Hitachi High Performance Liquid Chromatograph

Chromaster

Hitachi High-Tech

HITACHI

Chromaster

Chromaster

Outstanding performance
Easy-to-use
Robustness

HPLC for today and tomorrow

Three critical components in HPLC: Performance, Functionality, and Reliability. For each component, we implement one fine improvement after another, giving birth to a new standard in HPLC. That's Chromaster.

∗ After putting solvent bottles on the organaizer, please lift the handle located on the front side of the organizer.

Chromaster

[Chromaster] is a coined word combining *Chromatograph* and *Master*. It represents Hitachi's vision of developing and providing a liquid chromatograph system that can make valuable contributions as a powerful tool for a skilled, "master" chromatographer.

Outstanding performance

Easy-to-use

Robustness

⁎ After putting solvent bottles on the organaizer, please lift the handle located on the front side of the organizer.

Outstanding performance

Two performance capabilities supporting data reliability: the excellent reproducibility made possible by the pump and autosampler and the excellent stability of the column oven and detector.

【Pump】

Improved gradient performance and the excellent flow rate precision

The Chromaster has a new low-pressure mode called High Frequent Mode (HFM), which utilizes a double switching function of proportioning valves. HFM and the Hitachi high speed realtime feedback controll system, greatly suppress liquid pulsation for improved reproducibility of gradient and retention times.

【Autosampler】

Excellent injection volume precision and low carry-over

The newly adopted high-precision syringe drive unit provides excellent injection volume precision.
Hitachi has eliminated the dead volume in the autosampler flow path, which can cause carry-over and adopted a pumping method that washed the needle outer wall. The result is an accurate autosampler with extremely low carry-over.

【Column Oven】

Pre-heating function and a wide temperature control range

The block-type pre-heating function based on Peltier heating and cooling control delivers excellent symmetric and sharply peak shape.
The oven can regulate*1 temperature from 15 degree below ambient temperature to ambient temperature + 60℃ can accommodate various applications.

*1 Temperature setting range: 1 to 85℃.

【Diode Array Detector】

Excellent qualitative analysis performance, and extremely low noise and low drift.

With a wide wavelength range (190 nm to 900 nm) and excellent resolution (1,024-bit diode array), the Chromaster Diode array detector delivers the world' s highest level of high-resolution analyses.
With a noise level comparable to a UV detector, the Diode array detector is capable of supporting high-sensitivity analyses.
The adoption of a variable air-volume fan and the provision of a specially designed cover on the spectrometer minimize the influence of temperature fluctuations around the optical system and achieves a further reduction in drift.
A variable air-volume fan for the diode array detector and a new cover designed for the spectrometer greatly reduce the temperature change in the detector module.

【UV and UV-VIS Detectors】

Two-wavelength, simultaneous high-sensitivity detection of drug impurity

The two-wavelength detection function permits measurements at short data acquisition interval of 400 ms*2 and 800 ms per wavelength, resulting in chromatograms with fine, sharp peak shapes.

*2 The 400 ms interval is available only if the wavelength interval is 160 nm or less.

【Thermostat flow cell】

The thermostat flow cell*3 minimizes the influence of ambient temperature changes.
As a result, the baseline of detector is steady and data reliability is improved.

*3 Optional

Easy-to-use

Beyond the simplicity of operation and ease of use, a critical requirement for HPLC is ease of maintenance.

【GUI controller】

Provides an attractive user interface and permits the operation of modules on a stand-alone basis.

The GUI controller*4 comprises a color LCD monitor and a touch-panel system for a pleasing appearance and ease of operation. All modules can be operated from the Controller.

*4 Optional

【Auto-purge function】

Startup tasks of pump, simplified

From any of the components Chromatography Data Station (CDS), GUI Controller, and UI Pad*5, you can set any flow rate (9.999 mL/min max.) and running time (30 minutes max.) so that the pump can be purged automatically.
(Pumps with or without auto-purge valve are available.)

*5 See p. 22.

【Auto-plunger washing function】

Prevents the precipitation of salts onto the plunger surface.

As a standard, Chromaster includes a washing mechanism that prevents damage to the pump seal or the plunger by salt precipitation from the mobile phase. A combination of Plunger Washing Pump*6 and CDS permits automatic washing after each analysis run.

*6 Optional

【Low-volume degassing unit】

Shorter solvent purging time

The low-volume (480 μL/ch) degassing unit reduces solvent purging time for pump and autosampler, and reduces the amount of solvent used.
This degassing unit has 6-channels flow path. Therefore, it can degas four solvents for pump and two solvents for autosampler.

【Autosampler with thermostat】

Capable of heating up to 45℃

The Autosampler with thermostat is capable of controlling the temperature (in a vial) from 21 degree below ambient temperature to ambient temperature + 25℃*7.
This feature is used broadens the range of possible applications, such as preventing the crystallization of compounds in a sample vial.
This level of vial temperature control broadens the application range and maintains sample stability by preventing crystallization of sample components in the vial.
(Autosamplers are available with and without a thermostat.)

*7 Temperature setting range: 1 to 45℃

【Dedicated degassing unit for autosampler】

Space-saving built-in degassing unit

The Chromaster autosampler incorporates a dedicated a degassing unit*8.
When the user wants to combine and operate with Chromaster autosampler without Chromaster pump, this degassing unit has great utility. Moreover, because it can be a built-in unit, the degassing unit does not take extra bench space.

*8 Optional

【A specially designed cover for the spectrometer and a variable air-volume fan】

Reduced lamp stabilization time (Diode array detector)

A variable air-volume fan for the diode array detector and a new cover designed for the spectrometer greatly reduce the temperature change in the detector module. The result is a 30% reduction*9 in lamp sabilization time.

*9 in-house comparison

【Large column oven】

Easily accommodates a 300 mm analytical column fitted with a guard-column

The door, which opens in an L-shape pattern and with internal dimensions 375 mm wide and 114 mm high, facilitates the connection and stowing tasks for a guard-column and column.
The oven can accommodate up to three 300 mm columns.

【Column management system】

Column log information is saved in the ID tag

The Chromaster column management system*10 manages the Log information on analytical columns and guard-columns from any manufacturer.
Log information can be written and read through a connector or a PC USB port mounted on the column oven.
ID Tags can be used repeatedly.

*10 Optional

【Solvent cabinet with a power supply box】

A large space for a number of bottles in one place.

The following solvent bottles can be mounted on the organizer (a solvent cabinet with a power supply box):

Example

1	3.785 L (U.S. gallon bottle) × 2 + 500 mL × 2
2	3.0 L (Japanese gallon bottle) × 2 + 500 mL × 2
3	2.5 L (EU gallon bottle) × 2 + 500 mL × 3
4	1.0 L bottle × 5 + 500 mL × 2

(1) to (3) are for isocratic, 2-liquid gradient analysis, designed for use in quality control operations.
(4) is for method development.

【System size】

Reduced height and minimized footprint

Most optional accessories are internally mounted to reduce HPLC system height. At the same time, the handle located on the front side of the organizer moves vertically for easy access to solvent bottles.
With a module width of 340 mm*11 and a depth of 440 mm, the system provides space savings.

*11 Exclusive of the column oven

Robustness

The Hitachi reputation for instrument robustness and reliability continues with the Chromaster, which is made using stronger materials and is manufactured with Hitachi's strict quality control standards.

For long-term use

The external covers are made of heat-resistance, chemical-tolerant, and UV irradiation-withstanding materials. The internal walls of the module are made with SUS material for the prevention of corrosion due to the humidity and the vaporization of solvents that prevail in the system. To minimize any adverse effect on the module in the event of solvent leakage, the system incorporates an optimal flow path design.

Other functions

- The autosampler has a door lock mechanism.
- During the lamp replacement operation, power is automatically shut off.
- The leak sensor is installed in all modules.
- To guard against any leakage of non-volatile solvents in the column oven, the column oven incorporates a solvent leak sensor and a gas sensor.

Introducing the Chromaster modules

Fulfilling the customer's needs.

This goal underlies the data reliability and the ease of operation of the system.
Intuitive operation based on an LCD touch panel.
Consideration to details.
True value of HPLC is here in the Chromaster.

Improved gradient performance and excellent flow rate precision

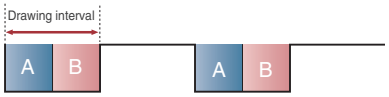
5110 Pump

New low-pressure gradient mode High Frequent Mode (HFM)

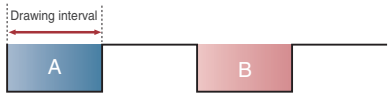
"HFM" refers to the mode that has the double switching function of the proportioning valve for solvent changes.The HFM mode combined with Hitachi's proprietary real-time feedback method delivers low pulsation pumping, resulting in excellent gradient*1 and retention time reproducibility without the use of mixers at 800 µL system delay volume*2 operations.

*1 Low-pressure gradient
*2 Configrations: Pump, Autosampler,Column oven, and Detector (UV and Diode Array detector)

HFM schematics



Schematics on conventional switching function



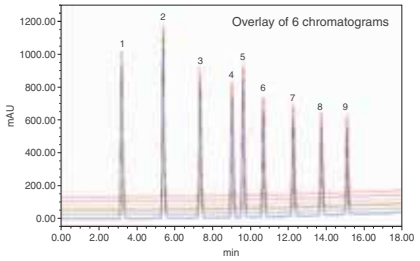
✳ A and B show mobile phase

Analysis of alkylphenones 9 components
Gradient reproducibility data (retention time) (n=6) (HFM) (Mixer-less)

Measurement condition

Sample: Alkylphenones
Column: Hitachi LaChrom C18
4.6 mmI.D.× 150 mmL (5 µm)
Column temperature: 40℃
Mobile Phase: A Water+0.1%TFA
B CH_3CN+0.1%TFA
Gradient mode: High Frequent Mode
Gradient: A:B (min)=65:35 (0)→5:95 (15)
→5:95 (20)→65:35 (20.1)
→65:35 (30)
Injection Volume: 10 µL (100 ppm)
Flow rate: 1 mL/min
Detection: 247 nm

Peak No.	Component	Retention Time AVE	Retention Time %RSD
1	Acetanilide	3.220	0.03
2	Acetophenone	5.397	0.04
3	Propiophenone	7.328	0.03
4	Butylophenone	9.006	0.02
5	Benzophenone	9.593	0.02
6	Valerophenone	10.642	0.02
7	Hexanophenone	12.214	0.02
8	Heptanophenone	13.679	0.02
9	Octanophenone	15.026	0.02



If you need even better gradient/retention time reproducibility and high-sensitivity analyses

Hitachi recommends the use of HFM and static mixer in combination.

For users of LaChrom Elite L-2000 system (model L-2130 pump with low-pressure gradient)

The L-2000 system and Chromaster have different system delay volumes. To use existing LaChrom Elite methods on Chromaster, use the conventional solvent mixing mode (Low Frequent Mode, LFM) and the conventional mixer. Also, delay volume kits are available (optional).

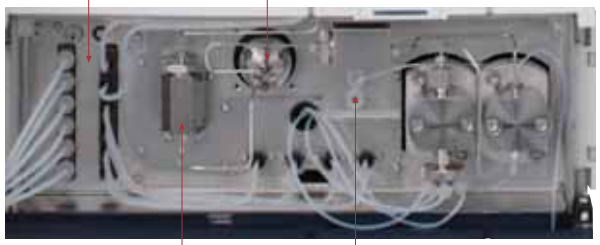
Pump options

6-channel degassing unit (480 µL/ch) (optional)

<Main specifications>
●4 solvents for pump (Maximum) /2 solvents for autosampler (Maximum)

Auto-purge valve (Pumps with or without Auto-purge valve are available)

<Main specifications>
●Flow rate setting range (0.001 to 9.999 mL/min)
●Time setting range (1 to 30 min)



Conventional mixer (Accessory of the low-pressure gradient unit option)

(Can also accept semi-micro/dynamic mixers)
(Can install either of one from three mixers)

Plunger washing pump (optional)
✳ Fitted inside the pump

<Main specifications>
●Flow rate setting (1 mL/min, fixed)
●Time setting range (1 to 300 sec)
●Automatic plunger washing function per one analysis available with CDS

<Notes>
(1) Plunger washing mechanism: standard
(2) Automatic plunger washing using only Item (1) is subject to the following limitations:
・Requires 5210 Autosampler
・Not compatible with two-solvent washing for the needle inner wall/inside the injection valve on autosampler

Excellent injection volume reproducibility and low carry-over

5210 Autosampler

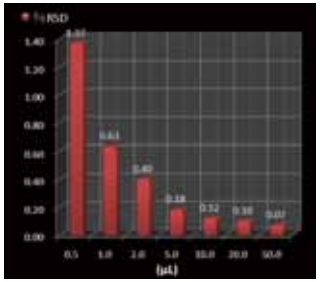
Excellent injection volume reproducibility

A new high-precision syringe drive unit has improved reproducibility in the syringe positions and the syringe measurement, resulting in a reproducibility of 0.2% RSD or less (with a 10 µL injection volume, using a cut injection method and under specified conditions).

[Injection volume reproducibility data (cut injection method)] (n=10)

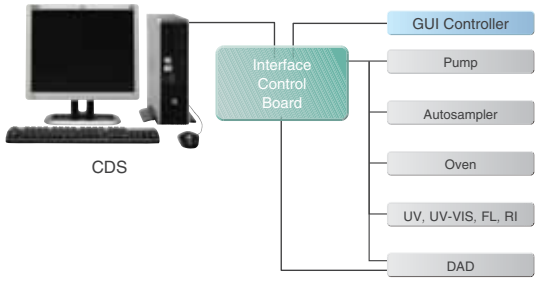
Measurement condition

Sample: 60 ppm methylparaben
(Eluent: 60%CH_3OH)
Column: φ0.25×20 m, SUS coil
Flow rate: 1 mL/min
Detection: 265 nm



Improved throughput for sample processing

An integrated Interface Control Board (IFC) that controls the communication between the chromatography data station (CDS) and the Chromaster system reduces the response time.
The interval of CDS's single run direction to the autosampler response is about 10 seconds.
Further, the high-speed, high-precision control of the needle XYZ axis motion mechanism achieves a minimum injection cycle time of about 30 seconds (on a stand-alone basis, under specified conditions).

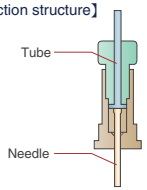


∗ IFC is actually installed in the autosampler.
This figure is an image.

Extremely low carry-over

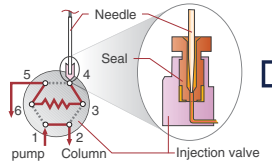
The first hurdle to be overcome in reducing the amount of carry-over is to create a structure by eliminating the dead volume in the autosampler flow path. 5210 Autosampler represents a revamping of the basic structure to minimize the dead volume. Additionally, active wash of the needle outer wall by dedicated pump provides constant washing effect. The result is extremely low carry-over.

【Needle connection structure】



Removal of dead volume from needle Connection by means of a flange needle (without a ferrule).

【Injection port structure】



Removal of dead volume through the direct connection between the injection port and the injection valve.

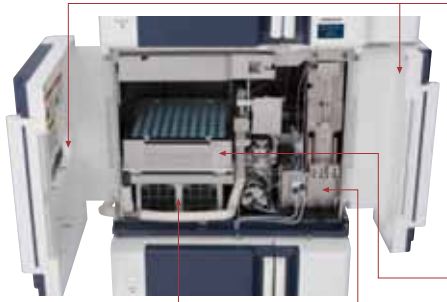
Low carry-over
≦0.003%
(under a specified condition)

Active wash of needle outer wall by dedicated pump

Additional settings for reducing the carry-over

・Washing the needle outer wall prior to sample drawing ・Two-solvent washing for the needle inner wall/inside the injection valve

Other features



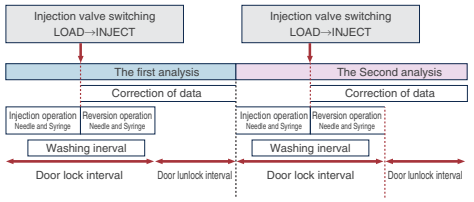
Temperature settings up to 1 to 45℃
(Autosamplers with or without thermostat are available)
∗ Controllable temperature is limited by ambient temperature

2-channel degassing unit
for 5210 Autosampler (250 µL/ch) (optional)

Built-in autosampler degassing unit enable degassing even when system is utilized without Chromaster pump.

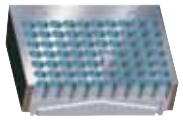
Door lock mechanism

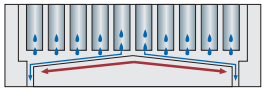
The door is locked only when the needle/syringe are operating



A sample rack with a unique effluent flow path

The sample rack having a tilted radial effluent flow path prevents an accumulation of water of condensation at the bottom of the rack and ensures smooth water discharge.





Cross-section

∗ The photo is a column oven with a GUI controller (optional).

Adequate size with column conpertment width of 375 mm

5310 Column Oven

Easily accommodates a 300 mm analytical column fitted with a guard-column

The door, which opens in an L-shape pattern and with internal dimensions 375 mm wide and 114 mm high, facilitates the connection and stowing tasks for guard-column equipped column. The oven can accommodate up to three 300 mm columns.
The column installation space, which has an air circulation system, permits easy mounting and detaching of columns.

∗ The photo is a column oven with a column management system (optional).

Pre-heating function and wide temperature control range

The block-type pre-heating function based on Peltier heating and cooling control, delivers excellent peak symmetry and shape.*1
Also, the oven with a capability to regulate*2 temperature from 15 degree below ambient temperature to ambient temperature +60℃ can accommodate various applications.

*1 Pre-heating pipings tailored to the flow rate used is available (optional).
*2 Temperature setting range: 1 to 85℃

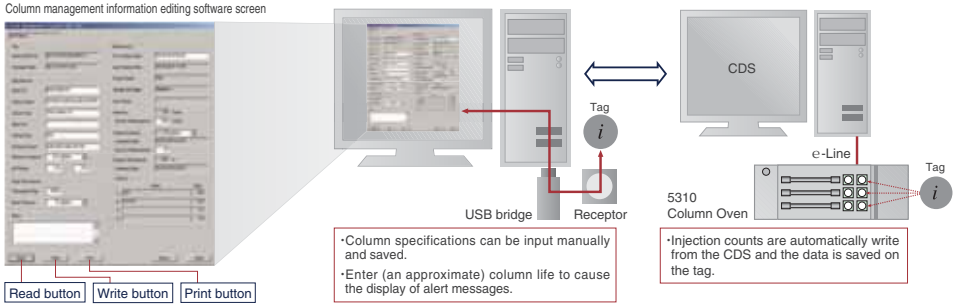
∗ The photo represents a unit in which a part of the pre-heating cover is removed.

Column management system (optional)

Hitachi column management system can manage the Log information on analytical columns and guard-columns from any manufacturer.
Log information can be written and read through a connector mounted on the column oven or USB port in the computer.
ID Tags can be used repeatedly.*3

*3 Approximate read/write life time : 100,000 times

Column management information editing software screen



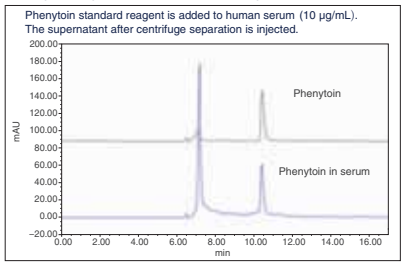
・Column specifications can be input manually and saved.
・Enter (an approximate) column life to cause the display of alert messages.

・Injection counts are automatically write from the CDS and the data is saved on the tag.

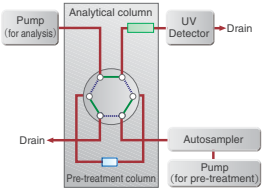
Valve options for sample preparation and method evaluation

2-position, 6-port valve and 3-column selector valve for use in automated sample pre-treatment for protein removal and for method evaluation are also available.
(Notes) 5310 column oven have a time program function.

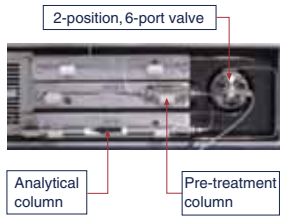
Example: Deproteinization of the sample



Column switching diagram



a. Deproteinization by pre-treatment column
b. After deproteinization, the target compound is road to the analytical column.
c. Analysis of the target compound
a,c b



Excellent qualitative and quantitative analysis performance

5430 Diode Array Detector
5410 UV / 5420 UV-VIS Detector

5430 Diode Array Detector

5410 UV / 5420 UV-VIS Detector

Excellent qualitative analysis performance

With a wide wavelength range of 190 nm to 900 nm, the 1,024-bit diode array in Chromaster Diode array detector delivers the world's highest level of wavelength resolution.

Achievement of further low noise and low drift

The 5430 Diode array detector is comparable to conventional Ultraviolet (UV) detectors in noise to 0.5×10^{-5} AU*1 (or less), and is capable of high-sensitivity detection.
The adoption of a variable air-volume fan and the provision of a specially designed cover on the spectrometer minimize of influence of temperature change around the optical system and achieves a further reduction in drift to 0.4×10^{-3} AU/hr*1 (or less) and a reduction in lamp stabilization time by about 30% (In-house comparison).

*1 Under a specified conditions

Common features (5410/5420/5430)

Thermostat flow cell (optional)

Thermostat controlled flow cell minimizes the influence of ambient temperature changes. As a result, the baseline of detector is steady and data reliability improved.

Ultraviolet (UV) region wavelength check by means of a built-in Hg lamp

You can perform wavelength checks in the ultraviolet region frequently used in HPLC, by using of 254 nm bright line from the Hg lamp. In combination with bright lines from the D_2 lamp, checks are performed at six wavelengths, resulting in highly reliable data. The Hg lamp, which is immune to physical changes, is highly reliable and provides a long life.

Low noise, low drift, and a high sensitivity detection

The noise can achieve 0.5×10^{-5} AU*2 (or less), for improved sensitivity more than before.
With a low drift of 1.0×10^{-4} AU/hr*3 (or less), these detectors deliver excellent baseline stability.

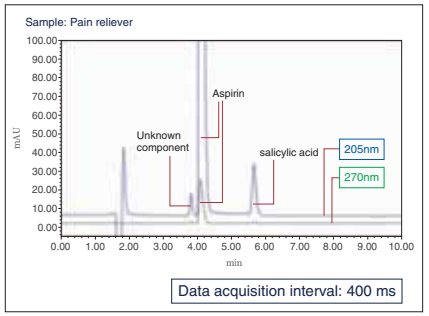
*2, 3 Under a specified conditions

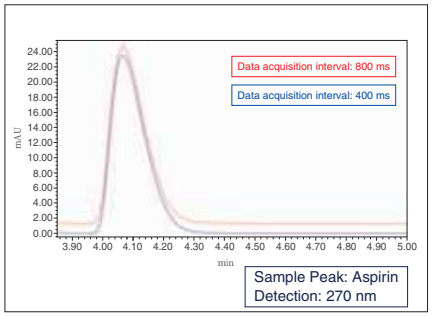
Two-wavelength simultaneous measurement function

The two-wavelength detection function*4 permits measurements at short data acquisition interval of 400 ms*5 and 800 ms per wavelength. The result is chromatogram with sharp peak shapes.

*4 Controlled by CDS only
*5 400 ms is available only if the wavelength interval is 160 nm or less.

Example: Two-wavelength simultaneous analysis data





The peak appears sharper by selecting a shorter data acquisition interval.

5440 Fluorescence Detector
5450 RI Detector

5440 Fluorescence Detector

High sensitivity with an S/N ratio of 900 or higher in water Raman

The detector incorporates low-light loss optical systems featuring a three-dimensional optical axis layout optical design, Hitachi's proprietary condensing mirrors, a slit flow cell , and an optimized transmission light monitoring method. This is a high-sensitivity fluorescence detector with an S/N ratio of 900 or higher (based on the baseline method) in water Raman.

Fluorescence detector with a variable slit

The spectrometer slit on the fluorescence side is variable between 15 nm and 30 nm. For high-sensitivity analyses, use the 30 nm slit.

Thermostat flow cell (optional)

Thermostat controlled flow cell that minimize the influence of ambient temperature changes is available. You can use the flow cells when you need to perform measurements at a fixed, stable sensitivity.

Automatic wavelength check using a built-in Hg lamp

Similar to the UV detector, the 254 nm bright line from the Hg lamp can be used to perform wavelength checks in the UV region that is often used in HPLC analyses.

5450 Refractive Index (RI) Detector

Short stabilization time

The RI detector permits the start of measurement in about 1 hour after it is turned on.

Flow cell with variable temperature setting

The cell temperature can be set from 30 to 50℃ (in 1℃ step). (when the room temperature is 20℃).

Organizer

Organizer capable of accommodating various solvent bottles

The organizer can accept the simultaneous mounting of the following solvent bottles.

Example

1	3.785 L (U.S. gallon bottle) × 2 + 500 mL × 2
2	3.0 L (Japanese gallon bottle) × 2 + 500 mL × 2
3	2.5 L (EU gallon bottle) × 2 + 500 mL × 3
4	1.0 L bottle × 5 + 500 mL × 2

(1) to (3) are for isocratic, 2-liquid gradient analysis, designed for use in quality control operations.
(4) is for method development.

Organizer also doubles as a power supply module

The organizer, which is also a power supply module, supplies power to one pump, one autosampler, one detector (one UV detector, one UV-VIS detector, or one Diode array detector or one RI detector), and one interface control board. Additional modules require an (optional) AC adapter or AC input.

Intuitive operation via unique touch panel

* The photo is a GUI controller fitted with a column oven.

GUI Controller

Feature of the GUI controller

- The configuration comprising a color LCD monitor (5.7-inch color TFT display with LED back light) and a touch panel method makes for ease of viewing and simple operations.
- All modules can be controlled from this controller.
- Supports single/sequence run analyses as directed from the autosampler
- Up to 10 programs involving a timer function, pre-analysis tasks of system (Wakeup), and post-analysis tasks of system (Sleep) can be created.
- The GUI controller can control three pumps (of which one is isocratic) (useful for building pre-treatment systems, such as deproteinization).
- The GUI controller enables you to check the status of consumables usage on all units that are connected to the system.

Main settings in the modules

Pump: Solvent feeding on/off, pump purging, and plunger washing
Autosampler: Needle washing, rinse-port washing, and syringe purging
Oven: Temperature control on/off, temperature settings, and valve switching
Detector: Lamp on/off, auto-zero, purging on/off (RI detector)

Introduction of main screens and their functions

Monitor
Data monitoring and status monitoring

Operation
Operates modules and provides function keys.

Setup
Sets method and sample parameters.

Maintenance
Module calibration, setting of maintenance parameters, and GLP function.

Configuration
System configuration settings.

Conditioning
Wakeup and Sleep programs

Running
Single/sequence run method settings, and starting a run.

Wakeup (automatic pre-analysis tasks) and Sleep (automatic post-analysis tasks) programs

Automatic system Wakeup and Sleep from GUI

- In Conditioning, up to 10 programs can be created by combining any of the module settings, such as pre-analysis tasks of system (Wakeup), and post-analysis tasks of system (Sleep).
- For Wakeup program ending time, you can specify any time on current day, the following day, or two days later.
- The Sleep program starts at a specified time on the current day/the following day, or after the end of a continuous analysis run.

The automation of system stand-by can reduce the amount of time required to make preparations for an analyses run.

Examples of Wakeup/Sleep settings

1) The analysis will begin this afternoon. Finish the preparation run by 1 p.m.
2) The analysis will finish at 2 p.m. tomorrow. Start the Sleep run at 3 p.m. tomorrow and shut down the system at the conclusion of the run.

Controller that pairs with one module—UI Pad (optional)

- The UI pad provides the flexibility of purchasing controllers for modules that require stand-alone operations.
- The large button size and a wide pitch enhance the ease of operation.
- Supports single/sequence run analyses by instructions received from the autosampler.

Main settings in the modules

Pump: Solvent feeding on/off, pump purging, and plunger washing
Autosampler: Needle washing, rinse-port washing, and syringe purging
Oven: Temperature control on/off, temperature settings, and valve switching
Detector: Lamp on/off, auto-zero, purging on/off (RI detector)

User oriented, convenient and smart system design

- Most optional accessories are internally mounted to reduce HPLC system height. The handle located on the front side of the organizer moves vertically for easy access to solvent bottles.
- With a module width of 340 mm*1 and a depth of 440 mm, the system provides space savings.

  *1 Exclusive of the column oven.
- Module operations and the replacement of consumable and maintenance parts can be performed from the front side.
- With attention to detail on the housing of tubes and wires, the system keeps tubes from getting tangled up, ensures the ease of replacement, and provides adequate seismic stability. In addition to incorporating these practical considerations, the system features a sleek, attractive appearance.

Front access
(Example: replacing lamps)

Vertically moving handle

SUS Inlet tube
(prevents tube deformation)

Wire covers
(Clamp between modules)

Tube holder for solvents
and waste fluids tubes

Molded tubes
(Example: tubes between the
degassing unit and the Autosampler)

Chromaster Modules

5110 Pump
5110 Pump with Auto-purge valve

Main optional accessories

- Low-pressure Gradient Unit for 5110 (with Conventional Mixer)
- Semi-micro Mixer (200 µL)
- UI Pad for 5110
- 6-channel Degassing unit (480 µL / ch)
- Dynamic Mixer (2,000 µL)
- AC adapter (150 W)
- Plunger Washing Pump
- Manual Injector Holder
- Conventional Mixe (700 µL)
- Column Holder

5210 Autosampler
5210 Autosampler with Thermostat

Main optional accessories

- Sample rack (4 mL × 72)
- Thermostat micro plate rack (2 pcs)
- 2-channel Degassing unit (250 µL / ch)
- Thermostat rack (4 mL × 72)
- Syringe kit (70 µL)
- AC adapter (150 W)
- Sample rack (1 mL × 195)
- Sample loop kit (5 µL)
- UI Pad for 5210
- Thermostat rack (1 mL × 195)
- Sample loop kit (10 µL)
- Micro plate rack (2 pcs)
- Sample loop kit (20 µL)

5410 UV Detector

Main optional accessories

- Thermo cell for 5410/5420
- Analog signal output unit (1ch)
- Thermo cell control unit for 5410/5420
- AC adapter (150 W)
- UI Pad for 5410/5420

5420 UV-VIS Detector

5430 Diode Array Detector

Main optional accessories

- Thermo cell for 5430
- Thermo cell control unit for 5430
- 2ch Analog signal output unit
- AC adapter (150 W)

5440 Fluorescence Detector

Main optional accessories

- Thermo cell for 5440
- Thermo cell control unit for 5440
- UI Pad for 5440
- Analog signal output unit (1ch)

5450 RI Detector

Main optional accessories

- AC adapter (150 W)

5310 Column Oven

Main optional accessories

- Column management system for 5310
- 2-position, 6-port valve for 5310
- 3 column selector valve for 5310
- UI Pad for 5310

Interface control board (IFC board)

Interface box

Front side

Back side

IFC board

∗ The Photo is a Interface box(L) with installed another AID board.

- Interface control board (IFC board) (for installing a 5210 autosampler)
- Interface box (S) (with an IFC board)
- Interface box (L) (with IFC board and one AID board)

∗ For systems that do not have an organizer, AC adapter (60W) is required.

GUI Controller

- GUI Controller

∗ Interface Control Board is required.

AC adapter

- AC adapter (60 W) (for IFC board/Interface box)

∗ For systems that do not have an organizer

- AC adapter (150 W) (for Pump, Autosampler and UV/UV-VIS/Diode array detector/RI detector)

∗ For systems that do not have an organizer

Organizer

- Can be used as a cabinet that holds solvent bottles
- Supplies power to one pump, one autosampler, one detector (one UV detector, one UV-VIS detector, or one Diode array detector), and one interface control board

Chromatography Data Station

∗ For details, see the Chromatography Data Station brochure.

Chromaster Specifications

Main specifications

■5110 Pump

Item	Specifications
Pumping system	Dual plunger reciprocating pump system Series connection, pulsation eliminatuon system
Operating flow late range	0.001 to 9.999 mL/min
Maxmum operating pressure	40 MPa (0.001 to 5.000 mL/min) 20 MPa (5.001 to 9.999 mL/min)
Flow rate accuracy	±1.0% or ±2.0 μL /min, whichever is greater (0.010 – 5.000 mL/min, under a specified condition)
Flow rate precision	SD0.02 min or RSD0.075%, whichever is greater, under a specified condition
Materials of wetted parts	SUS316, ruby, sapphire, ceramics, PTFE, carbon-contaning PTFE, PEEK (Auto-purge valve unit)
Functions of GLP	(a)Total flow rate display (b)Double speed error (c)Changeover number of times of the proportioning valve (d)Running time of the dynamic mixer (e)Changeover number of times of the auto purge valve (f)Operating time of the plunger wash pump
Dimentions and weight	340 (W) × 440 (D) × 140 (H) mm, Approx.16 kg
Power supply and Power consumption	DC 24 V, 4 A (Maximun) 96 W (power supply from organizer)
Ohters	Pumps are available with and without an auto-purge valve.

■Low pressure gradient unit (Optional)

Item	Specifications
Number of mixed solvents	Up to 4
Mixing system	Electromagnetic valve open/close time control system
Composition accuracy	±0.5% (5 to 95%)
Flow rate range recommended for analysis	0.4 to 1.8 mL/min

■5210 Autosampler

Item	Specifications
Sample capacity	195 × 1 mL 120 × 1.5 mL (Standard) 72 × 4 mL 2 × MTP (96,384)
Sample injection system	Loop injection method (Cut injection, All volume injection, Full loop injection method)
Syringe volume	175 μL (standard) (There is an optional syringe.)
Sample Injection volume	0.1 to 50 μL (100 μL loop) (standard) 0.1 to 100 μL (200 μL loop) (accessory of 5210 Autosampler)
Injection volume precision	≦0.2%RSD (10 μL, cut injection method) ≦0.25%RSD (5 μL, cut injection method) ≦0.9%RSD (1 μL, cut injection method) ≦1.0%RSD (1 μL, All volume injection method) ≦0.2%RSD (5 μL, full loop method)
Carryover	≦0.003% (cut method)
Materials of wetted parts	SUS316, Vespel® (Polyimide resin), fluororesin, PP, EPDM, perfluoroelastomers
Withstand pressure	40 MPa
Temparature setting range	1 to 45℃ (1℃ step), using 5210 Autosampler with a thermostat
Temparature controll range	[RT-21℃] to [RT+25℃] and range of the temparature setting (with a vial) [RT-15℃] to [RT+20℃] and range of the temparature setting (with a MTP) (using 5210 Autosampler with thermostat)
Functions of GLP	(a)Injection port seal (b)Injection valve seal (c)Syringe valve seal (d)Syringe (e) Wash pump operation time
Dimentions and weight	340 (W) × 440 (D) × 280 (H) mm, Approx.24 kg (with thermostat, approx.29 kg)
Power supply and Power consumption	DC24 V, 4 A (Maximum)/96 W (power supply from organizer) AC100 to 240 V (50 Hz/60 Hz) 110 VA (using 5210 Autosampler with thermostat)
Others	Autosamplers are available with and without a thermostat.

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■5310 Column Oven

Item	Specifications
Temparature controll system	Heating/Cooling block+air circulation system
Temparature setting range	1 to 85℃ (1℃ step)
Temparature controll range	[RT-15℃] to [RT+60℃] and range of the temparature setting
Temparature accuracy	±1.0℃ (20 to 85℃, part of Pre-heat)
Temparature controll precision	SD≦0.2℃
Time program functions	・Temparature setting ・Switchng valve (changing of position)
Functions of GLP	Recording of the changeover number of times and exchange dates of the optional changeover valve.
Column capacity	300 mm × 3 (Maximun)
Dimentions and weight	410 (W) × 440 (D) × 140 (H) mm, Approx 13 kg
Power supply and Power consumption	AC100 to 240 V (50 Hz/60 Hz)/230 VA (with optional valves) ✳ The Organizer and the AC adaptor are not necessary.

■5410 UV Detector

Item	Specifications
Optical system	Double-beam ratio photometric system
Light source	D_2 lamp, Hg lamp for checking wavelength
Wavelength range	190 nm to 600 nm
Wavelength accuracy	±1 nm
Spectral bandwith	6 nm
Noise	≦0.5 × 10^{-4} AU at 250 nm, under a specified condition
Drift	≦1.0 × 10^{-4} AU/h at 250 nm, under a specified condition
2-wavelength measurement	2 wavelengths in wavelength regions 190 to 350 nm and 351 to 600 nm, respectively (Minimum wavelength interval 5 nm, max. wavelength interval 160 nm with data sampling period set at 400 ms)
Pesponse	0.01, 0.02, 0.05, 0.1, 0.5, 1, 2 sec
Materials of wetted parts	Quartz glass, Fluororesin, SUS
Functions of GLP	(a)D_2 lamp/Hg lamp lighting time (b)Key lock (c)D_2 lamp energy check and D_2 lamp wavelength check (d)Hg lamp wavelength check
Flow cell	13 μL (Optical path length 10 mm)
Thermostatically flow cell	Optional, Thermostatic temperature: 40℃
Dimentions and weight	340 (W) × 440 (D) × 140 (H) mm, Approx.14 kg
Power supply and Power consumption	DC24 V, 2.5 A (Maximun)/60 W (power supply from organizer) ✳ Please purchase the AC adaptor (150 W) when there is no organizer.

■5420 UV-VIS Detector

Item	Specifications
Optical system	Double-beam ratio photometric system
Light source	D_2 lamp, W lamp, Hg lamp for checking wavelength
Wavelength range	190 nm to 900 nm
Wavelength accuracy	±1 nm
Spectral bandwith	6 nm
Noise	≦0.5 × 10^{-3} AU at 250 nm, 600 nm, under a specified condition
Drift	≦1.0 × 10^{-4} AU/h at 250 nm, 600 nm, under a specified condition
2-wavelength measurement	2 wavelengths in wavelength regions 190 to 350 nm, 351 to 400 nm, 401 to 600 nm and 601 to 900 nm (D_2&W mode) 2 wavelengths in wavelength regions 190 to 350 nm and 351 to 600 nm (D_2 mode) 2 wavelengths in wavelength regions 380 to 600 nm and 601 to 900 nm (W mode) (Minimum wavelength interval 5 nm, max. wavelength interval 160 nm with data sampling period set at 400 ms)
Pesponse	0.01, 0.02, 0.05, 0.1, 0.5, 1, 2 sec
Materials of wetted parts	Quartz glass, Fluororesin, SUS
Functions of GLP	(a)D_2 lamp/Hg lamp lighting time (b)Key lock (c)D_2 lamp energy check and D_2lamp wavelength check (d)W lamp energy check (e)Hg lamp wavelength check
Flow cell	13 μL (Optical path length 10 mm)
Thermostatically flow cell	Optional, Thermostatic temperature: 40℃
Dimentions and weight	340 (W) × 440 (D) × 140 (H) mm, Approx.14 kg
Power supply and Power consumption	DC24 V, 3.6 A (Maximun)/87 W (power supply from organizer) ✳ Please purchase the AC adaptor (150 W) when there is no organizer.

■5430 Diode Array Detector

Item	Specifications
Detection type	1,024 bit PDA
Light source	D_2 lamp, W lamp, Hg lamp for checking wavelength
Wavelength range	190 to 900 nm
Wavelength accuracy	±1 nm
Noise	≦0.5 × 10^{-4} AU at 250 nm, 600 nm, under a specified condition
Drift	≦0.4 × 10^{-3} AU/h at 250 nm, 600 nm, under a specified condition
Response	0.01, 0.02, 0.05, 0.1, 0.5, 1, 2 sec
Slit type	1 nm/4 nm (Variable)
Materials of wetted parts	Quartz glass, Fluororesin, SUS
Functions of GLP	(a)D_2 lamp, W lamp, Hg lamp lighting time (b)D_2 lamp energy check (c)W lamp energy check (d)Hg lamp wavelength check (e)D_2 lamp wavelength check
Flow cell	13 μL (Optical path length 10 mm)
Thermostat flow cell	Optional, Thermostatic temperature: 40℃
Dimentions and weight	340 (W) × 440 (D) × 140 (H) mm, Approx.14 kg
Power supply and Power consumption	DC24 V, 3.5 A (Maximun) /84 W (power supply from organizer) ✳ Please purchase the AC adaptor (150 W) when there is no organizer

■5440 Fluorescence Detector

Item	Specifications
Light source	Xe lamp, Hg lamp for checking wavelength
Wavelength range	Ex: 200 to 850 nm Em: 250 to 900 nm (Change photomultiplier at 731 nm or more)
Wavelength accuracy	±3 nm
Response	0.01, 0.02, 0.05, 0.1, 0.5, 1, 2sec
Spectral bandwith	Ex: 15 nm, Em: 15, 30 nm (Variable)
Sensitivity	＞900 S/N ratio of water raman (Bandwith 30 nm, Ex=350 nm, TC=2 s, Baseline method, standard cell)
Materials of wetted parts	Quartz glass, PEEK, SUS
Functions of GLP	(a)Lamp energy check, (b)Wavelength accuracy check, (c)Lamp lighting time and replacement record
Flow cell	Irradiation volume 12 μL
Thermostat flow cell	Optional, Thermostatic temperature: 40℃
Dimentions and weight	340 (W) × 440 (D) × 280 (H) mm, Approx.25 kg
Power supply and Power consumption	AC100 to 240 V (50/60 Hz)/330 VA ✳ The Organizer and the AC adaptor are not necessary.

■5450 RI Detector

Item	Specifications
Refractive index range	1 to 1.75
Noise	≦2.5 × 10^{-7} RIU
Drift	≦0.2 × 10^{-6} RIU/h
Time constant	0.05, 0.1, 0.25, 0.5, 1, 1.5, 2, 3, 6 sec
Temparature control range	OFF, and 30 to 50℃
Materials of wetted parts	SUS316, Fluororesin, Quartz glass, Sapphire (Al_2O_3)
Dimentions and weight	340 (W) × 440(D) × 140 (H) mm, excluding projections, Approx.13 kg
Power supply and Power consumption	DC24 V, 5 A (Maximun)/120 W (Maxmum) (power supply from organizer) ✳ Please purchase the AC adaptor (150 W) when there is no organizer.

■Organaizer

Item	Specifications
Output power	DC24 V, 450 W Supplies power to one pump, one autosampler, one detector (one UV detector, one UV-VIS detector, one Diode array detector, or one RI detector), and one interface control board
Bottle capacity and the space	1,000 mL bottle × 6 and 500 mL bottle × 3 (Maximun), 314 (W) × 280.8 (D)
Dimentions and weight	340(W) × 420(D) × 200(H)mm, approx.9 kg
Power supply and Power consumption	AC100 V to 240 V (50 Hz/60 Hz), 520 VA

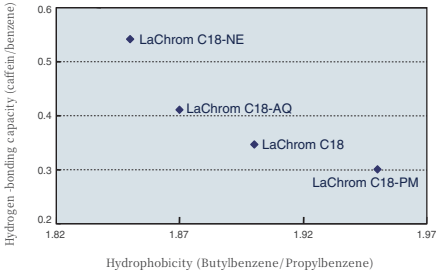
HITACHI LaChrom column series

A wealth of product offerings to fulfill a broad range of analysis needs

Four type of C18 columns with different separation properties

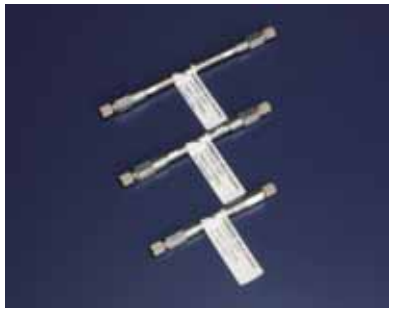
By using these columns according to the characteristics of the samples to be analyzed, highly optimized separations can be developed.

Comparison of properties of HITACHI LaChrom ODS series columns



In addition to ODS, Hitachi provides reverse phased, normal phase, and HILIC mode columns

C8 phenyl, cyano, amino, diol, and silica columns also available.



Product name	Particle size (μm)	Column size (mm I.D.× mm L.)	P/N
HITACHI LaChrom C18 C18 column with standard properties. Column of first choice for a wide variety of analyses.	3	4.6×100	891-5030
		4.6×150	891-5035
	5	4.6×150	891-5050
		4.6×250	891-5055
HITACHI LaChrom C18-AQ A low-carbon C18 column for highly polar compounds. Compatible with aqueous mobile phase (including 100% H_2O).	3	4.6×100	891-5036
		4.6×150	891-5037
	5	4.6×150	891-5058
		4.6×250	891-5059
HITACHI LaChrom C18-PM Polymeric C18 column. Offers a high solid planar recognition and a broad-range pH tolerance (pH 1-10).	3	4.6×100	891-5038
		4.6×150	891-5039
	5	4.6×150	891-5062
		4.6×250	891-5063
HITACHI LaChrom C18-NE Silanol-activated C18 column. For use in the separation of interaction with silanol groups.	5	4.6×150	891-5064
		4.6×250	891-5065

Product name	Particle size (μm)	Column size (mm I.D.× mm L.)	P/N
HITACHI LaChrom C8 Inhibits retention through the use of short alkyl chains, for reduced analytical time on highly hydrophobic compounds.	5	4.6×150	891-5066
		4.6×250	891-5067
HITACHI LaChrom Ph Retention by π-electron interactions. Useful for the separation of aromatic compounds.	5	4.6×150	891-5068
		4.6×250	891-5069
HITACHI LaChrom CN Can be used in both reverse d and normal phase modes.	5	4.6×150	891-5070
		4.6×250	891-5071
HITACHI LaChrom SIL First choice among normal phase columns, for the separation of lipid-soluble compounds.	5	4.6×150	891-5072
		4.6×250	891-5073
HITACHI LaChrom Diol Interaction with hydroxyl groups. Optimum for analysis in HILIC mode.	5	4.6×150	891-5074
		4.6×250	891-5075
HITACHI LaChrom NH2 An amino-silica column with improved durability. Especially for the analysis of sugar chains and oligo saccharides.	5	4.6×150	891-5076
		4.6×250	891-5077

・Guard columns (Holders and Cardriges) are also available.
・LaChrom C18 and LaChrom C18-AQ are also available for UHPLC (2 μm particle size).

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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