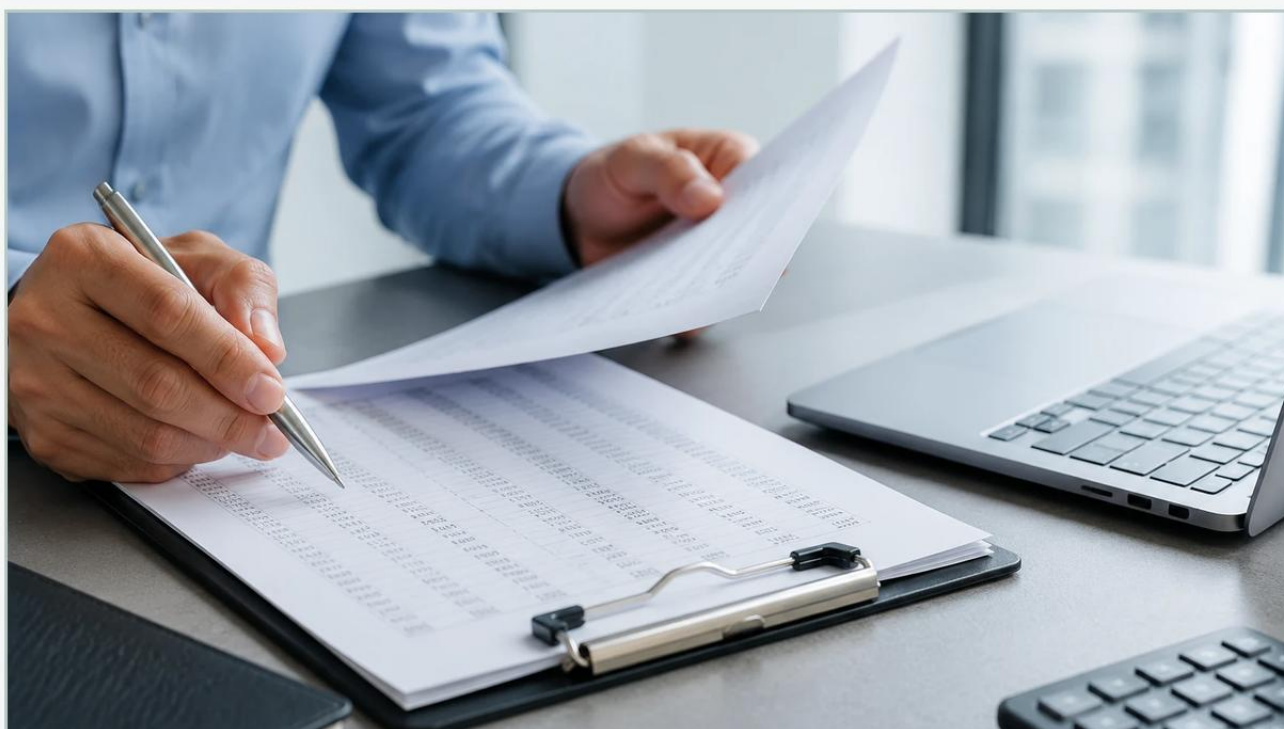


Numeros De Serie

A practical guide to numeros de serie, covering the reader intent, the relationship to numeros de serie, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



levelmeter.org
Main topic: Main Page
<https://www.level-meters.com/>

In the landscape of industrial automation and process control, the precision of instrumentation is only as valuable as the documentation and traceability supporting it. For engineers and procurement specialists managing complex systems, the term "numeros de serie" (serial numbers) represents more than a sequence of digits; it is the unique identifier that links a physical device to its technical specifications, calibration history, and manufacturing origin. In the context of level measurement, where accuracy can impact safety and profitability, maintaining a robust system for tracking these identifiers is a fundamental requirement of modern asset management.

Welk, a professional manufacturer of industrial level measurement instruments, emphasizes that every radar level meter, ultrasonic sensor, and hydrostatic transmitter is assigned a specific numero de serie. This ensures that throughout the lifecycle of the instrument—from installation to decommissioning—the user can access precise data regarding the device's configuration. This article explores the principles of level measurement technology and the critical role that serial number traceability plays in industrial applications.

| Principles of Level Measurement Technology

Before selecting an instrument or managing its lifecycle via its numero de serie, it is essential to understand the physical principles that govern different measurement technologies. Each method has specific strengths and ideal use cases.

| Radar Level Measurement (Non-Contact)

Radar level meters operate on the principle of Time of Flight (ToF). The device emits high-frequency electromagnetic waves (typically in the 26GHz or 80GHz range) toward the surface of the medium. These waves are reflected back to the sensor. The distance is calculated based on the time it takes for the pulse to travel to the surface and back, using the constant speed of light. Because radar waves do not require a medium for propagation, they are largely unaffected by temperature, pressure, or vacuum conditions.

| Ultrasonic Level Measurement

Ultrasonic sensors also use the ToF principle but utilize sound waves instead of electromagnetic pulses. The sensor emits an ultrasonic pulse that bounces off the product surface. The accuracy of this method is dependent on the speed of sound, which varies with air temperature. Consequently, most high-quality ultrasonic sensors include integrated temperature compensation to maintain accuracy. These are ideal for water treatment and simple liquid storage applications.

| Hydrostatic Level Measurement

Hydrostatic transmitters measure the pressure exerted by a liquid column at a specific depth. Based on the formula $P = \rho \cdot g \cdot h$ (where P is pressure, ρ is density, g is gravity, and h is height), the sensor can determine the level of the liquid. This technology is highly reliable for vented tanks and deep-well applications where the density of the liquid remains constant.

| Magnetic Level Gauges

Magnetic level gauges utilize a float containing an internal magnet that moves with the liquid level. This magnet interacts with an external indicator (flaps or a tracker) to provide a visual representation of the level. Because this is a mechanical-magnetic interaction, it provides a highly visible, power-free measurement solution often used in high-pressure or high-temperature bypass applications.

| The Critical Role of Numeros de Serie in Asset Management

In an industrial facility, a single plant might utilize hundreds of level meters. The "numero de serie" serves as the primary key in any computerized maintenance management system (CMMS). Here is why this identifier is indispensable:

1. Calibration Traceability: Every instrument leaves the factory with a calibration certificate. This certificate is indexed by the numero de serie, allowing the end-user to verify that the device meets the stated accuracy (e.g., $\pm 1\text{mm}$ for high-frequency radar).
2. Spare Parts Accuracy: Industrial instruments are often customized with specific flange sizes, wetted materials (such as SS316 or PTFE), and electronic outputs. When a replacement part is needed, providing the numero de serie ensures that the manufacturer can identify the exact build configuration, preventing costly installation delays.
3. Warranty and Support: Technical support teams use the serial number to pull up the original testing logs. This allows for faster troubleshooting by understanding the specific hardware and firmware versions present in the device.
4. Regulatory Compliance: In industries like chemical processing or oil and gas, regulatory bodies often require proof of maintenance and calibration. The numero de serie provides the necessary audit trail to prove that a specific sensor has been inspected according to schedule.

Selection Criteria and Practical Comparison

Choosing the right technology is the first step in ensuring long-term reliability. The following table provides a comparison of the primary technologies offered by Welk to assist in the selection process.

Technology	Typical Accuracy	Max Range	Media Suitability	Impact of Dust/Vapor
80GHz Radar	$\pm 1\text{ mm}$	120 m	Liquids, Solids, Slurries	Minimal
Ultrasonic	$\pm 0.25\% \text{ FS}$	30 m	Clean Liquids, Wastewater	Moderate
Hydrostatic	$\pm 0.5\% \text{ FS}$	200 m	Liquids in vented tanks	None
Magnetic Gauge	$\pm 10\text{ mm}$	6 m	Corrosive/Hazardous Liquids	None

When reviewing product options and application support, engineers should consult the Main Page to match these specifications with their specific environmental constraints.

| Installation Considerations for Maximum Accuracy

Even the most advanced radar or ultrasonic meter will fail to provide accurate data if installed incorrectly. When a device is registered under its numero de serie in a plant's database, the installation parameters should also be recorded.

Obstruction Clearance: For non-contact methods (Radar and Ultrasonic), the "beam angle" must be considered. Internal tank structures like ladders, agitators, or heating coils can create false echoes. The sensor should be positioned to provide a clear path to the liquid surface.

Nozzle Geometry: The height and diameter of the mounting nozzle can interfere with the signal. For radar meters, the antenna should ideally extend slightly beyond the nozzle to prevent "ringing" or signal interference near the sensor face.

Stability: Sensors must be mounted on a vibration-free platform. Excessive vibration can damage the electronics and lead to erratic readings, which may be misidentified as a hardware failure if the installation environment isn't documented.

Submergence Protection: For hydrostatic sensors, ensure the cable vent tube is not kinked or blocked, as this is necessary to compensate for atmospheric pressure changes.

| Limitations and Environmental Factors

While modern level meters are highly robust, certain conditions present challenges that even a unique numero de serie and high-end calibration cannot fully overcome:

Heavy Foam: Thick, dense foam can absorb ultrasonic and radar signals, leading to a "loss of echo." In these cases, a stilling well or a contact-based technology like a magnetic level gauge may be required.

Extreme Turbulence: Rapidly moving surfaces can scatter signals. Software filtering (damping) can help, but mechanical solutions like bypass chambers are often more effective for highly turbulent liquids.

Dielectric Constant (Dk): Radar measurement relies on the reflection of waves. Materials with a very low dielectric constant (like certain oils or liquefied gases) reflect less energy. High-sensitivity 80GHz radar units are typically required for low-Dk applications.

| Maintenance and Troubleshooting FAQ

Q: Where can I find the numero de serie on my Welk level meter?

A: The serial number is typically laser-engraved on the stainless steel nameplate attached to the electronics housing. It is also often printed on the original factory test report and the outer packaging.

Q: Can I change the configuration of a meter after it has been assigned a serial number?

A: While firmware settings and ranges can be adjusted via HART or Bluetooth interfaces, the physical wetted materials and pressure ratings are fixed. Any significant modifications should be noted in the asset's maintenance log alongside its original numero de serie.

Q: What should I do if the nameplate is unreadable due to corrosion?

A: Most digital level meters allow you to retrieve the serial number electronically through the display menu or a communication protocol like Modbus or HART. It is recommended to record these numbers in a digital registry immediately upon installation.

Q: How often should a device be re-calibrated?

A: This depends on the industry and the criticality of the measurement. Standard practice in water treatment is every 12-24 months, while high-precision chemical dosing may require annual verification. Always reference the numero de serie when filing calibration reports to ensure historical consistency.

| Conclusion

In the realm of industrial level measurement, the ability to track and verify equipment is just as important as the measurement technology itself. By understanding the principles of radar, ultrasonic, and hydrostatic sensing, and by maintaining strict records of each device's numero de serie, organizations can ensure higher safety standards, reduced downtime, and more efficient maintenance cycles. Whether you are managing a single tank or a global network of processing plants, the serial number remains the cornerstone of professional instrumentation management. For further technical guidance on selecting the appropriate instrument for your specific medium and environment, refer to the comprehensive resources available on our Main Page.