Cleanroom Contamination Control Solutions
Handheld Particle Counter
Model 3886 & 3887

Model 3886 and 3887 are CE certified handheld laser particle counters. The Model 3886 measures 5 particle sizes simultaneously with optional multi-functions, such as air velocity, temperature, and humidity. Its low air velocity measuring function is suitable for laminar flow units. The Model 3887 is a lightweight easy to use instrument.

Features and Benefits

- Simultaneous 5 channel particle measurements (Model 3886)
- Simultaneous 3 channel particle measurements (Model 3887)
- Handy and easy operation
- Multi-functions: Particle, Air Velocity, Temp, R/H (Model 3886)
- ISO mode calculates 95% UCL for user (Model 3887)
Portable Particle Counter
Model 3910 & 3905

The 3910 & 3905 are the smallest 6-channel portable particle counters in the industry; with a 50 LPM and 1 CFM flow rate respectively and a 0.3 micron sensitivity. Both units feature a large color touch screen, streamlined, user-friendly interface and pre-programmed standards mode to guide you through the measuring and certification process it may also be the most helpful.

Features and Benefits
- The unit is featherlight and the smallest in the industry
- Simultaneously measures and displays up to 6 particle sizes
- Enables you to certify cleanrooms up to ISO Class 2
- Fully compliant with ISO 21501-4 calibration standard

Climomaster™ Model 6501 Series

The most accurate hotwire anemometer (in its class) in the world. Just some of its capabilities include: up to 8 interchangeable probes for air velocity, temperature, humidity, and differential pressure.

Features and Benefits
- Simultaneously measures and displays air velocity, flow rate, humidity, temperature, and differential pressure
- 8 interchangeable probes are available for various applications
- Data processing software allows real-time measuring and downloading data to PC

TABmaster™ Capture Hood

Our new Kanomax TABmaster™ is the perfect tool for accurate supply and return airflow measurements. Interchangeable hoods make it a snap to sample the air for any duct size. The unit is lightweight and easy to handle. The full color screen can be tilted so it's at the optimal viewing angle at any height.

Features and Benefits
- Lightweight design makes one-person setup and use easy
- Five hood sizes make it easy to pick one that fits your duct size
Making ISO Cleanroom Certification easy with Kanomax Particle Counters

This guide is a brief look at how the Kanomax Particle Counters can simplify the job of certifying your ISO class cleanroom.

The ISO procedure can be broken down into 7 basic steps to certify a cleanroom. Let’s take a look at these steps and then we’ll go over how the features of Kanomax particle counters can help you with the job.

**Step 1: Calculating the number of locations**

The 3905 and 3910 have a Standard mode that allows you to enter the area of the room in cubic meters. Once this is done the instrument will calculate how many points need to be measured. You can still adjust the number of points manually if desired, but if you are following the ISO standard the instrument does the calculation for you.

1) Calculate the number of locations that need to be sampled based on the cleanroom size.
2) Determine the particle sizes to be measured, max concentrations allowed and the minimum sampling volume at each location.
3) Measure the particles at each sampling location.
4) If you are performing multiple samples at each location take the average from each location.
5) Take an average of the measurements from all the locations.
6) If the number of points sampled was between 2 and 9 then calculate the 95% UCL.
7) Determine if the cleanroom passed or failed by comparing the UCL to the maximum particles per cubic meter as shown on the ISO table.

**Step 2: Determine particle size, max. concentration and minimum sampling volume.**

The cleanroom certifier will need to determine these numbers per the ISO procedure. It’s important to note the flow rate of the 3886 and 3887 is 2.83 L/min, the 3905 is 28.3 L/min, and the 3910 is 50.0 L/min. If you will be certifying multiple cleanrooms and typically need to sample a high volume of air then the 3910 is a better choice with its higher sampling rate. The 3887 is the perfect tool for smaller air samples. Both instruments can be programmed to sample for a specified length of time making it easy to sample precise volumes of air flow.

**Summary of Seven Steps to Cleanroom Certification:**

1) Calculate the number of locations that need to be sampled based on the cleanroom size.
2) Determine the particle sizes to be measured, max concentrations allowed and the minimum sampling volume at each location.
3) Measure the particles at each sampling location.
4) If you are performing multiple samples at each location take the average from each location.
5) Take an average of the measurements from all the locations.
6) If the number of points sampled was between 2 and 9 then calculate the 95% UCL.
7) Determine if the cleanroom passed or failed by comparing the UCL to the maximum particles per cubic meter as shown on the ISO table.

<table>
<thead>
<tr>
<th>Particle Counter Model #</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3887 Handheld</td>
<td>2.83 L/min (0.1 CFM)</td>
</tr>
<tr>
<td>3886 Handheld</td>
<td>2.83 L/min (0.1 CFM)</td>
</tr>
<tr>
<td>3905 Portable</td>
<td>28.3 L/min (1.0 CFM)</td>
</tr>
<tr>
<td>3910 Portable</td>
<td>50.0 L/min (1.77 CFM)</td>
</tr>
</tbody>
</table>
Step 3: Measure particles at each location.

The 3887 has an ISO mode that will allow you to program it with the number of sample points and sample duration needed to certify the cleanroom. The 3905 and 3910 have a similar mode called Standard mode that includes a configurable setup to certify ISO (as well as other standards such as EU GMP). You can even upload a map of your cleanroom and specify the measuring locations on it in the particle counters.

Step 4 through 6: Average the measurements taken at each location, then average the final results from all locations and calculate the UCL.

Both instruments will automatically calculate the averages and the UCL for you. These steps are essentially eliminated from your workload.

Step 7: Determine if the cleanroom passed.

You can determine if the cleanroom passed or failed by comparing the UCL to the maximum particle concentration allowed as shown on the ISO table. The 3887 will calculate the UCL for you and you can just compare the final number to the ISO table. The 3905 and 3910 are programmed with the ISO standards and will tell you on the spot if your cleanroom has passed or failed. With its built-in printer it can even issue an on-the-spot report.

ISO Cleanroom Classification Table (ISO 14644-1: 1999)

<table>
<thead>
<tr>
<th>ISO classification</th>
<th>Certify every 6 months</th>
<th>Certify every 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iso Class 1</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 2</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Iso Class 3</td>
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</tr>
<tr>
<td>Iso Class 4</td>
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<td>10,000</td>
</tr>
<tr>
<td>Iso Class 5</td>
<td>100,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Iso Class 6</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Iso Class 7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Highest levels of particle concentrations (particles/m³) equal to or greater than the parameters listed as follows.

<table>
<thead>
<tr>
<th>Size (μm)</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.5</th>
<th>1.0</th>
<th>5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iso Class 1</td>
<td>10</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 2</td>
<td>100</td>
<td>24</td>
<td>10</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 3</td>
<td>1,000</td>
<td>237</td>
<td>102</td>
<td>35</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Iso Class 4</td>
<td>10,000</td>
<td>2,370</td>
<td>1,020</td>
<td>352</td>
<td>83</td>
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<tr>
<td>Iso Class 5</td>
<td>100,000</td>
<td>23,700</td>
<td>10,200</td>
<td>3,520</td>
<td>832</td>
<td>29</td>
</tr>
<tr>
<td>Iso Class 6</td>
<td>1,000,000</td>
<td>237,000</td>
<td>102,000</td>
<td>35,200</td>
<td>8,320</td>
<td>293</td>
</tr>
<tr>
<td>Iso Class 7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>352,000</td>
<td>83,200</td>
<td>2,930</td>
</tr>
<tr>
<td>Iso Class 8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,520,000</td>
<td>832,000</td>
<td>29,300</td>
</tr>
<tr>
<td>Iso Class 9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>35,200,000</td>
<td>8,320,000</td>
<td>293,000</td>
</tr>
</tbody>
</table>

3887 ISO mode results showing UCL

UCL: 2 POINT
AVG: 6.75E+2/m³
0.5μm SD: 0.10E+0/m³
UCL: 9.99E+2/m³

3905/3910 ISO mode results showing UCL and passing results for a Class 6 cleanroom
Cleanroom Continuous Monitoring

Kanomax offers a complete 24/7 monitoring solution suitable for pharmaceutical, aerospace, semiconductor and food industries. This system is easy to custom to your specific needs because of its modular nature. Our analog output sensors can even be added to your existing system.

Large Scale Facility Monitoring System

The datalogging and viewLinc PC software package is a powerful tool for large scale, continuous facility monitoring. Sensors (such as particulate, temperature, humidity and pressure) placed in critical or key locations connect to dataloggers, which in turn can integrate with an existing network (wired or wireless) and transfer the data to the system software. The software then provides remote monitoring, alarm warnings and reporting. Remote alarms include: emails, text messages and even phone dial-out to notify operators or administrators. Using this system a facility manager can remotely monitor several facilities via the internet.

Standard Cleanroom Monitoring System

Kanomax Cleanroom monitoring System (CRMS) provides an automated means to monitor and gather airborne particle counts and other parameter levels in controlled environments. The CRMS allows users to perform a variety of functions from their PC including the alteration of alarm information and the viewing of particle count concentrations. The system is designed with a modular nature so you can purchase exactly what you need for your particular application. Whether you need a single sensor or two located at critical areas or a full multi-sensor, 24-hour monitoring system, Kanomax can work with you to provide the perfect system.
Remote Particle Sensor (0.1 CFM)
Remote Particle Sensor (1.0 CFM)
Airflow Transducer
Temperature/Humidity Sensor

Kanomax sensors with analog output are designed to fit into your existing monitoring system, or they can be used as a stand-alone unit to monitor a critical area when connected to an alarm or controller. The Kanomax particle sensor is available with both 0.1 and 1.0 CFM flow rates. Our airflow transducer is available with many different probes to suit your specific application needs.
General Indoor Air Quality
Measure a variety of parameters important for monitoring and maintaining occupant thermal comfort while helping to assure healthy indoor environments. Kanomax IAQ monitor Model 2211 and Gas Monitors help facility managers to control thermal comfort and to detect sick building syndrome in the building.

Industrial/Occupational Hygiene
Measure parameters including dust concentration, temperature, air velocity, gas concentration, indoor air quality, ventilation performance, pressure differential and humidity to find hazards in occupational environments. Kanomax Piezobalance Dust Monitor Model 3521 and Digital Dust Monitor Model 3443 implement dust exposure testing to protect workers.

Nanoparticle Measurement
Nanoparticles are becoming more commonplace and are a growing health concern. Kanomax is ready to help you monitor nanoparticles with our Nanosolutions line: including PAMS (Portable Aerosol Mobility Spectrometer) and InfiTOF, a new innovative multi-turn time-of-flight mass spectrometer that’s small enough to be used in the field.