

Hitachi High-Performance Liquid Chromatograph

LaChrom Elite



| 保持時間 | 面積 |
|-------|-------|
| 0.856 | 959 |
| 0.996 | 1156 |
| 1.164 | 643 |
| 1.440 | 340 |
| 1.440 | 267 |
| 3.619 | 63066 |
| 5.739 | 52508 |
| 6.587 | 437 |
| 7.514 | 47432 |
| 8.300 | 79411 |
| 8.569 | |

●Degasser® is a trademark of

NOTICE: For proper 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.

Hitachi High-Technologies Corporation

Tokyo, Japan
<http://www.hitachi-hitec.com>

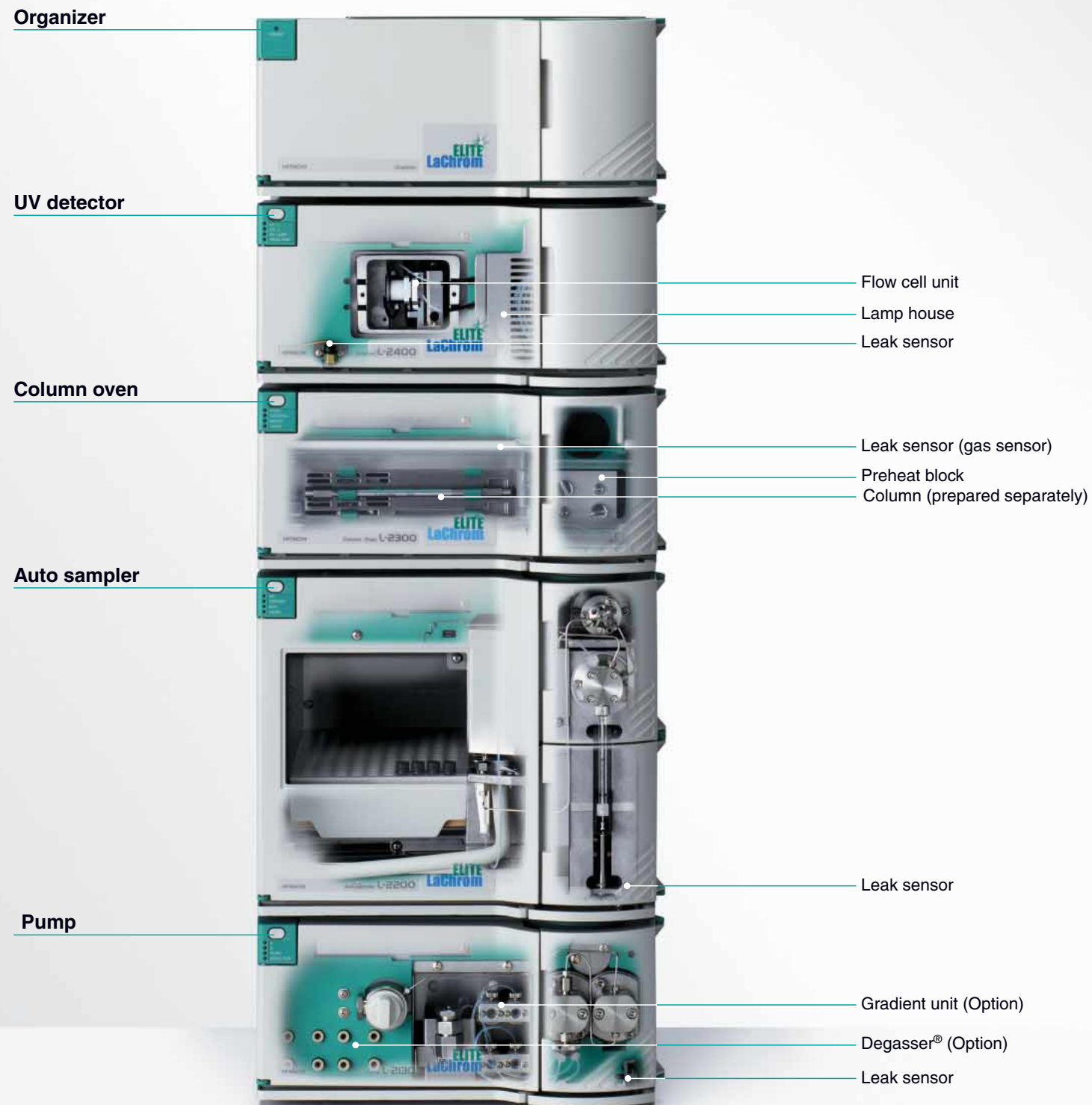
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*For further information, please
 contact
 your nearest sales representative.*

Streamlined appearance with built-in options

Front accessibility for ease of use and space saving



Features of system

Streamlined appearance of system with built-in options

The Degasser®, gradient unit, sample cooling unit, and other major options can all be built within the system. Addition of options is easily done without increasing the installation space.

Improved operability and maintainability by front accessibility

All modules can be operated from the front of the instruments. Tubess are also collected in the front, affording easy column change and smooth handling of the flow channel system. To ease the maintenance work, the system is designed to allow front-panel access to lamp and cell at replacement.

All modules are equipped with a leak sensor.

When solution leaks from the flow channel system, the leak sensor mounted in each module detects the leakage, stopping the system, providing system stability and reliability.

Full-control from system manager

The system manager provides all types of control, not requiring an operation panel. With the UI pad (provided as standard equipment) the use of individual modules is possible as well.

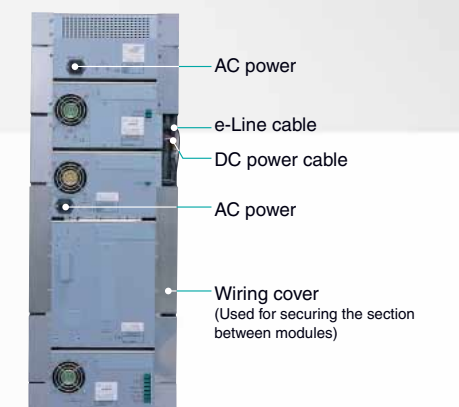
Communication via e-Line and USB

The e-Line communication has replaced the conventional D-Line. One-touch connection of respective modules with the e-Line cable permits integration of all communications. Digital signals are used to enhance the reliability of communication. Highly versatile USB is adopted for connection with a PC, and communication can be flexibly established in any PC communication environment. (Japanese Patent No.1876463)

GLP function

- The detector is equipped with a Hg lamp. The line spectrum (254 nm) permits inspection of the wavelength in the ultraviolet range. (Built in L-2400 UV/L-2420 UV-VIS/L-2450 DAD/L-2480 FL)
- Each module supplies an ample amount of quality assurance information to enhance the reliability of data. Centralized control from the system manager allows automatic validation. (Automatic validation software for EZChrom Elite is optional.)

When each cable is connected



*The photo shows the system before installation of the UI pad (standard equipment). The front door of the product is not transparent.

A variety of LaChrom Elite systems developed for various purposes can meet a wide range of analytical needs.

Standard (HTA) system

(HTA : High Throughput Analyzer)

多検体を高速・高精度に分析します。



The photo shows the system before installation of the UI pad (standard equipment).

Purpose

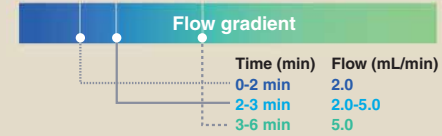
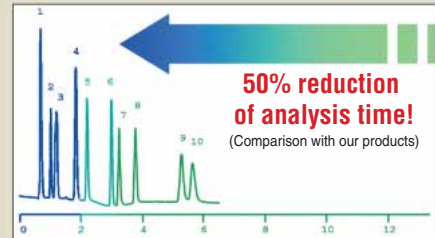
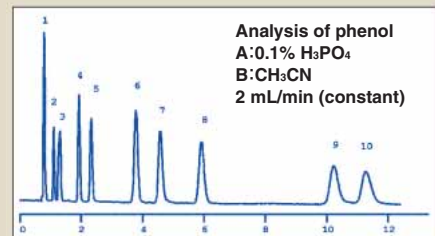
This system is ideal for routine analysis of ever-increasing samples to ensure highly accurate results.

Features

- The L-2130 pump provides an accurate solution flow even in a high flow range.
- The L-2200 auto sampler allows a large sample capacity. (Standard: 200 samples)
- The L-2400/2420 UV/UV-VIS detectors provide quick-response and low-noise. Accurate identification of sharp peaks permits high-sensitivity measurement with a short measuring time.

Example of high-speed analysis using flow gradient

Use of Chromolith® performance RP-18e (4.6 mm I.D. x 100 mmL) column



Example of system configuration

- L-2130 pump
- Conventional low-pressure gradient unit
- L-2200 auto sampler
- L-2300 column oven
- L-2400 UV detector
- Organizer
- EZChrome Elite (Software, I/F, and PC)

Personal system

A simple configuration with a manual injector and an integrator.



The photo shows the system after installation of the UI pad (standard equipment).

Purpose

Many laboratories can afford one system for each person. Anyone who uses the LC for the first time can use this simple system without difficulty.

Features

- The manual injector and integrator allow easy and quick use of the system.
- The system is compact and highly reliable.

Example of system configuration

- L-2130 pump
- AC adapter
- Manual injector
- Injector holder
- Column holder
- L-2400 UV detector
- AC adapter
- Analog output unit
- Signal cord
- D-2500 data processor

Semi-Micro (SMASH) System

(SMASH : Semi-Micro Applicable Standard HPLC)

Reliable system for semi-micro/micro analyses



The photo shows the system before installation of the UI pad (standard equipment).

Purpose

As columns improve, the demand for semi-micro (2 mm I.D. column) and micro (1 mm I.D. column) analyses has increased. With the LaChrom Elite SMASH system, you can benefit from low solvent consumption and high-sensitivity analysis.

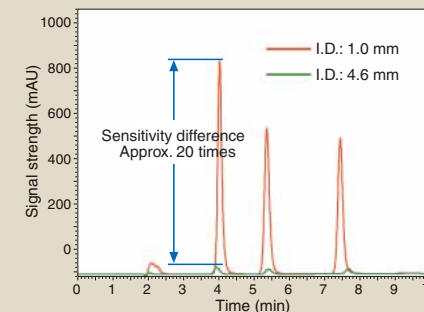
Features

- The L-2100 pump permits a highly accurate solution flow at a very low flow rate.
- Hitachi's original pressure correction mechanism affords accurate control of mixing ratios when a high-pressure gradient unit is used even at a very low flow rate.
- The direct injection system of the L-2200 auto sampler provides high repeatability of injection of a very small quantity of samples.
- The detector is equipped with a flow cell optimized for the selected flow rate.

Example of semi-micro system configuration

- L-2100 pump x 2 units
- High-pressure gradient unit for L-2100
- Degasser®
- L-2200 auto sampler
- L-2300 column oven
- L-2400 UV detector
- Semi-micro flow cell
- Organizer
- EZChrome Elite (Software, I/F, and PC)

Example of high-sensitivity analysis with micro system - Paraben (Gradient analysis)



Measuring conditions

Column: Hitachi-Inertsil ODS-3 150 mmL
 Eluant: 60% methanol → 80% methanol (5-min linear)
 Sample injection qty: 10 µL

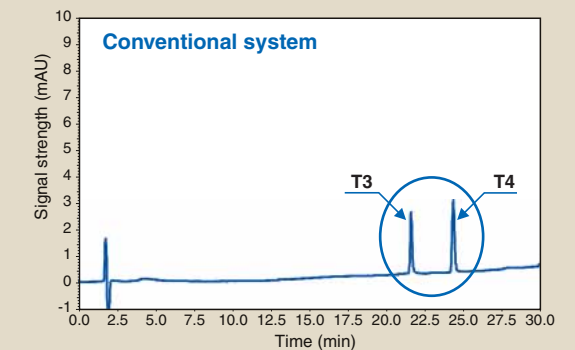
Inside diameter: 1.0 mm I.D. column
 Flow: 0.05 mL/min
 Micro flow cell: 0.9 µL

Inside diameter: 4.6 mm I.D. column
 Flow: 1.0 mL/min
 Standard flow cell: 13 µL

When a single solvent is used for measurement with a micro system, the quantity of samples must be reduced according to the inside diameter of the column. Use of gradient permits injection of the same quantity of samples as the conventional system because of the concentration effect (###? Can't understand the original meaning) of the column tip, substantially improving the sensitivity. During the measurement of paraben shown here, the sensitivity is 20 times higher than that of the conventional system.

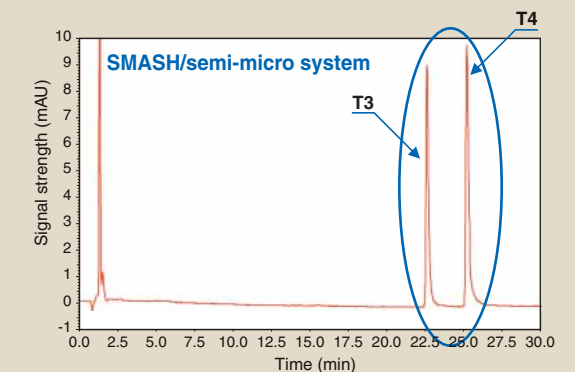
Example of high-sensitivity analysis with semi-micro system - Thyroid hormone (single solvent)

When the same quantity of samples as with the conventional conditions is injected, the semi-micro system ensures approx. 3 times higher sensitivity.

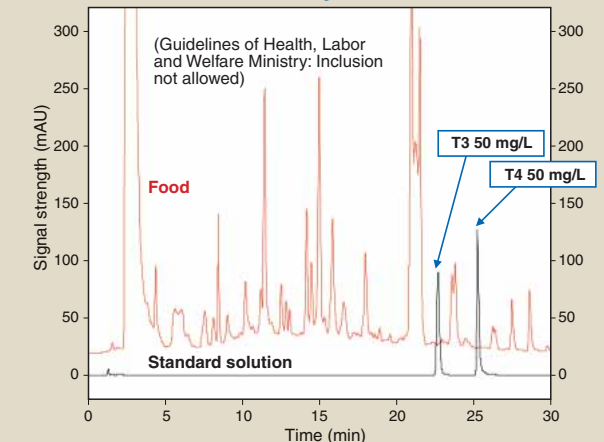


The signal strength is 3 times higher!

(Comparison with our products)



Example of analysis of thyroid hormone T3 and T4 in food analysis



T3 : 3, 5, 3' - triiodothyronine
 T4 : thyroxine

Three-dimensional system with DAD is recommended to customers who have experienced the limit of a single-wavelength UV detector.

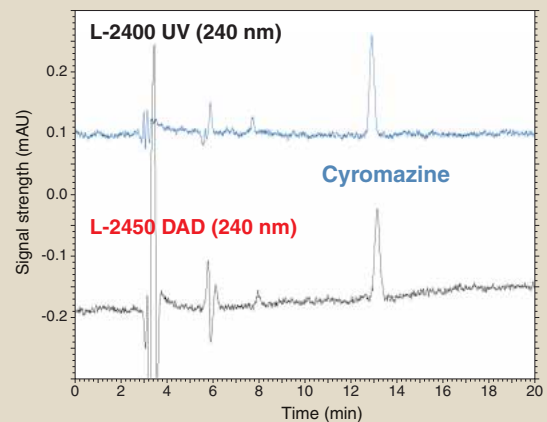
Three-dimensional system

The L-2450 Diode Array Detector can provide as much sensitivity as the UV detectors. In addition, the L-2450 affords various 3-D functions, including "spectrum collection," "acquisition of multi-wavelength chromatogram," "peak purity check," and "spectrum library".



The photo shows the system before installation of the UI pad (standard equipment).

Comparison of data with generic UV detector Example of measurement of 0.025 mg/L Cyromazine



[Cyromazine] *A kind of insecticides
*Added to fertilizer and used for livestock and livestock barn
*Added to animal drugs by the Health, Labor and Welfare Ministry

The conditions of the peak height and baseline noise show that the measuring sensitivity of UV is almost the same as that of DAD.

L-2450 DAD



Features

Application to high-sensitivity analysis

Affords measurement of data equivalent to an UV detector. Not a stereotypical Diode Array Detector with poor sensitivity.

The L-2450 detector offers a system that is little affected by the temperature variations in the laboratory

A large lamp compartment is adopted to stabilize the light source. The spectroscope is separated from the lamp compartment and the lamp compartment is insulated for quick cooling, making the system less susceptible to the changes in the ambient temperature. The system ensures low noise and high stability, permitting stable analysis at all times.

Spectral correction with high-wavelength resolution

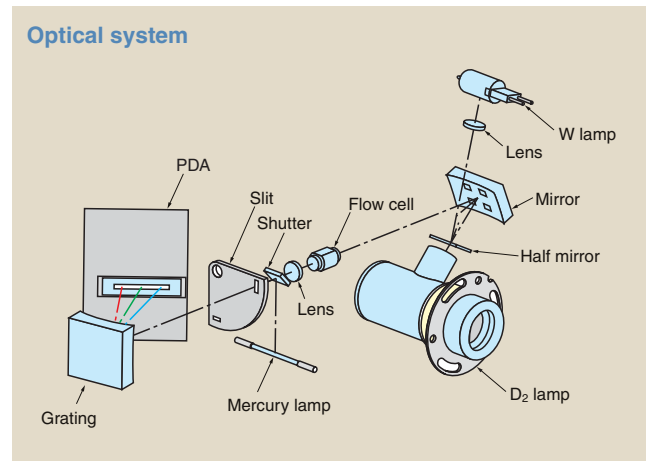
The system is provided with a 1024-bit photodiode array to ensure a high-wavelength resolution (0.78 nm/bit). The grating used in the spectroscope provides acquisition of uniform wavelength resolutions within a range from ultraviolet to visible radiation.

Digital noise reduction processing permits application to high-speed analysis.

Enables low-noise analysis with a short sampling period (0.05 second). Low-noise sharp peaks can be obtained during high-speed analysis as well.

Automatic wavelength inspection function

The built-in Hg lamp permits automatic wavelength inspection within a UV range that is used frequently.



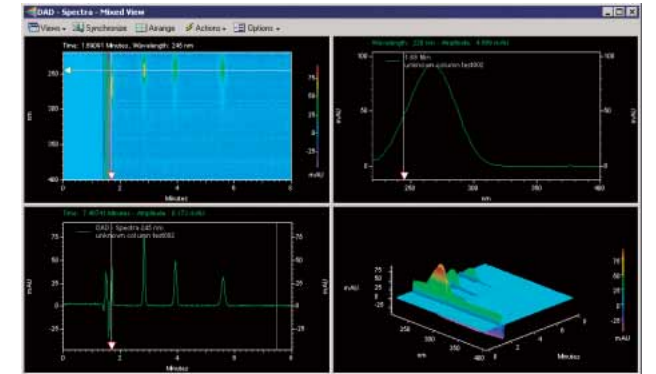
Three-dimensional functions of EZChrome Elite

(PDA optional software)

Note: An EZChrome Elite license is required.

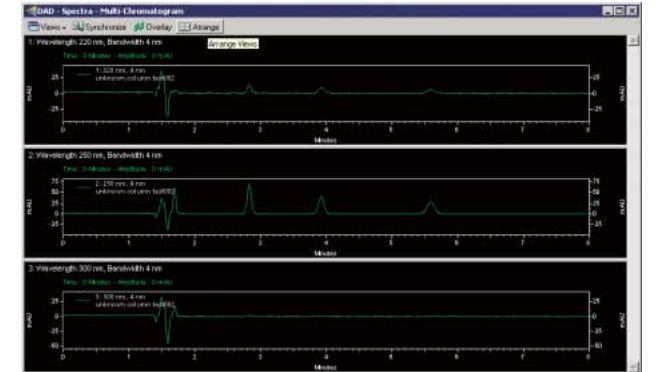
Example of screen (Mixed view)

Simultaneous display of a contour map, 3-D display, chromatogram, and spectrum in a single window. Display of information on one screen allows easy confirmation of the spectrum of the target peak.



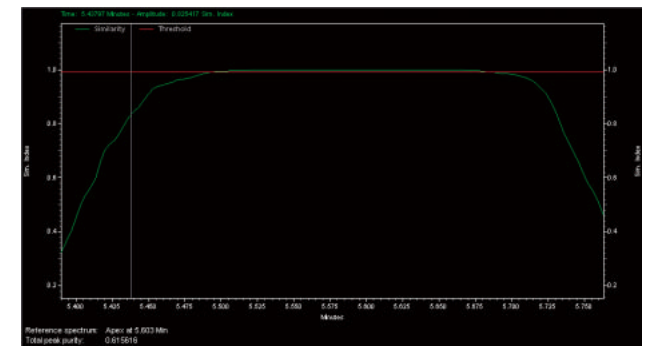
Multi-chromatogram

Information about the entire wavelength range can be obtained with one measurement, permitting extraction of an arbitrary number of chromatograms of any wavelength in 1-nm increments. The chromatogram can be used for on-line quantitative calculation.



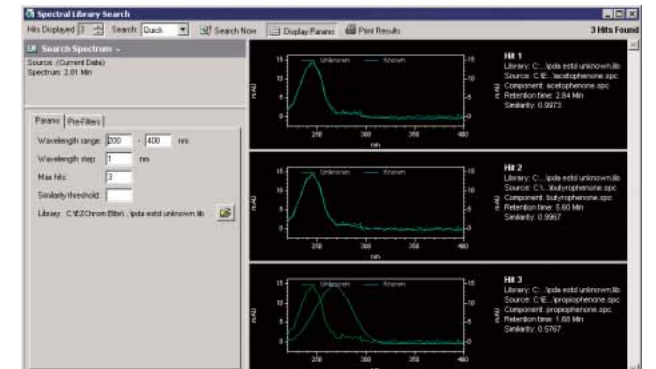
Peak purity calculation function

The peak purity is displayed in the form of correlation coefficients, enabling easy comparison between samples. Use of similarity curves shows the location of impurities at the peak, which is effective in examining the purity in detail.



Spectral library search function

A spectrum that resembles the spectrum of the target peak is automatically searched. Spectra are displayed in the descending order of similarity, which is effective for discriminating unknown peaks. This function permits recalculation, as well as searching during data collection, to improve efficiency of analysis.



Two pumps are provided for generic-purpose and semi-micro systems.

L-2130 pump

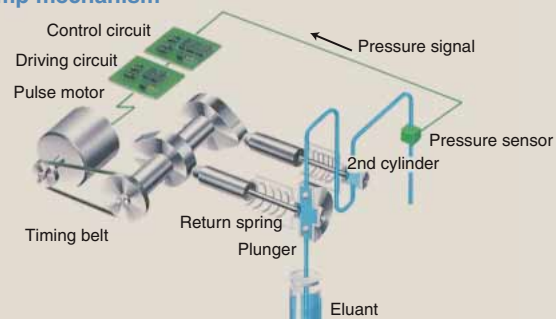


Inheriting the tradition of Hitachi HPLC pumps, this generic-purpose pump has been developed for routine analysis. Maintaining the unchanged high performance, the pump will support customers during routine measurements.

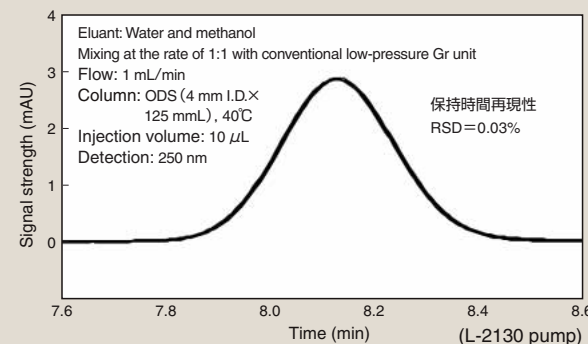
Improvement of flow accuracy

The double-speed control method is used to correct the pulsating flow for Hitachi pumps. The double-speed start timing of this method is optimized to successfully minimize the pulsating flow in the L-2130 pump. (Common to L-2130 and L-2100) (Japanese Patent No.3111790)

Pump mechanism



Example of repeated measurement of propylparaben (6 times)



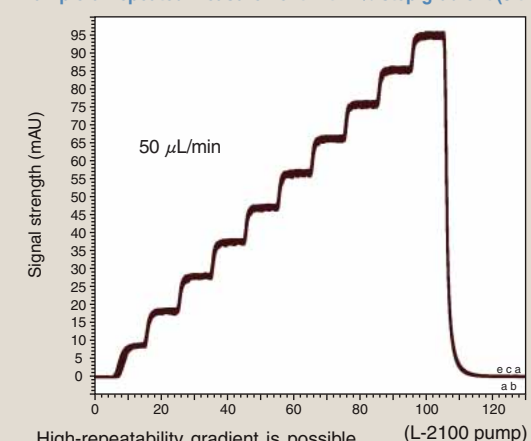
This is an example of an actual measurement of a sample. In addition to the excellent flow accuracy, sufficient mixing in the mixer ensures constant mixed states at all times. Therefore, the retention time repeatability of elution ingredients is extremely high.

L-2100 pump



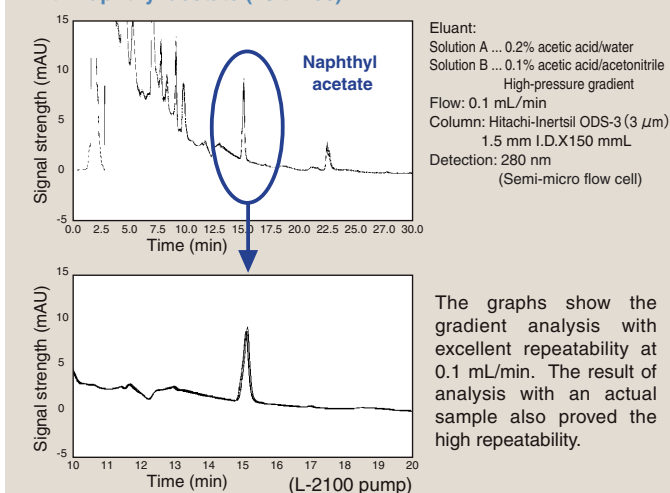
A pump ideal for semi-micro and micro analyses. The pump is provided with a micro plunger, new check valve, subsensor for high-pressure gradient, and many other innovative devices. This pump is recommended for stable measurement for semi-micro analysis.

Example of repeated measurement with 1% step gradient (5 times)



High-repeatability gradient is possible even in the very small flow range. Both repeatability and reliability of data are sufficient.

Example of repeated measurement of apple juice mixed with naphthyl acetate (10 times)

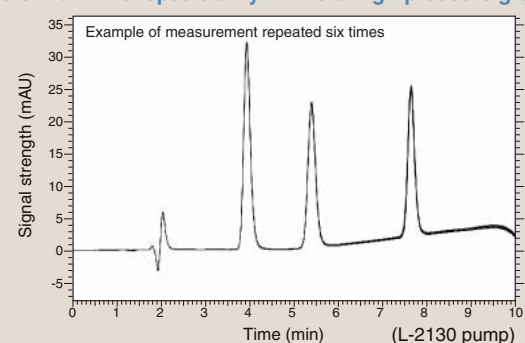


Features of pump

Improvement of retention time repeatability during gradient analysis

The injection timing of the L-2200 auto sampler is synchronized with the pump operation timing for gradient analysis. This provides a high retention time repeatability and high-accuracy analysis.

Retention time repeatability of micro high-pressure gradient



Eluant: 60% methanol → 80% methanol (5-min linear)
Flow: 50 μL/min
Column: Hitachi-Inertsil ODS-3 (3 μm) (1 mm I.D.×150 mmL)
Sample: Methylparaben, ethylparaben, and propylparaben
Detection: 250 nm; 6-times overwriting

| | Retention time | |
|---------------|----------------|---------|
| | Average (min) | RSD (%) |
| Methylparaben | 3.938 | 0.092 |
| Ethylparaben | 5.394 | 0.092 |
| Propylparaben | 7.631 | 0.089 |

Correct mixing ratio during high-pressure gradient analysis

In addition to the two pumps and a standard pressure sensor, a subsensor is installed in the high-pressure gradient system. The operation of a total of four sensors provides a solution flow with an extremely stable mixing ratio. The L-2100 pump specially displays its great power in the microscopic region of 50 μL/min.



The pump is provided with the built-in Degasser® and gradient unit.

It is unnecessary to provide an extra space for the Degasser® and gradient unit. The Degasser® connected with the minimum required tubing allows an efficient solvent replacement.

Example of mounted Degasser® and low-pressure gradient unit



(The Degasser® and low-pressure gradient unit are optional.)

The plunger cleaning mechanism kit ensures a safe use of a buffer solution.

A buffer solution may damage the seal and plunger because of accumulated salt. Cleaning of these parts with the plunger cleaning mechanism kit can prevent the damage. When used in combination with an auto sampler, automatic cleaning is available.

Plunger cleaning mechanism kit



(The plunger cleaning mechanism kit is an option.)
*This photo shows the kit after removal of the pump head.

Use the auto sampler for analysis of micro samples and faster measurement.

L-2200 auto sampler



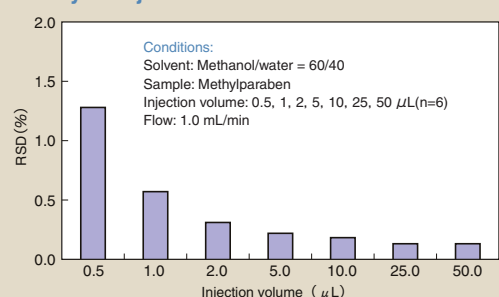
Analysis of micro samples and faster measurement by direct injection system

This auto sampler provides a direct injection system, in which the sampling needle functions as part of the flow channel during sample injection. Since the entire amount of a sample taken in the needle can be injected into the flow channel, a sample amount can be as small as 7 μL . The L-2200 presents its greatest power during measurement of a very small amount of a valuable sample. Compared to the injection method using a sample loop, the L-2200 injection process is simple, shortening the injection cycle by half. This system speeds up measurement and is effective in processing multiple samples.

High-accuracy analysis by improved repeatability

The syringe mechanism used for sample measurement is provided with a high-performance motor to improve the repeatability of injections. Synchronization of the sample injection and pump flow has also improved the repeatability of the peak retention time, ensuring high-reliability analysis results.

Repeatability of injections



Low carryover

Cleaning of the outside of the needle before and after sample injection minimizes the carryover. The auto sampler can measure samples with a wide density range, showing a correct area especially when a low-density sample is injected.

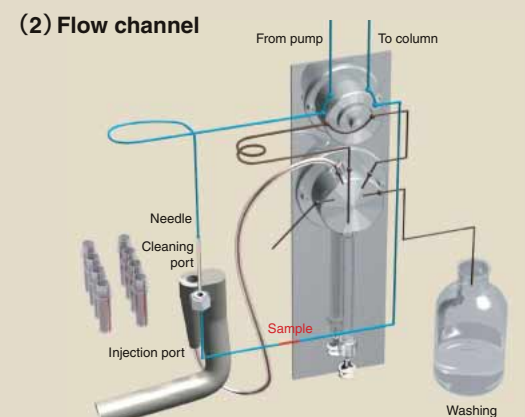
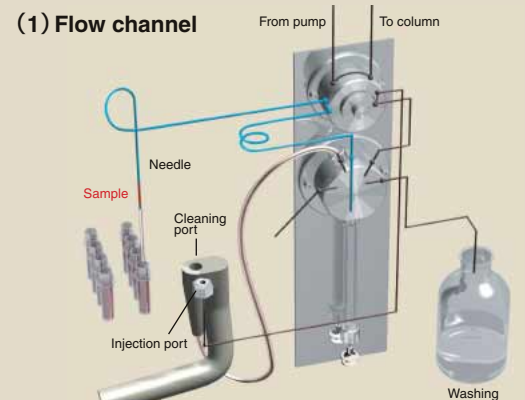
Safe analysis by sample vial detection mechanism

A sample vial detection mechanism is provided to prevent accidental injections of air at the position where there is no vial. You can simply leave the analysis work to the auto sampler.

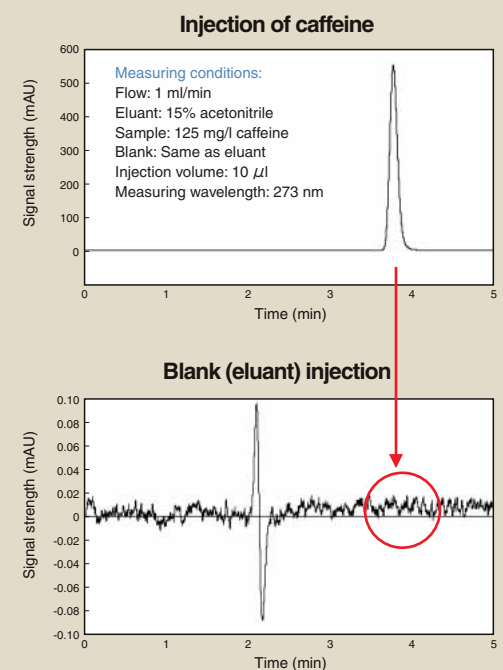
A wide range of applications for multiple samples with a variety of racks

The standard rack can accommodate two hundred 1.5-mL vials. It also accommodates three micro plates (384 holes), affording measurement of 1,152 samples at a time. (Option) (Refer to p.13 for the racks and syringes.)

Direct injection system



Example of carryover measurement



The column oven with a preheating system produces sharp peaks.

L-2300 column oven



An optimized heating system for sharper peaks.

The block-type preheating system with excellent thermal efficiency improves the identification and sharpness of peaks, ensuring stable measurement free from variations in ambient temperature. The air circulating column allows easy detachment.

An optimized preheating unit

The dead volume increases when the tubing in the preheating unit is longer. The length can be minimized according to the purpose of measurement.

Cooling function provided as standard equipment

Control within a range from 5 to 65°C is possible (at the room temperature of 20°C).

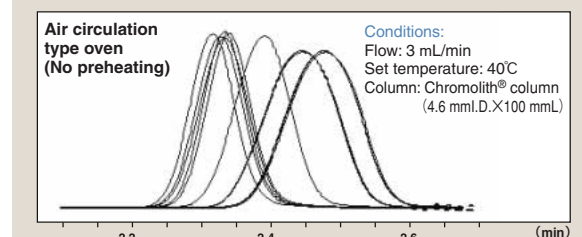
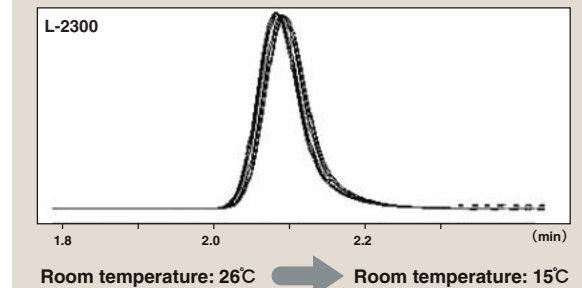
Automatic analysis by the 3-column selector valve (Option)

The 3-column selector valve that can be built in the column oven enables a measurement by switching 3 columns for different analytical needs. It is ideal for an evaluation of measuring conditions and multi-method analysis.

When there is no preheating unit, the temperature gradient generated in the column may affect the peaks because the eluant temperature at the tip of the column may not reach the oven temperature. Furthermore, the temperature gradient inside the column changes when the room temperature changes, and the peak retention time may fluctuate, preventing an accurate measurement.



Example of comparison of retention time affected by change in room temperature



L-2350 column oven

A large column installation space

This oven accommodates a maximum of four 50-cm columns, which are usually used for measuring sugar contents and GPC analyses. A manual injector can be installed within the module.

Wide temperature control range

The cooling function provided as standard equipment permits a wide temperature control from 5 to 85°C (at a room temperature of 20°C).

Preheating system

The preheating system is adopted in the same way as the Model L-2300.

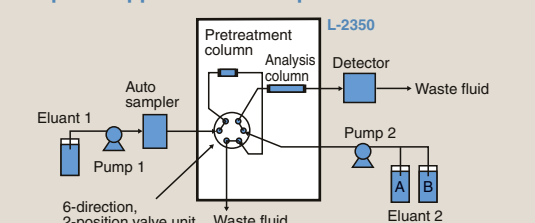
A wide range of applications

Two sets of the three types of valves (option) can be controlled simultaneously. The time program is available for switching the temperature and optional valves at any desired time. This column oven can also be used for sample condensation, multidimensional LC, and other applications.

- [Optional valves]
- 3-column selector unit
 - 6-direction, 2-position valve unit
 - 10-direction, 2-position valve unit

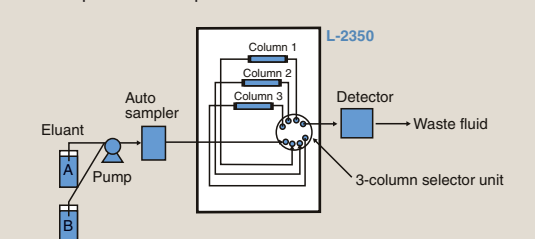


Example of application with optional valve



Example of application of 6-direction, 2-position valve unit

Automation of sample condensation, removal of impurities, and other pretreatment processes



Example of application of 3-column selector unit

This unit is effective in measuring one sample with multiple columns for examination of analysis methods.

Lineup of various detectors, UV, fluorescence, and RI, for selection of the best module for specific analytical needs

L-2400 UV detector/L-2420 UV-VIS detector



Low noise for high-sensitivity analysis

The Models L-2400 and L-2420 have realized the noise level of less than 0.6×10^{-5} AU, displaying the great power in detection of minor components.

High response and low noise for high-speed analysis

The noise level is low even when the response is set at 0.05 second, maintaining accurate identification of sharp peaks, as well as high-speed, high-sensitivity analysis.

Excellent stability free from influence of changes in ambient temperature

The site environment can vary for each laboratory. The LaChrom Elite detectors are designed to protect the optical system from heat to flexibly adjust to day-and-night temperature fluctuations and seasonal temperature changes, thereby ensuring excellent results with stable repeatability at all times.

Inspection of wavelength in ultraviolet range using a built-in Hg lamp

The 254 nm line spectrum of the Hg lamp built in the detector permits inspection of wavelength in the ultraviolet range which is frequently used for LC. In combination with the line spectrum of the D2 lamp, three wavelengths in total are used for inspection to ensure high-reliability analysis in a wide range of wavelengths.

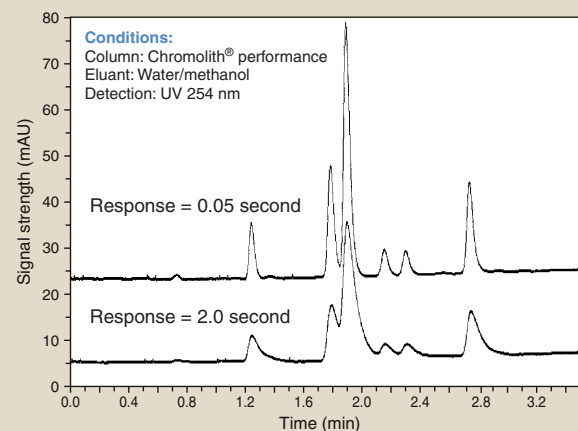
Front accessibility for improved maintainability

The lamp and flow cell can be replaced from the front, providing easy maintenance.



Lamp change

Response comparison data



L-2490 RI detector



The difference in the refractive index between the eluant and sample is used to detect the target ingredient. The detector is used widely for measurement of high molecular compounds and sugar.

Shorter stabilization time

Compared to the conventional models (our products), the stabilization time has been shortened substantially. Measurement can be started 0.5-1 hour after the power is turned on.

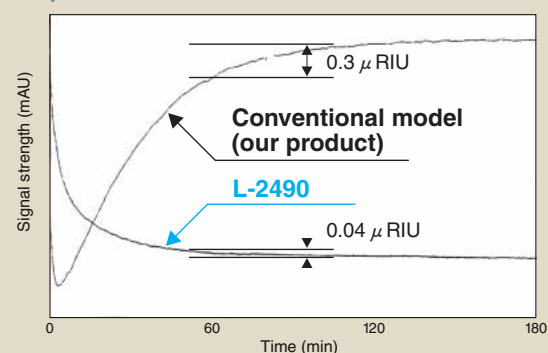
Variable cell temperature

The cell temperature can be set within a range between 30 and 50°C (in 1°C increments). Detailed setting is possible depending on the column temperature and ambient temperature.

Control from system manager

Chromatograms are processed by digital signals.

Example of baseline measurement after power is turned on



L-2480 fluorescence detector



The optical system with a minimum loss of light provides high sensitivity.

The optical system with a minimum loss of light is realized by the optical design for the three-dimensional optical axis layout, new collection mirror, slit flow cell (Japanese Patent No.2936947), optimized transmitted-light monitoring system, and other state-of-the-art technologies that are unique to Hitachi. The S/N of the Raman light of water is above 600 (baseline method).

Higher sensitivity by movable slit

The spectroscopy slit on the fluorescent side is switchable between 15 nm and 30 nm. Use 30 nm when high-sensitivity analysis is necessary.

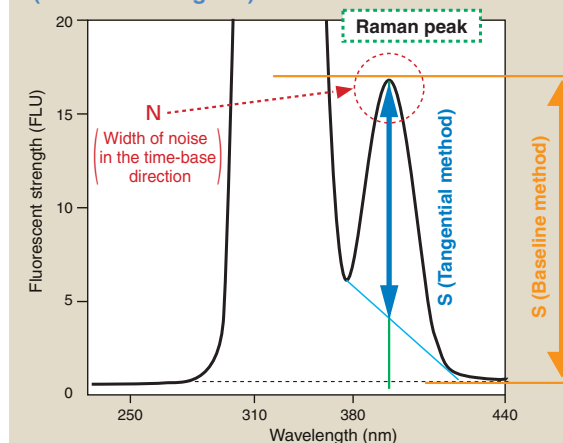
Automatic wavelength inspection function

Utilization of the line spectrum of the built-in Hg lamp has realized automatic waveform inspection at 254 nm which is used frequently.

Front access for maintenance

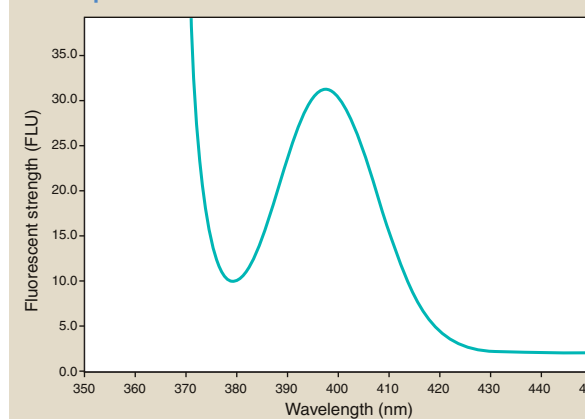
The position adjustment after Xe lamp replacement and maintenance for flow cell replacement are possible from the front of the system, allowing easy maintenance.

S/N (Raman of water): 600 or more Example of measurement of S/N by Raman spectrum (Schematic diagram)



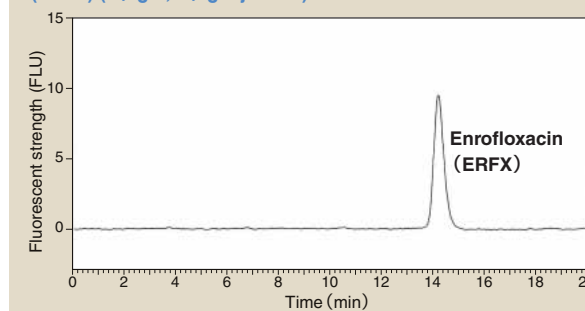
S (Baseline method): From peak top to baseline
S (Tangential method): From peak top to tangential line
N: The noise widths S and N of a signal in the time-base direction at 397 nm are calculated to obtain S/N.

Example of Raman measurement with L-2480



In the above example of measurement, S/N = 905.
(Note) This value does not guarantee the performance.

Example of measurement of standard sample of enrofloxacin (ERFX) (1 µg/L, 5 µg injection)



Measuring conditions

Eluant: Mixture of acetonitrile and aqueous solution of sodium dihydrogenphosphate containing 50 mmol/L sodium heptanesulfonate
Flow: 0.6 mL/min
Column: Hitachi-Inertsil ODS-3 (4.6 mm I.D. × 150 mmL)
Column temperature: 40°C
Detection: ex295 nm, em445 nm

Enrofloxacin (ERFX)
New quinolones (fluoroquinolone) synthetic antimicrobial used for prevention of infectious disease of livestock. Its use for food additives and cultured fish, including eels, is not allowed in Japan.

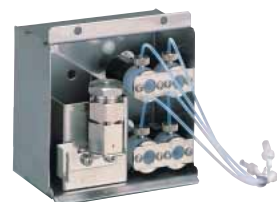
Lineup of L-2000 Series

Solution sending unit

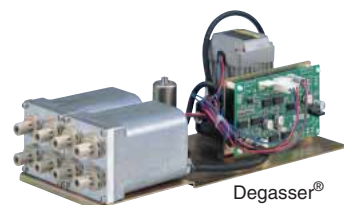
L-2100 pump



L-2130 pump



Conventional low-pressure gradient unit



Degasser®

- Conventional low-pressure gradient unit
- Semi-micro low-pressure gradient unit
- High-pressure gradient unit for L-2100
- High-pressure gradient unit for L-2130
- Degasser® (4 channels)
- Dynamic mixer
- Large mixer
- Conventional mixer
- Semi-micro mixer
- Plunger cleaning mechanism for L-2130
- Plunger cleaning mechanism for L-2100
- Hexane check valve for L-2130

Organizer



- Used as a reservoir to place up to 4 solvent vials in
- Supplying power to 2 pumps, 1 auto sampler, and 1 detector

Sample injection unit

L-2200 auto sampler
L-2200 auto sampler
(with cooling unit)



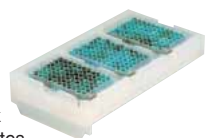
Standard syringe: 0.1 mL
(Injection volume: 0.1-50 µL)

| Optional syringe | Injection volume |
|------------------|------------------|
| 0.5 mL | 0.5~450 µL |
| 1.0 mL | 1.0~900 µL |
| 2.5 mL | 2.5~2250 µL |
| 5.0 mL | 5.0~4500 µL |



Cooling unit

Sample rack
for micro plates



- Standard rack for 1.5 mL x 200 pcs (Provided for L-2200 as standard equipment)
- Sample rack for 4.0 mL x 128 pcs
- Sample rack for 1.0 mL x 336 pcs
- Sample rack for 3 micro plates
- Standard rack for cooling 1.5 mL x 200 pcs (10°C) (Provided for L-2200 (with cooling unit) as standard equipment)
- Sample rack for cooling 1.5 mL x 100 pcs (4°C)
- Sample rack for cooling 4 mL x 128 pcs
- Sample rack for cooling 1 mL x 336 pcs
- Sample rack for cooling 3 micro plates
- Syringe: 0.1 mL (standard), 0.5 mL, 1.0 mL, 2.5 mL, and 5.0 mL
- Micro Tubes set

Manual injector



- Manual injector holder (For installation of pump or L-2300)
- Manual injector holder (For installation of L-2350)

Oven

L-2300 column oven



- 3-column selector unit

L-2350 column oven



- 3-column selector unit
- 6-direction, 2-position valve unit
- 10-direction, 2-position valve unit

Reaction unit

L-5050 reaction unit



- Reagent device

Detection unit

L-2400 UV detector



Flow cell unit (common to L-2400/L-2420)

- Semi-micro flow cell unit
- Micro flow cell unit

L-2420 UV-VIS detector



- Fractional flow cell unit
- Semi-micro high-pressure flow cell unit

L-2450 DAD



- Semi-micro flow cell unit
- Semi-micro high-pressure flow cell unit

L-2480 fluorescence detector



- Semi-micro flow cell unit

L-2490 RI detector



Fraction collector

L-5200 fraction collector



- 3-way valve assembly
- 3-way valve connection part

D-2500 chromatogram data processing unit



USB interface board



Chromato Data Station

- EZChrom Elite
- D-2000 Elite type



Accessories required to use modules as a single unit

An AC power adapter is required to use a module in the L-2000 Series as a single unit. An analog signal output unit is required for connection with D-2500 or other data processing units. Prepare accessories for each module to use. The UI pad for inputting parameters is provided as standard equipment.



Module equipped with UI pad

UI pad (standard equipment)

- For L-2100/L-2130 pumps
- For L-2200 auto sampler
- For L-2300 column oven
- For L-2350 column oven
- For L-2400 UV detector/L-2420 UV-VIS detector
- For L-2480 fluorescence detector



60W

120W

AC power adapter

- 60W AC adapter (For L-2100 pump, L-2130 pump, and L-2200 auto sampler)
- 120W AC adapter (For L-2400 UV detector, L-2420 UV-VIS detector, and L-2450 DAD)



Analog signal output unit

- For L-2400 UV detector, L-2420 UV-VIS detector, and L-2480 fluorescence detector
- For L-2450 DAD

Specifications

●L-2100/L-2130 pumps

| | L-2100 pump | L-2130 pump |
|--------------------------------|---|---|
| Solution sending method | Double plunger reciprocating pump (Series connection for removal of pulsating current) | |
| Discharge flow range | 0.001-2.499 mL/min | 0.001-9.999 mL/min |
| Max. discharge pressure | 39.2 MPa (0.001-2.499 mL/min) | 39.2 MPa (0.001-5.000 mL/min) 19.6 MPa (5.001-9.999 mL/min) |
| Correctness of flow | ±2 μL/min (0.005-0.050 mL/min) | ±2 μL/min (0.01-0.1 mL/min) |
| | ±2% (0.051-2.000 mL/min) | ±2% (0.101-8.0 mL/min) |
| | ±4% (2.001-2.499 mL/min) | ±4% (8.001-9.999 mL/min) |
| Accuracy of flow | SD 0.02 min or RSD 0.075%, whichever is larger (Retention time at 0.2 mL/min) | SD 0.02 min or RSD 0.075%, whichever is larger (Retention time at 1.0 mL/min) |
| Material of wetted part | SUS 316, ceramics, fluorocarbon resin, or PEEK | |
| Functions for GLP | Error check in double-speed section, pressure profile, solution sending quantity counter, registration/output of date of plunger tool change, and registration/output of serial No. | |
| Outside dimensions/weight | 340 (W) x 400 (D) x 150 (H) mm; approx. 15 kg | |
| Power supply/power consumption | 24 VDC, 50 VA (supplied from organizer) ※ A separate 60W AC adapter is required when the Organizer is not provided. | |

●Gradient system

| | Low-pressure gradient (common to L-2100/L-2130) | | High-pressure gradient | |
|---------------------------|---|----------------------------------|-----------------------------------|-----------------------------------|
| | Conventional low-pressure gradient | Semi-micro low-pressure gradient | High-pressure gradient for L-2100 | High-pressure gradient for L-2130 |
| Number of mixed solutions | 4 solutions | | 2 solutions | |
| Mixing method | Solenoid valve open/close time control method | | 2-pump flow control method | |
| Recommended flow range | 0.4-1.8 mL/min | 0.2-0.4 mL/min | 0.05-2.0 mL/min | 0.2-8.0 mL/min |
| | 1.8-3.5 mL (when large mixer is used) | | | |

●L-2200 auto sampler

| | |
|--------------------------------|---|
| Number of standard samples | 1.5 mL x 200 pcs |
| Sample injection method | Direct injection |
| Volume of syringe (standard) | 100 μL |
| Sample injection volume | 0.1 μL-50 μL (standard syringe), -4500 μL (option) |
| Injection volume repeatability | 0.3%RSD (when 10 μL is injected) |
| Material of wetted part | SUS316, PEEK, fluorocarbon resin, PP or EPDM |
| Functions for GLP | Date of seal change and number of injection times after change |
| Outside dimensions/weight | 340 (W) x 400 (D) x 300 (H) mm; approx. 19 kg |
| Power supply/power consumption | DC24 V, 50 VA (supplied from organizer) ※ A separate 60W AC adapter is required when the Organizer is not provided. |

●L-2300 column oven

| | |
|---------------------------------|--|
| Temperature control method | Block heating + Air circulation |
| Temperature setting range | 1-65°C (1°C step) |
| Temperature control range | (ambient temperature - 15) to (ambient temperature + 50) °C (The upper limit is 65°C.) |
| Accuracy of temperature control | ±0.1°C |
| Storage column | Three 25 cm columns max. |
| Outside dimensions/weight | 340 (W) x 400 (D) x 150 (H) mm; approx. 10 kg |
| Power supply/power consumption | 100 V (50 Hz/60 Hz) , 200 VA (Organizer and AC adapter are unnecessary.) |

●L-2350 column oven

| | |
|---------------------------------|--|
| Temperature control method | Block heating + Air circulation |
| Temperature setting range | 1-85°C (1°C step) |
| Temperature control range | (ambient temperature - 15) to (ambient temperature + 65) °C (The upper limit is 85°C.) |
| Accuracy of temperature control | ±0.1°C |
| Time program function | Temperature control, オプションバルブ切替, イベント出力 |
| Storage column | Four 50 cm columns max. (10 mm I.D. or less) |
| Outside dimensions/weight | 210 (W) x 360 (D) x 615 (H) mm; approx. 20 kg |
| Power supply/power consumption | 100 V (50 Hz/60 Hz) , 300 VA (Organizer and AC adapter are unnecessary.) |

●Organizer

| | |
|--------------------------------|--|
| Output | 24 VDC, 300 W; power supply to 2 pumps, 1 auto sampler, and 1 detector |
| Outside dimensions/weight | 340(W) x 400 (D) x 150 (H) mm; approx. 10 kg |
| Power supply/power consumption | 100 V-240 V (50 Hz/60 Hz) , 400 VA |

●L-2400 UV detector

| | |
|--------------------------------|---|
| Optical system | Double-beam ratio photometry |
| Light source | D ₂ lamp and Hg lamp (for wavelength inspection) |
| Wavelength range | 190 nm-600 nm |
| Correctness of wavelength | ±1 nm |
| Noise | 0.6×10 ⁻⁵ AU or less (Wavelength: 250 nm) |
| Drift | 1.0×10 ⁻⁴ AU/h or less (Wavelength: 250 nm) |
| Response | 0.05, 0.1, 0.5, 1, 2, 4, 8 sec |
| Material of wetted part | Quartz glass or fluorocarbon resin |
| Functions for GLP | Date of lamp change, number of lighting times and lighting hours, energy, and automatic wavelength inspection |
| Outside dimensions/weight | 340 (W) x 400 (D) x 150 (H) mm; approx. 11 kg |
| Power supply/power consumption | 24 VDC, 85 VA (supplied from organizer) ※ A separate 120 W AC adapter is required when the Organizer is not provided. |

●L-2420 UV-VIS detector

| | |
|--------------------------------|---|
| Optical system | Double-beam ratio photometry |
| Light source | D ₂ lamp and Hg lamp (for wavelength inspection) |
| Wavelength range | 190-900 nm |
| Correctness of wavelength | ±1 nm |
| Noise | 0.6×10 ⁻⁵ AU or less (Wavelength: 250 and 600 nm) |
| Drift | 1.0×10 ⁻⁴ AU/h or less (Wavelength: 250 and 600 nm) |
| Response | 0.05, 0.1, 0.5, 1, 2, 4, 8 sec |
| Material of wetted part | Quartz glass or fluorocarbon resin |
| Functions for GLP | Date of lamp change, number of lighting times and lighting hours, energy, and automatic wavelength inspection |
| Outside dimensions/weight | 340 (W) x 400 (D) x 150 (H) mm; approx. 11 kg |
| Power supply/power consumption | 24 VDC, 85 VA (supplied from organizer) ※ A separate 120 W AC adapter is required when the Organizer is not provided. |

●L-2450 DAD (Diode array detector)

| | |
|--------------------------------|---|
| Number of photodiode bits | 1024bit |
| Light source | D ₂ lamp and Hg lamp (for wavelength inspection) |
| Wavelength range | 190-900 nm |
| Correctness of wavelength | ±1 nm |
| Noise | 1.5×10 ⁻⁵ AU or less |
| Drift | 0.5×10 ⁻³ AU/h or less |
| Spectrum collection cycle | Selection from 50, 100, 200, 400, 800, 1600, and 3200 ms |
| Material of wetted part | Quartz glass or fluorocarbon resin |
| Functions for GLP | Date of lamp change, number of lighting times and lighting hours, energy, and automatic wavelength inspection |
| Outside dimensions/weight | 340 (W) x 400 (D) x 150 (H) mm; approx. 12 kg |
| Power supply/power consumption | 24 VDC, 85 VA (supplied from organizer) ※ A separate 120 W AC adapter is required when the Organizer is not provided. |

●L-2480 FL detector

| | |
|--------------------------------|---|
| Light source | Xe lamp and Hg lamp (for wavelength inspection) |
| Wavelength range | Excitation side: 200-850 nm Fluorescence side: 250-900 nm (Change of photomultiplier for 731 nm or more) |
| Correctness of wavelength | ±3 nm |
| Spectrum band width | Excitation side: 15 nm; fluorescence side: 15 or 30 nm (variable) |
| Sensitivity | S/N ratio of water Raman: 600 or more (baseline method) and 450 or more (tangential method) |
| Material of wetted part | Quartz glass or fluorocarbon resin |
| Outside dimensions/weight | 340 (W) x 400 (D) x 300 (H) mm; approx. 23 kg |
| Power supply/power consumption | 100 V (50 Hz/60 Hz) , 450 VA (Organizer and AC adapter are unnecessary.) |

●L-2490 RI detector

| | |
|--------------------------------|--|
| Range of refractive index | 1-1.75 RIU |
| Noise | 2.5×10 ⁻⁹ RIU or less |
| Drift | 0.2×10 ⁻⁶ RIU/h or less |
| Response | 0.1, 0.25, 0.5, 1, 1.5, 2, 3, 6sec |
| Temperature control range | 30-50°C, OFF |
| Material of wetted part | SUS316, fluorocarbon resin, pyrex glass |
| Outside dimensions/weight | 340 (W) x 400 (D) x 300 (H) mm; approx. 13 kg |
| Power supply/power consumption | 100 V (50 Hz/60 Hz) , 200 VA (Organizer and AC adapter are unnecessary.) |

Memo