Turbidity Monitoring in Bottled Water Production

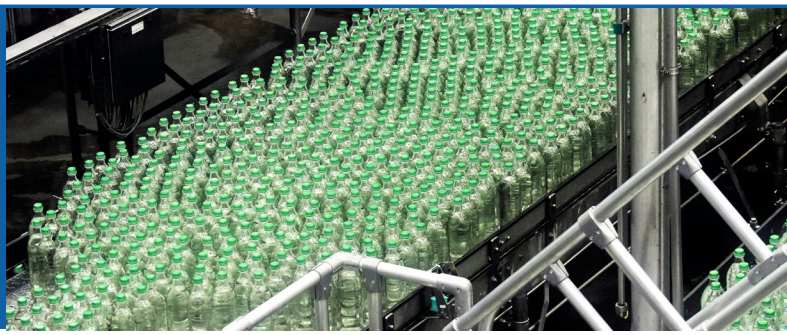


Photo by Waldemar Brandt through unsplash.com

Turbidity is a critical quality parameter in bottled water production. Even slight increases in suspended particles can affect appearance, taste, and shelf life, and can be an early indicator of issues such as inadequate filtration, contamination, or process upsets. Manual grab sampling is slow and easily misses transient events.

A continuous in-line turbidity measurement system provides real-time visibility into process quality, enabling prompt intervention, consistent product clarity, and reduced waste.

The EXpure 191 turbidity sensor from Exner Process Equipment is purpose-built low-turbidity applications such as bottled water, offering precise and stable readings under continuous operation.

PROCESS DESCRIPTION

In a typical bottling plant, source water undergoes multiple filtration steps — often including carbon filters, cartridge filters, or membrane ultrafiltration — followed by disinfection. Product water is then stored in buffer tanks before filling.

Critical control points for turbidity measurement include:

- **After Basic Raw Water Filtration:** detects breakthrough of filter media. After basic filtration, water turbidity target is in the range of 0.1 – 0.5 NTU.
- **Pre-Filler Turbidity Check:** ensures only water within specification reaches the bottling line. Typical specification is < 0.2 NTU.
- **Final Quality Verification:** continuous monitoring during filling operations provides data for batch release and production record documentation. Final water turbidity is often < 0.1 NTU.

Traditional batch testing can miss short-duration spikes caused by filter failure, tank agitation, or line flushing. Continuous inline measurement ensures these excursions are detected and acted on immediately.

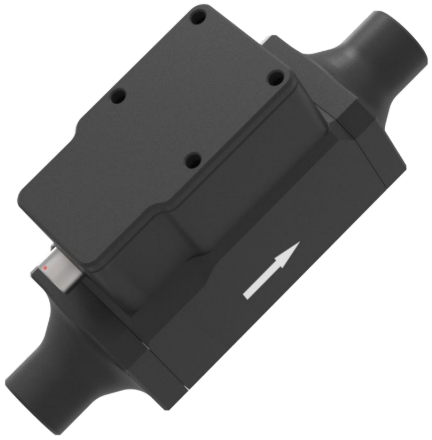
TECHNOLOGY OVERVIEW

The EXpure 191 employs optical measurement using a 90° scattered light (nephelometric) principle, designed to detect low turbidity levels (<1 NTU) encountered in bottled water production.

Key technical features:

- Measurement range: 0–10 NTU, with a resolution of 0.01 NTU
- High sensitivity for early detection of turbidity changes
- Inline measurement with no moving parts
- Tamperproof operation

The sensor is well suited for continuous operation with essentially zero maintenance.



EXpure 191 sensors are easily installed using standard ¼" (6 mm) process tubing, making integration into existing bottling lines a straightforward task. The durable sapphire optical window and polished stainless steel wetted components are well suited to bottled water production.

APPLICATION BENEFITS

Implementing continuous turbidity monitoring in bottled water production delivers measurable improvements across quality, efficiency, and operational control. Accurate, real-time measurement provides the ability to produce consistently clear water, supporting both regulatory compliance and brand reputation. Early detection of process deviations, such as minor filter failures or transient contamination events, allows operators to take corrective action immediately, reducing product waste and minimizing the risk of releasing off-spec water.

The EXpure 191's simple optical design lowers maintenance requirements and decreases downtime. Easy integration with existing process control systems enables automatic trending, alarms, and data logging. Overall, continuous turbidity monitoring helps bottlers optimize operations, maintain high product quality, and improve overall equipment effectiveness.

WHY CONTINUOUS MONITORING MATTERS

Because turbidity is **so low** in bottled drinking water, even small spikes/changes are significant:

- A filter breakthrough may briefly raise turbidity to 0.5–1 NTU.
- Visual inspection is insufficient; human eyes can't reliably detect turbidity below ~1 NTU.
- Inline sensors like the Exner EXpure 191 allow detection of small excursions before they affect bottles leaving the line.

SUMMARY

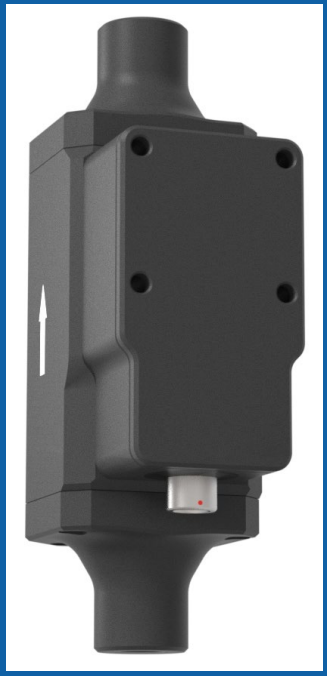
Reliable turbidity control is essential for maintaining bottled water quality. The EXpure 191 turbidity sensor provides accurate, real-time measurement without interrupting production. Its hygienic design and sensitivity to low turbidity levels make it ideally suited to bottled water applications.

Key advantages:

- Accurate low-level turbidity detection
- Hygienic and robust construction
- Seamless integration into existing process control systems
- Reduced downtime and maintenance costs

By installing inline turbidity monitoring, bottlers gain a higher degree of process visibility, improve product consistency, and enhance brand reputation.

Expure 191 Sensor



- **Compact** design with integrated amplifier
- **Durable** sapphire windows
- **Modbus** or **0/4...20 mA**
- **LED light source** guarantees a durable and stable signal
- **Easy configuration** via the EXpert software package

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