Knowledge Beyond Measure.

Nano LPM™ System

Model NANO-LPM10

Designed for Ultrapure Water (UPW), the Nano LPM™ System (Nanoparticle Liquid Particle Monitor) combines 10 nm sensitivity with precise sampling techniques and unique flow properties to provide accurate, reliable and repeatable measurements.

Specifically designed to detect nanoparticles suspended in UPW down to 10 nm, the Nano LPM™ System is a versatile instrument capable of monitoring UPW continuously as well as sampling by injection.

The patented* technology combines a specialized particle generator and a fit-for-purpose cleanroom water-based condensation particle counter (CPC). In addition to many other functions, the particle generator eliminates counting of microbubbles that are problematic in other types of UPW monitoring instruments while the CPC, designed for use in cleanrooms, is engineered to have an ultra-low false count rate. Working together, they provide accurate, reliable and repeatable nanoparticle monitoring in UPW.

Features and Benefits

- Continuous, 24/7 operation for online particle monitoring down to 10 nm
- Separates nonvolatile residue (NVR) signal from that of solid particles in UPW
- Monitors trends in real-time and analyzes historical data via multi-functional interface
- No false alarms due to counts from microbubbles
- No influence on measurement accuracy from particle index of refraction
- Hassle-free system calibration and component maintenance due to modular design
- Quickly verifies particle detection performance in-situ, using silica nanoparticle size standards, via patent pending integrated injection port

Applications

- Continuous, online monitoring of UPW final polish water quality
- Evaluation and monitoring of water quality at various steps in the UPW purification process
- Detection of particle excursions (e.g. breakthrough) and performing particle trend baseline analysis
- Quantification of particle concentrations in semiconductor quality UPW systems
- Evaluation of UPW filter and resin efficiencies over time to improve preventative maintenance cycles
- Monitoring rinse-down after UPW system maintenance

Specifications

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Size Range

10 nm – 250 nm

Particle Channel Sizes

Single channel

Counting Efficiency

50% at 10 nm

Concentration Limit

10^9 counts per mL

Total Water Consumption

Line Pressure Dependent, 150-300 mL/min

Inspected Water Sample Flow Rate

10 mL/hr

Sample Frequency

Continuous sampling, minimum 1-minute sample - user selectable averaging intervals. Live trend graphing

Gas Feed to Generator

70 – 125 psi (N_2 or CDA)

Sample Water Temperature Range

15 – 50 °C

Sample Water Pressure

40 – 72.5 psi (on line sampling)

Generator Wetted Surface Materials

PFA, Teflon™, Stainless Steel, PEEK

Generator Inlet and Outlet Fittings

Water in/out 0.25 in. Flaretek® (2), Gas in 0.25 in. Swagelok®

CPC Working Fluid

Ultrapure or deionized water. Direct connect

CPC Flow Rate

0.1 CFM (2.83 L/min)

CPC Sample Output/Exhaust

Internal HEPA filter (>99.997 % at 0.3 µm)

Communication, Data Transfer and Storage

10.5 in. Windows™ tablet computer preloaded with Nano LPM™ Software, controls all system components, acquires, logs, exports and displays data. > 6 months of continuous data storage. Provides Modbus server for external communications

Power AC Adaptor

CPC: 100 to 240 VAC universal power supply. Mains supply voltage fluctuations not exceeding +/- 10% of rated voltage, DC power requirement to instrument: 12 VDC @ 16.0 amps.
Particle Generator: 100 to 240 VAC universal power supply

Operating Environment

Temperature: 15 – 30 °C, Humidity: 10 – 90% non-condensing, Maximum Altitude: 2000 m, indoor use

Dimensions (H x W x D)

CPC (without water bottle):
22.4 in. x 9.3 in. x 8.6 in. (56.9 cm x 24.6 cm x 21.8 cm)

Particle Generator:
21.0 in. x 11.1 in. x 22.5 in. (53.3 cm x 28.2 cm x 57.2 cm)

Weight

CPC: 28.5 lbs. (13.0 kg),
Particle Generator: 64.4 lbs. (29.2 kg)

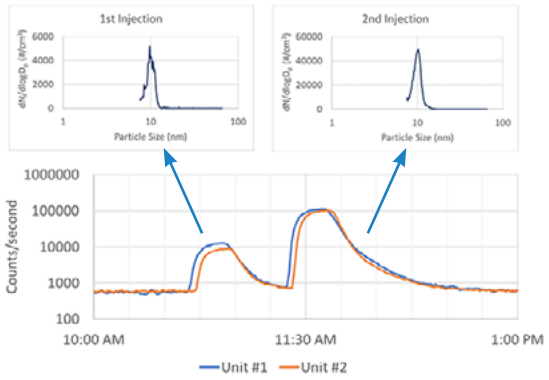
Included Accessories

Manuals are available on tsi.com, power supply, alarm connector, purge filter, CPC barbed inlet and a .19 in. OD straight tube connector inlet, water bottles, brackets for water bottles USB cable, (2) Ethernet cables, Water Regulator, PFA Tubing 0.25 in. OD, CPC drain line, communications hub, stylus.

Patents

Visit tsi.com/patents

10 nm Silica Injections



Top graphs are scanning mobility particle size distribution plots made during each 10 nm silica nanoparticle injection at two different concentrations (factor 10x).

Bottom graph is comparison of two Nano LPM™ Systems measuring simultaneously before, during, and after the injections at two different concentrations (factor 10x) — demonstrating consistent baselines, linear response and particle size verification.

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Specifications reflect typical performance and are subject to change without notice.