

Microbial Detection



THORNTON

Leading Pure Water Analytics

7000RMS Microbial Detection Analyzer

Continuous, Real-time Analysis

Process Control & Transparency

High Measurement Sensitivity

Supports Regulatory Compliance



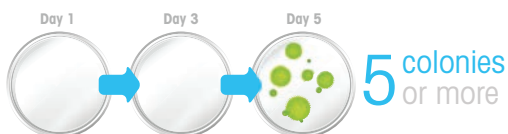
Real-time, On-line Microbial Monitoring For Pharmaceutical Waters

METTLER TOLEDO

7000RMS

Real-Time Microbial Analysis

METTLER TOLEDO Thornton's 7000RMS™ is an on-line analyzer for real-time measurement of microbial contamination (bioburden) in pharmaceutical water. Laser-based technology enables immediate detection and quantification of microorganisms directly from the water sample, overcoming limitations of time-consuming growth-based methods.



An indirect estimate from plate counting

Relies on the formation of a colony which is dependent on incubation parameters and culturability



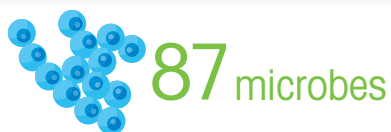
Plate counting can only provide a measurement like a **snapshot** **5-7 days** after a sample is taken

A direct count using on-line monitoring

Advanced optical measurement technology that counts individual microorganisms and does not rely on growth



In the same 5-7 day timeframe, the **7000RMS** takes **216,000+ measurements**



Using traditional culture-based lab methods, measuring bioburden in Purified Water (PW) and Water for Injection (WFI) is time-consuming and error-prone. Used in parallel with plate counting, on-line microbial detection offers the potential to improve pharmaceutical water system operations, reduce costs, and ensure water quality. With real-time, on-line measurement an event can be detected immediately and remedied within hours.



Reduced risk of process upsets for maximized production efficiency



- Eliminate 5-7 day waiting period for plate count results
- Release product/water without delay
- Real-time monitoring and trending data to react prior to an out of specification event

Highly sensitive technology to control product quality



- Count microorganisms as small as $0.3\mu\text{m}$ in size
- Technology does not rely on the formation of a colony
- Ability to detect viable but nonculturable (VBNC) bacteria

Real-time Microbial Analysis for Process Control and Transparency

The 7000RMS detects microbial presence within seconds after the sample enters the analyzer. Measurements are continuously updated providing a real-time profile of your PW or WFI system. This real-time information enables the user to quickly divert contaminated water before it impacts other locations within the water system.

Optimize sanitization frequency and effectiveness



- Trending data shows when sanitization is needed
- Understand when sanitization is sufficient and release water immediately
- Reduce sanitization cost and wear on water system components

Real-time data allows immediate reaction to contamination



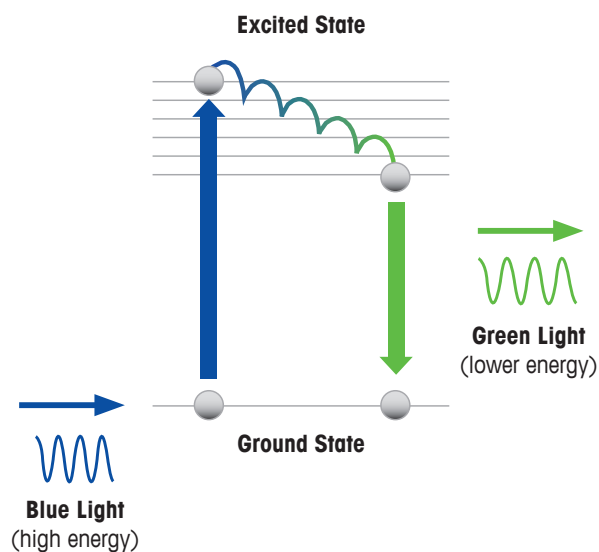
- View excursion details, including timing and severity
- Trend information to proactively reduce and mitigate risk of releasing contaminated water
- Understand how water system changes impact contamination risk



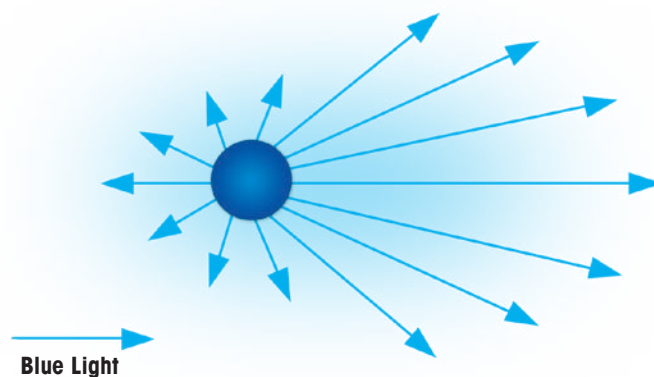
Advanced Measurement Technology

Using Established and Trusted Techniques

Microorganisms such as bacteria and fungi contain metabolites such as NADH and riboflavin to regulate growth and development. These metabolites fluoresce when exposed to light of certain wavelengths. The 7000RMS utilizes two established optical measurement techniques, Laser Induced Fluorescence (LIF) and Mie Scattering, combining them in a unique manner to detect microorganisms in high purity waters.



LIF: Molecule is excited to a higher energy level laser light source, then releases that energy by emitting fluorescence



Mie Scattering: Molecule absorbs light/photons and scatters them at different distances based on their size

Pharmacopeia Guidelines

Endorse Alternative Microbial Methods



The General Information Chapter <1231> **Water**

for Pharmaceutical Purposes, the United States Pharmacopeia (USP) has long supported on-line, continuous monitoring of pharmaceutical waters so that historical in-process data is recorded to ensure the water system is in control and continues to produce water of acceptable quality.

Grab sampling provides incomplete information.

In USP <1231> compendial limits of 100 cfu/mL for Purified Water (PW) and 10 cfu/100 mL for Water for Injection (WFI) are the traditional microbial requirements for water quality. However, **“water sampling protocols are limited in their ability to identify changes in ongoing water system performance making it difficult to provide ongoing trend analysis, as ‘grab’ samples can only provide a snapshot of the dynamic water system.”**¹

- Continuous monitoring capability of the 7000RMS enables a more accurate and constant surveillance of water system status.
- On-line monitoring enables early indication of microbial excursions so that process and quality groups can ensure water used for manufacturing is in compliance and in control.

General Chapter <1223> Validation of Alternative Methods encourages selection, evaluation and use of technologies such as 7000RMS as alternatives to compendial methods. Chapter <1223> provides guidance and methods for the specification, qualification and implementation of alternative methods.

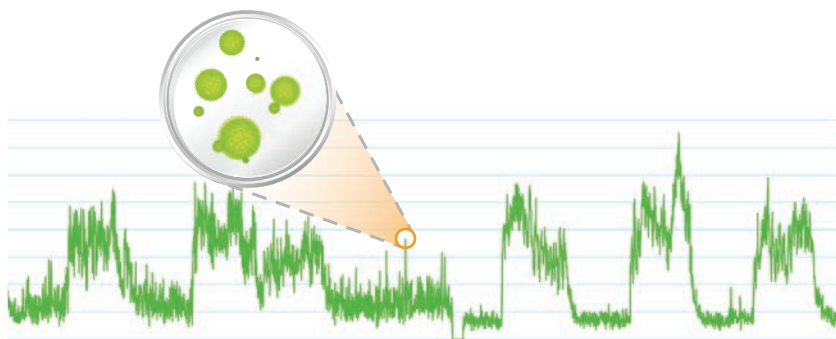
“Alternative methods and/or procedures may be used if they provide

advantages in terms of accuracy, sensitivity, precision, selectivity, or adaptability to automation or computerized data reduction, or in other special circumstances.” USP <1223>

The USP <1223> and the EP (5.1.6) are informational documents which detail validation procedures of alternative microbiological methods, which detail validation procedures for different technologies and procedures. In addition, the FDA and the European Medicines Agency (EMA) have also published guidelines for the deployment of alternative microbiological measurement methods.

USP is a trademark of the United States Pharmacopeia

1) Novel Concept for Online Water Bioburden Analysis: Key Considerations Applications and Business Benefits
American Pharmaceuticals Review, July 2013



7000RMS Analyzer

Specifications

General Specifications

Flow rate	30 mL/min
Detection limit	1 AFU (Auto Fluorescent Units)
Minimum detection size	≥ 0.3 µm
Measurement range	0-10,000 AFU/mL
Analysis time	Continuous
Response time	2 seconds (1 mL)
Data communication	- Ethernet - standard RJ 45 / Wi-Fi capable - SCADA connectivity via Modbus TCP - Analog output channels; 4-20 mA standard, with configurable output ranges - USB

Water Requirements

Temperature (non-condensing)	5-90 °C (41-194 °F)*
Inlet pressure	20-80 psig (2-5.5 bar(g))** ¹
Type/Quality	Purified Water (PW), Ultrapure Water (UPW), Water for Injection (WFI)

Power/Installation/Enclosure

Power requirements	100-240 VAC 50-60 Hz 5A Use the power cord included with the instrument 8.2' (2.5 m) cord length provided standard
Monitoring location	At-line to drain
Ambient temperature (non-condensing)	0-37 °C (32-98.6 °F)*
Inlet connection	0.125" (3 mm) O.D.
Outlet connection	0.125" (3 mm) O.D.
Wall mount	Anti-vibration shelf required (P/N 58 079 700)
Enclosure material	Stainless steel
Physical dimensions (WxHxD)	22.2"(56.4 cm) W x 24.25"(61.6 cm) H x 12"(30.5 cm) D
Weight	73.4 lbs (33.3 kg)

Environmental Conditions

Use	Indoor use
Altitude	Up to 6562' (2000 m)
Environmental Temperature	5-35 °C (41-95 °F)
Environment	Pollution degree 2
Humidity (non-condensing)	80% maximum relative humidity up to 31 °C (87.8 °F) decreasing linearly to 50% relative humidity at 40 °C (104 °F)
Voltage	MAINS supply voltage fluctuations up to ±10% of the nominal voltage of 100-240VAC 50-60 Hz TRANSIENT OVERVOLTAGES: up to levels of OVERVOLTAGE CATEGORY II TEMPORARY OVERVOLTAGES occurring on the MAINS SUPPLY

* Temperature below 15 °C or above 45 °C requires Sample Conditioning Coil (included)

** Process pressure above 80 psig (5.5 bar(g)) requires optional High Pressure Regulator (P/N 58 091 552)

¹ Calibration, cleaning and grab sample requires sample pressure of 0 psig (0 bar(g))

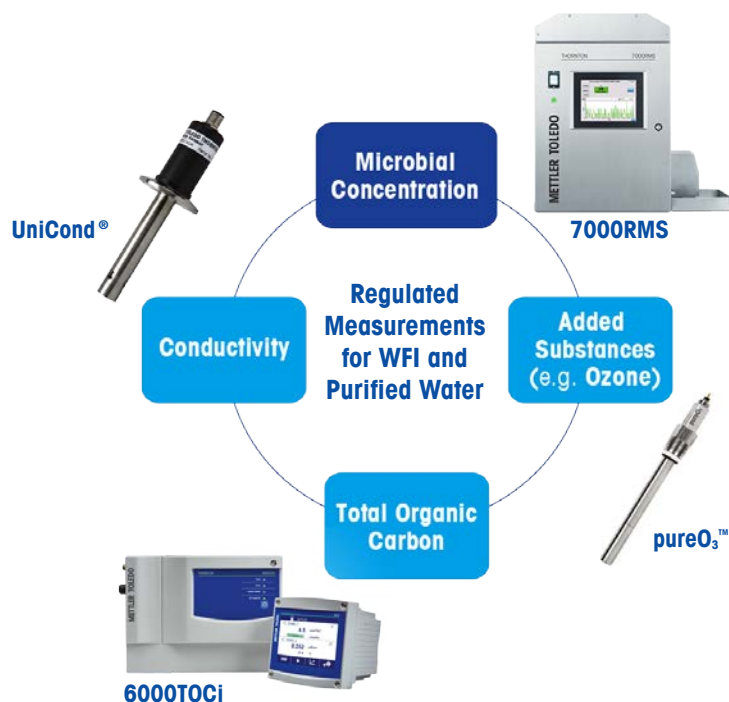


The 7000RMS analyzer is certified as a Class 1 laser product.
The 7000RMS unit contains a Class 3B Laser System, as specified by IEC 60825-1 Ed.3 (2014).

Ordering Information

Description	Order Number
7000RMS Microbial Detection Analyzer	58 045 001

METTLER TOLEDO Thornton provides complete on-line measurements for Pharmaceutical Water Systems.



www.mt.com/thornton

For more information

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Subject to technical changes
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