

**Still taking measurements? Or are you monitoring already? Why not play it safe, and save money with a temperature monitoring system?**



## Executive summary.

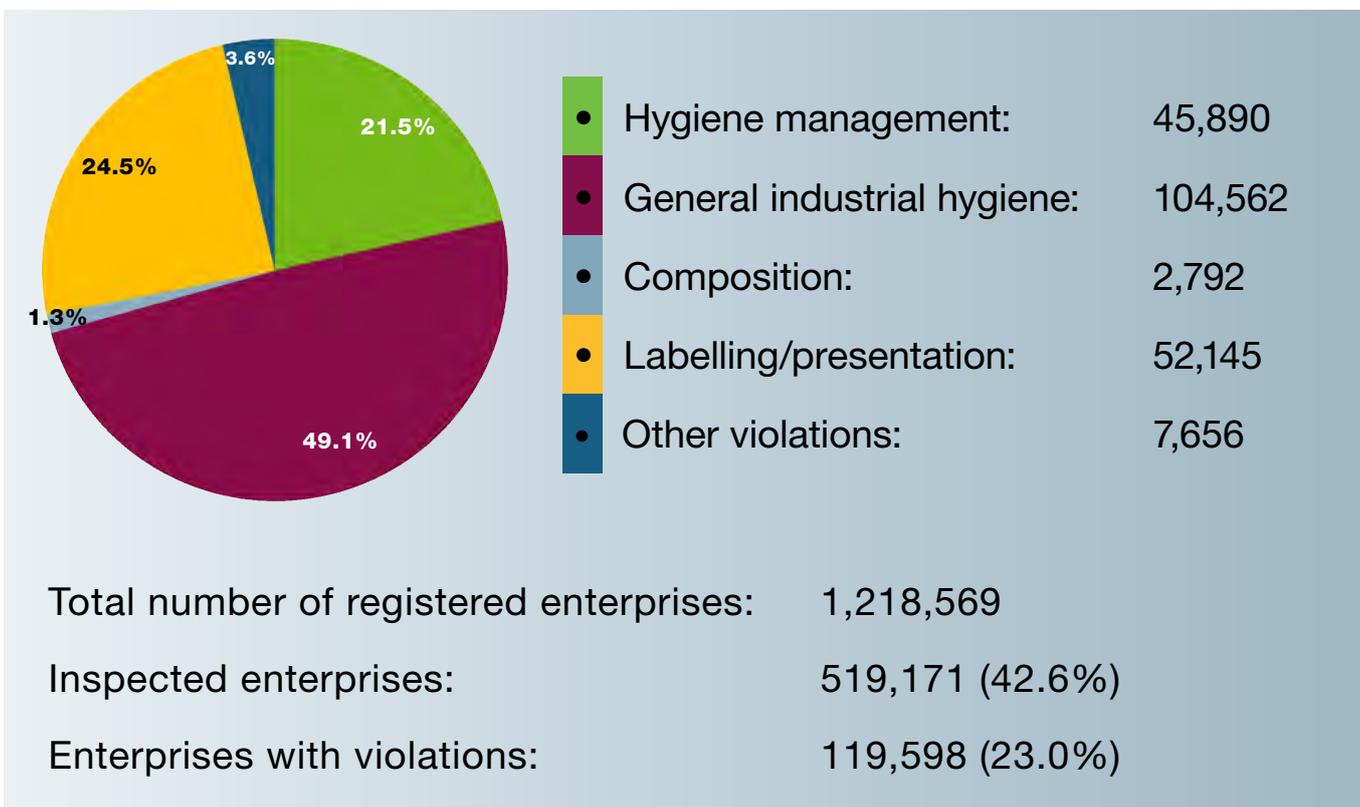
When it comes to measuring and documenting temperatures, many food business operators are convinced that they have this perfectly under control. But the reality may be somewhat different, as shown by the example of statistics presented on this page from a publication by the German Federal Office of Consumer Protection and Food Safety. According to this, around a quarter of all companies inspected fail to comply with hygiene management or industrial hygiene regulations. And that is in a country where there is rigorous enforcement. The inspection criteria includes compliance with the temperature limits, e.g. in the storage, transportation or processing of food products, similarly in South Africa.

However, although the sole reason for monitoring critical temperatures is not just about passing an audit or inspection, any company which produces or distributes food products has a duty of care and is responsible for ensuring that its products are safe for consumption and acceptable to quality standards. The food business operator must ensure this via appropriate control systems. In addition, it is also necessary to take into account the value of the products that are stored or produced as food products which do not meet the legal hygiene requirements must be withdrawn from the market. Recalls are costly.

In any case, it is critical for those responsible for quality to have temperature values under control.

On the following pages, you can therefore find out all about:

- The legal requirements for monitoring temperatures according to Regulation R638.
- Why good old-fashioned everyday measurements are just not enough.
- Why paperwork with manually input measuring values is problematic.
- The costs incurred by different measurement methods.
- The advantages of monitoring systems when it comes to monitoring temperature.



BVL, Lebensmittelsicherheit 2016 in Deutschland [Food Safety 2016 in Germany].

	Department Of Health	National Regulator For Compulsory Specifications
<b>Legal regulations</b>	<ul style="list-style-type: none"> <li>• Regulation R638 General hygiene regulations – all food stuffs</li> <li>• Regulation R961 Regulations Relating To Hygiene Requirements For Milking Sheds, The Transport Of Milk And Related Matters</li> </ul>	<ul style="list-style-type: none"> <li>• VC 8014/2018 Compulsory specification for the manufacture, production, processing and treatment of canned fish, canned marine molluscs and canned crustaceans</li> <li>• VC 8017/2015 Compulsory specification for frozen fish, frozen marine molluscs and frozen products derived therefrom</li> <li>• VC 8019/2004 Compulsory specification for the manufacture, production, processing and treatment of canned meat products</li> <li>• VC 8020/2003 Compulsory specification for frozen rock lobster and frozen lobster products derived therefrom</li> <li>• VC 8021/1974 Compulsory specification for smoked snoek</li> <li>• VC 8031/2015 Compulsory specification for frozen shrimps (prawns), langoustines and crabs</li> <li>• VC 9001/2012 Compulsory specification for live aquacultured abalone</li> <li>• VC 9104/2016 Compulsory specification for live lobsters</li> <li>• VC 9107/2018 Compulsory specification for aquacultured live and chilled raw bivalve molluscs</li> </ul>
	<p><b>Department of Agriculture, forestry and fisheries Meat Safety Act and associated regulations for meat, poultry, ostrich</b></p>	
	<ul style="list-style-type: none"> <li>• Agricultural Products Standard Act and associated regulations – each species has recommended storage temperatures</li> </ul>	
<b>Standards</b>	<ul style="list-style-type: none"> <li>• SANS 10049 Food safety management - Requirements for prerequisite programmes (PRPs)</li> <li>• SANS 1159 The production of pre-cooked frozen foods containing protein</li> <li>• SANS 1406 Commercial refrigerated food display cabinets</li> <li>• SANS 10156 The handling of chilled and frozen foods</li> <li>• SANS 788:2019 Frozen shrimps (prawns), langoustines and crabs</li> <li>• SANS 1675:2018 The manufacture, production, processing and treatment of canned meat products</li> <li>• SANS 587:2017 Canned fish, canned marine molluscs and canned crustaceans, and products derived therefrom</li> <li>• SANS 2879:2016 Live and chilled raw bivalve molluscs</li> <li>• SANS 22002-2:2014 Prerequisite programmes on food safety - Part 2: Catering</li> <li>• SANS 1680:2014 Live lobsters</li> <li>• SANS 585:2014 The production of frozen fish, marine molluscs, and products derived therefrom</li> <li>• SANS 1369:2016 Organic agriculture production and processing</li> <li>• SANS 587:2011 Canned fish, canned marine molluscs and canned crustaceans, and products derived therefrom</li> <li>• SANS 885:2011 Processed meat products</li> </ul>	

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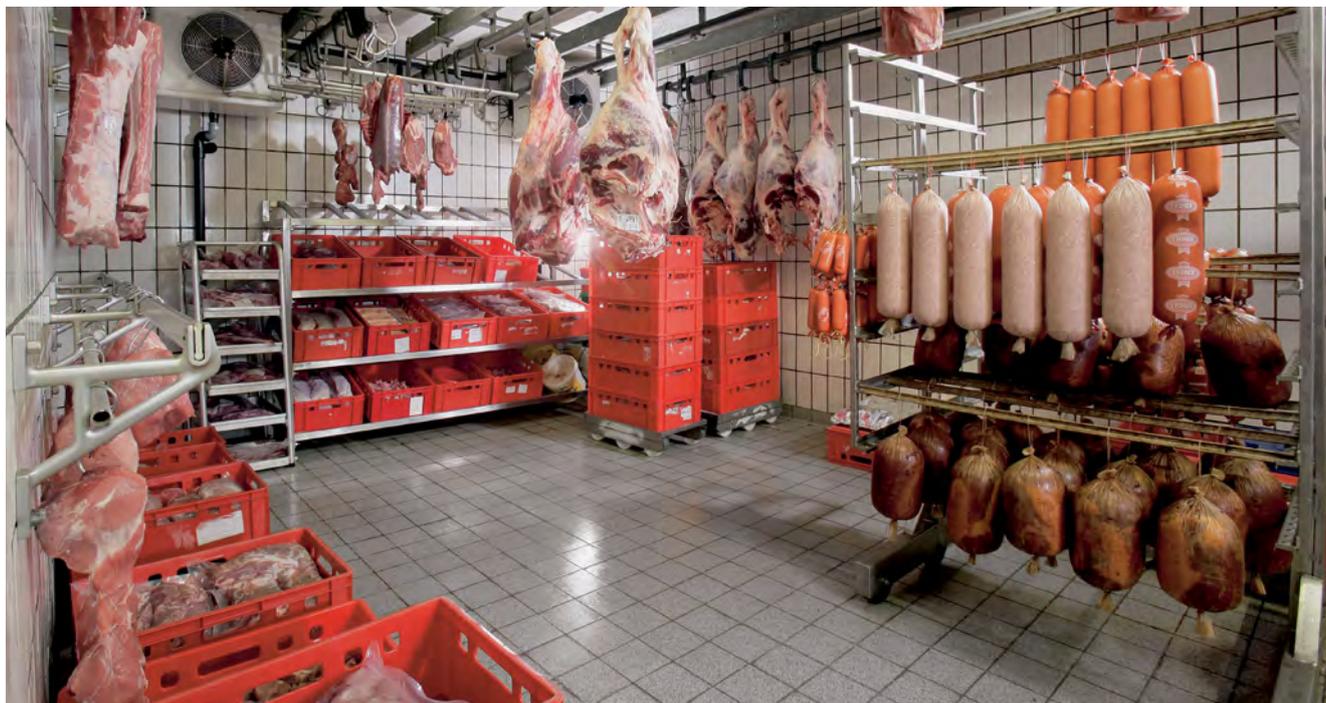
## Quality cannot be delegated.

### Or: Obligations of a food business operator

As a food business operator or the person in charge, you are personally liable for the quality and safety of your goods. And a food business operator refers to anyone involved in activities relating to the production, processing or sale of food products, not just a manufacturer. The only problem is that you can't be everywhere in order to deal with incoming goods, production and shipping as well as managing the business. This means that quality awareness must form the foundation of the day-to-day work of all employees. And as a food business operator, you need to ensure that this is the case via regular inspections and training. Moreover, you must ensure that your documents are kept up to date at all times and are available for at least 6 months after the shelf life in relation to compliance with temperature limits, e.g. during the storage, processing and transportation of food products.

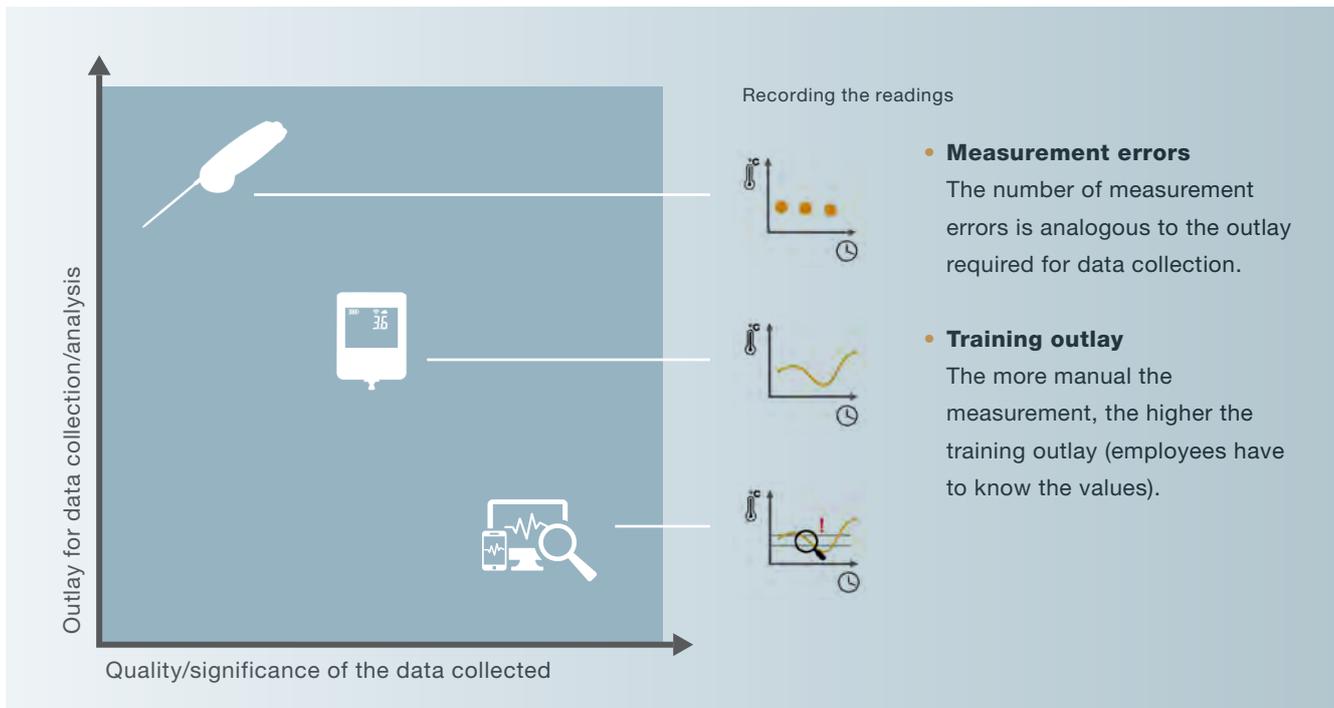
In the event of any limit value deviations, you should document which corrective action was implemented to show due diligence. It is essential to maintain the cold chain for the goods that come under your responsibility. In the case of foods which cannot be stored at room temperature without potential problems, the cold chain must not be interrupted. Deviations (e.g. during loading and unloading) are only permitted within certain limits (maximum +2 °C) and for a short period of time. In accordance with R 638, other legal requirements and standards, the measuring instruments used for this must be accurate to 1°C and should be calibrated at regular intervals to ensure this accuracy is maintained.

There are a number of ways temperatures can be recorded to demonstrate this due diligence.



## The 3 methods of measuring temperature.

Spot check measurement	Continuous data recording	Automated temperature monitoring
<ul style="list-style-type: none"> <li>Measuring technology: Handheld measuring instruments</li> </ul>	<ul style="list-style-type: none"> <li>Measuring technology: Data loggers</li> </ul>	<ul style="list-style-type: none"> <li>Measuring technology: Monitoring systems</li> </ul>
<ul style="list-style-type: none"> <li>Readings are collected manually using spot checks. These usually take place 1 to 2 times per day or, for example, always at the beginning of a shift.</li> </ul>	<ul style="list-style-type: none"> <li>Readings are first collected continuously and then analyzed manually.</li> </ul>	<ul style="list-style-type: none"> <li>Readings are collected continuously and analyzed automatically.</li> </ul>
<ul style="list-style-type: none"> <li>High training outlay: every employee must know the limit values so that he/she can take corrective action.</li> </ul>	<ul style="list-style-type: none"> <li>Due to the time lag between collection and analysis of the data, there are only very limited opportunities to respond in an emergency. There is also a high training outlay.</li> </ul>	<ul style="list-style-type: none"> <li>Limit values are stored once in the system. If a limit value is violated, the monitoring system automatically issues an immediate alarm.</li> </ul>
<ul style="list-style-type: none"> <li>The data only has very limited significance, because it only ever represents a snapshot. The readings between the spot checks are not known.</li> </ul>	<ul style="list-style-type: none"> <li>However, the data obtained is complete and meaningful.</li> </ul>	<ul style="list-style-type: none"> <li>The readings are complete and have a very high significance.</li> </ul>



## It'll all be worthwhile in the end.

In the table on the next page, we compare measurements of the air temperature at 10 measuring points using different methods:

- Reading a measuring value from a thermometer and entering this value in a list.
- Weekly collection, readout and re-attachment of a data logger.
- Using the testo Saveris 2 data monitoring system, which automatically transfers the readings to the Cloud.

The set-up is based on feedback from numerous discussions with customers, which is why the time and cost data presented is strongly geared towards actual practice.

Typical errors that can be prevented by using a data monitoring system:

- Data is not measured/read, but assumed or copied from the previous day to save time.
- Data is either read incorrectly or transferred to the table incorrectly.
- No regard is given to the fact that the temperature values need to be monitored. This results in data gaps or incorrect, assumed values.
- The employee must know the temperature limits so that he/she can take corrective action in the event of a deviation. This action must also be documented. Often, however, the employees do not know the limit values or forget about the documentation.
- Transposing paperwork is time-consuming and errors can occur when transposing the paperwork to an electronic format.
- When data loggers are used, the customer only notices the limit value deviation (long) after it has occurred and must then take action.



**Cost comparison of measuring technology for temperature control**

<b>10 Measuring points (1 logger per measuring point)</b>	Spot check measurement with handheld instrument without software	Continuous data recording with data loggers	Temperature monitoring with testo Saveris 2 measurement data monitoring system	Enter the expenditure for your existing solution here  
<b>One-time outlays</b>				
Installation of the software on a PC		15 min		
Registering the logger in the WiFi network			100 min	
Setup/configuration of the measuring instrument/logger	10 min	50 min	30 min	
Inserting batteries (per measuring instrument)	5 min	50 min		
Attaching the wall bracket (per measuring point)		100 min	100 min	
Setting up the report wizard			5 min	
<b>Total one-time expenditure</b>	<b>15 min</b>	<b>215 min</b>	<b>235 min</b>	
<b>Regular outlays</b>				
Hanging up/distributing the loggers (per measuring point) once a week		20 min		
Collecting (once a week)		20 min		
Reading (once a week)		40 min		
Measuring (per measuring point) 10 minutes daily, on 30 days per month	300 min			
Monthly evaluation/reporting	60 min	30 min	5 min	
<b>Total regular expenditure for the month</b>	<b>360 min</b>	<b>110 min</b>	<b>5 min</b>	
<b>Total time for the year</b> calculated from: <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Total regular expenditure                     </div> x 12                     + <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Total one-time expenditure                     </div>	4,335 min	1,535 min	295 min	
<b>Total wage costs of a quality manager per working minute (wage costs for short)</b> calculated from: (ZAR 12 000 x 1.5): 160 working hours for the month: 60 = ZAR 1.88				
<b>Costs for the month</b> calculated from: <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Wage costs                     </div> x <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Total one-time expenditure                     </div> + <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Wage costs                     </div> x <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Total regular expenditure for the month                     </div>	ZAR 705.00	ZAR 611.00	ZAR 451.20	
<b>Costs for the year</b> calculated from: <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Total time for the year                     </div> x <div style="border: 1px solid black; padding: 2px; display: inline-block;">                         Wage costs                     </div>	<b>ZAR 8 149.80</b>	<b>ZAR 2 885.80</b>	<b>ZAR 554.60</b>	

## Special challenges for handheld measuring instruments and data loggers.

### The problems with paperwork

Numerous companies which produce, store or distribute food products still record temperature readings manually on paper. Lots of quality managers in these companies remain convinced that paperwork is sufficient to meet the legal documentation requirements. It is not our aim to call this into question, but we do believe that it makes sense to take a closer look at this within the context of risk analysis. The Hygiene Regulation R638:2018 requires appropriate temperature control measures to be taken to ensure that the cold chain is not interrupted.

### Errors can seemingly come out of nowhere

The major downfall of using handheld measuring instruments, spot checks and paperwork: as a quality manager, you never know what has happened between two measuring points. Suppose that your company closes over the weekend and the last spot check on Friday was as uneventful as the first spot check on Monday morning. You cannot be certain that the cooling did not malfunction in between, thereby interrupting the cold chain.

Temperature measurements with handheld measuring instruments of any kind – whether it's penetration or surface measurement – are prone to error. This is partly down to the measuring technology itself, which requires consideration of certain aspects in order to obtain the correct results. It's also due to the fact that people make mistakes. This is, and always will be the case – especially in an environment like the food industry, which is so strongly driven by time and cost pressure.

When it comes to documentation, errors creep in there too. After all, manual entries can always be tampered with, and the person recording them has his or her own scope for interpretation when transferring the readings to a list. The retrospective recording of multiple values can also be frequently observed – each individual temperature reading is not always remembered correctly. Whether you're replacing your existing system with a data logger or a data monitoring system – both can help you ensure that measurements are actually taken.



### The hidden costs of temperature measurement

The outlays involved in using handheld measuring instruments and data loggers should not be underestimated and many are not immediately apparent. First, the obvious: spot check measuring instruments must be used, data loggers must be read out and readings documented and analyzed. All this takes time. This could be spent by both you and your employees on more profitable activities. Time and money also need to be invested in training. The rule of thumb here is: the more manual a measurement, the higher the training outlay. After all, the temperature limits of all food products that need to be checked are not the only things that employees need to know. They should also know what to do in the event of an emergency. The complexity of analysis should not be underestimated either. Especially if, for example, you wish to use a spreadsheet program to get at least minimal insights from the data obtained.

## There is another method: The advantages of automated monitoring systems.

Automated temperature monitoring with an appropriate monitoring system leaves the shortcomings of manual measuring methods behind, and boosts the control of this quality-relevant data to a completely new level. That may sound like an exaggeration at first – but that’s really what it does:

- Recording, documentation and evaluation of the readings is completely automated: Once set up, the system does the work for you. It does this reliably and in your selected measuring cycle.
- All data is stored securely – both in the logger and also in the Cloud.
- A normal PC/computer or mobile device gives you access to all measurement data any time and anywhere.
- By outsourcing the task of temperature monitoring to technology, you can save both time and money. Moreover, you also get extra security – because even in cases of holidays, illness, etc., measurements are taken reliably.
- In the event of limit value violations (the limit values can, of course, be individually adjusted), those in charge are immediately alerted via e-mail or SMS. This allows enough time for them to take corrective action.

- In addition, the controlling authorities put more trust in customers who can demonstrate an effective HACCP self-monitoring system (and temperature monitoring with an automated monitoring system falls into this category).

Incidentally: the common preconception that temperature monitoring systems are always expensive and complicated is actually just that: a preconception. As a rule, these systems can be scaled according to requirement – and can even be operated with a single data logger. Plus installation only takes a few minutes. The prices for a good handheld instrument, a data logger or a temperature monitoring system are all similar.

**The tried and tested testo Saveris 2, the automated temperature monitoring system from Testo, also offers you all these advantages. Check it out for yourself by going to our website:**

<https://www.testo.com/en-ZA/products/saveris-2>



## These questions will help you find the temperature monitoring system that is perfect for you.

To help you decide which temperature method is most suitable for you, we have prepared these questions for you:

1. Do your employees know the temperature limits, and do they know what to do in the event of deviations?
2. Do the replacements to cover holiday and sickness absences also know the limit values and what needs to be done?
3. How many measuring points do you have and where are these allocated? For example, do you want to measure the temperature in closed refrigerated rooms?

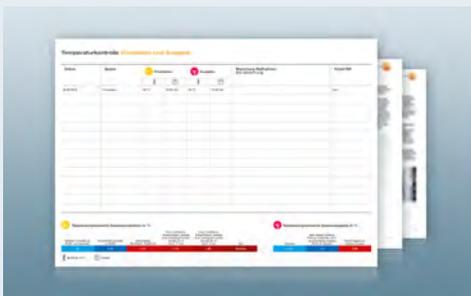
4. Do you want to “only” record temperature or humidity values or do you also want an alarm function? Does this need to be done promptly, or is that sufficient for logger evaluation?
5. Is there a WLAN available where you want to measure and monitor temperatures?
6. Do you only want to access the data on your own and only locally on one PC, or do you require data access from anywhere via smartphone, tablet or computer, possibly distributed to multiple users.

We would be happy to answer these and any other questions relating to automated temperature monitoring.

## These might also interest you.

### Temperature checklists:

- For incoming goods, storage, production and service
- Just download and fill in



<https://static-int.testo.com/media/e7/74/866277b69ee9/testo-Gastronomy-Restaurants-checklists-EN.pdf>

### Food safety training cards:

- Selecting the correct measuring points in the warehouse
- Tips & tricks for measuring temperature



<https://static-int.testo.com/media/11/cf/64477f05083e/Food-Inspector-Trainingscards-EN.pdf>

### Security dossier:

- Everything Testo does to protect your measurement data and privacy
- How and where your measurement data is stored
- Supported encryption technologies and network protocols



<https://static-int.testo.com/media/2c/79/aeea85b1abb3/testo-saveris-2-testo-160-Security-Dossier-2017-EN.pdf>

# ANNEXURE G [Regulation 8(7)] R638/2018

## Code of practice for measuring temperature of food

Informing the person in charge or person responsible

The inspector must inform the person in charge, or a person supervising the operation if the person in charge is not available, that he or she wishes to measure the temperatures of the food concerned and must explain to him or her all the procedures contained in this code.

### Precautionary measures

- (1) All procedures must be carried out as far as is practicable in a manner that is aseptic and free from chemical pollutants
- (2) In the case of prepacked food, and if it is necessary, the inspector must remove the packaging in such a manner that the minimum and only the most reasonable essential damage is caused, or the person in charge or the person supervising the operation must remove the packaging at his or her own risk.
- (3) The temperature of food must as far as is practicable be measured without removing the food from a chilling, freezing or heating facility

### Measurement of temperature

Prepacked food

- (1) If the food is prepacked, the estimated temperature of the food may be measured by placing for at least one minute the stem / probe of a thermometer (hereinafter referred to as the "stem / probe ") between two or more food packages or, in the case of a single food package, on the outer surface of the package.
- (2) If the temperature reading is not in compliance with the core temperatures specified in Annexure E to these Regulations or if the inspector has any doubts regarding the temperature of the food inside the package, the surface or core temperature of the food may be measured to determine the actual temperature.

Core temperature

- (3) If the food product is frozen a hole must be drilled in the food up to the estimated core of the food product with a sterilized stainless steel bit with an external measurement of about 4mm. The sterilized stem / probe must be inserted into the hole up to the estimated center of the product and a reading must be taken after two minutes. In the case of a heated, chilled or unchilled product, the sterilized stem / probe must be inserted up to the estimated core of the food product and a reading shall be taken after one minute.

Surface temperature

- (4) The surface temperature shall be measured by placing the sterilised stem directly on the surface of the food for at least one minute or, in the case of liquid, in the liquid for at least one minute, and the reading shall be taken immediately thereafter.

### Presumption in respect of representative temperature reading

- (1) The food temperature determined in accordance with this code of practice shall be regarded as being representative of the temperature of all food in the freezing, chilling or heating facility concerned if the inspector is satisfied that such food is in the same condition or has the same characteristics as the food the temperature of which was taken.



<b>ANNEXURE E</b> <b>[Regulations 6(7)(j) / 8(4)(a)(i) / 8(6)(e)]</b> <b>FOOD TEMPERATURES</b>		
<b>Category</b>	<b>Type Of Food</b>	<b>Required core temperature of food products that are stored, transported or displayed for sale</b>
Frozen Products	<ul style="list-style-type: none"> <li>Ice cream and sorbet, excluding sorbet which is used for soft serve purposes and frozen fish and fishery products</li> </ul>	<b>≥-18°C</b>
	<ul style="list-style-type: none"> <li>Any other food which is marketed as a frozen product</li> </ul>	<b>≥-12°C</b>
Chilled Products	<ul style="list-style-type: none"> <li>Raw unpreserved fish, molluscs, crustaceans, edible offal, poultry meat and milk</li> </ul>	<b>≤+4°C</b>
	<ul style="list-style-type: none"> <li>Any other perishable food that must be kept chilled to prevent spoilage</li> </ul>	<b>≤+5°C</b>
Heated Products	<ul style="list-style-type: none"> <li>Any perishable food not kept frozen or chilled</li> </ul>	<b>≥+60°C</b>



## About us: introducing Testo.

Testo South Africa is a subsidiary of Testo SE & Co. KGaA with its headquarters in Germany. Testo is a world market leader in the field of portable and stationary measurement solutions with a strong focus on digital quality management software for the food and pharmaceutical industries. Testo supplies most of the food manufacturers, major retailers and restaurant chains in South Africa with food safety measuring devices.

Testo SA is your partner in food safety instrumentation: food thermometers, cooking oil testers, pH meters, data loggers, wireless data monitoring systems and SANAS accredited calibrations for temperature and humidity.

You can find more information at [www.testo.co.za](http://www.testo.co.za)

