

Continuous Monitoring of a Cleanroom Should be Taken for Granted in the Near Future.

As the recent revise of the JIS standards indicates, we are increasingly required to ensure that a higher level of cleanliness in a cleanroom environment will be maintained. To do so, a real-time monitoring becomes important. In this month's issue we would like to explain the revised JIS standards and a monitoring system which will be added to the product line-up of KOKEN LTD.

As manufacturing becomes more high tech, better clean environments are critical.

As the rate of technological advance has accelerated at an unprecedented pace in recent years, the needs for clean environment are changing drastically. In such advanced fields as semiconductor manufacturing where nanoscale high-precision processing is performed and DNA studies for analyzing single cells, the past cleanliness control systems seem to be out of date now. The traditional idea of cleanliness control or the way cleanliness is maintained will be no longer tenable not only in particular advanced fields, but also in a wide variety of fields including medicine, food and space when we move into a new era.

This is reflected in the revised JIS standards in which the classification criteria have changed to address smaller particle size in the upper-limit particle concentrations. At the same time the revised JIS standards have added the monitoring requirement to provide evidence of cleanroom performance.

A Point of the revised JIS standards**JIS B9920-1 Classification of Air Cleanliness and the maximum permitted concentration for each measuring particle size**

The table of classification of air cleanliness is revised according to the new ISO standards. For example, 0.2 μ m is deleted from the maximum permitted concentration in Class 1. This reflects the needs for addressing smaller particle sizes than those stated in the previous standards.

JIS B9920-2 Monitoring to provide evidence of cleanroom performance related to air cleanliness by particle concentration

This document defines "monitoring" and explains how it should be implemented. The preparation and implementation of "monitoring plan" is stated in it. There is an additional guidance regarding the conduct of risk assessment by monitoring.

Table: Maximum Concentration Limits

New Standards

Class (N)	Maximum concentration limits (particles/m ³)					
	0.1µm	0.2µm	0.3µm	0.5µm	1µm	5µm
1	10	deleted	-	-	-	-
2	100	24	10	deleted	-	-
3	1000	237	102	35	deleted	-
4	10000	2370	1020	352	83	-
5	100000	23700	10200	3520	832	deleted
6	1000000	237000	102000	35200	8320	293
7	-	-	-	352000	83200	2930
8	-	-	-	3520000	832000	29300
9	-	-	-	35200000	8320000	293000

Where deleted, “less than 10” was mentioned in the old table. It was judged as inappropriate for classification.



KOACH T500-F (Table-top type)



KOACH C900-F (Stand type)



KOACH Ez (Floor type)

Monitoring becomes a new common sense for cleanliness control.

When a cleanroom was introduced to a manufacturing facility, the whole facility was included within a cleanroom, which can be very large. This was because the cleanliness of the whole facility must be maintained due to the difficulty of removing the contaminants generated inside the cleanroom. As a consequence, it is necessary to implement a strict control to maintain a level of cleanliness based on the four principles: 1. Do not bring contaminants. 2. Do not generate contaminants. 3. Do not accumulate contaminants. 4. Remove contaminants quickly.

No matter how much the cleanliness control is tightened, generation of contamination is unavoidable. This causes contamination in the very area which requires cleanliness.

Monitoring is indispensable for ensuring that a desired level of cleanliness is maintained in the area that requires high cleanliness. Because you can determine the number of particles in a cleanroom in real time by monitoring, you can improve the way works are performed. To put it the other way, if monitoring is not conducted, you cannot determine how much each work is generating contaminants, which may not allow you to adopt effective countermeasures.

Most of particle counters that can measure particles in the size of 0.1 μ m, which may become a standard instrument in the future, were still large and very expensive. They could not be familiar to many people. Even if a particle counter that can measure particles of 0.3 μ m and above does not show the presence of particles, it is possible that there are lots of particles of 0.1 μ m.

KOKEN LTD. will add a new monitoring system to its line-up of KOACH products.

The addition of a new monitoring system to KOACH allows you to realize an ideal clean environment.

KOACH is a device that can create a clean zone locally in a place that requires high cleanliness. By monitoring the work performed in the local area that is maintained free from contaminants by KOACH, the person in charge of a clean environment is relieved of the complicated responsibility regarding the maintenance of cleanliness in a whole room. Furthermore, because KOACH can create a super clean environment with the world's highest level of cleanliness of ISO Class 1, you can respond to ever increasing demands for high cleanliness requirements.

It has become a new common sense to form a high cleanliness environment in an area that requires it without a sophisticated strict administration.

Benefits of Monitoring Clean Environment

- **Allows for a quick response to adverse events or situations**
 - **Allows for investigating trends from data obtained over a long period of time**
 - **Allows for integrating and analyzing data obtained from multiple devices**
 - **Allows for effective risk evaluation**
 - **Allows for reduction of operation cost and product loss**
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Monitoring System with a 0.1µm sensitivity-A necessity for cleanliness control

As the risks associated with contamination are increasing recently, particle sizes that should be controlled are getting smaller year by year. To meet the requirement for measuring 0.1µm particles due to advance in measurement technique, a particle counter that allows for particle monitoring with sensitivities from 0.1µm has been developed.

Because particles are invisible, it is necessary to quantify and manage them as data. Monitoring will become a new common sense as if you were watching the clock. This combination of the monitoring system and KOACH will change the world of cleanliness.

Best for monitoring

Feature 1: Display software included

A display software is included in this system. No additional investment in a display software for monitoring is necessary.

The introduction of monitoring system will not only help manage high cleanliness on site but also lead to the appeal of a high level of awareness about cleanliness and effectiveness to customers and visitors.

Anyway, let's start to monitor the environment. Understanding the present conditions as they are is a first step to improve them.

“Hmm. It is dirtier than I thought.” “I did not know so many contaminants were generated while at work.” “I wonder if we should change the way we used to do in cleanliness control.”

Please consult with KOKEN, LTD as soon as you are aware with the problem that has been invisible to you.



Display screen to indicate the number of particles

KANOMAX Particle Counter Model 3950

Best for monitoring

Feature 2: KANOMAX Particle Counter Model 3950

It is used to determine the air quality in a clean room by counting and quantifying the number of particles in the air. It has a 0.1 μ m sensitivity. It enables you to monitor at high accuracy a clean room with ISO Class 1 cleanliness provided by the KOACH.

KANOMAX Particle Counter Model 3950 is an ultra-small particle counter that can measure particle sizes from 0.1 μ m. Even if a particle counter that can measure particles of 0.3 μ m and above does not show the presence of particles, there is no guaranty that particles of 0.1 μ m do not exist. To maintain a high level of cleanliness with precision, it is important to measure particles sizes from 0.1 μ m.

By monitoring, both the quality of products and the peace of mind of workers can be ensured. Monitoring plays an important role in quality control.

Benefits of Monitoring

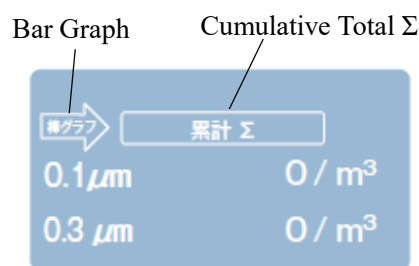
- You can take corrective action immediately when a level of cleanliness deteriorates in order to prevent product defects in the upstream area.
 - You can demonstrate that production process has been controlled properly.
 - Workers can use it with total confidence.
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Triple benefits to make monitoring more familiar to you

1. Can measure particle sizes from 0.1μm.

It can measure ultra-fine particle sizes from 0.1μm.

With an alert function, it is an ideal equipment for controlling an area with a high level of cleanliness.



2. Ultra-small! Ultra-light! Very easy to carry by hand!

It weighs only about 3.4kg. With ultra-small size it is extremely light.

It can be integrated into the whole system easily, which was impossible before.



3. A 4.1 inch large touchscreen with an easy interface by using user-friendly simple icons.



Specifications by Kanomax Japan Inc. Product Catalogue as of May 2019	
Product Name	Particle counter
Model	3950
Measuring Method	Light scattering
Measuring Particle Sizes	0.1μm and 0.3μm
Flow Rate	0.1CFM (2.83LPM), Accuracy of ±5%, (compliant with JIS B9921 and ISO21501-4)
Single Sampling Time	From 6 seconds to 99 minutes and 59 seconds
Measurement Interval Time	From 6 seconds to 99 minutes and 59 seconds (interval between the starting time of a measurement and the starting time of the next measurement)
Sampling Cycle	From 1 to 999 or Continuous Measurement Mode
Location Classification	99 locations
Measurement Mode	Repeat, Single, Continuous and Calculation
Display Time of Measured Value	From 1 to 10 seconds
Display of Measured Value	Cumulative Σ, Differential Δ and Bar Graph

Maximum Measurable Concentration	10,000,000 particles/m ³ at less than 10% coincidence loss (compliant with JIS B9921 and ISO21501-4)
Counting Efficiency	50±20% (PSL particles near the minimum measurable size) 100±10% (PSL particles of 1.5 to 2.0 times as large as the minimum measurable size) (compliant with JIS B9921 and ISO21501-4)
False Count	≧ 1 particle/35 minutes
Size Resolution	≧ 15% (for PSL particles near 0.3μm) (compliant with JIS B9921 and ISO21501-4)
Pump	Internal pump
Display and Operation	4.3 inch color LCD, Resistive touch panel
Communication	USB (Host: for printer and USB flash memory, Device: for PC) Ethernet, RS485(9600,19200,3844 baud)
Recording Media	Internal memory Up to 10,000 records in CSV format
Language	Japanese and English
Power	AC adaptor Input 100 to 240 V
Operating Environment	From 10 to 35°C, from 0 to 85%RH (with no condensation)
Dimension	W150 × H163 × D228 (mm)
Weight	3.4kg