

Humidity Meter Calibration Salt Test

1.0 Maintenance Objective & Frequency

The objective of this procedure is to calibrate a humidity meter (hygrometer) using the saturated salt method to verify and adjust its accuracy for relative humidity (RH) readings. This method uses the stable equilibrium humidity generated by a saturated salt solution (e.g., sodium chloride for 75% RH at 25°C) as a reference standard. The procedure ensures the instrument provides reliable data for environmental control in manufacturing, storage, or laboratory areas.

Frequency: Every 6 months (semi-annual) or whenever the meter is suspected of drift, after repair, or following exposure to extreme conditions. For critical applications (e.g., cleanrooms, pharmaceutical storage), perform quarterly.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Not applicable for battery-operated handheld meters. For mains-powered units, disconnect power and apply personal lock.
- **Chemical Safety:** Handle salt and distilled water with care. Avoid inhalation of salt dust. Use in a well-ventilated area.
- **PPE:** Safety glasses and nitrile gloves. Lab coat recommended.
- **General Safety:** Ensure the calibration chamber is sealed to prevent external air currents from affecting the equilibrium. Do not place near heat sources or direct sunlight.

3.0 Required Tools, Parts & Lubricants

- Sodium chloride (NaCl) – reagent grade or food-grade table salt (non-iodized)
- Distilled or deionized water
- Airtight calibration chamber (e.g., glass jar with sealed lid, or a dedicated calibration chamber)
- Small container or dish to hold the salt solution (e.g., a shallow plastic or glass dish)
- Thermometer (calibrated, $\pm 0.5^{\circ}\text{C}$ accuracy) to monitor chamber temperature
- Reference humidity standard (optional, but recommended: a second calibrated hygrometer or a dew point mirror)
- Small screwdriver or adjustment tool (if the meter has a calibration trim pot)
- Lint-free wipes
- Label and permanent marker

4.0 Step-by-Step Maintenance Procedure

1. **Prepare the saturated salt solution:** In a clean container, mix sodium chloride with distilled water until no more salt dissolves and a small amount of undissolved salt remains at the bottom. This ensures saturation. The equilibrium RH for NaCl at 25°C is 75.3% $\pm$ 0.1%.
2. Place the saturated salt solution dish inside the airtight calibration chamber. Ensure the dish is stable and will not tip over.
3. Insert the humidity meter probe into the chamber through a sealed port or simply place the entire meter inside if it fits. Ensure the sensor is not in direct contact with the salt solution or the dish.

4. Seal the chamber tightly. Place the chamber in a location with stable temperature (ideally $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$) and away from drafts, heat sources, or direct sunlight. Allow the chamber to equilibrate for at least 2 hours. For best results, allow 4 hours or overnight.
5. After equilibration, record the temperature inside the chamber using the calibrated thermometer. Do not open the chamber.
6. Read the humidity value displayed on the meter. Compare it to the expected RH for the measured temperature. For NaCl at 25°C , the expected RH is 75.3%. For other temperatures, refer to a standard table (e.g., at 20°C , NaCl gives 75.5% RH).
7. If the meter reading deviates by more than the manufacturer's specified accuracy (typically $\pm 2\%$ RH for industrial meters), proceed with adjustment. Locate the calibration trim pot (usually accessible via a small hole) and use the adjustment tool to turn it slowly until the reading matches the expected value. If no adjustment is possible, note the deviation for correction factors.
8. Repeat the reading after adjustment. Allow 10 minutes for the sensor to stabilize after each adjustment. If the meter cannot be adjusted to within tolerance, tag it for replacement or factory recalibration.
9. Remove the meter from the chamber. Clean the probe with a lint-free wipe if necessary. Dispose of the salt solution properly (down the drain with water).
10. Document the calibration results: date, meter ID, as-found reading, as-left reading, temperature, and any adjustments made. Attach a calibration label to the meter with the new calibration date and due date.

5.0 Verification & Return to Service

1. Perform a quick verification by exposing the meter to ambient air and comparing its reading to a second calibrated reference hygrometer. The difference should be within the meter's specified accuracy.
2. If the meter passes verification, return it to its designated location or storage. Ensure the calibration label is visible.
3. Update the maintenance log in ServiceGrid: record the calibration date, next due date, and any notes on performance. Close the work order.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.