KERN YDB-03

KERN YDB-03 Universal Density Determination Set

INSTRUCTION MANUAL FOR LIQUIDS AND SOLIDS

1. Introduction

The KERN YDB-03 Universal Density Determination Set is designed for precise measurement of density in both liquids and solids. This set is compatible with all KERN analytical balances, providing a reliable solution for laboratory and scientific applications. It facilitates density determination for substances with densities less than or greater than 1.

This manual provides essential information for the correct setup, operation, and maintenance of your KERN YDB-03 set to ensure accurate and consistent results.

2. Scope of Delivery

The KERN YDB-03 set includes the following components:

- Beaker
- Thermometer
- Sample holder
- Adapter
- Counter weights
- Plummet (stainless steel, 20 g)
- Universal submersible basket for solid bodies (for both floating and sinking samples). The wire diameter of this basket is 0.5 mm, complying with DIN EN ISO 1183-1 requirements.

Figure 1: Assembled KERN YDB-03 Density Determination Set, showing the beaker, sample holder, and submersible basket within the support structure.

3. Setup

Follow these steps to set up the KERN YDB-03 Density Determination Set:

1. **Unpack Components:** Carefully remove all components from the packaging and inspect for any damage.
2. **Assemble Support Structure:** Place the base plate on a stable, level surface. Attach the vertical support rods and the horizontal crossbar.
3. **Position Beaker:** Place the provided beaker onto the designated area on the base plate.
4. **Install Sample Holder/Plummet:** Depending on the measurement type (liquid or solid), attach the appropriate sample holder or plummet to the adapter, which then connects to the balance. Ensure it hangs freely within the beaker without touching the sides or bottom.
5. **Connect to Analytical Balance:** Position the KERN YDB-03 set directly on the weighing pan of your KERN analytical balance. Ensure the balance is calibrated according to its own instruction manual.
6. **Fill Beaker (for liquids/submerged solids):** If determining the density of a liquid or a solid submerged in a liquid, carefully fill the beaker with the reference liquid (e.g., distilled water) or the liquid to be measured. Ensure the sample holder/plummet is fully submerged.

4. Operating Instructions

The KERN YDB-03 set is designed for use with KERN analytical balances. Refer to your specific balance's manual for detailed instructions on density determination calculations and balance operation.

4.1. Density Determination of Solids

For solids, the density is typically determined by measuring the sample's weight in air and its apparent weight when submerged in a liquid of known density (e.g., distilled water).

1. **Weigh in Air:** Place the solid sample on the balance pan (or in the submersible basket if suitable) and record its weight (W_{air}).
2. **Weigh Submerged:** Submerge the sample completely in the reference liquid (e.g., distilled water) using the universal submersible basket. Ensure no air bubbles are trapped. Record the apparent weight ($W_{submerged}$).
3. **Measure Liquid Temperature:** Use the thermometer to measure the temperature of the reference liquid. This is crucial for determining the liquid's precise density at that temperature.
4. **Calculate Density:** Use the formula provided in your analytical balance's manual or standard density calculation methods, considering the density of the reference liquid at the measured temperature.

4.2. Density Determination of Liquids

For liquids, the density is typically determined by measuring the apparent weight of a plummet of known volume when submerged in the liquid.

1. **Weigh Plummet in Air:** Record the weight of the plummet in air (P_{air}).
2. **Weigh Plummet in Liquid:** Submerge the plummet completely in the liquid to be measured. Ensure no air bubbles are trapped. Record the apparent weight (P_{liquid}).
3. **Measure Liquid Temperature:** Use the thermometer to measure the temperature of the liquid.
4. **Calculate Density:** Use the formula provided in your analytical balance's manual or standard density calculation methods, considering the known volume of the plummet.

5. Maintenance

Proper maintenance ensures the longevity and accuracy of your KERN YDB-03 set:

- **Cleaning:** After each use, especially when working with corrosive liquids, thoroughly clean all components with appropriate cleaning agents. Rinse with distilled water and dry completely.
- **Storage:** Store the set in a clean, dry environment, preferably in its original packaging or a protective case, to prevent dust accumulation and damage.
- **Inspection:** Regularly inspect the submersible basket and plummet for any signs of wear, corrosion, or deformation that could affect measurement accuracy.

6. Troubleshooting

If you encounter issues during density determination, consider the following:

- **Inaccurate Readings:**
    - Ensure the analytical balance is properly calibrated.
    - Check for air bubbles on the submerged sample or plummet.
    - Verify the temperature of the reference liquid is accurately measured and accounted for in calculations.

- Ensure the sample holder/plummet is not touching the beaker walls or bottom.

- **Sample Floating (Solids):** If a solid sample floats, use the universal submersible basket designed for floating bodies to ensure full submersion.
- **Component Damage:** If any component is damaged, contact KERN customer support or your supplier for replacement parts.

7. Specifications

- **Product Model:** KERN YDB-03
- **Application:** Density determination of liquids and solids (density ≤/≥ 1)
- **Compatibility:** Suitable for all KERN analytical balances
- **Plummet Material:** Stainless steel
- **Plummet Weight:** 20 g
- **Submersible Basket Wire Diameter:** 0.5 mm (complies with DIN EN ISO 1183-1)

8. Warranty and Support

For warranty information, technical support, or further inquiries regarding the KERN YDB-03 Universal Density Determination Set, please contact your authorized KERN dealer or refer to the official KERN website. Additional technical information and data sheets may be available upon request from Schniebel Trading.