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APPLICATION NOTE

INNOVATIVE BATH THERMOSTAT WITH MODULAR RING INSERT

Precise, contamination-free temperature control of up to five samples

The LAUDA Universa bath circulators, in combination with a special bath lid with ring inserts, offer an innovative solution for precise temperature control of samples in research and development and analytics. This seemingly simple but extremely helpful accessory enables uniform rinsing of several samples with excellent temperature stability of ±0.01 K and, at the same time, prevents contamination through optimal sample fixation. The idea for this solution was born during a visit to a customer laboratory and shows how LAUDA develops innovations and improvements based on the actual needs and challenges of its customers.

Initial situation and challenge

Precise temperature control is the foundation for reproducible laboratory results. Chemical reactions, biological processes, and physical measurements react extremely sensitively to even the slightest temperature fluctuations. Even the most minor deviations can significantly affect the accuracy of analyses and lead to non-reproducible results. This is particularly critical in the case of temperature-sensitive substances such as enzymes or proteins, which only develop their optimum activity within narrow temperature windows.

However, the actual circumstances in everyday laboratory practice often present a challenge. Beakers and sample containers frequently float uncontrollably in the temperature control bath, and, depending on the pump settings, can spin around freely, becoming contaminated or exposed to inconsistent temperatures. Even if the samples remain at the bottom of the bath, they are heated only via the cylinder jacket and not through the bottom of the vessel. This prolongs the time it takes to reach the set temperature, resulting in uneven heating. Direct contact with the temperature control liquid during sampling poses further risks of contamination.

All these factors can cause inaccurate or incorrect measurement results. At the same time, open baths lead to considerable heat loss, which results in longer heating times and poorer temperature stability.

A customer from the chemical industry, who was struggling with precisely these challenges in his daily quality control, addressed them when a LAUDA expert visited his premises. Together, they discussed the problems and requirements, which LAUDA ultimately transformed into a sophisticated innovation.

Solution: Bath lids with ring inserts for high temperature stability

Bath lids with ring inserts are available in two sizes to match the LAUDA Universa appliances. Made of high-quality stainless steel and with practical bow handles, the lids minimize heat loss so that the target temperature is reached more quickly and control accuracy is improved. The ring inserts consist of a four-part construction made of heat-resistant plastic.

The rings allow samples of different sizes to be inserted and fixed in place, ensuring that they are evenly circulated. Five different sizes can be set, suitable for test tubes from 16 mm diameter up to 250 ml beakers (diameter 60 mm). A detailed overview of the supported vessel sizes can be found in the product data sheet.

The smaller lid size is suitable for bath openings of 150 x 150 mm, offering four openings with ring inserts and a holder (4 mm diameter) for a Pt100 temperature probe. This lid size is suitable for all 8-liter baths in the LAUDA Universa range. The larger lid is designed for bath openings of 200 x 200 mm, has five openings with ring systems, and two holders for Pt100 temperature sensors. It is suitable for all Universa appliance types with a 12- or 20-liter bath from the LAUDA Universa series. The additional temperature probes can be used to monitor the sample temperature and support maximum measurement accuracy.

Figure 1:
LAUDA Universa U 12 M with ring system lid (5 openings) and connected Pt100 temperature sensor

The advantages at a glance

✓ Flexible configuration
✓ High sample throughput
✓ Contamination protection
✓ Reduction of heat loss
✓ Improved control accuracy
✓ Improved reproducibility

Practical example

The combination of a Universa thermostat and ring lid creates a high-precision, flexible temperature control system with exceptional temperature stability. In a special customer setup, a temperature stability of ±0.004 K was measured when using a LAUDA Universa U 855 M cooling thermostat at 20 °C.

Conclusion

The combination of LAUDA Universa and a bath lid with ring inserts represents an innovative solution in sample temperature control, adapted to the needs and everyday challenges in the laboratory. With a temperature stability of ±0.01 K and the capability of simultaneously controlling the temperature of five samples of varying volumes, this system opens up new avenues in laboratory analysis.
The well-thought-out design with modular ring inserts, integrated Pt100 holder, and contamination-free sample handling makes the system an indispensable tool for quality-conscious laboratories.

This highly effective accessory also demonstrates how the customer focus of LAUDA and the attention to customer needs give rise to new ideas and how solutions are developed to meet specific challenges.

LAUDA DR. R. WOBSER GMBH & CO. KG
Laudaplatz 1 • 97922 Lauda-Königshofen • Germany
www.lauda.de/en