KANOMAX
The Ultimate Measurements

LiquiTrak®

Scanning Threshold Particle Counter
ScanningTPC Model 9010

10 nm Particle Counter for Ultrapure Water (UPW)

The LiquiTrak® ScanningTPC is a new on-line particle counter for UPW. Developed by Kanomax in association with CT Associates, Inc. (CTA), the LiquiTrak® ScanningTPC has three size channels ranging from 10 nm to 20 nm.

Kanomax's new ScanningTPC incorporates the following significant technology breakthroughs:

- An ultra-fine nebulizer that minimizes the influence of dissolved non-volatile residue present in all UPW systems.
- A size-selectable Condensation Particle Counter (CPC) that continuously cycles through, or scans, particle sizes at 10, 15 and 20 nm.

Benefits

- Monitors particles ≥10 nm in real-time.
- Rapid response time to detect changes in particle contamination levels.
- Response is not dependent on particle refractive index or particle shape.
- Specify particle sizes for continuous (non-scanning) monitoring.
- The scanning feature can be disabled and individual sizes can be continuously monitored.
- Operate with either an in-house vacuum system or the internal pump.
- Portable and easy to set up.
- Offline Monte Carlo-based data inversion algorithm predicts true particle distribution in UPW.
- Simple to operate using the intuitive front-panel-display menus.
- Robust with minimal maintenance requirements.

Current particle counting technology based on optical particle detection is inadequate to monitor particles at the line-widths used in today's semiconductor manufacturing facilities. The ITRS roadmap for semiconductor manufacturing has needed sub-20 nm particle detection for several years. The ScanningTPC® provides a means to meet that need.

Applications

- Valuable tool for for UPW system monitoring and troubleshooting.
- Used for compliance with SEMI C79 "Guide to Evaluate the Efficacy of Sub-15 nm Filters used in Ultrapure Water (UPW) Distribution Systems."
- Used for compliance with the SEMI C93 "Guide for Determining the Quality of Ion Exchanged Resin used in Polish Applications of Ultrapure Water (UPW) Systems."

Patent numbers 8,272,253 and 8,573,034 have been issued to CTA and licensed by Kanomax. Kanomax has applied for additional domestic and international patents for technology contained within the ScanningTPC. Patent number 7,852,465 has been issued to Kanomax.

How It Works

The ScanningTPC incorporates a unique patented nebulizer and a Condensation Particle Counter (CPC) with variable size selection capabilities. The nebulizer creates UPW droplets of varying size. Large water droplets are removed by an inertial impactor. Water from the small droplets is evaporated leaving precipitated non-volatile residue (PNVR) particles sized below the detection capability of the CPC. The CPC only counts the particles above the specified size-detection capability, therefore it does not count the small PNVR particles. Figure 1 illustrates the sequence for creating and drying the droplets and counting the remaining particles. By changing the size selection threshold within the CPC, a customer can specify different sizes of particles to be counted. Figure 2 shows three separate cumulative particle counts as the CPC size-selection threshold is changed. Figure 2 also illustrates how PNVR particles are not counted because they fall outside the CPC's detection efficiency curve.

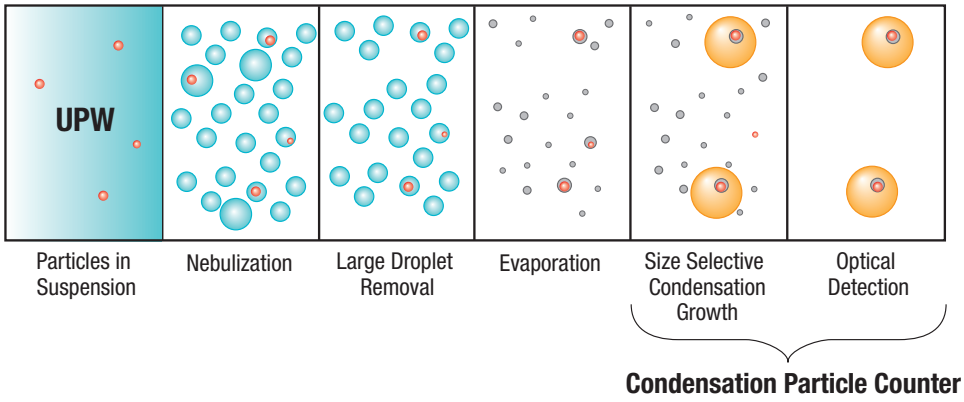

Figure 1: ScanningTPC Measurement Technique.

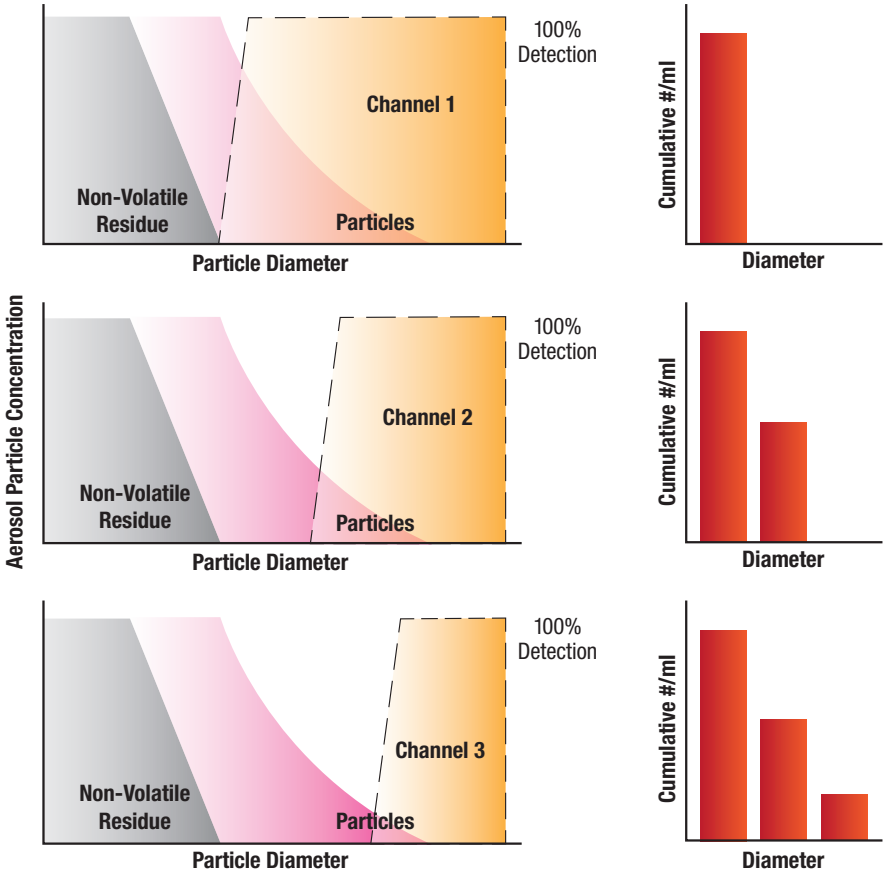

Figure 2: Size Selection and Cumulative Particle Counts

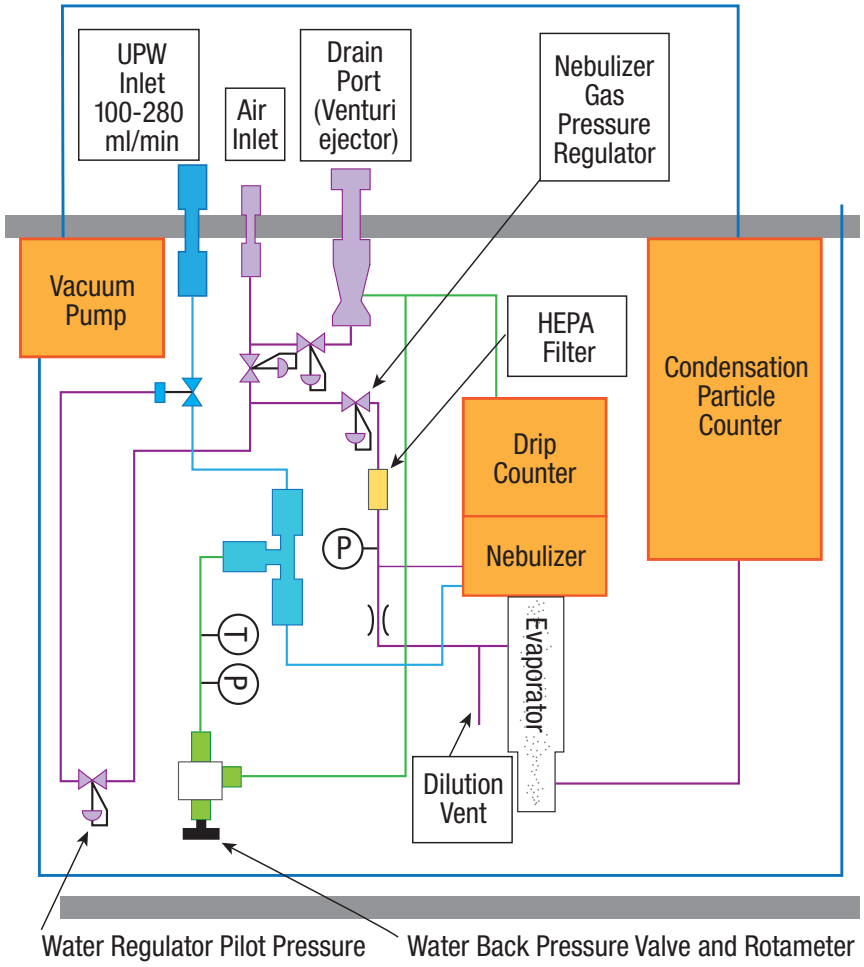

Figure 3: Schematic diagram illustrating the flow and internal components of the ScanningTPC.

Figure 4 illustrates that particle counts fluctuate throughout a 24-hour period. Also, as the particle size increases, the count decreases.

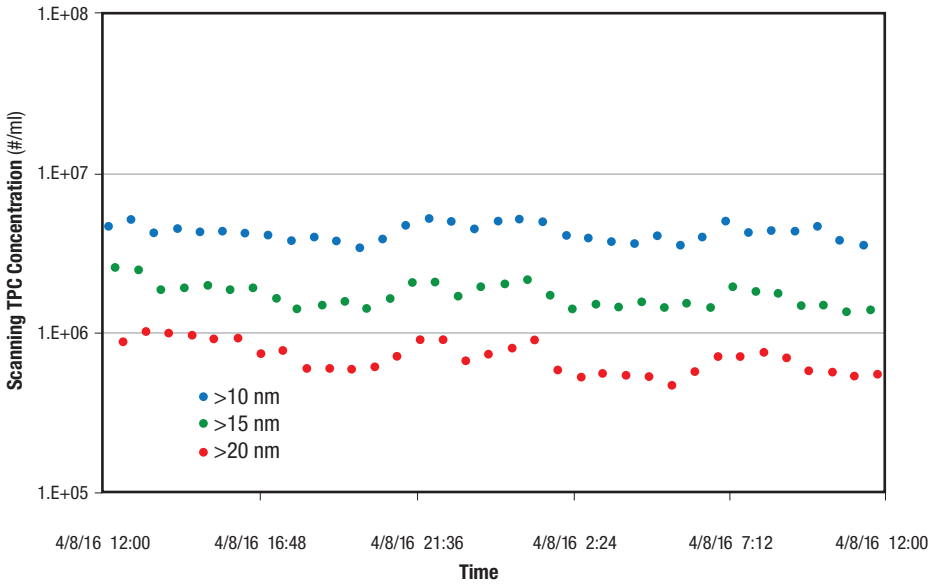

Figure 4: ScanningTPC output for three size channels (>10, >15, and >20 nm) over 24 hours.

Kanomax of Japan purchased Fluid Measurement Technologies (FMT) in July 2015 and renamed the company Kanomax FMT, Inc. (KFMT). Dr. David Blackford, the founder of FMT is now the President of KFMT. He has nine issued U.S. patents, three U.S. patents pending, and many technical publications for his innovative technologies.

Specifications

Measurement range: 1E3 to 1E10 particles/mL
Inspection volume rate: <1 µL/min >10 µL/min
Threshold sizes: 10-20 nm user selectable in 5 nm increments (50% detection efficiency)
Number of size channels: 1-3
Dead time between channel adjustment: 2-5 minutes
Total flow rate: 50-280 mL/min
Response time to concentration change: <30 seconds
Inlet water pressure (online): 200-500 kPa (30-70 psig)
Compressed air/nitrogen flow rate/pressure: 25 std L/min CDA or Nitrogen, 345-414 kPa (50-60 psi) ANSI IS08573-1:2010 Class 2 for compressed air
Maximum UPW nonvolatile residue: 200 ppt at 10 nm threshold, 1 ppb at 20 nm
Wetted surface materials: PFA, PTFE, PEEK, sapphire, 316L stainless steel
Detector working fluid: Reagent-grade n-Butyl alcohol
Working fluid consumption rate: Approximately 150 mL/day (bottle lasts for one week)
Detector vacuum: Internal pump or external flow rate of 1 std/min at 400 mbar absolute
Ambient temperature range: 15-35°C (59-95°F)
Ambient relative humidity range: 0-85% non condensing
Maximum water temperature: 80°C (176°F)
Dimensions (W x D x H): 42 × 43 × 27 (43 with bottle) cms, 16.7 × 16.8 × 10.5 (16.8 with bottle) inches
Weight: 16.1 Kg (35.5 lbs)
Power (Nebulizer): Universal 100-240 VAC, 50/60 Hz, 90 W max
Power (CPC): Universal 100-240 VAC, 50/60 Hz, 210 W max
Output: RJ-45 for Modbus, USB FlashDrive
Internal storage: Micro SD
Ultrapure water inlet: ¼ inch PFA Flaretek®
Waste outlet: ½ inch SS Swagelok®
Compressed air inlet: ¼ inch SS Swagelok®
Detector vacuum: ¼ inch SS Swagelok® Port
Display: 7 inch TFT Color, touch panel
Shipping Drain: Colder brand quick disconnect

Specifications subject to change without notice.

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