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Bridging the Gap

From Optional to Essential Air Quality Monitoring in Data Halls

Modern data centers are the backbone of the global economy, making uptime non-negotiable. The industry has shifted from viewing particle counters as optional tools to seeing them as essential components of a robust operational strategy. Environmental contamination - primarily airborne particulates - is a leading cause of 'silent failures,' leading to equipment degradation, increased energy costs, and the catastrophic voiding of hardware warranties.

This application note details how the Met One Instruments BT-620 and Handheld Particle Counters provides the critical data and compliance evidence necessary for every data center.



BT-620

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Met One Instruments indoor air quality handheld particle counters



Featured Instruments

I. Full Regulatory and Warranty Alignment

Compliance is no longer a suggestion - it is a contractual requirement. Our instruments are designed to provide the documentation needed to prove adherence to the industry's most critical standards:

ISO 14644-1:2015 Compliance

The instrument's accurate and certified measurements are capable of demonstrating that the data hall environment consistently meets the required ISO Class 8 cleanliness standard (and for high-end facilities, ISO Class 7). This compliance is vital for securing and maintaining OEM warranty validity from major hardware manufacturers. These instruments provide the "Certificate of Conformity" needed to prove an equipment failure was not caused by environmental neglect. (BT-620 / Handheld Particle Counters)

Continuous Monitoring (ISO 14644-2)

Suitable for both scheduled audits and continuous monitoring, the BT-620 helps fulfill the requirements for ongoing performance review and early detection of contamination events. (BT-620)

ASHRAE TC 9.9 & ISO 21501-4

The BT-620 assists in adhering to the "Gaseous and Particulate Contamination" guidelines within ASHRAE TC 9.9 and ensures its data is legally and technically valid for audits by being calibrated to the ISO 21501-4 standard for light scattering particle counters. (BT-620)

II. Key Use Cases and Operational Benefits

The Met One Instruments line of particle counters are more than measurement devices – they are critical control and auditing tools

Free-Air Cooling Management (Economizers)

When using free-air cooling, external pollutants (such as wildfire smoke, construction dust, or salt air) pose a massive risk. Positioned at the air intake, the BT-620 functions as a "Gatekeeper." High particle counts can be used to automatically trigger the DCIM to close dampers and switch to safer, closed-loop cooling, protecting sensitive equipment. (BT-620)

Construction & Maintenance Monitoring

For data centers that remain "live" during expansion, portable particle counters are essential. They allow for "spot checks" during and after maintenance activities (like drywall work or raised floor modifications) to confirm the space is returned to baseline cleanliness before servers are re-commissioned, preventing catastrophic "silent" failures like creep corrosion from dust or zinc whiskers. (BT-620/Handheld Particle Counters)



III. Essential Technical Parameters for Data Centers

These instruments' technical specifications are tailored for the realities of the data hall:

The Critical 0.5 µm Threshold

While cleanrooms focus on 0.1 µm, data center filters (MERV 11-14) are most efficient at the 0.5 to 1.0 µm range. The instruments' primary metric focuses on particles 0.5 µm as the critical size for risk assessment in a data hall. (BT-620/Handheld Particle Counters)

High Flow Rate for Fast Sampling

To ensure fast sampling across large data center volumes, the BT-620 features an ISOcompliant 1.0 CFM (Cubic Feet per Minute) flow rate, providing rapid and representative air quality data. (BT-620)

Seamless Data Integration

Data center managers require particle data to appear on their central DCIM dashboard alongside temperature and power metrics. The BT-620 supports industry-standard protocols like Modbus for seamless integration and remote monitoring. (BT-620)

Achieving and maintaining ISO 14644-1 Class 8 cleanliness is a continuous operational requirement, not a one-time audit. By transitioning from periodic sampling to integrated, real-time particle monitoring, data center managers replace anecdotal evidence with a high-fidelity data stream. Incorporating a Met One Instruments BT-620 or handheld particle counter into your facility's DCIM architecture ensures that environmental variables remain within OEM-specified tolerances—effectively mitigating the risk of thermal insulation, creep corrosion, and warranty non-compliance before they impact hardware availability.

Met One Instruments powered by Acoem offers a wide range of solutions for data center monitoring, including outdoor and indoor air quality, gas analyzers, noise analyzers, and more. Visit metone.com or scan this QR code to get started.

IV. The Risks of Neglect

Ignoring particle contamination results in direct and measurable costs:

Thermal Insulation

Dust buildup on heatsinks acts as a blanket, leading to thermal throttling or forcing cooling fans to run faster, which can increase energy costs.

Hygroscopic Dust

Certain dust absorbs moisture. As humidity rises, this dust can become conductive, leading to short circuits on printed circuit boards (PCBs).

Fire Suppression Nuance

Your particle counter acts as an essential pre-screening tool for Early Warning Smoke Detection (VESDA) systems. By monitoring particle levels, it can help prevent expensive and unnecessary gas suppression discharges caused by “nuisance alarms” from noncombustion dust events.

