

Memosens Technology

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



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In the field of industrial process automation, the reliability of liquid analysis is often the bottleneck for operational efficiency. Traditional analog sensors for pH, ORP, conductivity, and dissolved oxygen have historically been plagued by signal interference, moisture ingress, and the logistical challenges of field calibration. Memosens technology was developed to solve these fundamental issues by transforming the sensor-to-transmitter connection from a vulnerable analog link into a robust digital interface.

For engineers and plant operators managing complex systems—ranging from water treatment facilities to chemical processing plants—understanding the mechanics and advantages of Memosens is essential. This technology complements other advanced instrumentation, such as the radar and ultrasonic sensors found on our Main Page, by providing a standardized, digital backbone for liquid analysis that matches the reliability of modern level measurement systems.

| The Fundamental Principles of Memosens Technology

At its core, Memosens technology is defined by two primary innovations: inductive signal transmission and the integration of data storage within the sensor head itself. Unlike traditional sensors that use metal-to-metal contact pins, Memosens utilizes a non-contact, galvanic isolation approach.

| Inductive Signal Transmission

The connection between a Memosens sensor and its cable is entirely inductive. The sensor head and the cable connector act as two halves of a transformer. When joined, an electromagnetic field transfers both power to the sensor and bidirectional data back to the transmitter. This design eliminates the most common failure point in liquid analysis: the physical electrical contact. Because there are no open pins, the connection is 100% waterproof and immune to corrosion, salt bridges, and moisture—factors that frequently cause signal drift or total failure in analog systems.

| Intelligent Data Storage

Every Memosens sensor contains an integrated microchip. This chip converts the analog measurement signal into a digital protocol directly in the sensor head. Furthermore, the chip stores critical information, including:

Calibration Data: Slope, zero point, and calibration history.

Operational Logs: Total hours of operation, time spent under extreme temperatures, and maximum/minimum temperature exposure.

Manufacturing Details: Serial number, sensor type, and order code.

This "intelligence" allows the sensor to be recognized automatically by the transmitter, enabling a true plug-and-play experience that simplifies the integration of complex analytical loops into broader industrial automation frameworks.

| Comparison: Traditional Analog vs. Memosens Technology

To understand why many industries are migrating to digital sensor platforms, it is helpful to compare the technical limitations of analog systems against the capabilities of Memosens.

Feature	Traditional Analog Sensors	Memosens Technology
Signal Type	High-impedance analog (mV or nA)	Digital (Inductive)
Moisture Sensitivity	Extremely high; leads to signal leakage	Immune; works even underwater
Cable Length	Limited (typically <15m without boosters)	Up to 100 meters without signal loss
Calibration	Must be performed at the measurement point	Performed in the lab; "Plug & Play"
Data Storage	None (stored in the transmitter)	Integrated in the sensor head
EMC Interference	High susceptibility to electrical noise	High immunity due to digital protocol
Connector Wear	Subject to corrosion and mechanical fatigue	Wear-free inductive coupling

| Practical Benefits in Industrial Applications

The transition to Memosens technology offers tangible improvements in maintenance workflows and data integrity. These benefits are particularly relevant for facilities that already utilize high-precision level measurement instruments, like those manufactured by Welk, where accuracy and uptime are non-negotiable.

| Lab-Based Calibration

One of the most significant operational shifts enabled by Memosens is the ability to calibrate sensors in a controlled laboratory environment rather than at the process site. Technicians can calibrate a batch of sensors under ideal conditions, document the results, and then simply swap out the sensors in the field. When a pre-calibrated Memosens sensor is connected to a transmitter, the transmitter automatically uploads the new calibration data. This reduces the time spent at the measurement point from hours to minutes, significantly increasing safety in hazardous or hard-to-reach areas.

| Enhanced Process Safety

Because the sensor stores its own history, Memosens technology can provide predictive maintenance alerts. If a sensor has been exposed to temperatures exceeding its specification for a cumulative 500 hours, the system can flag it for replacement before it fails. This predictive capability prevents unplanned shutdowns and ensures that the liquid analysis data used for process control remains accurate.

| Signal Integrity over Long Distances

In large-scale industrial sites, the distance between the sensor and the control room can be substantial. Analog signals degrade over long cable runs due to cable resistance and environmental noise. Memosens converts the signal to digital at the source, allowing for cable lengths of up to 100 meters (approx. 328 feet) without any loss in precision. This flexibility allows for more centralized transmitter placement, simplifying wiring and reducing infrastructure costs.

| Integration with Level Measurement Systems

While Memosens is a standard for analytical parameters like pH and conductivity, it operates within the same industrial ecosystem as hydrostatic and radar level transmitters. In applications such as wastewater treatment or chemical tank monitoring, liquid analysis and level measurement are often used in tandem to ensure process compliance and safety.

For example, in a chemical neutralization tank, a Welk ultrasonic level sensor might monitor the volume of the tank while a Memosens pH sensor controls the dosing of neutralizing agents. Integrating these digital technologies ensures that the entire control loop is resistant to the harsh, humid, and corrosive environments typical of these industries. For more information on how these systems integrate, you can review product options and application support on our [Main Page](#).

| Selection and Installation Considerations

When implementing Memosens technology, engineers must consider several factors to ensure optimal performance. While the technology is robust, proper selection of the sensor body and cable type is still required.

| Sensor Selection

Memosens is available for a variety of parameters. Selection should be based on the process conditions:

pH Sensors: Choose based on the glass type (e.g., high-alkali or low-temperature) and the reference system (e.g., gel-filled or liquid-filled).

Conductivity Sensors: Available in conductive (4-pole) or inductive (toroidal) designs for different concentration ranges.

Oxygen Sensors: Amperometric or optical (fluorescence quenching) versions are available with Memosens heads.

| Cable Management

The standard Memosens cable (often designated as CYK10) features a robust outer jacket suitable for industrial use. However, in environments with extreme chemical exposure or mechanical stress, specialized armored or chemically resistant cables should be specified. It is also important to ensure that the transmitter being used is Memosens-compatible, as the digital protocol is proprietary to the Memosens standard.

| Installation Best Practices

1. **Mounting Orientation:** Ensure the sensor is mounted at an angle (typically at least 15° from horizontal) to prevent air bubbles from trapping on the sensing surface.

2. Cable Routing: While Memosens is resistant to EMI, it is still good practice to route measurement cables away from high-voltage power lines to minimize any potential inductive interference on the digital signal.

3. Cleaning: The non-contact connector does not require cleaning, but the sensing element (the glass bulb or electrodes) still requires regular cleaning to prevent fouling. Many Memosens systems can be paired with automated cleaning assemblies.

| Limitations and Common Risks

Despite its advantages, Memosens technology is not a universal "fix-all." Engineers should be aware of the following:

Protocol Compatibility: Memosens is a specific digital protocol. You cannot mix Memosens sensors with standard analog transmitters or third-party digital transmitters that do not support the Memosens standard.

Initial Cost: The upfront cost of a Memosens sensor and its corresponding digital transmitter is generally higher than a basic analog setup. However, the Total Cost of Ownership (TCO) is usually lower due to reduced maintenance and longer sensor life.

Battery/Power: While the sensor is powered by the transmitter via the inductive link, any interruption in power to the transmitter will result in a loss of data, though the calibration data remains safely stored on the sensor chip.

| Frequently Asked Questions (FAQ)

Q: Can I use a Memosens sensor with my existing analog transmitter?

A: No. Memosens sensors require a compatible digital transmitter that can provide the inductive power and decode the digital signal. However, many modern transmitters are modular and can be upgraded to support Memosens.

Q: Is Memosens technology suitable for hazardous areas (Ex-zones)?

A: Yes. One of the primary advantages of the inductive, non-contact connection is that it is inherently spark-free. Many Memosens sensors and cables are certified for use in ATEX, IECEx, and CSA hazardous environments.

Q: How long does the data stay stored on the sensor chip?

A: The data is stored in non-volatile memory (EEPROM), meaning it remains on the chip indefinitely, even when the sensor is disconnected from power for long periods.

Q: Does the inductive connection wear out over time?

A: No. Because there is no physical contact or friction between the sensor head and the cable, the connection does not suffer from mechanical wear or corrosion, which are the leading causes of failure in analog connectors.

| Conclusion

Memosens technology represents a significant leap forward in the digitalization of process instrumentation. By eliminating the vulnerabilities of analog signal transmission and enabling sophisticated data management at the sensor level, it provides a level of reliability that matches modern industrial demands. Whether integrated into a water treatment plant or a complex chemical reactor, Memosens ensures that liquid analysis is as accurate and maintenance-friendly as the level measurement solutions found on our Main Page. As industries continue to move toward IIoT (Industrial Internet of Things) and smarter factories, the adoption of digital sensor protocols like Memosens will be a foundational requirement for success.