Primaide
Hitachi High Performance Liquid Chromatograph
History of Hitachi HPLC Systems

Hitachi has been involved in the development and production of HPLC systems for nearly half a century. To meet growing demands in an increasingly broad range of fields where HPLC is applied, we never cease improving our technologies to create cutting-edge HPLC equipment.

Affordable and robust HPLC system engineered for seamless integration and reliable analyses

High Performance Liquid Chromatography (HPLC) is utilized in a diverse range of fields, including medicine, food production, chemistry, and environmental science, making HPLC systems increasingly in-demand among the various types of analytical equipment. The Hitachi HPLC Primaide is designed for long-term, stable operation, and features both high reliability and great durability. It offers tremendous capability for everyday analysis.

Based on over 50 years of experience in the development and production of HPLC systems, Hitachi proudly introduces the Primaide. Make the most of your analytical equipment with Hitachi as the “Prime Aide” in your lab!

The Chromaster features improved operability with a GUI, as well as higher functionality and performance.

The simple design of the Primaide provides superior operability in routine analysis.

The best choice for personal use

Even in small to mid-scale facilities, individual operators see increasing opportunities to use multiple HPLC systems. Thanks to its simple design and front-access layout, maintenance of the Primaide is easy. Even a beginner at LC analysis can confidently operate the Primaide.

Excellent basic performance

The demand for HPLC systems with higher precision, better reproducibility, and improved stability is increasing daily. The Primaide is built according to strict specifications to meet stringent requirements. In addition, labs can apply the Primaide to an even wider range of applications by employing optional units, such as a sophisticated DAD* and an autosampler cooler.

Reliable durability

Hitachi HPLC systems have earned a reputation as highly durable machines, and Primaide is no exception. Our strict production quality standards ensure both high performance and endurance. This standard extends to all equipment from systems to accessories.

* DAD: Diode Array Detector
HPLC is a system for separating and quantifying the components in a mixed sample. The basic HPLC system consists of a pump, a separation column, and a detector. In many cases, however, systems are also equipped with an autosampler and a column oven.

Overview of HPLC
The development of HPLC dates back to the beginning of the 20th century, with the discovery of its basic principle by M.S. Tswett, who separated the dyes in a plant extract with petroleum ether (mobile phase) and calcium carbonate powder (solid phase). In recent years, the stationary phase comprises a column of chemically treated silica gel or polymer micro-particles packed in a stainless tube. Pumps are used to make the mobile phase flow. HPLC takes advantage of the phenomenon whereby each component in a sample may take a different amount of time to flow through a column. The elution order and degree of separation depend on the choice of the mobile and stationary phases. HPLC analysis relies on the principle that, under the same conditions of measurement, the time between the injection of a component into the column and the elution of that component is constant. This characteristic can be used to perform qualitative or quantitative analysis.

Applications
HPLC supports analysts in various fields involved in the development of novel pharmaceutical compounds and new materials, food safety assurance, and water quality testing for environmental protection.

HPLC Principle and System Configuration

Uses of HPLC
- Quality control
- Production process management
- Impurity analysis
- Qualitative/quantitative analysis

HPLC System Configuration
- Organizer
  - This organizer accommodates bottles for solvents (mobile phase) as well as a cleaning solution. It also serves as a power supply box for each module.
- Detector
  - This module detects the components which are eluted from the column. A UV detector is most commonly used to carry out quantitative analysis by measuring absorbance. With a DAD, it is possible to simultaneously obtain not only a UV spectrum but also data for multiple components which absorb different wavelengths of light.
- Column oven
  - A column oven is necessary to maintain a constant column (stationary phase) temperature. Column temperature is an important parameter for separation, and should be well-controlled in order to achieve the most reproducible results.
- Autosampler
  - This unit injects the sample automatically, which is very useful in performing the sequential analysis of large numbers of samples and standards.
- Pump
  - This module pumps the mobile phase. Two techniques are available. In isocratic analysis, the composition of the mobile phase is constant. In gradient analysis, two or more solvents are mixed, and the mix ratio is changed during the analysis.
Overview of the Primaide

Every detail of the Primaide is well designed to ensure worry-free operation by even a complete beginner at HPLC. It is an easy-to-use system that incorporates simple design and a user-friendly layout where optional units are contained inside and access from the front enables easy maintenance.

**System Features**

- **Optional units mounted inside provide clean appearance**
  All principal options, including a degasser, gradient unit, and sample cooling system can be mounted inside the main body. It is not necessary to make room for optional units.

- **Front access layout for Improved operation and maintenance**
  Every module can be accessed and handled from the front. Since connections are arranged on the front side, it is easy to replace columns and manipulate the flow system. To support easier maintenance, the lamp and cell unit can also be accessed easily.

- **Leak sensors in all modules**
  Any leakage in the flow system is detected by leak sensors built into each module. After detection the system halts, ensuring improved safety and reliability.

- **Complete control with system manager**
  A control panel is not necessary, as everything can be controlled via the system manager. By installing a UI-pad (optional), each module can be controlled separately, in a conventional manner.

- **e-Line and USB**
  The e-Line is an advanced version of the existing D-Line. All modules are connected by an e-Line in a single chain, and all the communications are integrated. The use of digital signals improves the reliability of data transactions. The interface between the PC and equipment is via versatile USB. A wide range of PC types are supported, enabling flexible configuration.

- **GLP function**
  A Hg lamp is installed in the detector, and wavelengths in the UV range can be calibrated using its emission line (254 nm) (installed in the Primaide1410 UV / 1430 DAD). Each module stores various types of quality assurance information, for improved data reliability.

**Organizer**

The organizer is a power supply box for all of the other modules (except the column oven) and accommodates solvent bottles. The handle on the front side moves vertically for easy bottle replacement. Any spilled solvent flows safely into the drainage tube.

**Useful single-swing door**

A single-swing door saves space on the right side of the equipment. A PC can be installed right next to the instrument.

**Wiring and tubing**

The arrangement of wiring and tubing between the modules has undergone detailed consideration. Electric cables are stored inside of covers for safety, and solvent/drain tubes are routed to allow easy user handling.
Improvement of retention time reproducibility

R

Improved reproducibility results in high-precision analysis. This is a great advantage in the analysis of valuable micro-samples. In addition, since the injection method is simpler than using a sampling loop, the injection cycle is shortened by half. This method accelerates throughput and improves efficiency in the analysis of many samples.

Pump

The Primaide1110 Pump has been developed for reliable analysis and shares characteristics with Hitachi’s existing HPLC pump models. Its consistently high level of performance provides users with strong support in everyday analysis.

- Improvement of flow rate stability
  For pulse compensation, a proprietary real-time feedback method has been developed for Hitachi’s pumps. Not only has the pulse been significantly reduced, but the Primaide1110 Pump estimates pressure fluctuations and employs the optimal timing to set the plunger speed interval.

- Built-in optional units inside pump
  Both the degasser and gradient unit can be mounted inside the pump. A built-in degasser minimizes the tubing volume, and yields a more compact system by eliminating the need for additional modules.
  The gradient unit is capable of mixing 4 solvents via its solenoid valves. The placement of the mixer in a high-pressure compartment enables high-precision, stable mixing, even with a single pump.

- Improvement of retention time reproducibility
  For gradient analysis, injection by the Primaide1210 Autosampler is synchronized with the movements of the pump. This ensures a highly-reproducible retention time, and guarantees precise analysis.

- Glossary
  Gradient
  Gradient injection is a technique for changing the composition of the carrier during analysis by mixing multiple solvents, so that solution times can be controlled. This is an effective method if the analysis takes too much time with a constant-component solvent (isocratic method) or the sample contains many components.

  Low-pressure gradient method
  Using a single pump, the solvents are switched via solenoid valves, thereby controlling the mix ratio. Compared to the high-pressure-gradient method which uses two or more pumps, installation costs are lower. A mobile phase can be prepared in this manner by mixing up to 4 types of solvent.

  Pulse
  The flow rate may transiently drop at regular intervals due to the reciprocating motion of the plunger or other factors. To optimize HPLC analysis, the pump should achieve a constant and stable flow rate.

  Retention time
  Each substance takes a given amount of time to pass through the column and is detected as a peak in the chromatogram. This time is referred to as the retention time. The reproducibility of this parameter is vital, as it is important in qualitative analysis using HPLC.

  Carry-over
  Sample carry-over occurs when residue from injected samples remains inside the needle or flow channel is detected in the next cycle. The needle washer and piping configuration of the autosampler are well designed to reduce carryover.

Autosampler

The Primaide1210 Autosampler incorporates direct injection, allowing the automation of consecutive analyses without wasting precious sample.

- Direct injection of micro-sample samples and quicker analysis
  In the direct injection method, the sampling needle becomes part of the flow channel so that the sample in the needle flows into the channel with zero waste. This is a great advantage in the analysis of valuable micro-samples. In addition, since the injection method is simpler than using a sampling loop, the injection cycle is shortened by half. This method accelerates throughput and improves efficiency in the analysis of many samples.

- Wide opening enables operational checks
  A wide sample rack, accommodating 200 1.5 mL vials is mounted on the Primaide, facilitating the measurement of many samples. The wide opening of the autosampler is very convenient for manipulating the rack and for carrying out operational checks of the syringe and needle.

- Improved reproducibility results in high-precision analysis
  The syringe for sample measurement is driven by a high-performance motor. The drive improves the reproducibility of injection. Furthermore, peak retention times are also more repeatable due to synchronization of injection with the pump motion, achieving higher analytical reliability.

- Glossary
  Configuration of the degasser and low pressure gradient unit
Primaide module
More resolved peaks are achieved by using a preheating column oven, and a low noise and low drift UV detector

Column Oven
The Primaide1310 Column Oven also functions as a cooler. The preheating function obtains better performance from columns, achieving a sharper peak shape.

- **More resolved peaks with optimized heating**
  Pre-heating with an efficient block heater improves the symmetry and sharpness of peaks, eliminating the influence of ambient temperature changes. The column installation space, which features an air circulation system, permits the easy mounting and detaching of columns.

- **Cooling function is included as standard**
  The oven can regulate the temperature from 5°C to 65°C.

- **Influence of the column temperature on separation**
  Changes in column temperature substantially affect the degree of separation. The column oven makes it possible to perform analysis under constant conditions, eliminating the influence of ambient temperature. In order to achieve higher reproducibility of retention time and separation, the use of this column oven is recommended. The cooling function of the standard Primaide1310 Column Oven is useful for measurements around room temperature.

- **Easy-to-use UI-Pad**
  The UI-Pad is tilted to allow analysts to check and operate it from any direction. The display, which features an LED backlight, is easily viewable.

**Glossary**

- **Advantages of the column oven**
  The oven maintains temperature and ensures reproducible retention time which is difficult otherwise to be affected by the ambient temperature. A temperature rise decreases the viscosity of the solvent, which also decreases the pressure on the apparatus; however, users need to consider the heat tolerance of the sample.

- **Pre-heating**
  The pre-heating function matches the temperature of the mobile phase to the column temperature, before the solvent flows into the columns. A temperature gradient between the column ends can broaden and distort peaks.

- **Dead volume**
  Dead volume is the part of the volume between the injector and detector that does not contribute to separation. A dead volume that is too large diffuses samples, resulting in peak broadening and distortion. It is best to take care to minimize tubing length.

- **Absorption**
  In an absorption analysis, the analyst measures the absorbance at a specific wavelength. In general, the measurement is performed at the maximum absorption wavelength of a target component, and the absorbance data is utilized for quantitative analysis.

- **Signal-to-Noise ratio (S/N)**
  This refers to the ratio between the peak intensity and baseline noise. A good S/N is necessary to detect trace amounts of components. A reduced detector noise improves sensitivity.

**UV Detector**

- **Low noise for high sensitivity detection**
  The Primaide1410 UV detector achieves a noise level of not more than 0.6 x 10⁻⁵ AU, greatly enhancing trac component analysis.

- **High response and low noise, enabling rapid analysis**
  Analysts can perform low noise measurements in 0.05 seconds. High sensitivity detection is possible, rapidly yielding sharp and accurate peaks.

- **Stable, without effects from ambient temperature changes**
  Since local environments may vary considerably, the optics of the UV detector are well designed to avoid the effects of daily and seasonal temperature changes, guaranteeing stable and reproducible results.

**Effect of using column oven**

<table>
<thead>
<tr>
<th>Retention time (min)</th>
<th>Absorbance (AU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
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<tr>
<td>10</td>
<td>3</td>
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<tr>
<td>15</td>
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<td>20</td>
<td>7</td>
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<tr>
<td>25</td>
<td>9</td>
</tr>
</tbody>
</table>

**Condition**

- Sample: 10 Inpgredients of Organic Acid standard substance
- Column: HHTACHI LaChrom (C18, 4.6 mm, 5 μm, L = 250 mm, 15/85)
- Mobile phase: 0.02 mol/L KH2PO4 (pH = 3.18) = 15/85
- Column temperature: 40°C
- Flow rate: 1.0 mL/min
- Detection: UV 210 nm

**UV Detector**

- **Low noise for high sensitivity detection**

**Wavelength measurement in the UV region with a built-in Hg lamp**

Users can perform measurements at the maximum absorption wavelengths of the Hg and D2 lamps, enabling highly reliable analyses across a broad wavelength range.

**Signal-to-Noise ratio (S/N)**

Aspartame in beverages

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<td>25</td>
<td>9</td>
</tr>
</tbody>
</table>

**Condition**

- Column: LaChrom C18 (5 μm), L = 250 mm, 15/85
- Mobile phase: acetonitrile / (0.01 mol/L KH2PO4 (pH = 3.18)) = 15/85
- Column temperature: 40°C
- Flow rate: 1.0 mL/min
- Detection: UV 210 nm

**Signal-to-Noise ratio (S/N)**

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- Mobile phase: acetonitrile / (0.01 mol/L KH2PO4 (pH = 3.18)) = 15/85
- Column temperature: 40°C
- Flow rate: 1.0 mL/min

**Signal-to-Noise ratio (S/N)**

- **Front access layout and easy maintenance**
  Both the lamp and flow cell are replaced through the front of the module, allowing easy maintenance, regardless of where the instrument is installed (Lamp replacement).

- **A Diode Array Detector (DAD)**
  A Diode Array Detector enables multiple wavelength measurements. A beam passing through a flow cell is dispersed using a grating. UV spectra may be obtained, providing strong support for qualitative analysis. This sophisticated detector can display data in three dimensions (time, absorbance, and wavelength).

- **Wavelength measurement in the UV region with a built-in Hg lamp**
  Users can perform measurements at the maximum absorption wavelengths of the Hg and D2 lamps, enabling highly reliable analyses across a broad wavelength range.

- **Signal-to-Noise ratio (S/N)**

**Effect of using column oven**

- **Aspartame in beverages**

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- Column temperature: 40°C
- Flow rate: 1.0 mL/min
- Detection: UV 210 nm

**Retention Time (min)**

- Aspartame: 5

**Retention Time (min)**

- Commercial drink: 10

**Absorbance (AU)**

- Aspartame: 0.00, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35

**Signal-to-Noise ratio (S/N)**

- Aspartame: 0.00, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35

**Retention Time (min)**

- Commercial drink: 5, 10

**Absorbance (AU)**

- Commercial drink: 0.00, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35

**Signal-to-Noise ratio (S/N)**

- Commercial drink: 0.00, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35

**Retention Time (min)**

- Commercial drink: 5, 10
The Primaide1430 Diode Array detector is as sensitive as a UV detector. In addition, the DAD system has many functions, including spectrum collection, chromatography using multiple wavelengths, a peak purity test, a spectral library, and more.

The standard system is suitable for routine analysis but was developed to meet the demand for high-precision analysis of an increasingly large number of samples.

**Features**
- The Primaide1110 Pump assures accurate pumping, even for high flow rates.
- The Primaide1210 Autosampler can automatically process multiple samples (Standard: 200 samples).
- The Primaide1410 UV high response, low noise UV detector provides sharp and accurate peak shapes, enabling sensitive detection in short times.
- Novel optics and improved software reduce noise considerably (0.5 x 10^-5 AU or less). The idea that “DADs are less sensitive” is now obsolete.
- The light source is stabilized via a large lamp housing. The spectrometer and housing are separated and thermally insulated. By cooling the lamp housing separately, the influence of ambient temperature is minimized.
- The new design incorporates temperature sensors as well as an associated variable rotation speed cooling fan, which largely eliminate temperature changes inside the instrument. This reduces noise and enhances stability, allowing for stable analysis day after day.
- High resolution and accurate spectra
  High wavelength resolution (0.78 nm/data point) is achieved with an array of 1,024 photo diodes. Uniform resolution is maintained throughout a wide range of wavelengths from the UV to VIS, thanks to the diffraction optics, which feature a grating.
- Digital noise reduction in rapid analysis
  Data with a low level of noise are obtained in a very short sampling period (0.05 seconds). Noise-free, sharp peaks are obtained during rapid analysis.
- Automatic wavelength calibration
  A built-in Hg lamp is utilized in the automatic wavelength accuracy test for the commonly-used UV region.

**Manual injection system**
In the one instrument one researcher era, we can offer a simple and worry-free system for everyone, including LC beginners.

**Features**
- The simple configuration includes a manual injector, which is quick and easy to use.
- A compact and reliable system that is ready when you need it.

**Photo Diode Array Detector System**
The Primaide1430 Diode Array detector is as sensitive as a UV detector. In addition, the DAD system has many functions, including spectrum collection, chromatography using multiple wavelengths, a peak purity test, a spectral library, and more.

**Features**
- High sensitivity
  Novel optics and improved software reduce noise considerably (0.5 x 10^-5 AU or less). The idea that “DADs are less sensitive” is now obsolete.
- Minimizing the influence of temperature changes in the measurement cell
  The light source is stabilized via a large lamp housing. The spectrometer and housing are separated and thermally insulated. By cooling the lamp housing separately, the influence of ambient temperature is minimized.
  The new design incorporates temperature sensors as well as an associated variable rotation speed cooling fan, which largely eliminate temperature changes inside the instrument. This reduces noise and enhances stability, allowing for stable analysis day after day.
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  Data with a low level of noise are obtained in a very short sampling period (0.05 seconds). Noise-free, sharp peaks are obtained during rapid analysis.
- Automatic wavelength calibration
  A built-in Hg lamp is utilized in the automatic wavelength accuracy test for the commonly-used UV region.

**Comparison of Sensitivity between UV and DAD**
The 1,024-bit photo diode array is very effective for the measurement of samples such as Benzene, which has a characteristic UV spectrum.
**Practical examples**

The Primaide provides reliable data in diverse settings, ranging from educational laboratories to routine industrial analysis.

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**Food-associated**

### Measurements of organic acids

Organic acids are known to influence the taste and flavor of food. Here, we present a measurement of the organic acids in cider vinegar, using the versatile UV detection system along with the "LaChrom C18-AQ" reverse-phase column, which is suitable for the separation of highly polar molecules. Malic acid, which is contained in cider vinegar, was detected.

- **[Standard Samples]**
  1. Tartaric acid
  2. Formic acid
  3. Malic acid
  4. Lactic acid
  5. Acetic acid
  6. Pyroglutamic acid
  7. Citric acid
  8. Fumaric acid
  9. Succinic acid
  10. Propionic acid

![Graph](image)

**Column**: HITACHI LaChrom C18-AQ (5 μm)
**Solvent**: 1.0 mmol/L H2SO4 + 8.0 mmol/L Na2SO4 (pH 2.8)
**Temperature**: 25°C
**Flow rate**: 1.0 mL/min
**Injection Vol.**: 10 μL

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**Pharmaceutical**

### Measurement of natural medicine

Glycosides are regarded as active ingredients in several natural medicines. By utilizing the UV absorption of the aglycones, glycoside content can be analyzed using an HPLC system. Since many peaks from foreign substances will also be present, a DAD is also useful. Researchers can identify the various components by comparing the obtained spectral data with standard spectra.

- **[Standard samples]**
  1. Sennoside B
  2. Sennoside A

![Graph](image)

**Contribution rate**

<table>
<thead>
<tr>
<th>Wave length (nm)</th>
<th>Peak 1</th>
<th>Peak 2</th>
<th>Peak 3</th>
<th>Peak 4</th>
<th>Peak 5</th>
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</thead>
<tbody>
<tr>
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<td>0.047%</td>
<td>0.028%</td>
<td>0.070%</td>
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<tr>
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<td>67.085</td>
<td>67.085</td>
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</table>

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**Chemistry**

### Measurement of parabens

Parabens are a class of p-hydroxybenzoate esters, which are used as preserving agents in pharmaceuticals, cosmetics, and food products, due to their ability to prevent fungus and mold. A DAD may be used to detect phenoxyethanol and parabens, simultaneously. For quantitative analysis, a desired component of interest may be targeted by selecting the appropriate wavelength.

- **[Standard samples]**
  1. 2-Phenoxyethanol
  2. Methyl p-hydroxybenzoate
  3. Isobutyl p-hydroxybenzoate
  4. Isopropyl p-hydroxybenzoate
  5. Propyl p-hydroxybenzoate
  6. Isobutyl p-hydroxybenzoate
  7. Butyl p-hydroxybenzoate

![Graph](image)

**Contribution rate**

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<th>Peak 4</th>
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</thead>
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**Bio-related**

### Peptide mapping

Peptide mapping is a method to identify amino acid changes in a protein. After proteins undergo enzymatic treatment, the resulting peptide fragments are separated, and may be detected via LC or other techniques for comparison of the patterns of their chromatograms. This analysis results in elution patterns with many peptide peaks. Accordingly, reproducible retention times and peak areas are vital factors in peptide mapping.

- **[Standard samples]**
  1. Reference 1
  2. Reference 2
  3. Reference 3

![Graph](image)

**Contribution rate**

<table>
<thead>
<tr>
<th>Retention Time (min)</th>
<th>Date 1</th>
<th>Date 2</th>
<th>Date 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>0.050</td>
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<tr>
<td>0.100</td>
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<td>0.150</td>
<td>0.150</td>
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Hitachi software and columns

Hitachi High-Technologies provides control software and a variety of columns, which facilitate HPLC analysis for a broad spectrum of compounds.

Primaide System Manager

The intuitive, easy-to-use Chromatography Data Software (CDS). This software is optimal for both student experiments in academia and routine professional use.

- **Best chromatogram improves measurement sensitivity (when using the DAD)**
  The best Chromatogram feature improves chromatogram sensitivity by utilizing the wavelength of maximum absorbance for individual peaks. This software tool also allows users to avoid the absorption bands of contaminants and obtain a chromatogram consisting of well-separated components. Apply this function to your application, and after 3D data acquisition, the optimum wavelengths are chosen and processed.

- **Easy USB connection**
  The LaChrom Elite features an installed USB interface. Thus, connection of the HPLC system with a PC is accomplished via a USB cable. There is no need to install a special interface card into the PC.

- **Measurement sequence visualized at a glance via a Toolbox**
  The left-hand side of the screen feature a Toolbox, which contains icons which may be clicked, in sequence, to quickly and reliably open the windows necessary for measurements.

- **Data transfer via an online DDE function**
  During data acquisition, reports of measurement results can be transferred to Microsoft® Excel® automatically. These reports include a header, chromatogram, calculation results, confidence report, etc, and can be also transferred during re-calculation of the collected data. A Summary Program also delivers multiple results in a chart format. This function facilitates data management with Microsoft® Excel®. (Microsoft® Excel® is necessary for this function.)

.Hitachi LaChrom Column Series

**Four types of C18 columns with different separation properties**

By selecting the columns according to the characteristics of the samples to be analyzed, highly optimized separations can be developed.

- **In addition to ODS, Hitachi provides reverse phased, normal phase, and HILIC mode columns**
  C8, Phenyl, Cyan, Amino, Diol, and Silica columns also available.

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**Comparison of properties of Hitachi LaChrom ODS series columns**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Particle size (μm)</th>
<th>Column length (mm) X (mm L)</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>HITACHI LaChrom C8</td>
<td>3</td>
<td>4.6×150</td>
<td>891-5030</td>
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<tr>
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<td>891-5035</td>
</tr>
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<td>4.6×250</td>
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<td>891-5508</td>
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<td>891-5505</td>
</tr>
<tr>
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<td>5</td>
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<td>891-5505</td>
</tr>
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<td>HITACHI LaChrom C18-PM</td>
<td>3</td>
<td>4.6×150</td>
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</tr>
<tr>
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<td>891-5305</td>
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<td></td>
<td>5</td>
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<td>891-5305</td>
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<tr>
<td>HITACHI LaChrom C18-NE</td>
<td>5</td>
<td>4.6×150</td>
<td>891-5304</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4.6×250</td>
<td>891-5305</td>
</tr>
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</table>

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<table>
<thead>
<tr>
<th>Product name</th>
<th>Particle size (μm)</th>
<th>Column length (mm) X (mm L)</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>HITACHI LaChrom C8</td>
<td>5</td>
<td>4.6×150</td>
<td>891-5036</td>
</tr>
<tr>
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<td>4.6×150</td>
<td>891-5035</td>
<td></td>
</tr>
<tr>
<td>HITACHI LaChrom Ph</td>
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<td>4.6×250</td>
<td>891-5037</td>
</tr>
<tr>
<td></td>
<td>4.6×150</td>
<td>891-5035</td>
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</tr>
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<td>HITACHI LaChrom CN</td>
<td>5</td>
<td>4.6×250</td>
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<td>4.6×150</td>
<td>891-5035</td>
<td></td>
</tr>
<tr>
<td>HITACHI LaChrom SI</td>
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<td>4.6×250</td>
<td>891-5039</td>
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<td>4.6×150</td>
<td>891-5035</td>
<td></td>
</tr>
<tr>
<td>HITACHI LaChrom Diol</td>
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<td>4.6×250</td>
<td>891-5040</td>
</tr>
<tr>
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<td>4.6×150</td>
<td>891-5035</td>
<td></td>
</tr>
<tr>
<td>HITACHI LaChrom NH2</td>
<td>5</td>
<td>4.6×250</td>
<td>891-5041</td>
</tr>
<tr>
<td></td>
<td>4.6×150</td>
<td>891-5035</td>
<td></td>
</tr>
</tbody>
</table>

---

*Guard column (Holes and Cartridges) are also available.*

*LaChrom C18 and LaChrom C18-AQ are also available for UHPLC (3 μm particle size).*
### Specifications / Other products

#### Pump

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide110 pump</th>
<th>Primaide116 pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid feed system</td>
<td>Dual plunger reciprocating pump (series connection, pulsation suppression)</td>
<td></td>
</tr>
<tr>
<td>Flow rate range</td>
<td>0.50 to 9.999 mL/min</td>
<td>0.01 to 9.999 mL/min</td>
</tr>
<tr>
<td>Maximum discharge pressure</td>
<td>39.2 MPa (0.01 to 0.001 mL/min)</td>
<td>19.8 MPa (0.001 to 0.999 mL/min)</td>
</tr>
<tr>
<td>Flow rate accuracy</td>
<td>±2 μL/min (±0.2 to 0.1 mL/min)</td>
<td>±2% (±10 to 80 μL/min)</td>
</tr>
<tr>
<td>Flow rate stability</td>
<td>SD 0.02%, or RSD 0.07%, whichever is larger (set time at 1.0 mL/min)</td>
<td></td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 159(H) mm, approx. 13.0 kg</td>
<td></td>
</tr>
</tbody>
</table>

#### Gradient Unit

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide Low-Pressure Gradient Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of solutions modulus</td>
<td>4 solutions</td>
</tr>
<tr>
<td>Mixing system</td>
<td>Solenoid valve opening/closing time control system</td>
</tr>
<tr>
<td>Recommended flow rate range</td>
<td>0.4 to 1.6 mL/min</td>
</tr>
</tbody>
</table>

#### Autosampler

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide1210 Autosampler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of standard samples</td>
<td>1,500, ± 200 pcs, 4, ± 139 pcs (option)</td>
</tr>
<tr>
<td>Sample injection system</td>
<td>Direct injection system</td>
</tr>
<tr>
<td>Syringe capacity (standard)</td>
<td>150 μL</td>
</tr>
<tr>
<td>Sample injection volume</td>
<td>0.1 to 50 μL (standard syringe), up to 4,500 μL (option)</td>
</tr>
<tr>
<td>Injection volume reproducibility</td>
<td>0.3% RSD (when 10 μL is injected)</td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 280.8(H) mm, approx. 21.4 kg</td>
</tr>
</tbody>
</table>

#### Column Oven

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide1310 Column Oven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature control system</td>
<td>Block heating + Air circulation system</td>
</tr>
<tr>
<td>Temperature setting range</td>
<td>1 to 65°C (in 1°C steps)</td>
</tr>
<tr>
<td>Temperature control range</td>
<td>(ambient temperature +15°C) to (ambient temperature +65°C)</td>
</tr>
<tr>
<td>Temperature control accuracy</td>
<td>±0.1°C</td>
</tr>
<tr>
<td>Column accommodated</td>
<td>Up to 3 columns (250mm length max.)</td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 155(H) mm, approx. 10.5 kg</td>
</tr>
</tbody>
</table>

#### UV Detector

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide1410 UV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical system</td>
<td>Double-beam ratio photometry system</td>
</tr>
<tr>
<td>Light source</td>
<td>Di lamp, Hg lamp (for wavelength check)</td>
</tr>
<tr>
<td>Wavelength range</td>
<td>190 to 600 nm</td>
</tr>
<tr>
<td>Wavelength accuracy</td>
<td>±1 nm</td>
</tr>
<tr>
<td>Noise</td>
<td>0.6 ± 10^(-2) AU or less (250 nm)</td>
</tr>
<tr>
<td>Response</td>
<td>Drift 1.0 ± 10^(-2) AU/hr or less (250 nm)</td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 155(H) mm, approx. 13.0 kg</td>
</tr>
</tbody>
</table>

#### Diode Array Detector

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide1420 DAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of photodiode bits</td>
<td>1024</td>
</tr>
<tr>
<td>Optical system</td>
<td>Di lamp, W lamp, Hg lamp (for wavelength check)</td>
</tr>
<tr>
<td>Wavelength range</td>
<td>190 to 950 nm</td>
</tr>
<tr>
<td>Wavelength accuracy</td>
<td>±1 nm</td>
</tr>
<tr>
<td>Noise</td>
<td>0.5 ± 10^(-4) AU or less (250 / 600 nm)</td>
</tr>
<tr>
<td>Drift</td>
<td>0.3 ± 10^(-4) AU/hr or less (250 / 600 nm)</td>
</tr>
<tr>
<td>Spectrum acquisition cycle</td>
<td>Selectable from 50, 100, 200, 400, 800, 1600, 3200 msec</td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 155(H) mm, approx. 13.5 kg</td>
</tr>
</tbody>
</table>

#### Organizer

<table>
<thead>
<tr>
<th>Option</th>
<th>Primaide Organizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>AC 100 to 240 V (50/60 Hz), 300VA</td>
</tr>
<tr>
<td>Output</td>
<td>DC 24V, 300W (provide DC power supply for 1110 pump x1, 1210-Autosampler x 1, 1410UV x1, 1420DAD x1)</td>
</tr>
<tr>
<td>Space to accommodate solvent bottles</td>
<td>3(140)W × 280,802(H) mm</td>
</tr>
<tr>
<td>Dimensions/weight</td>
<td>340(W) × 464(D) × 207(H) mm, approx. 8.2 kg</td>
</tr>
</tbody>
</table>

#### Amino acid analyzer L-8900

**Chromaster L-8900**

Hitachi High-Technologies provides the HPLC “Chromaster,” which enables more sophisticated analyses, as well as the Amino Acid Analyzer L-8900. The technology cultivated by Hitachi in the development of its HPLC systems has been applied to the L-8900. Hitachi offers the best systems for your applications.

**Chromaster**

Time has shown that HPLC systems need to meet three requirements: improved performance, function, and reliability. By responding to each of these areas, we have improved our HPLC systems down to the smallest detail and have established a new standard for HPLC.

**Features**

- New mixing mode (HFM), yielding improved gradient elution precision
- Autosampler that features a greatly reduced carry-over
- UV/UV-VIS detector enabling simultaneous detection at two wavelengths
- GUI controller consisting of a color LCD and touch panel

**Amino acid analyzer L-8900**

The amino acid analyzer continues to evolve as an analytical instrument suitable for routine use. The L-8900 is a highly sensitive analyzer which allows very good separation, based on the post-column ninhydrin method. Since it is specialized for amino acid analysis, operation of the L-8900 is simple and stress-free.

**Features**

- Ion-exchange resin adopted (particle diameter, 3μm)
- Highly efficient TDE® Reactor improves sensitivity (option).
- Rapidly-achieved good separation with twin columns
- Highly automated, easy-to-navigate system
Degasser® is a registered trademark of ERC Inc.
Microsoft®, Excel® are registered trademark of Microsoft Corporation in U.S.A and other countries.

CAUTION: For correct operation, follow the instruction manual when using the instrument.
Specifications in this catalog are subject to change with or without notice, as Hitachi High-Technologies Corporation continues to develop the latest technologies and products for our customers.

NOTICE: The system is For Research Use Only, and is not intended for any animal or human therapeutic or diagnostic use.

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