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TBI 40 Thermobox Thermometer from ebro®
How a New Device Is Born from Solving a Problem

ebro® Electronic, specialists in measurement at Ingolstadt, Germany, celebrates its 40th anniversary in 2008, but the ingenuity of the ebro® engineers continues unabated. The new **TBI 40 thermobox thermometer** is a typical ebro® response to customers' needs.

TKT, leading European manufacturer of **isotainers in transporting fresh or deep-frozen food products**, asked ebro® to find a solution to their problem: In order to maintain the complete refrigerating capacity and efficiency of its isotainers and comply with the EC directive VO 37/2005, it was intended to develop a thermometer that would be easily visible and readable from the outside. As an additional feature, TKT sales manager Klaus Hartmann requested a cost-effective, cable-free solution which enables a measurement while the box remains closed.

Eckehard Peschel, product manager at ebro® immediately recognised an opportunity to use **infrared technology**. The TBI 40 was developed to fit neatly into the opening door of an isotainer, enabling internal temperature to be monitored without the need to open the container. This is an important advantage, since so far the measurement was made using a bi-metallic strip thermometer located on the interior surface of the isotainer door — and every time the door was opened, undesirable, warm indoor air entered.

Following in-house trials at ebro® to prove the effectiveness of the TBI 40 thermometer, further independent tests were conducted by the German Inspection Agency at **TÜV SÜD** using 4 isotainers part filled to 33% and then to 75% of capacity. Ten temperature sensors were placed between cartons/packs in the containers and the average values of these 10 units computed. In parallel, over a period of 6 hours, an infrared measurement was carried out every 10 minutes. The two sources of measurement were then plotted into curves and the offset (difference) determined. The maximum offset recorded was 0.9°C in deep frozen goods and 1.7°C in fresh produce. The tests at TÜV SÜD were conducted by Mr Rudolf Glück, the responsible persons for the project being Mr Bernhard Schrempf and Mrs Birgit Kress.

At the push of a button, the actual and average product temperatures in the isotainer can be clearly displayed. The TBI 40 **automatically recognises the appropriate temperature range for fresh** (-1°C to +7°C) and **deep frozen food** (-18°C to -33°C), and red/green LED signals provide alerts for out-of-range temperatures. The measuring range is -33°C to +60°C; the operating range is from -25°C to +60°C. The accuracy is ±1°C at T_{amb} = 23°C ± 3°C and for the remaining range it is ±2°C with a resolution of 0.1°C. The infrared distance to spot ratio D:S is >= 1:1, the emissivity rating is fixed at 0.95. The device is

sealed to IP65 and switches off automatically after 15 seconds. The battery has a life of approx. 5 years and can be easily replaced by the user.

The TBI 40 infrared unit is **TÜV-certified** and has '**registered utility model**' and '**patent applied for**' status.

LIDL is the first German multiple food retailer to use the TBI 40 thermobox thermometer. The company supported the project and the development of the TBI 40 by supplying realistic samples of **food products that typically would be transported in this manner**. Following the success of the project, LIDL plans to retrofit TBI 40 thermobox thermometers **into all isotainers by mid 2008**.

Legend: Infrared technology makes it possible: Using the TBI 40 thermobox thermometer, containers can be successfully monitored without the need to open up!

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