applies to adults as well.

For children younger than 1 year old, gently pull the ear straight back to ensure that the ear canal is straight (see Figure 2).

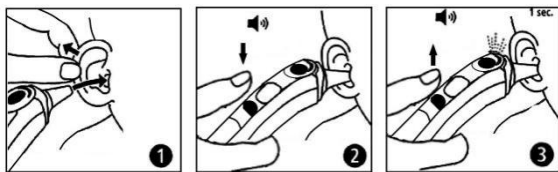


Figure 2


In order to avoid inaccuracy:










1. The sensor is extremely sensitive. Any debris and/or grease on the sensor lens might prevent an accurate measurement. For best result, please check and clean the lens regularly. **Please note that the sensor lens can look deceptively “clean” when it is not. The lens of a clean sensor should be reflective and gleaming. If it looks dull and lackluster, then it is dirty. Please clean the lens with a cotton swab moistened with alcohol and wait 5-10 mins for the alcohol to completely evaporate before using the thermometer.**
2. Please use the thermometer indoor or in an environment where there is no strong air draft.
3. Do not move during measurement.
4. Make sure there isn't any sweat, water or condensation on the forehead.
5. If the thermometer is transferred from an environment where the ambient temperature might be different, please wait at least 10 minutes and follow rule number 2 before using the thermometer.
6. Do not hold the thermometer for a long time as it is highly sensitive to







heat.

7. Keep the infrared sensor probe clean to ensure accurate readings.
8. Before measuring temperature from the ear, remove earwax, if any. Keep the ear canal clean.

8. Instructions for Display and Operation

LCD display	Operational method and instruction for displays	Sound and backlit
	<p>1.Measurement of forehead temperature: Point the thermometer at the center of the forehead. Move the thermometer towards the forehead until the probe cover touches the skin. Press and release the F1 button. The temperature will be displayed on the LCD screen.</p> <p>2.Measurement of ear temperature: Detach the probe cover. Insert the ear probe into the ear canal. Press and release the F2 button. The temperature will be displayed on the LCD screen.</p> <p>3. To measure again, simply press the F1/F2 button accordingly.</p>	<p>When the temperature is below 99.6°F/ 37.6°C (32.0-99.5°F/ 0.0-37.5°C), there will be a long beep and a green backlit will be displayed for 3 seconds.</p> <p>When the temperature is above 99.5°F/37.5°C (99.6-212.0°F/ 37.6-100.0°C), there will be 7 short beeps and the reading will flicker with a red backlit for 3 seconds. This indicates that the subject may have a fever. Please consult your doctor if you are not sure.</p>

	Forehead measurement mode	
	Eardrum measurement mode	
	The measured value exceeds 212.0°F/100.0°C.	3 short beeps with a red backlit for 3 seconds.
	The measured value falls below 32.0°F/0.0°C.	3 short beeps with a red backlit for 3 seconds.
Inquiry for memory data, Storing 20 temperature readings		
LCD display	Operational method and instruction for displays	Sound and backlit
	Press and hold button F2 for 3-6 seconds and the LCD will display “- - -” with the M signal blinking.	None
   	<p>Press button F2 again and the LCD will display the number ‘1’ with the M signal. After 1 second, the measured temperature with the mode of measurement icon will be displayed. Note that this is the latest reading.</p> <p>To recall the next recorded reading, press button F2 again. The number ‘2’ with the M signal will be displayed. After 1 second, the measured temperature with the mode of measurement icon will be displayed.</p> <p>Repeat to recall earlier recordings (up to 20 total) if necessary.</p>	None

	The LCD will display “- - -” with the M signal blinking if there is no test data.	None
°C/°F conversion		
LCD display	Operational steps	Sound and backlit
 	When the thermometer is off, press and hold the F2 button for 6-9 seconds . The screen will display “- - -” with “M” at the bottom right. Continue to hold the button until “- - -°C/°F” appears on the screen. Release the F2 button and the “- - -°C/°F” temperature unit will start to blink. Press the F2 button again within 5 seconds to change the temperature unit to your choice.	None
Error message		
	LCD screen will display “Er1” when ambient temperature exceeds 104.0°F/40.0°C or drops below 50.0°F/10.0°C.	3 short ticks and green backlit for 3 seconds.
	LCD screen will display “ErC” if there is EEPROM data reading error or the calibrating process is not finished. Please contact your supplier.	3 short ticks and green backlit for 3 seconds.
	Low-voltage signal when the battery voltage is below 2.61V±2%. Please replace battery.	None
Power Off Mode		
The thermometer will power off automatically if no activity is detected for 10 seconds.		

Attention:

- Electromagnetic interference: INV-EF100 thermometer contains sensitive electronic components. You should not use the thermometer in an area with electromagnetic interference (e.g. near mobile phones or microwaves)
- Please dispose the used thermometer and batteries in accordance with local regulation requirements.

- Please remove the battery if you will not be using the thermometer for an extended period of time.

9. Troubleshooting

Symptom	Possible Cause	Solution
The thermometer fails to power on.	The battery level is extremely low.	Use new batteries of the same model or specifications.
	Polarities of the batteries are reversed.	Ensure that the batteries are correctly installed according to the polarity symbols in the battery compartment.
	The thermometer is faulty.	If the warranty period has not expired, contact the manufacturer.
Battery symbol displayed when thermometer powers on.	The battery level is low.	Use new batteries of the same model or specifications.
"Er1" is displayed.	The ambient temperature is lower than 10.0°C (50.0°F) or higher than 40.0°C (104.0°F).	Take a measurement under an ambient temperature between 10.0°C (50.0°F) and 40.0°C (104.0°F).
The temperature reading is lower than the typical body temperature range.	The infrared sensor is dirty.	Clean the sensor using a cotton swab moistened with alcohol. The sensor surface should be reflective and gleaming.
	The thermometer probe is not aligned	Reposition the thermometer probe so that

Symptom	Possible Cause	Solution
	to the eardrum.	it is aligned to the eardrum.
	The thermometer is used within 30 minutes after being taken from a cold environment.	Wait for 30 minutes before taking the temperature again.
The temperature reading is higher than the typical body temperature range, in the absence of a fever.	The thermometer probe is faulty.	Contact Innovo Medical.

10. Technical Specifications

Items	Standards
Model	Dual mode infrared thermometer INV-EF100
Applicable regulations and laws	ASTM 1965/EN12470-5/GB/T 19146-2010
Temperature units	°F/°C, adjustable
Displayed temperature range	Forehead temperature mode: 32.0°F – 212.0°F/ 0.0°C-100.0°C Ear temperature mode: 32.0°F – 212.0°F/ 0.0°C-100.0°C

Accuracy (Laboratory)	$\pm 0.4^{\circ}\text{F}/\pm 0.2^{\circ}\text{C}$ (50.0 °F -104.0 °F /10.0°C – 40.0°C) The measurement accuracy of INV-DC200 is within $\pm 0.4^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$) under operating ambient temperature of 50.0°F – 104.0°F (10.0°C – 40.0°C). This meets the ASTM E1965-98 laboratory accuracy requirements for Infrared thermometers which is $\pm 0.4^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$) in the display range of 98°F to 102°F (37°C-39°C). Note: for mercury-in-glass and electronic thermometers, the measurement accuracy requirement is $\pm 0.2^{\circ}\text{F}$ ($\pm 0.1^{\circ}\text{C}$) instead, per ASTM Standards E 667-86 and E 1112-86
Display resolution	0.1°F/0.1°C
Latency Time	1 second
Abnormal state display	LCD displays "L" if the measured temperature is below the minimum measurement range. LCD displays "H" if the measured temperature is above the maximum measurement range. LCD displays "Er1" if the temperature measurement circuit is abnormal (faulty sensor or temperature measurement circuit), or the ambient temperature exceeds 50.0°F-104.0°F (10.0°C-40.0°C). LCD displays "ErC" if the calibration process is not completed or EEPROM data recording is abnormal.
Sound	volume ≥ 50 db (the perpendicular distance from dB Volume sensor to thermometer is 10cm)
Automatic shutdown function	10s \pm 1s
Low-voltage display function	The product shall display low-voltage signal if the voltage is below 2.51V \pm 0.15V.
Memory function	Memorize 20 groups of measured temperature.
Current consumption	$I_{\text{stand-by}} < 2\mu\text{A}$; $I_{\text{working}} < 0.5\text{mA}$; $I_{\text{Buzzer on}} < 2\text{mA}$; $I_{\text{backlight}} < 15\text{mA}$
LED backlit specifications	$\geq 1.2 \text{ cd}/\text{m}^2$

Operating conditions	Temperature: 50°F-104°F (10°C-40°C) Humidity: 15-95% RH, non-condensing Atmospheric pressure: 860hPa-1060hPa
Storage and Shipping Conditions	Temperature: -4°F-122°F (-20°C-50°C) Humidity: 0-95% RH, non-condensing Atmospheric pressure: 860hPa-1060hPa
Type of measuring	Applicable for forehead temperature and ear temperature
Battery	Changeable for two 1.5V triple AAA batteries
Battery life	More than 3000 times
Accuracy for clinical test	The maximum allowable error for clinical test is specified in the formula below: $\text{Error} = \frac{ T1-T_{ref} + T2-T_{ref} }{2}$ $\leq 0.6^{\circ}\text{F}, 0.3^{\circ}\text{C} \text{ (for 95\%)}$ Error! Bookmark not defined. Error! Bookmark not defined. Among which: T1 and T2 represent temperature value for thermometer under test respectively, Tref represents the constant reference temperature

This infrared thermometer meets requirements established in ASTM Standard (E 1965-98). Full responsibility for the conformance of this product to the standard is assumed by Innovo Medical, 406 Sterling Street, Building 2, Camphill, PA 17011, USA.

ASTM laboratory accuracy requirements in the display range of 98°F to 102°F (37°C-39°C) for IR thermometers is $\pm 0.4^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$), whereas for mercury-in-glass and electronic thermometers, the requirement per ASTM Standards E 667-86 and E 1112-86 is $\pm 0.2^{\circ}\text{F}$ ($\pm 0.1^{\circ}\text{C}$).








11. Warranty and After-Sale Service

For inquiries, please email cs@innovogroups.com

The device is under warranty for one year after the date of acquisition. To extend your warranty period for an additional 1 year, please go to www.innovo-medical.com and register your purchase.

Batteries, packaging, and any damage caused by improper use are not covered under warranty.

12. Symbols

Symbol	Description
	The product is a Type BF device.
	Attention! Please refer to this User Guide.
	The action expressed in words beside the symbol is prohibited.
	Manufacturer information, including its name and address
	Waste electrical materials should be sent to dedicated collection points for recycling.
 Warning	A personal injury or meter damage may result if the meter is not correctly used.
 Notice	Inaccurate reading or meter damage may result if the meter is not correctly used.



Manufactured for:
Innovo Medical
406 Sterling Street, Building 2
Camphill, PA, 17011
Phone: +1-858-888-9781
cs@innovogroups.com
www.innovo-medical.com