



**PARTICLE  
MEASURING  
SYSTEMS®**

a spectris company

# Introducing the NanoAir™ 10

*A revolutionary new 10 nm sensitivity  
aerosol nanoparticle counter.*



# NanoAir™ 10

*Designed specifically for use in the most critical fab spaces*

*The NanoAir™ 10 is a purpose-built nanoparticle counter designed specifically for use in the most critical fab spaces. Enables detection of yield impacting particle excursions within Process Tools, Critical Cleanroom Areas, and Pressurized High Purity Gas delivery.*

The NanoAir™ 10 is a revolutionary new aerosol nanoparticle counter offering the sensitivity of a Condensation Particle Counter (CPC) with the ease of use of traditional cleanroom particle counters. The NanoAir is designed to monitor ultra-clean environments and provides 10 nm detection sensitivity at a sample flow rate of 2.8 LPM. The instrument is small enough for use in semiconductor process tools and Equipment Front-End Modules. The innovative working fluid handling system design is robust and efficient for 365 days of 24/7 continuous operation without the need for user intervention of any kind. A 10-port manifold companion (ParticleSeeker™) product is available for use in applications that require multiple sample locations to be monitored in programmed sequences or in pseudo-simultaneous ensemble fashion. Finally, the NanoAir is compatible with high-pressure inert gas when used in conjunction with PMS' High Pressure Diffuser HPD III. Data can be viewed using PMS FacilityNet Facility Monitoring Software or transmitted directly to third party SCADA systems or process tool inputs.

**The NanoAir is a purpose-built nanoparticle counter designed specifically for use in the most critical fab spaces in the following applications:**

#### **NanoAir: Point of Use (POU) Monitor**

- The NanoAir can be used to monitor a single sample point 24/7, 365 days/year providing truly continuous and real-time particle activity.
- Its compact size makes it suitable for use in the most critical process areas.
- In stand-alone point of use applications, NanoAir will support sample tube lengths up to 10 m.

#### **ParticleSeeker: Monitoring inside process tool Equipment Front End Module (EFEM) mini-environments**

- The ParticleSeeker is a companion, multi-point aerosol sampler for the NanoAir, providing up to 10 distributed sample locations. This capability is ideal for applications requiring broad contamination monitoring with programmed sample point monitoring critical surfaces within the cleanest and most confined spaces in the fab.
- Up to 6 meters of sample tubing can be used for each manifold port. The ParticleSeeker and NanoAir provides the ability to monitor up to 120 m<sup>2</sup> of space

#### **HPD-III: High pressure inert gas monitoring**

- Using the NanoAir particle counter with PMS's HPD III (High Pressure Diffuser) enables real-time, continuous, high sensitivity measurement of high pressure bulk gases.



Recessed ISP probe minimizes size

Power Button Ring LED and front corner edge indicator LED

- High Visibility LED colored lights indicate warm-up, operation, and shut down states.

Fluid level indicator

Shows real-time working fluid level in 8 increments

Dimensions

16.5 x 20.2 x 15.2 cm

## NanoAir Features

- The small form factor (16.5 x 20.2 x 15.2 cm) sets the standard for CPC's designed for manufacturing and process control applications
- External volumetric size is over 80% smaller than the next smallest industrial CPC allows monitoring:
  - » within process tools in the most critical functional areas
  - » on congested high-pressure gas distribution utility pads
- Patent-pending, innovative, working fluidics design allows for 24x7x365 days operation without working fluid maintenance; thus avoiding any sampling and data collection interruptions
- Refills only 1x per year at annual calibration, capable of 15 months between refills with 24x7 full-time operation
- No potential for unwanted fluid migration during shipping, handling, and installation that is common in other industrial-application CPCs
- Ready for operation in under 20 minutes after connecting vacuum and power
- No internal pumps or fans, eliminating maintenance and potential particle generation
- Sample flow rate of 2.8 LPM and does not use sheath airflow, providing volumetric sampling capability
- Zero Count is < 1.5 counts/m<sup>3</sup> without the use of zero count subtraction schemes
- Results in best-in-class performance and enables use in ISO Class 1 environments



### ParticleSeeker Ring LED

- Indicates the active sample port (1-10) or if the unit is in Ensemble mode (psuedo-simultaneous sampling)

### Base Station

- Instrument IP address and locations
- Dry Contact relay (x4)
- 4-20mA: IN (x4) & OUT (x2)
- USB for Serial (service port)
- USB for flash memory
- Ethernet x2:
  - MODBUS over TCP/IP
  - PMS Protocol over TCP/IP
- DC Power x2
- Vacuum port

## ParticleSeeker Manifold Features

- Only aerosol particle manifold on the market designed and purpose-built to handle particles down to < 10 nm
- 10 manifold points providing 120 m<sup>2</sup> of fab/process space sampling coverage. Each sample tube can be up to 6 m in length
- Multiple modes of manifold Sampling:
  - » **User Defined** Sequence
  - » **Ensemble** samples all ports simultaneously
  - » **Sync** (via Dry Contact Relay) communicates with external fab processes in real-time to synchronize with events and follow movement within the environment
- Effectively eliminates crosstalk and other common nanoparticle transport handling problems

## Base Station Features

- The utilities interface “Base Station” retains all local configuration (Location, IP address, recipe settings) at the point of installation, allowing the ability to swap NanoAir and ParticleSeeker instruments, eliminating re-configuration downtime.
- Multiple Input/Output communication interfaces enable seamless SCADA data transfer, reducing process tool downtime
- Dry Contact Relay (x4) for selecting and synchronizing sequence modes (ensemble mode, user defined sequence, wafer flow path)
- 4-20mA analog inputs (x4) for additional sensors, such as Temperature, Relative Humidity, and Differential Air Pressure
- 4-20mA outputs (x2) for single channel particle data export to data handling and SCADA
- USB for Serial (service port)
- USB for flash memory
- Ethernet ports (2):
  - » PMS Ethernet Protocol for FacilityNet Software communication
  - » MODBUS over TCP/IP communication with process tools and other fab system interface
- DC Power ports (x2) allows a ParticleSeeker to share power with a NanoAir
- Vacuum port for house or external source (>12 inHg)

# NanoAir 10 Aerosol Particle Counter

<b>Size range</b>	10 nm (minimal detectable size @ D50)
<b>Aerosol flow rate</b>	2.8 LPM (0.1 CFM) ± 5%
<b>Sampling period</b>	0.2 to 3600 seconds, user-selectable
<b>Max. particle concentration</b>	200,000 #/ft <sup>3</sup> @ 10% coincidence loss
<b>Zero count</b>	< 1.5 #/m <sup>3</sup> , No false count subtraction
<b>Volumetric sample %</b>	100% - no sheath flow
<b>Counting efficiency</b>	10 nm = 50% ± 20%, 15 nm = 100% ± 10%
<b>Calibration</b>	yearly
<b>Instrument warm-up time</b>	20 minutes, nominal
<b>Working fluid</b>	Organic, non-toxic, non-flammable 240 ml total working fluid volume
<b>Working fluid consumption and instrument volume</b>	12 months between refills 240 ml total working fluid volume
<b>Sample tubing</b>	Static Control Polyurethane Tubing 6 mm OD, 4 mm ID (PMS P/N: 1000026711)
<b>Sample tubing length</b>	≤ 10 m (33 feet)
<b>Laser classification</b>	Class 1, complies with US 21 CFR 1040.10 and EN60825-1. Internally an enclosed Class 3B laser is used per EN60825-1.
<b>Data storage</b>	>10,000 samples
<b>Dimensions (l,w,h)</b>	8.0 x 6.0 x 6.5 in (20.3x 15.2 x 16.5 cm)
<b>Weight</b>	6.1 lb (2.8 kg)
<b>LED Indication</b>	Power, flow error, laser error, activity, working fluid level
<b>Power</b>	External AC to DC Power Supply: Input: 100 – 240 VAC, 50/60 Hz, 1.5 A Output: 24 VDC 5.0 A AC input voltage fluctuation shall not exceed ± 10%
<b>Communications</b>	<ul style="list-style-type: none"> <li>• Ethernet connectivity (PMS Proprietary)</li> <li>• Modbus via TCP/IP</li> <li>• Serial USB</li> <li>• 4-20mA (4 analog input ports, 2 analog output ports)</li> <li>• Dry contact relays (4)</li> </ul>
<b>Operating temperature range</b>	50 – 90 °F (10 – 32 °C)
<b>Humidity range</b>	0 – 60% RH, non-condensing
<b>Operating pressure</b>	1 atm (ambient)
<b>Vacuum source</b>	External, ≥ 12 inHg required
<b>Power</b>	24 VDC, 5 Amp
<b>Installation requirements (with external AC to DC power supply)</b>	<ul style="list-style-type: none"> <li>• Indoor use only</li> <li>• Pollution degree 2</li> <li>• Over voltage category I</li> <li>• Ordinary protection (not protected against harmful ingress of moisture)</li> <li>• External AC to DC Power Supply: <ul style="list-style-type: none"> <li>• Over voltage category II</li> <li>• Class I Equipment (Electrical earth ground from the mains power source to the product input is required for safety.)</li> </ul> </li> </ul>
<b>Status Indicators</b>	<ul style="list-style-type: none"> <li>• Power button LED ring (4-color, operational states)</li> <li>• Front edge and corner LED (4-color, operational states)</li> <li>• Working fluid level indicator (8 level real-time detection)</li> </ul>

# Particle Seeker Aerosol Manifold

Sample ports	10 ports supporting a single particle counting instrument
Sample flowrate	0.1 CFM
Bulk flowrate	0.2 to 0.3 CFM per port (nominal)
Purge time between ports	0-30 seconds, user configurable
Sample interval time	Minimum 1 second, Maximum 3600 seconds
Sample modes	Sequential, Scanning, Ensemble Mode, Patterned
Crosstalk $\geq 10\text{nm}$	$\leq 0.01\%$
Sample tubing	Static Control Polyurethane Tubing 6mm OD, 4 mm ID (PMS P/N: 1000026711)
Sample tubing length	$\leq 6$ m (20 feet) per port, sample tubing must be of equal length for all ports
Fittings provided	10 self-locking, 6 mm OD, push-fit fittings
Vacuum required	$\geq 12$ inHg VAC, 3.0 CFM
Data storage	$\geq 10,000$ samples
Power	External AC to DC Power Supply: Input: 100 – 240 VAC, 50/60 Hz, 1.5 A Output: 24 VDC, 5.0 A Current Draw: 1 A @ 24 VDC
Dimensions (l, w, h)	8.2 x 5.4 x 4.7 in (21x14x12 cm)
Weight	2.2 lb (1.0 kg)
Operating temperature range	50 – 95 °F (10 – 35 °C)
Humidity range	0 – 60% RH, non-condensing

# HPD III High Pressure Diffuser with NanoAir 0.1 CFM CPC

Sample ports	High Pressure (CDA) 25 – 100 psi	High Pressure (Nitrogen) 22.5 - 98 psi	High Pressure (Argon) 119 psi	High Pressure (CO <sub>2</sub> ) 126 psi
Particle size range	$\geq 0.10$ nm			
Temperature range	Typical: 39 – 86 °F (4 – 30 °C)			
Humidity	0 – 85% RH non-condensing			
Material	Enclosure: 316L stainless steel body, exhaust filter Gaskets: 316 stainless steel, Buna-N O-rings			
Sample gas	Dry, inert, non-toxic, non-flammable gases (CDA, nitrogen, argon, carbon dioxide)			
Inlet fitting	Male 4-VCR fitting, #4 size, class 316L stainless steel with Ruby orifice			
Exhaust fitting	Barb fitting for 4mm ID			
Tubing length	1 m (39.4 in) maximum			
Dimensions (h, w, d)	15 x 2.75 x 5.5 in (38 x 7 x 14 cm)			
Weight	2.7 lb (1.25 kg)			



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