Applications:
The Model 3938 is used for a wide variety of applications, a few of which are listed below.
+ Nanotechnology research and materials synthesis
+ Atmospheric studies
+ Environmental monitoring
+ Combustion and engine exhaust studies
+ Indoor air quality measurements
+ Nucleation/condensation studies
+ Inhalation toxicology studies

Features and Benefits
+ High resolution data: up to 192 channels
+ Broad size range: from 1 nm to 1,000 nm
+ ISO 15900:2009 compliant
+ Fast measurements: <10 second scans
+ Wide concentration range up to 10^7 particles/cm^3
+ Component design for maximum flexibility
+ Touch screen control with no computer needed for operation†
+ Easy setup with tool-less installation and auto discovery of components
+ Discreet particle measurement: works well for multi-mode samples
+ Independent of optical properties of the particles and fluid
+ Wide range of system options: choice of water or butanol CPC; choice of traditional or non-radioactive neutralizer; long, Nano or 1 nm DMA
Differential Mobility Analysis

TSI’s Scanning Mobility Particle Sizer™ Spectrometer (SMPS) measures the size distribution and concentration of particles in the size range of 1 nm to 1 μm using differential mobility analysis. This method is based on the physical principle that the ability of a particle to traverse an electric field (electrical mobility) is fundamentally related to particle size—no size calibration is necessary (first principle measurement). In a Differential Mobility Analyzer (DMA), an electric field is created and the airborne particles drift in the DMA according to their electrical mobility. Particle size is then calculated from the mobility distribution. This method is independent of the particle zeta potential.

Sizing limitations of surface techniques include low sample sizes (non-representative), image edge definition problems, 3D to 2D image distortion, and operator bias. Rigorous peer reviewed uncertainty analyses have been performed indicating TSI’s DMA has a sizing uncertainty of approximately <2%.
A BROAD RANGE OF OPTIONS TO MEET YOUR MEASUREMENT NEEDS

**Differential Mobility Analyzers (DMAs)**

+ **Long Differential Mobility Analyzer Model 3081A**: This classic DMA has been relied upon by aerosol researchers for over 40 years. Data from the DMA Model 3081A is well known to be precise, repeatable, and comparable to results measured by the luminaries in the field of aerosol science.

+ **Nano Differential Mobility Analyzer Model 3085A**: Improves size resolution over the particle size range of 2.5 – 150 nm and NDMA also features increased nanoparticle transmission efficiency through the DMA.

+ **1nm Differential Mobility Analyzer Model 3086**: Expands high resolution measurements down to 1 nm. Optimized for minimal diffusion losses and improved resolution over the size range of 1-50 nm.

**Aerosol Neutralizers**

TSI also offers a choice in aerosol neutralization. All of the options feature bipolar diffusion charging to bring the aerosol to a steady-state charge distribution.

+ **The traditional Kr85 neutralizers have been used in the industry for decades. (Model 3077A)**

+ **The Advanced Aerosol Neutralizer**: Provides a nonradioactive option, and features virtually identical sizing to radioactive sources when used in a sizing system with built-in power from the classifier for easy integration. (Model 3088)

**Software**

+ **Aerosol Instrument Manager® Software**: Data Collection and Data Management TSI’s SMPS spectrometer includes the Aerosol Instrument Manager® software, a program designed for use with Microsoft® Windows® operating systems. It features pull-down menus and dialogue boxes to simplify set up, operation, data collection, and analysis.

+ **Data Merge**: Enables merging of SMPS and APS data files to produce a wide-range particle size distributions (0.0025 to 20 µm) for analysis and fits a set of data to unimodal, bimodal or trimodal distributions functions.

+ **Built in SMPS Functionality**: The 3938 SMPS includes resident firmware to execute measurement without the need for an attached PC.

**Condensation Particle Counters (CPCs)**

+ **Butanol CPCs**: TSI has extensive experience in the design and engineering of reliable, research quality Condensation Particle Counters (CPCs). The SMPS compatible instruments feature extended single particle counting range and on-board live-time coincidence correction for superior data accuracy for measuring particles down to 2.5 nm.

+ **Water-based CPCs**: TSI also offers a line of precision water-based CPCs as a VOC-free alternative to alcohol based instruments. Using a patented laminar flow water condensation technique these instruments count particles can measure down to 2.5 nm at concentrations up to 400,000 particles/cm³ using single particle counting.

+ **Diethylene Glycol (DEG) Nano Enhancer**: The Nano Enhancer (NE) Model 3777 uses diethylene glycol as a working fluid to allow the growth of particles from 1 nm. Paired with the Model 3772 CPC, the 1nm CPC system can measure concentrations up to 1.65 x 10⁵ particles/cm³ (165,000) using single particle counting.

+ For more information on CPC selection, visit www.tsi.com and...
SMPS Settings and Requirements
Data Averaging (Scans per Sample) 1 to 999, user-selectable
Aerosol Flow Rate 0.2 to 5 L/min, user-adjustable
Sheath Flow Rate 2 to 30 L/min, user-adjustable
Working Fluid n-butyl alcohol (butanol), distilled water, diethylene glycol (depends on CPC)
Operating Temperature 10 to 40°C
Storage Temperature -10 to 55°C
Aerosol-Inlet Temperature 10 to 40°C
Humidity 0 to 90%, noncondensing
Pressure 70 to 125 kPa

Data Logging
Up to two weeks via internal storage or via ethernet with PC.

File Size per Sample
Varies by sample time 5.7 kilobyte (120 sec upscan, 15 sec downscan time)

Aerosol Neutralizer Options - Ordered Separately
3077 74 MBq (2 mCi), Kr85 1/2 life 10.8-year
3077A 370 MBq (10 mCi), Kr85 1/2 life 10.8-year
3088 Soft X-ray <9.5 keV ~8,760 operating hours
6005931 Lead shielding column for 3077/3077A

DMA Voltage - Negative Standard
308202 Dual voltage version

Display
640×480 pixel color touchscreen LCD for Electrostatic Classifier

Communications
RS-232 and USB for data; RS-232, USB, and Ethernet for status

Inlets
Three single-stage, inertial impactors (each with a different cut size)

Power Requirements
3772 CPC 210 W
3775/6/7 CPC/NE 335 W
3787/8 WCPC 200 W
3082 200 W

Dimensions (HWD/Weight)
3081A 61 × 8 × 8 cm / 5.4 kg
3085A 21 × 10 × 10 cm / 2.2 kg
3086 19 × 10 × 10 cm / 2 kg
3082 40 × 28 × 40 cm / 14.2 kg
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Working Fluid n-butyl alcohol (butanol), distilled water, diethylene glycol (depends on CPC)

Specifications reflect typical performance and are subject to change without notice.
Aerosol Instrument Manager, TSI and the TSI logo are registered trademarks, and Scanning Mobility Particle Sizer and SMPS are trademarks of TSI Incorporated.
Microsoft and Windows are either registered trademarks of Microsoft Corporation in the United States and/or other countries.

<table>
<thead>
<tr>
<th>DMA</th>
<th>CPC</th>
<th>Working Fluid</th>
<th>Particle Size Range (nm)</th>
<th>Particle Concentration (#/cm³)</th>
<th>Measurement time (sec)</th>
<th>Particle Resolution</th>
<th>Total Size Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>3081A</td>
<td>3772</td>
<td>Butanol</td>
<td>10* to 1,000</td>
<td>1 to 10** (selectable)</td>
<td>&lt;10 to 300 (selectable)</td>
<td>64 Channels per decade</td>
<td>Varies by configuration; spans 192 channels from 1 to 1,000 nm collectively</td>
</tr>
<tr>
<td>3085A</td>
<td>3786</td>
<td>Water</td>
<td>2.5 to 150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3086</td>
<td>3777 + 3772</td>
<td>Diethylene glycol + Butanol</td>
<td>1 to 50</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3081A and 3085A</td>
<td>3787</td>
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