

Infrared Thermometer Operating Manual

Model: AOJ-20A

Software Version: V1.2.8

Issuing Date: 2026/04/10

Infrared Thermometer

Forehead & Ear



Introduction

Thank you for purchasing this Forehead and Ear Infrared Thermometer.

Please read the Operating Manual carefully before using the thermometer, and put it in a safe and secure place for reference.

Foreword

The infrared thermometer can be used to read the body temperature by measuring the ear and forehead temperature, which is suitable for adult and children (ear test mode only for the child above 3 months).

Package Contents

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1	Infrared Thermometer	1
2	Pouch	1
3	Battery (AAA, optional)	2
4	Operating Manual	1

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1. WARNINGS AND PRECAUTIONS

- 1) Keep out of reach of children under 12 years.
- 2) Never immerse the thermometer into water or other liquids (not waterproof). For cleaning and disinfecting, please follow the instructions in the "Care and cleaning" section.
- 3) Never use the thermometer for purposes other than those it has been intended for. Please follow the general safety precautions when using on children.
- 4) Keep the thermometer away from direct exposure to the sun and keep it in a dust-free, dry area, well-ventilated place at a temperature between 10°C (50°F) - 40°C (104°F). Do not use the thermometer in high humidity environments. (>95% RH)
- 5) Do not use the thermometer if there are signs of damage on the measuring sensor or on the instrument itself. If damaged, do not attempt to repair the instrument! Please contact the dealer.
- 6) This thermometer consists of high-quality precision parts. Do not drop the instrument. Protect it from severe impact and shock. Do not twist the instrument or the measuring sensor.
- 7) Please consult your doctor if you see symptoms such as unexplained irritability, vomiting, diarrhea, dehydration, changes in appetite or activity, seizure, muscle pain, shivering, stiff neck, pain when urinating, etc., even in the absence of fever.
- 8) Even in the absence of fever, those who exhibit a normal temperature may still need to receive medical attention. People who are on antibiotics, analgesics, or antipyretics should not be assessed solely on temperature readings to determine the severity of their illness.

- 9) Temperature elevation may signal a serious illness, especially in adults who are old, frail, have a weakened immune system, or neonates and infants. Please seek professional advice immediately when there is a temperature elevation and if you are taking temperature for whom are:
- Over 60 years of age (Fever may be blunted or even absent in elderly patients)
 - Having diabetes mellitus or a weakened immune system (e.g., HIV positive, cancer, chemotherapy, chronic steroid treatment, splenectomy)
 - Bedridden (e.g., nursing home patient, stroke, chronic illness)
 - A transplant patient (e.g., liver, heart, lung, kidney)
- 10) This thermometer is not intended for preterm babies or small-for-gestational age babies. This thermometer is not intended to interpret hypothermic temperatures. Do not allow children to take their temperatures unattended.
- 11) Use of this thermometer is not intended as a substitute for consultation with your physician or pediatrician.
- 12) Clean the thermometer probe after each use.
- 13) Do not use the thermometer on newborns or for continuous temperature monitoring purposes.
- 14) Do not take a measurement while or immediately after nursing a baby.
- 15) Patients should not drink, eat, or be physically active before/while taking the measurement.

2. Product Description

1) Overview

Infrared Thermometer measures the body temperature based on the infrared energy emitted from the eardrum or the forehead. Users can quickly get measurement results after positioning properly the temperature probe in the ear canal or forehead.

Normal body temperature is a range. The following tables shows that this normal range also varies by site. Therefore, readings from different site should not be directly compared. Tell your doctor what type of thermometer you used to take your temperature and on what part of the body. Also bear this in mind if you are diagnosing yourself.

Measuring part	Normal temperature range
Forehead temperature	36.1°C - 37.5°C (97°F - 99.5°F)
Ear temperature	35.8°C - 38°C (96.4°F - 100.4°F)
Oral temperature	35.5°C - 37.5°C (95.9°F - 99.5°F)
Rectal temperature	36.6°C - 38°C (97.9°F - 100.4°F)
Axillary temperature	34.7°C - 37.3°C (94.5°F - 99.1°F)

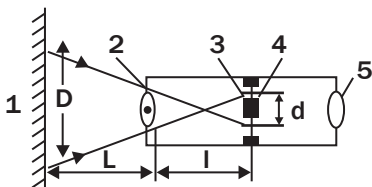
2) Structure

The device consists of enclosure, button, a temperature sensor, Infrared temperature - measuring element, microcomputer controlled circuit, LCD, backlight and a buzzer.

3) Operating principle

In the nature, for all objects whose temperature is higher than the absolute zero (-273.15°C), for the sake of molecule's thermal motion, radiate electromagnetic wave to the surrounding ambient including the infrared wave without a break, the relationship between the density of radiation energy with the object's temperature conform to the radiation law.

The infrared thermometer's working principle is based on the fourth-power law: infer objects' radiation temperature by measuring objects' radiation infrared energy. Thermopile sensor can convert the infrared energy into thermoelectricity, and output as a detected signal after signal processing.



1-Subject 2-Object len 3-Heat plate 4-Thermocouple 5-Eye Len

Figure 1

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.

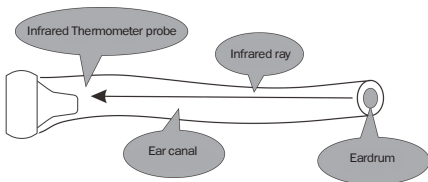


Figure 2

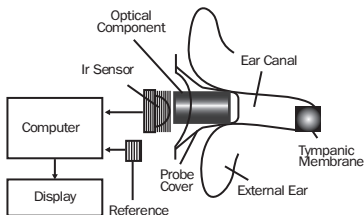


Figure 3

4) Indications for use

The infrared thermometers take human body temperature via the eardrum or forehead. The forehead mode is indicated for people of all ages and the eardrum mode is indicated for people above three months old. It applies to both professional use and home use.

5) ContraIndications

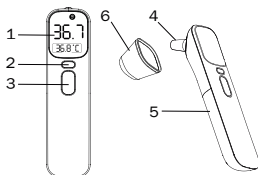
Do not use the thermometer if the ear is infected with otitis or suppuration.

3. Features

- Magnetic probe cover and automatic mode switch between forehead & ear mode
- Quick measurement, less than 1 second
- Small body with super large font
- Multi-functional, can measure ear & forehead.
- Accurate: clinically accurate algorithm with three stage calibration
- Reliable: each thermometer will do environmental test under 15-35°C during production
- Easy operation, one button design, to measure ear & forehead.
- Switching between mute and un-mute mode
- Audio and visual fever warning
- Switching between °C and °F
- Auto shut-down and power-saving
- Backlight color temperature indication
- Patent technology to realize separate measurement of adult and child

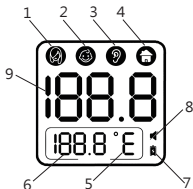
4. Product Structure

1. LCD display screen
2. Mode/Memory button
3. Measure/Mute-unmute button
4. Probe
5. Battery cover
6. Probe cover (take it off when measuring ear temperature)



5. Display description

1. Adult forehead mode
2. Child forehead mode (under 12 years old)
3. Ear mode
4. Object mode
5. Fahrenheit/Celsius degrees
6. Previous temperature value
7. Low battery indication
8. Mute/Un-mute icon
9. Current temperature value



6. How to use your thermometer

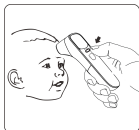
(1) In order to avoid the Inaccuracy:

- 1) Please make sure that the device will be used in the room only, and there is no strongly conversation of wind.
- 2) Please make sure that there is no intense emotion and movement before measuring.
- 3) If the device is transferred from one condition to another, which has different ambient temperature, it is suggested to deposit for more than 30 minutes.
- 4) If the tester is transferred from one condition to another, which has different ambient temperature, it is suggested to have a rest for more than 10 minutes.
- 5) Do not hold the device for a longtime, as it is highly sensitive to heat.

The device has undergone clinical test, it is safe and accurate when using in accordance with operation manual.

(2) Take your forehead temperature

- 1) When using the thermometer for the first time, please load the batteries.
- 2) Press and release the Measure Button in one second to power on.
- 3) Press the Mode Button to choose  or . Then point the temperature probe at the center of the forehead, with a distance of 0-3 cm (0-1.18 inches).
- 4) Press and release the Measure Button in 1 second. The beep is heard, you can now read the value.



NOTE: The forehead measurement is an indicative reading. The measured forehead temperature can fluctuate up to 1°F/0.5°C from your actual body temperature. Please be aware of the factors that influence the accuracy as described in the section "Temperature taking tips" and "WARNINGS AND PRECAUTIONS".

-  If the eyebrow area is covered with hair, sweat or dirt, please clean the area beforehand to improve the reading accuracy.
-  Always check if the lens is clean.

- ⚠ Always make sure the user and the thermometer will have been in the same room for at least 30 minutes prior to the measurement.

(3) Take your ear temperature

- 1) Press the **Measure/Mute-unmute** button to power on.
- 2) Take off the probe cover, fit the probe snugly into the ear canal.
- 3) Press and release the **Measure/Mute-unmute** button in 1 second, the beep is heard, you can now read the value.



- ⚠ Please make sure that the ear is clean, with no earwax or obstructions.
- ⚠ The right ear reading may differ from the reading taken at the left ear. Therefore, always take the temperature in the same ear.



Note:

Children under 1 year: Pull the ear straight back.

Children aged 1 year to adult: Pull the ear up and back.

- ⚠ Do not force the thermometer into the ear canal. Otherwise, the ear canal may get injured.
- ⚠ When taking the temperature on an adult, gently pull the ear up and back to make sure the ear canal is straight, so that the temperature probe can receive an infrared ray from the eardrum.
- ⚠ Be careful when taking temperature on a child, whose ear canal is small.

(4) After a measurement

Once the reading has been completed, remove the thermometer away from the forehead/ear and observe temperature.

After each measurement, you can enter the recall mode and query earlier temperature readings.

-  Do not hold the thermometer for a long time, because it is sensitive to the ambient temperature.
-  After each measurement, clean the temperature probe with a soft cloth, and put the thermometer in a dry and well-ventilated place.
-  You should wait at least 10 seconds between each measurement.
-  It is dangerous to make a self-diagnosis or self-treatment based on the obtained measurement results. For such purposes, please consult a doctor.

(5) Read your temperature

“T” indicates a temperature reading.

1) In forehead or ear mode.

If $32^{\circ}\text{C} \leq T \leq 37.5^{\circ}\text{C}$ ($89.6^{\circ}\text{F} \leq T \leq 99.5^{\circ}\text{F}$), the green light will be displayed, with one long beep.

If $37.6^{\circ}\text{C} \leq T \leq 38.0^{\circ}\text{C}$ ($99.7^{\circ}\text{F} \leq T \leq 100.4^{\circ}\text{F}$), the orange light will be displayed with 6 short beeps, each with 2 short sounds, which is a warning that you may have a low fever.

If $38.1^{\circ}\text{C} \leq T \leq 42.9^{\circ}\text{C}$ ($100.6^{\circ}\text{F} \leq T \leq 109.2^{\circ}\text{F}$), the red light will be displayed with 6 short beeps, each with 2 short sounds, which is a warning that you may have a high fever.

(6) Switching between mute and un-mute

When the thermometer is turned on, keep pressing the Measure Button for 5 seconds, to switch from un-mute to mute.

(7) °C/°F conversion

Open the battery cover, use the toggle switch to change the °C/°F.

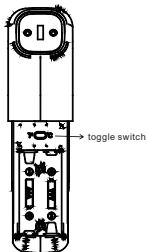
(8) Automatically turn off

The unit will shut down automatically after 60 seconds of no use.



Caution

All memory records will be lost when uninstall or reinstall the battery.



(9) Replace the battery.

Put two AAA batteries correctly into the compartment.



Remove the batteries if the thermometer will not be used for more than two months.

7. Temperature taking tips

- 1) It is important to know each individual's normal temperature when they are well. This is the only way to accurately diagnose a fever. Record readings twice a day (early morning and late afternoon). Take the average of the two temperatures to calculate normal oral equivalent temperature. Always take the temperature in the same location, since the temperature readings may vary from different locations on the forehead.
- 2) A child's normal temperature can be as high as 99.9°F (37.7°C) or as low as 97.0°F (36.1°C). Please note that this unit reads 0.5°C (0.9°F) lower than a rectal digital thermometer.
- 3) External factors may influence ear temperatures, including when an individual has:
 - been lying on one ear or the other
 - had their ears covered
 - been exposed to very hot or very cold temperatures
 - been recently swimming or bathing

In these cases, remove the individual from the situation and wait 20 minutes prior to taking a temperature.

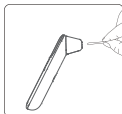
Use the untreated ear if prescription ear drops or other ear medications have been placed in the ear canal.

- 4) Holding the thermometer for too long in the hand before taking a measurement can cause the device to warm up. This means the measurement could be incorrect.
- 5) Patients and the thermometer should stay in steady-state room condition for at least 30 minutes.
- 6) Before placing the thermometer sensor onto the forehead, remove dirt, hair, or sweat from the forehead area. Wait 10 minutes after cleaning before taking measurement
- 7) Use an alcohol swab to carefully clean the sensor and wait for 5 minutes before taking a measurement on another patient. Wiping the forehead with a warm or cool cloth may impact your reading. It is advised to wait 10 minutes before taking a reading.
- 8) In the following situations it is recommended that 3-5 measurements in the same location be taken and the highest one taken as the reading:
 - Newborn infants in the first 100 days.
 - Children under three years of age with a compromised immune system and for whom the presence or absence of fever is critical.
 - When the user is learning how to use the thermometer for the first time until he/she has familiarized himself/herself with the instrument and obtains consistent readings.

8. Care and cleaning

Use an alcohol swab or cotton swab moistened with 70% alcohol to clean the thermometer casing and the measuring probe. After the alcohol has completely dried out, you can take a new measurement.

Ensure that no liquid enters the interior of the thermometer. Never use abrasive cleaning agents, thinners or benzene for cleaning and never immerse the instrument in water or other cleaning liquids. Take care not to scratch the surface of the LCD screen.



9. Error and Troubleshooting

Symptom	Possible Cause	Description & Solution
Failed to power on	The battery level is too low.	Replace with a new battery
	Polarities of the batteries are reversed.	Ensure the batteries are in the right position
	The thermometer is damaged	Contact dealer
The reading is too low	The lens of the probe is dirty.	Clean the lens with a cotton swab.
	The distance of the item and target is too far	Keep in contact with skin, or put the probe into the Ear Canal.
	You have just come from a cold environment	Stay in a warmer room for at least 30 minutes before taking a reading
The reading is too high	You have just come from a hot environment.	Stay in an adequately cool room for at least 30 minutes before taking a reading
	The ambient temperature is not in range.	One long beep, and red backlit for 3 seconds. Take a measurement under an ambient temperature between 10°C (50.0°F) and 40°C (104°F).
	Memory error or calibration is not finished. Item will be turned off automatically after 3 seconds.	One long beep, and red backlit for 3 seconds. Contact dealer.

Symptom	Possible Cause	Description & Solution
	In ear or forehead mode, $T > 42.9^{\circ}\text{C}$ (109.2°F) In object mode, $T > 100^{\circ}\text{C}$ (199°F)	One long beep, and red backlight for 3 seconds.
	In ear or forehead mode, $T < 32^{\circ}\text{C}$ (89.6°F) In object mode, $T < 0^{\circ}\text{C}$ (32°F)	One long beep, and red backlight for 3 seconds.
	The power voltage is between 2.4V-2.7V	The battery icon will flicker, it means the battery is low, but you still can use the thermometer.
	The power voltage is lower than 2.4V	The battery icon will flicker, the item will be turned off automatically after 3 seconds. Please replace with a new battery.

10. Technical Specifications:

Product name	Forehead & Ear Infrared Thermometer	
Display	Segment LCD, Four color LED backlight (white, green, orange, red)	
Temperature units	$^{\circ}\text{C}/^{\circ}\text{F}$, switchable	
Power supply	DC 3V, AAAX2	
Measurement range	Forehead & Ear: 32.0°C - 42.9°C (89.6°F - 109.2°F)	
	Object: 0°C - 100°C (32°F - 199°F)	
Accuracy (Laboratory)	Ear & Forehead mode	$\pm 0.2^{\circ}\text{C}/\pm 0.4^{\circ}\text{F}$
	Object mode	$\pm 1.0^{\circ}\text{C}/2.0^{\circ}\text{F}$
Display resolution	$0.1^{\circ}\text{C}/^{\circ}\text{F}$	
Automatic	60s $\pm$ 10s	

Operational conditions	Temperature: 10°C-40°C (50°F-104°F) Humidity: 15-95%RH, non-condensing Atmospheric pressure: 70-106kPa
Storage condition	Ambient Temperature: -20°C-55°C (-4°F-131°F) Relative Humidity: 0-95% RH, non-condensing Atmospheric pressure: 50kPa to 106kPa
Battery	2*AAA, can be used for more than 3000 times
Weight & Dimension	80g (with battery), 143x35x41mm

ESSENTIAL PERFORMANCE

Measurement Range: 32.0°C-42.9°C (89.6°F-109.2°F)

Accuracy: $\pm 0.2^{\circ}\text{C}/\pm 0.4^{\circ}\text{F}$

Statement:

The clinical accuracy or clinical deviation of the medical infrared frontal thermometer has been clinically verified and can be obtained by contacting the manufacturer.

The infrared thermometer using Bluetooth 4.2 technology, transmitting and receiving frequencies of 2402-2480MHz, modulation type GFSK, effective radiation power of 2.79dBm.

11. Symbols:

Symbol	Description
	Type BF applied part.
	Information about a manufacturer.
	Refer to instruction manual
	Comply with local regulations about disposal
	Date of manufacture
	Use-by date
	Batch code
	Serial number
	Caution

IP22	2 Protected against solid foreign objects of 12,5 mm Ø and greater; 2 If keep the thermometer in 15 degree angle, it still can prevent the water drop.
	Medical device
	Importer
	CE mark
	Authorized Representative In The European Community
	Unique Device Identifier
	keep away from sunlight
	Keep dry
	Fragile, handle with care

12. **Appendix: EMC Information - Guidance and manufacturer's declarations**

CAUTION:

- The Infrared Thermometer needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided for in the ACCOMPANYING DOCUMENTS.
 - Portable and mobile RF communications equipment can affect Infrared Thermometer.
 - The Infrared Thermometer should not be used adjacent to or stacked with other equipment.
- Guidance and manufacturer 's declaration - electromagnetic emission - for all EQUIPMENT AND SYSTEMS.**

Guidance and manufacturer's declaration - electromagnetic emission		
The Infrared Thermometer is intended for use in the electromagnetic environment specified below. The customer or the user of the Infrared Thermometer should assure that it is used in such an environment.		
Emissions	Compliance	Electromagnetic environment - guidance
test RF emissions CISPR11	Group 1	The Infrared Thermometer uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class B	The Infrared Thermometer is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings

Guidance and manufacturer's declaration - electromagnetic immunity - for all EQUIPMENT and SYSTEMS

Guidance and manufacturer's declaration - electromagnetic immunity			
The Infrared Thermometer is intended for use in the electromagnetic environment specified below. The customer or the user of the Infrared Thermometer should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8kV contact ±15 kV air	±8kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

**Guidance and manufacturer's declaration -
electromagnetic immunity - for EQUIPMENT and
SYSTEM that are not LIFE SUPPORTING**

EN

Guidance and manufacturer's declaration - electromagnetic immunity			
The Infrared Thermometer is intended for use in the electromagnetic environment specified below. The customer or the user of the Infrared Thermometer should assure that it is used in such an environment.			
Immunity test	IEC 60601 Test level	Compliance Level	Electromagnetic environment - guidance
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	10 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the Infrared Thermometer, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = \left[\frac{3.5}{V_1} \right] \sqrt{P}$ $d = \left[\frac{3.5}{E_1} \right] \sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz}$ $d = \left[\frac{7}{E_1} \right] \sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz}$ Where "p" is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is recommended separation distance in meters (m).^b Field strengths from fixed RF transmitters, as determined by an Electromagnetic site survey, should be less than the compliance level in each frequency range.^b Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations.

Electromagnetic is affected by absorption and reflection from structures, objects and people.

a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Infrared Thermometer is used exceeds the applicable RF compliance level above, the Infrared Thermometer should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Infrared Thermometer.

Recommended separation distances between portable and mobile RF communications equipment and the EQUIPMENT or SYSTEM - for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

Recommended separation distances between portable and mobile RF communications equipment and the Infrared Thermometer.

The Infrared Thermometer is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Infrared Thermometer can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Infrared Thermometer as recommended below, according to the maximum output power of the communications equipment

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2,5 GHz
	$d = \left[\frac{3.5}{V_1} \right] \sqrt{P}$	$d = \left[\frac{3.5}{E_1} \right] \sqrt{P}$	$d = \left[\frac{7}{E_1} \right] \sqrt{P}$
0.01	/	0.12	0.23
0.1	/	0.38	0.73
1	/	1.2	2.3
10	/	3.8	7.3

100	/	12	23
The Infrared Thermometer is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Infrared Thermometer can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Infrared Thermometer as recommended below, according to the maximum output power of the communications equipment.			

13. Warranty and After-Sale Service

The device is under warranty for **12 months** from the date of purchase.

The batteries, the packaging, and any damage caused by improper use are not covered by the warranty.

Excluding the following user-caused failures:

- 1) Failure resulting from unauthorized disassembly and modification.
- 2) Failure resulting from an unexpected dropping during application or transportation.
- 3) Failure resulting from not following the instructions in the operating manual.