

Cooling Water System Turbidity Measurement



THE IMPORTANCE OF TURBIDITY CONTROL IN COOLING WATER

Cooling water systems are constantly exposed to suspended solids — from corrosion, environmental debris, biological activity, and process contamination. If left unchecked, these particles drive fouling, scale formation, reduced heat transfer efficiency, and unplanned maintenance.

Turbidity is the most practical early warning indicator of changing water quality. Optical turbidity analyzers provide continuous, real-time indication of water cleanliness and purity. Contamination originates from a variety of sources within and around cooling water systems, and left unchecked, can create significant issues with line components like heat exchangers, valves and pumps. Typical sources include:

- Corrosion: rust, scale, and iron oxides from piping and equipment
- Environmental: dust, pollen, airborne debris entering open towers
- Biological: algae, slime, and biofilm fragments
- Process Leaks: contamination through heat exchanger failures
- Chemical Residues: overdosing of coagulants or dispersants

TYPICAL TURBIDITY RANGES AND CONTROL LIMITS IN COOLING WATER SYSTEMS

System Type	Normal Operating Range	Action Level (Alarm)
Closed Loop	< 1 NTU	> 2 NTU
Open Recirculating Tower	1 – 5 NTU	> 10 NTU
Once-Through Cooling	< 2 NTU	> 5 NTU

Even a small rise in turbidity can signal accelerating fouling—well before visible problems or operational inefficiencies appear. The benefits provided by monitoring turbidity are numerous:

- Early detection of fouling and scaling
- Improved chemical treatment efficiency through better dosing control
- Reduced manual sampling and lab testing frequency
- Increased equipment life and efficiency for heat exchangers, pumps, valves, and piping
- Support for environmental discharge compliance

OPTICAL TURBIDITY INSTRUMENTS PROVIDE ROBUST, LOW-MAINTENANCE SOLUTIONS

The Kemtrak TC007 is **particularly well-suited for cooling water monitoring** in places where **reliability, low maintenance, and rugged performance** matter.



Its **fiber-optic design and robust measurement principle** make it ideal for dirty, chemically treated, or harsh process environments. A wide range of flow through measurement cells make it adaptable to different line sizes and connection types.

- True in-line optical measurement using dual-beam backscatter technology
- High chemical and temperature resistance for harsh industrial environments
- No moving parts, no glass windows to foul — ideal for dirty water applications
- SMA 905 fiber optic connectivity allows remote sensor mounting for safety and convenience
- Low maintenance and fast response time, well suited for automated control loops

The TC007 is ideal for continuous monitoring on cooling tower return lines, bypass loops, and discharge points



The **Exner EXPure 191** is a **high-precision optical turbidity sensor** designed for accurate, continuous monitoring in industrial water systems. For cooling water, it's ideal in locations where **measurement accuracy, low biofouling, and stable long-term performance** are critical.



- High-precision optical measurement using scattered light detection
- Compact, construction with excellent chemical resistance
- Factory-calibrated and field-verifiable for long-term accuracy
- Simple side stream tube connection
- Optional bubble eliminator

Ideal for installations requiring higher measurement precision or where cleanliness and low biofouling are priorities, such as food, beverage, or pharmaceutical cooling systems.

RECOMMENDED TURBIDITY TARGETS BY INDUSTRY

Industry	Suggested Limit	Notes
Power Generation	≤ 5 NTU	Early detection of scaling protects condenser performance
Chemical / Petrochemical	≤ 10 NTU	Allows rapid detection of process contamination
HVAC / Commercial	≤ 3 NTU	Prevents fouling in chillers and plate exchangers
Food & Beverage	≤ 2 NTU	High cleanliness standards

Turbidity is a key performance indicator (KPI) for cooling water health and maintaining clean, low-turbidity cooling water is critical for system efficiency, equipment longevity, and regulatory compliance. Optical sensors like the **Kemtrak TC007** and **EXPure 191** provide real-time monitoring of cooling water turbidity, giving operators immediate warning of fouling or contamination before problems escalate.

- **Early Detection:** Identify fouling, scaling, or contamination quickly to prevent downtime.
- **Cost Savings:** Optimize chemical dosing and reduce maintenance requirements.
- **Improved Efficiency:** Keep heat exchangers and pumps operating at peak performance.
- **Regulatory Compliance:** Support environmental permits and ESG reporting with continuous, documented data.
- **Operational Control:** Trend data enables proactive responses and system optimization.

By installing optical turbidity monitoring at critical points in your cooling water system, you gain visibility, control, and confidence—ensuring cleaner water and lower operating costs.

WHY OPTICAL SYSTEMS ARE SUPERIOR

- No consumables or reagents – lower lifecycle cost
- True real-time measurement – faster response than grab sampling
- High chemical resistance – compatible with cooling water treatment chemicals
- Reduced maintenance – less fouling, easier cleaning
- Stable long-term performance – minimizes recalibration



GET IN TOUCH

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