Thermometers for Non-Contact Temperature Measurement

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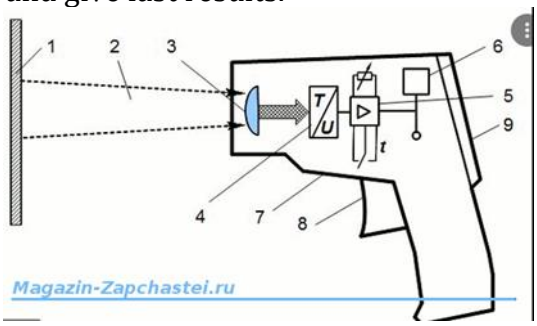
ABSTRACT

The article is devoted to the study and analysis of modern non-contact infrared thermometers. The principles of work and general trends in the development of non-contact thermometers are analyzed. Criteria for the selection of non-contact thermometers are given and their advantages are listed

Keywords: Thermometer, Non-Contact Infrared Thermometer, Body Temperature, Pyrometer, Sensor.

It is known that human body temperature is measured using thermometers. At home, liquid thermometers are often used, which use alcohol or mercury. But their use can be dangerous. Therefore, non-contact infrared thermometers are increasingly becoming an alternative. This modern solution allows you to quickly and contactlessly measure the temperature. They are easy to use, convenient, safe and give fast results.



What are infrared thermometers?

Recently, the traditional mercury thermometer has been replaced by a more modern infrared thermometer. The infrared instrument is one of the most sought-after technical innovations for temperature measurement in recent years. A few simple steps, a few seconds of time - and the body temperature will be displayed on the display. Thanks to the accuracy of the results and the speed of work, the robust universal instrument will not go unnoticed by many users.

The creator of the first prototype of a non-contact thermometer was the famous Dutch physicist of the 18th century, Peter Van Muschenbroek. His invention measured temperature readings from the light intensity of condensed objects. The device is called a pyrometer. It could be applied in various fields. Some of his models could work at low temperatures. Pyrometers have changed

considerably over the twentieth century. Physicists have made a number of important discoveries that have improved the technical properties of pyrometers, making them less cumbersome. In 1967, mankind created the first portable device.

At present, a non-contact measuring device is widely used in medicine, in everyday life, making life easier and improving its quality.

The device of a non-contact thermometer and the principle of its operation.

Devices called pyrometers work by determining the strength, power (usually in the spectrum of visible light and infrared radiation) of thermal radiation. The principle of their operation is based on the Stefan-Boltzmann law, which describes how the temperature of a body is related to its thermal (infrared) radiation.

Heat flow from the body is recorded using a highly sensitive sensor mounted on this non-contact meter. In standard non-contact thermometers, the normal human body temperature is 36.6 degrees Celsius. A highly sensitive temperature sensor captures all deviations from this norm. The information is converted to degrees Celsius and sent to the display. Based on this, the temperature of the object under study is calculated.

Naturally, in such an apparatus there is an error, but usually it does not exceed 0.3 ° C.

The place for measurement can be any part of the head (usually the forehead), as well as the hands (wrists). These places are easily accessible when checking the temperature. In this case, a person does not need to undress, perform unnecessary actions.

In this way, the temperature is measured in both adults and children. The device runs on easily replaceable batteries. But only a high-quality device can show a reliable result. Therefore, it is worth taking seriously the choice of a model of such thermometers, which will greatly facilitate people's lives.

Types of thermometers.

Depending on the field of application, infrared thermometers can be:

- ear;
- frontal;
- contactless.

In some parts of the human body, thermal radiation has different intensities. If you want accurate results, use this ruler correctly. The ear model is intended only for temperature detection directly in the ear, while the sensor must be placed directly in the ear. The forehead thermometer records the temperature on the surface of the forehead. Non-contact infrared thermometers are universal, they can be used to study any surface, body parts.

Criteria for choosing a non-contact thermometer.

For a person who wants to purchase such a device, making a choice from a variety of offers on the modern market is not an easy task. Here are some tips to help you make an informed choice and make the right decision:

- First you need to determine what functionality you need. Some devices are only capable of measuring human body temperature. Their range is designed for temperature fluctuations from 34 to 42°C. But now there are devices that record the temperature of any object. This could be the temperature of a baby's formula bottle, bath water, the floor of a baby's room, and so on. More expensive models have a number of functions in their arsenal.
- When choosing a device for public use (for example, in kindergarten groups), look for models with a waterproof case. This makes it easy to use, allowing you to thoroughly clean your device.
- If you want to use the additional features of the non-contact infrared assistant, pay attention to the ability to remember the last measurements, color temperature indicators (green numbers on the display mean 36.6 ° C, bright red numbers - the signal is above the norm). You can also turn on the backlight of the display and optionally add an audible signal. Additional functionality is a convenience that you will have to pay more for.
- When choosing, do not forget about the certificate for the product. This serves as a confirmation of quality. Accurate results are given by thermometers with an error of less than 1%, the optimal error is about 0.2%.
- Such an instrument must be calibrated (correct reading) before use. Without it, the

device cannot determine what a low or high temperature is. Otherwise, it may not work.

• Remember the importance of response time. The time interval after which the result appears on the display is important, for example, when using devices for children.

• In some cases, it is very convenient to monitor the storage status of the measurement result. So you can easily follow the temperature readings, their change over several days.

• When choosing a device, give preference to models with a durable plastic case, check the build quality. It is important that the battery cover is tightly closed. Auto-off is a nice bonus that saves power, which means you need to change power supplies less.

Main advantages.

Thermometers that should not come into contact with the body are a valuable invention for many consumers. This is very convenient, for example, if there are small children in the house. Many pediatricians recommend the use of such thermometers.

The following advantages are obvious:

• Infrared temperature measuring instruments quickly display test results. A few seconds are enough to determine if a person has a fever. Parents no longer have to wait 5-10 minutes to calm a restless child. Press the button of the proximity device on the child's forehead or hand, the temperature will be immediately visible on the child's screen. And the backlight of the screen allows you to take measurements even at night, without disturbing the baby's sleep.

• A very important plus is the safety of use. Such thermometers, unlike mercury thermometers, are harmless when not in use. The infrared non-contact device is not dangerous for people in case of any damage.

• Thanks to the built-in memory, some models allow you to see the temperature readings in the dynamics.

• Surprisingly easy to use, allowing even a child to cope with the task. There is no need to shake the thermometer before taking a measurement. And it can be turned off automatically.

• Models with backlit displays and clear numbers will be an indispensable assistant for people with vision problems.

How to use a non-contact thermometer?

To get the most accurate results, you need to follow a few simple rules:

• Appropriate power supplies (batteries) must be installed in the thermometer.

• Measurements should be taken on dry and clean surfaces. Skin areas should be cleaned of sweat, various contaminants.

• The temperature should preferably be measured without fans, air conditioners or heaters running.

• Before use, make sure that the thermometer probe is free of dust and dirt. You can wipe it with a dry soft cloth.

Direct temperature measurement includes:

• turn on the device;

• site selection and preparation for research;

• aim at a distance of 4-6 cm;

• press the start button of the meter.

After a few seconds, the results will appear on the display. They just have to wait patiently. Do not move your hand or the sensor during this time. This interferes with the operation of the thermometer. If the temperature reading in one area is questionable, you can repeat the steps elsewhere.

The measurement procedure for children and adults is the same. The use of such a device does not disturb children's sleep. A thermometer facing the forehead or ear will quickly show if the baby has a fever.

You can easily determine the temperature yourself.

It is enough to activate the device, direct it to the right place and wait for the result.

Such an assistant must be properly looked after so that it serves for a long time and shows clear results. And it's very simple:

• Don't forget the most sensitive part of the device - the sensor. It should be periodically cleaned of dirt and protected from damage. It is recommended to carefully wipe its surface with a swab moistened with alcohol or just water.

• Soapy solution easily removes dirt from the case. The housing should be gently wiped with a damp cloth to prevent the solution from getting inside.

To clean non-contact infrared thermometers, do not use:

• hard brushes;
• aggressive cleaners;
• gasoline;
• thinners.

In an unused thermometer, in the event of a leak, the batteries should be removed to prevent corrosion of the contacts.

Direct sunlight, like water, can damage the thermometer. Therefore, plastic or resealable boxes with a rigid lid are used for its storage. It also acts as a protection against dirt, dust, and cushions the force of a fall.

Such a device in a convenient compact box, along with a set of alcohol wipes for disinfection, is simply an indispensable assistant on a trip.

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