Products for Semiconductor / Display Industry
The HORIBA Group continues to provide leading technologies in response to the needs of the electronics industry. We aim to be a partner you can count on with our unique control and measurement technologies and our technical strength cultivated through many years of experience.

Integrating technologies from each company in our group allows us to provide a wide variety of solutions and contribute to the evolution of semiconductors.

**Overall analysis technology specialist**

**HORIBA**

HORIBA proprietary analysis technology is fully demonstrated in a wide range of fields - semiconductors, medicine, environment, science, and engine measurements. In semiconductors, HORIBA provides an extensive selection of process monitors for integration into manufacturing lines that aid the safe production of higher performance semiconductors.

**Fluid control technology specialist**

**HORIBA STEC**

A core company in the HORIBA Group’s semiconductor business, HORIBA STEC boasts a world-leading share in industry-standard mass flow controllers and liquid source vaporization control systems*, important devices that are vital in semiconductor manufacturing lines.

*From HORIBA STEC’s 2015 research.

**Water measurement technology specialist**

**HORIBA Advanced Techno**

HORIBA Advanced Techno manufactures leading edge products for the fields of environment, water quality, and semiconductor cleaning. In semiconductors, its main products include equipment for measuring the concentration of Hydrofluoric Acid required in wafer etching, and various other liquids and equipment for measuring the purity of ultra-pure water that is vital in wafer cleaning processes.

**Optical analysis technology specialist**

**HORIBA JOBIN YVON**

Based in France, this company is the leading manufacturer of spectroscopic ellipsometers and was welcomed into the HORIBA Group in 1997. Fusing proprietary HORIBA technology with spectroscopy that covers the infra-red to visible light ranges has established an analysis technology that covers the entire wavelength range.
Core Technologies from the HORIBA Group in the Semiconductor Field

- Chemical Solution Concentration Control
- Particle Inspection
- Gas Concentration Control
- Fluid Control / Measurement
- Vacuum Measurement
- Thin Film Measurement
- Measurement
We provide a wide range of an to meet the requirements

### Semiconductor Process

<table>
<thead>
<tr>
<th>Manufacturing Process</th>
<th>Major Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>RCA Chemical Solution Concentration Monitor CS-100/CS-600F Series</td>
</tr>
<tr>
<td>Oxidation/Diffusion</td>
<td>Digital Mass Flow Controller SEC-Z500X Series</td>
</tr>
<tr>
<td>Deposition</td>
<td>Liquid Source Vaporization System LSC Series</td>
</tr>
<tr>
<td>Lithography</td>
<td>Liquid Source Vaporization System MV Series</td>
</tr>
<tr>
<td>Inspection/Measurement</td>
<td>Gas Monitor IR-400 Series</td>
</tr>
<tr>
<td>Etching</td>
<td>TMAH Concentration Monitor HE-960H-TM-S</td>
</tr>
<tr>
<td>Ion Implantation</td>
<td>TMAH Chemical Solution Concentration Monitor CS-100/CS-600F Series</td>
</tr>
<tr>
<td>CMP</td>
<td>Reticle/Mask Particle Detection System PR-PD Series</td>
</tr>
</tbody>
</table>

### Display Manufacturing Process

<table>
<thead>
<tr>
<th>Manufacturing Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
</tr>
<tr>
<td>Transparent Electrode Formation</td>
</tr>
<tr>
<td>Deposition/Surface Treatment</td>
</tr>
<tr>
<td>Etching</td>
</tr>
<tr>
<td>Spacer/Seal Formation</td>
</tr>
<tr>
<td>Panel Alignment</td>
</tr>
<tr>
<td>Liquid Crystal Filling</td>
</tr>
<tr>
<td>Sealing</td>
</tr>
<tr>
<td>Polarizer Sticking</td>
</tr>
</tbody>
</table>
Analysis and control technologies of cutting-edge processes.

### Compound Semiconductor

#### Manufacturing Process

- **Deposition (MOCVD)**
  - Digital Mass Flow Controller
    - SEC-Z500X Series
  - Digital Automatic Pressure Regulator
    - UR-Z700 Series
  - Vapor Concentration Monitor
    - IR-300 Series

- **Etching**
  - Low-concentration HF/HCl/NH₃ Monitor
    - HF-960M
  - HF Concentration Monitor
    - HF-960EM
  - Chemical Solution Concentration Monitor
    - CS-100/CS-600F Series
  - Plasma Diagnosis Endpoint Monitor
    - EV-140C
  - Backside Wafer Cooling System
    - GR-300 Series

- **Impurity Diffusion**
  - RCA

- **Electrode Formation**
  - Liquid Source Vaporization System
    - VC Series
  - Compact Process Gas Monitor
    - MICROPOLE System
  - Digital Mass Flow Controller
    - SEC-N100 Series
  - Oxalic Acid Conductivity Meter
    - HE-960HC-110 Series
  - Digital Sensor Conductivity Meter
    - HE-960RW-GC

- **Inspection**
  - Fully Automated Ellipsometer
    - UVISEL2
  - Fast Automatic Ellipsometer
    - Auto SE
  - Cathode Luminescence Measurement Equipment
    - MP Series

#### Major Products

- **Products of HORIBA**
- **Products of HORIBA STEC**
- **Products of HORIBA Advanced Techno**
- **Products of HORIBA JOBIN YVON**
**Gas**

**Fluid Control**
- Pressure-insensitive Digital Mass Flow Module
- Thermal Method Digital Mass Flow Module
- Multi-range/Multi-gas Digital Mass Flow Controller
- Digital Mass Flow Controller

**Concentration Measurement**
- Vapor Concentration Monitor
- Gas Monitor

**Pressure Control**
- Digital Automatic Pressure Regulator
- Backside Wafer Cooling System

**Vacuum Measurement**
- Compact Process Gas Monitor
- Capacitance Manometer
- Plasma Emission Controller

**Thin Film Measurement**
- Plasma Diagnosis Endpoint Monitor

**Temperature Measurement**
- Infrared Thermometer

**Liquid**

**Supply System**
- Liquid Auto Refill System

**Vaporization System**
- Liquid Source Vaporization System

**Digital Liquid Mass Flow Meter**
- Digital Liquid Mass Flow Meters/Controllers

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**Products of HORIBA**

**CRITERION**

- UR-Z700 Series

**LSC Series**

**SEC-Z700X Series**

**SEC-500X Series**

**SEC-N100 Series**

**GR-300 Series**

**LU-A1000 Series**

**IT-470H**

**MICROPOLE System**

- VG-200
- RU-1000
- EV-140C
- IT-470H

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**Products of HORIBA STEC**

**Products of HORIBA Advanced Techno**

**Products of HORIBA JOBIN YVON**

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*From HORIBA’s research as of December 2015*
# Liquid

## Chemical Concentration

<table>
<thead>
<tr>
<th>Fiber Optic Type Chemical Solution Concentration Monitor</th>
<th>Chemical Solution Concentration Monitor</th>
<th>Micro-volume pH Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-400F</td>
<td>CS-100F1 Series</td>
<td>SC-1 Monitor</td>
</tr>
<tr>
<td>This monitor has a compact body to enable direct measurement of high-temperature chemicals (20–80°C) with a substantial reduction in the need to perform background correction.</td>
<td>This monitor enables high-precision measurement of individual constituents of complex chemicals (measures up to 8 constituents).</td>
<td>CS-131</td>
</tr>
<tr>
<td>CS-100</td>
<td>CS-700</td>
<td>CS-2 Monitor</td>
</tr>
<tr>
<td>This monitor measures silica in ultrapure water with high precision during processes that require a high level of purity.</td>
<td>This monitor provides real-time concentration measurement of various chemicals used in cleaning and etching processes.</td>
<td>CS-152</td>
</tr>
<tr>
<td>CS-100F1 Series</td>
<td>CS-100 Series</td>
<td>SPM Monitor</td>
</tr>
<tr>
<td>This monitor enables high-precision measurement of individual constituents of complex chemicals (measures up to 8 constituents).</td>
<td>This compact sensor can be installed in a small space. The automatic range-setting function selects the most appropriate range for high or low concentration samples.</td>
<td>CS-150</td>
</tr>
</tbody>
</table>

## Specific Component Concentration

<table>
<thead>
<tr>
<th>Dissolved Oxygen in HF Meter</th>
<th>Low Concentration HF/HCL/Mb Monitor</th>
<th>Hydrofluoric Acid Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD-960L</td>
<td>HF-960M</td>
<td>HE-960EM/CM-520</td>
</tr>
<tr>
<td>Measures dissolved O₂ in chemicals with ppb - ppm level modulation. Range switching function automatically selects high or low range to match the sample being measured.</td>
<td>This monitor uses sensors that offer outstanding corrosion resistance for high precision and high-speed measurement of low concentrations of hydrofluoric acid, hydrochloric acid, and ammonia.</td>
<td>This compact sensor can be installed in a small space. The automatic range-setting function selects the most appropriate range for high or low concentration samples.</td>
</tr>
<tr>
<td>HZ-960H/Hz-960HF0-M</td>
<td>TMAH Concentration Monitor</td>
<td>Citric Acid Concentration Monitor</td>
</tr>
<tr>
<td>In-line detector for measuring dissolved O₂ or H₂O₂ concentrations in liquids.</td>
<td>Highly chemically resistant sensor provides precise contamination-free measurement of TMAH concentrations.</td>
<td>HE-960-CA</td>
</tr>
<tr>
<td></td>
<td>KOH Concentration Monitor</td>
<td>Phosphoric Acid Concentration Monitor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HE-960K-PA</td>
</tr>
</tbody>
</table>

## Conductivity

<table>
<thead>
<tr>
<th>Carbon Sensor Conductivity Meter</th>
<th>Resistivity Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Concentration Type</td>
<td>Resistivity Meter</td>
</tr>
<tr>
<td>HE-480C-SC/HE-960LC</td>
<td>SF-1 Monitor</td>
</tr>
<tr>
<td>This chemical-resistant sensor measures the conductivity of chemicals. It is ideal for in-process concentration, dilution control, and monitoring for ultrapure water recycling.</td>
<td>This monitor affords measurements of just 500 μL to enable continuous pH monitoring for a variety of critical manufacturing processes.</td>
</tr>
<tr>
<td>High Concentration Type</td>
<td></td>
</tr>
<tr>
<td>HE-960HC</td>
<td></td>
</tr>
<tr>
<td>This meter has dual calculation circuits and software. The concentration conversion function enables it to be used as a chemical concentration meter.</td>
<td></td>
</tr>
<tr>
<td>HE-480R</td>
<td></td>
</tr>
<tr>
<td>This meter measures ultrapure water with high precision during processes that require a high level of purity.</td>
<td></td>
</tr>
<tr>
<td>Carbon Sensor</td>
<td></td>
</tr>
<tr>
<td>HE-960R-SC</td>
<td></td>
</tr>
<tr>
<td>Resistivity meter with chemically resistant glassy carbon sensor. Produces no contamination from metal elution and is resistant to water cleaning chemicals.</td>
<td></td>
</tr>
<tr>
<td>2 channel / Carbon Sensor</td>
<td></td>
</tr>
<tr>
<td>HE-960RW-SC</td>
<td></td>
</tr>
<tr>
<td>Two-channel, resistivity meter with dual, chemically resistant sensors for simultaneous measurement from 2 measurement points.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Resistivity

<table>
<thead>
<tr>
<th>Silica Analyzer</th>
<th>Dissolved Oxygen Monitor</th>
<th>CMP Slurry Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Water</td>
<td>Pure Water</td>
<td>Nano Particle Analyzer</td>
</tr>
<tr>
<td>SLA-200</td>
<td>SD-300</td>
<td>SF-1 Monitor</td>
</tr>
<tr>
<td>The monitor measures silica concentrations in ultrapure water on the order of 1 μg/L (1 ppb).</td>
<td>This portable DC monitor provides high-precision measurement of minute quantities of dissolved oxygen in ultrapure water.</td>
<td>This monitor affords measurements of just 500 μL to enable continuous pH monitoring for a variety of critical manufacturing processes.</td>
</tr>
<tr>
<td>SLA-3000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Silica

<table>
<thead>
<tr>
<th>High Sensitivity Silica Monitor</th>
<th>Silica Analyzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Water</td>
<td></td>
</tr>
<tr>
<td>SLA-200</td>
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<tr>
<td>The monitor measures silica concentrations in ultrapure water on the order of 1 μg/L (1 ppb).</td>
<td></td>
</tr>
</tbody>
</table>
Liquid

Drain Water Analysis

- **Fluoride Ion Monitor**
  - FLA-101
  - This monitor automatically measures the concentration of fluoride in wastewater. The optimal range can be selected from low to high concentrations.

- **Total Nitrogen/Total Phosphorus Measurement System**
  - TPNA-300
  - The system provides continuous, simultaneous, and automatic monitoring. It also reduces the amount of reagents used and the total volume of waste fluids.

- **Free Fluoride Ion Meter**
  - HC-200F
  - This monitor continuously measures the concentration of free fluoride ions in wastewater.

- **Industrial pH Meter**
  - HP-410
  - The meter uses a lead-free pH electrode out of consideration for the environment. Ease of maintenance is improved through the use of shock-resistant and heavy-duty electrodes.

Solids

Particle Inspection

- **Blank Mask Particle Detection System**
  - PR-PD2BLI
  - Provides high sensitivity measurement of blank masks with high throughput (0.1 μm – 5.5 mm; 0.15 μm – 2.75 mm; 0.2 μm – 22 sec. When measuring 142mm).

- **Reticle/Mask Particle Detection System**
  - PR-PD2
  - Detects particles with a minimum size of 0.35 μm on reticles and masks by combining HORIBA’s laser scattering technology and an innovative detection system.

- **Reticle/Mask Particle Remover**
  - PR-PD2 HR
  - This system offers a threshold improvement in the S/N ratio over PR-PD2 for significantly increased operational sensitivity.

- **PL Measurement Equipment**
  - PR-PD3
  - With the ability to detect particles of just 0.5 μm, this system delivers high throughput particle measurement for both reticle/mask and glass/pellicle surfaces.

- **Cathode Luminescence Measurement Equipment**
  - PR-PD5
  - As well as inheriting the PR-PD series’ high efficiency, this system offers outstanding cost performance thanks to its space-saving design.

Particle Removal

- **Reticle/Mask Particle Remover**
  - RP-1
  - This automatic particle blower removes particles from reticle/mask glass surfaces or pellicle surfaces with air (or N2) blowing with simultaneous vacuum suction.

Material Analysis

- **PL Measurement Equipment**
  - Photoluminor-D
  - This equipment analyzes silicon impurities (P, B, A1, As) by using the photoluminescence method.

- **Material Analysis**
  - MP Series
  - This equipment uses cathode luminescence to evaluate the physical characteristics at fine resolutions.

- **Energy Dispersive X-ray Analyzer**
  - EMAXEvolution
  - When combined with an electron microscope (SEM or TEM), this analyzer can perform element analysis of substances down to the microscopic scale.

- **X-ray Analytical Microscope**
  - XGT-7200V
  - This is an energy dispersive X-ray fluorescence analyzer that is capable of X-ray fluorescence-based elemental analysis and internal structure analysis by using transmission X-ray imaging.

- **Handheld X-ray Fluorescence Analyzer**
  - UVISEL2
  - This portable type analyzer is capable of rapid onsite elemental analysis. It is easy to operate with a touch panel.

- **Glow Discharge Optical Emission Spectroscopy**
  - GD-Profilr 2
  - This analyzer quickly performs depth profiling of PSG and various metal silicide wiring films.

- **Raman Spectroscopy**
  - LabRAM-HR evolution
  - This system uses Raman scattered light to enable microscopic domain analysis of substances. It is ideal for evaluating crystallinity and stress.

- **Fast Automatic Ellipsometer**
  - Auto SE
  - This is a fast and easy-to-use automatic ellipsometer that provides results and reports in a matter of seconds, which makes it an ideal instrument for routine thin film measurements.

- **Fully Automated Ellipsometer**
  - UVISEL2
  - This is the next generation of spectroscopic ellipsometers that delivers the highest level of performance with an innovative, integrated, and fully automated design.

- **Handheld X-ray Fluorescence Analyzer**
  - MESA Portable
  - This portable type analyzer is capable of rapid onsite elemental analysis. It is easy to operate with a touch panel.
Complete with an analysis center where core technologies of the HORIBA Group are concentrated, our main plant manufactures products that meet customer needs as the mother factory for water quality measuring instruments.

To respond to product needs in markets related to the high-tech industry, HORIBA Technology Center was established in Silicon Valley. Its aim is to promote joint development with partners in the US and deliver optimum solutions.

The Fukuchiyama Technology Center is permanently equipped with high accuracy gas flow measurement equipment and experimental equipment for development of products, so as to build up functions of basic research on flow rate control devices for high-tech materials.

The HORIBA Aso Plant manufactures semiconductor-related products and products for the medical industry, in addition to flagship mass flow controllers, and engages in mass production as a key manufacturer for the HORIBA group companies.

Development and manufacture of HORIBA, Ltd. semiconductor sensors are integrated with HORIBA STEC, Co., Ltd. fluid control technologies to realize speedy development, downsizing, and stable quality of products.
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