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Hitachi High-Tech
HITACHI

ULTRA HIGH-PERFORMANCE LIQUID CHROMATOGRAPH

ChromasterUltraRS

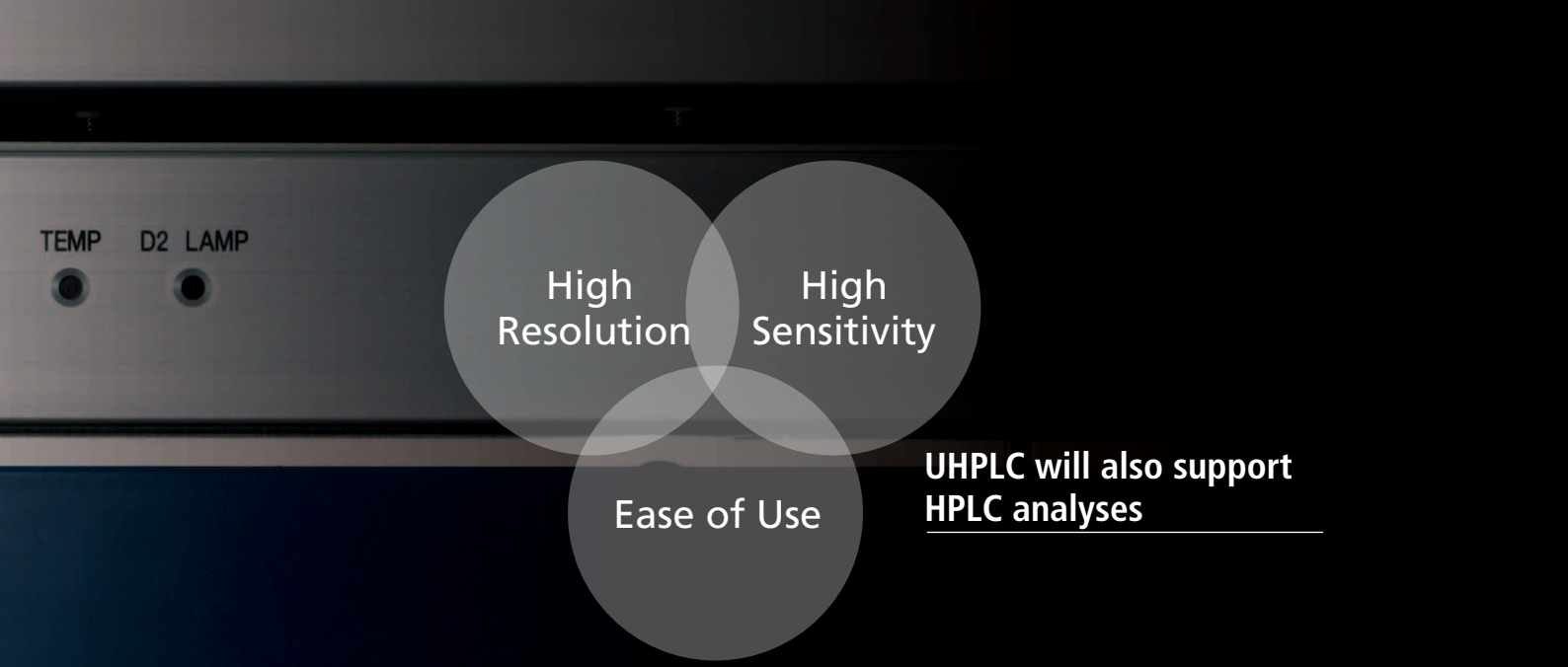
ChromasterUltraRS

Visualize the future

A new UHPLC system designed for a new era.
Indispensable support.

We set out to create an UHPLC system for the future, anticipating coming changes in analysis neads. A system with high resolution and high sensitivity has been achieved through application of our market leading technolgies.

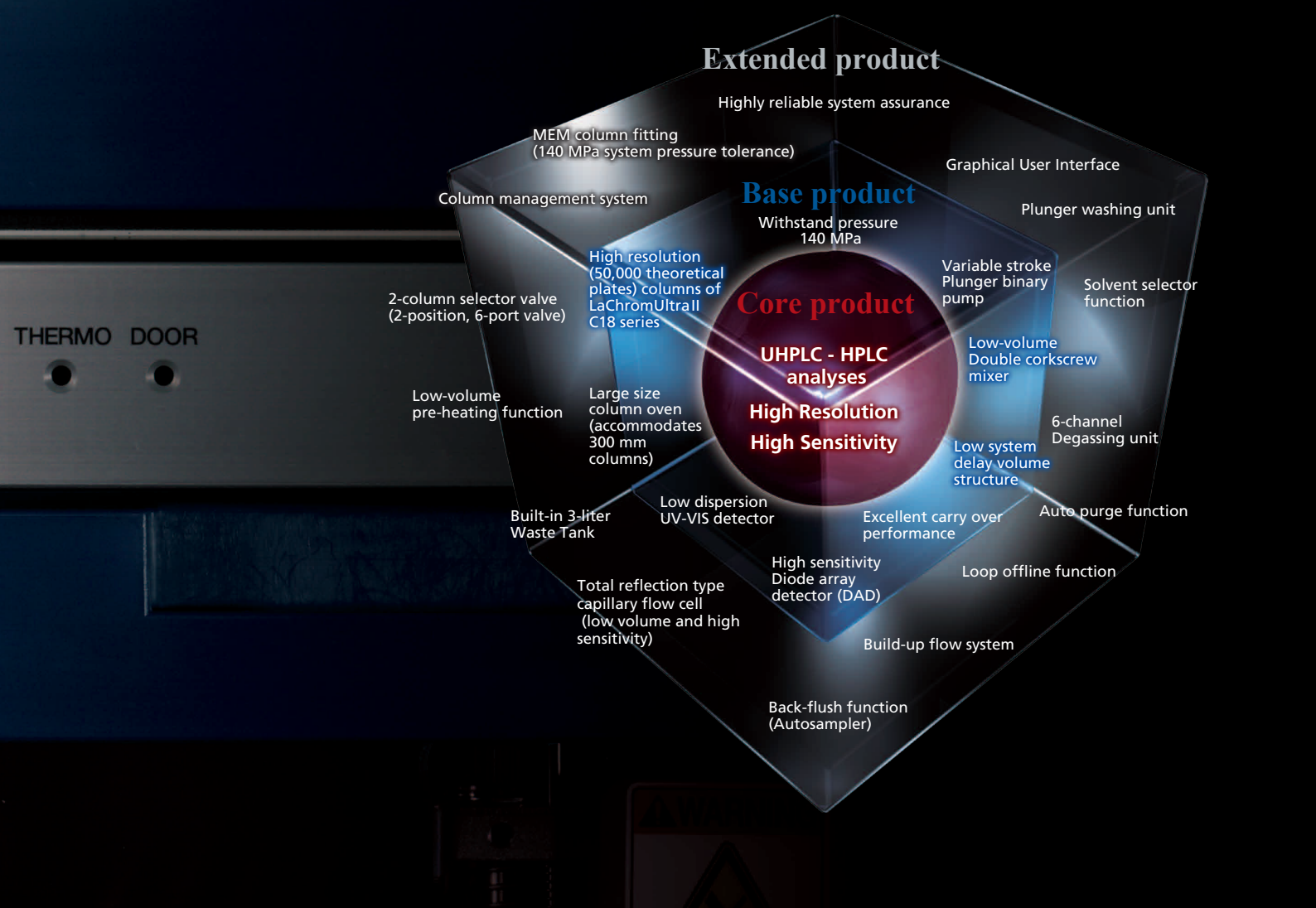
The future of UHPLC starts here and now.



UHPLC will also support HPLC analyses

- High resolution analysis is achieved through the highest pressure system on the market (140MPa, 1400 Bar) combined with the new high resolution LaChromUltra II column (250 mm x 3 mm, 1.9 µm particle size).
- High sensitivity and high resolution stand side by side thanks to the total reflection capillary flow cell design
- A system compatible with both HPLC and UHPLC analyses
- Features designed for operational excellence including the MEM column fitting with 140 MPa system pressure tolerance, the built-in Waste Tank, etc.

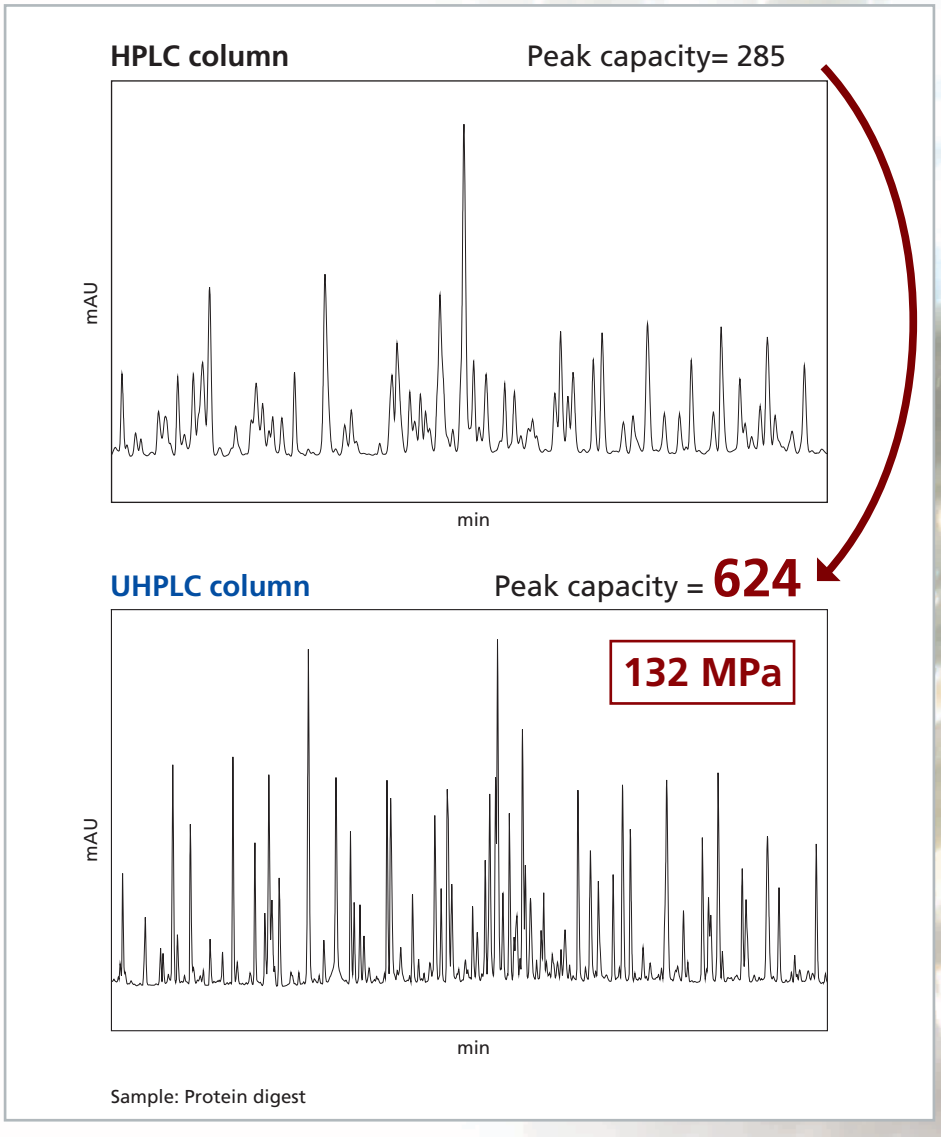
*1: Among models sold in Japan, surveyed by Hitachi High-Technologies as of July 2013



High Resolution

High resolution for even complex samples.

When true separation performance is required, tap into the high resolution analysis that only High Resolution UHPLC can offer.



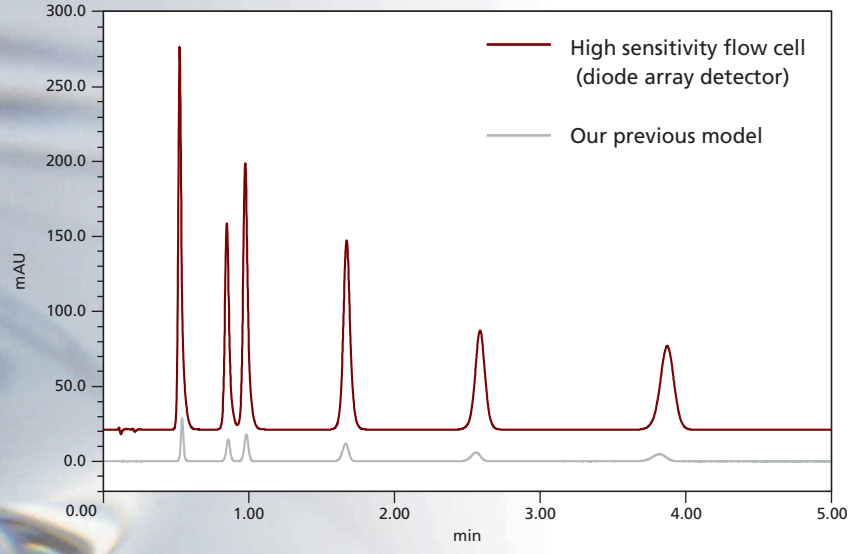
Sample: Protein digest

See P. 9 for details

High Sensitivity

Ideal for related compounds analysis

Lower the risk of missing trace components and impurities.



See P. 11 for details

ChromasterUltra RS

Thorough inspection of individual systems just prior to shipment assures delivery of high quality products

RS Resolution
Sensitivity

Contents

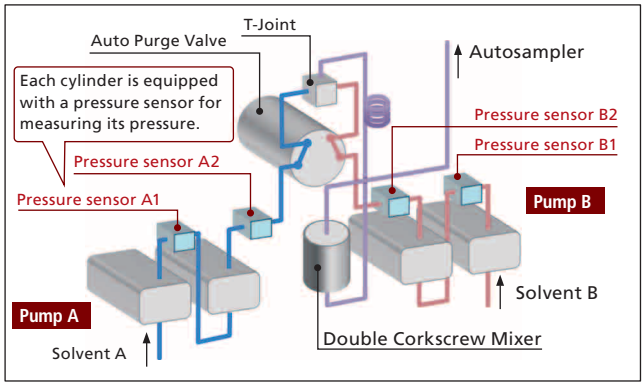
UHPLC will support HPLC analyses

Excellent performance up to 140 MPa system pressure

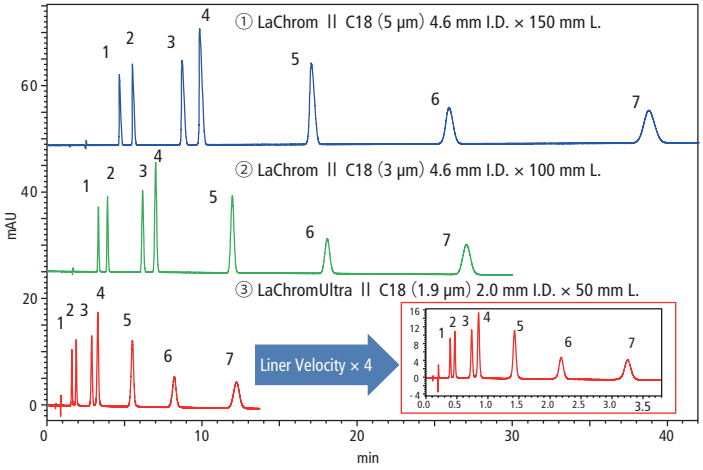
Stable solvent delivery is realized for a broad range of pressure, as high as 140 MPa, by incorporating a new Liquid Beat Technology (LBT) into the Binary pump. Even for gradient analysis under high pressures, highly reproducible analyses are available.
Moreover, ultra fast analyses are supported by improving the gradient response using an extremely low system volume.

Stable solvent delivery allows a broad range of analyses from UHPLC to HPLC

Stable solvent delivery is achieved, independent of pressure and solvent composition, by incorporating LBT control and by correcting the bulk modulus of solvent.
Stable analyses are achieved with columns containing particle sizes between 1.9 µm and 5 µ.



System configuration of Binary pump

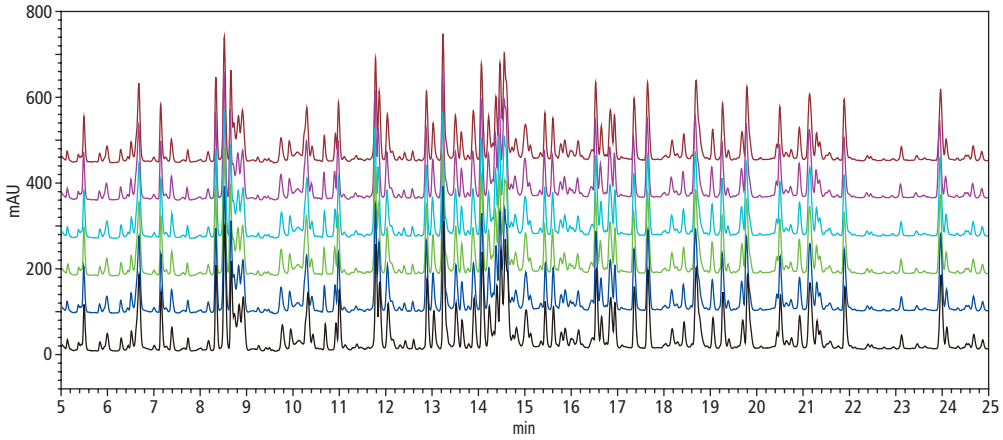


[Conditions]
Eluent: 20 mM KH_2PO_4 / CH_3CN = 95/5
Detection: 274 nm

[Sample]
1. 1-Methyluric acid
2. 3-Methylxanthine
3. 1,3-Dimethyluric acid
4. Theobromine
5. Theophyline
6. β-Hydroxyethyltheophyline
7. Caffeine

Excellent reproducibility

Even for gradient analysis under high pressure conditions, highly reproducible, high resolution results are achieved.



Highly reproducible analyses are also possible for analyses of protein digests, which produce numerous peptide peaks.

[Conditions]
Column: LaChromUltra II C18(1.9 µm)
3.0 mm I.D. × 250 mmL.
Eluent: A)0.05% TFA/H_2O(v/v)
B)0.05% TFA/CH_3CN(v/v)
5%B(0 min)→45%B(30 min)
Flow rate: 0.85 mL/min
Column Temperature: 40°C
Detection: UV 214 nm

[Sample]
Protein digest

High Resolution

Helping you with even higher resolution and better performance

It has been generally accepted that high resolution analyses of impurities and structural analogs of synthetic compounds, such as medicines and chiral molecules, are challenging, even with UHPLC.
Now, however, the newly developed high resolution column, LaChromUltra II, designed for UHPLC applications with system pressures up to 140 MPa can achieve more advanced separation analyses and industry-leading performance.

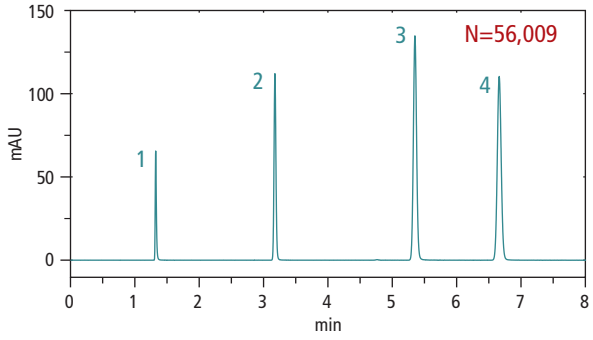
High resolution column for UHPLC applications: Number of theoretical plates of 50,000 per column

For the LaChromUltra II C18 (1.9 µm) column, a high system pressure tolerance of 140 MPa* is realized by using grafted material comprised of organic-inorganic silica, the physical and chemical durability of which is improved compared to the conventional silica gel particle.
The combination of this column and the ChromasterUltra Rs will enable a system pressure tolerance of 140 MPa with 50,000 or more theoretical plates per column.

<Features>
- High system pressure tolerance of 140 MPa*
- Mobile phase selectable for a wide range of pH from 1 to 12
- Ultra high resolution analyses by connecting columns in series

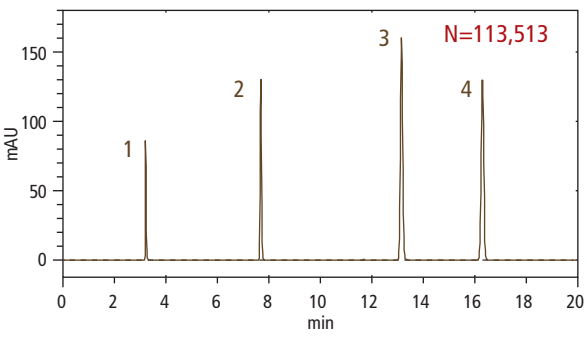
Create 0.5 m UHPLC column!

Column size: 3.0 mm I.D. × 250 mm L.
Flow rate: 0.7 mL/min (72 MPa)



Higher Resolution!

Column size: 3.0 mm I.D. × (250+250) mm L.
Flow rate: 0.7 mL/min **(128 MPa)**



[Conditions]
Eluent: 70% CH_3CN
Detection: UV 270 nm

[Sample]
1. Uracil
2. Methyl benzoate
3. Naphthalene
4. Buthyl benzoate

* Each column has its own recommended flow rate range for analysis, and it is advisable to respect these limits in order to maintain and optimize the separation performance of any column.

Thoroughly minimized system volume

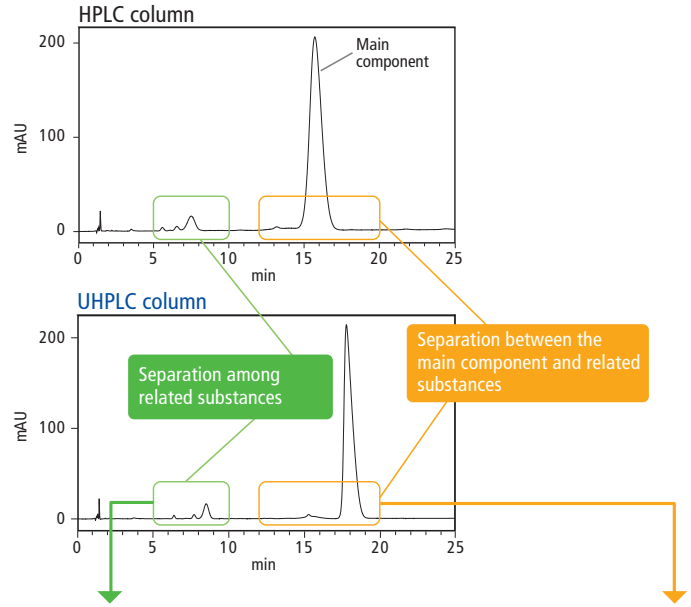
The ChromasterUltra Rs is designed with reduced piping volume and minimized piping length, thereby improving the gradient response and reducing the extra-column dispersion.

Standard total reflection type capillary flow cell (optical path length of 10 mm) for diode array detector

The diode array detector (DAD) is equipped with a standard total reflection type capillary flow cell. Through the incorporation of capillary structure, the flow cell volume and the dispersion within the flow cell are reduced, leading to high resolution separation.

High resolution analyses of related substances (impurities)

Erythromycin (a macrolide antibiotic having a basic structure comprised of a 14-membered ring) is used as a sample model for separation of the main component and related substances to compare the separation using an HPLC column vs. the separation using a UHPLC column.



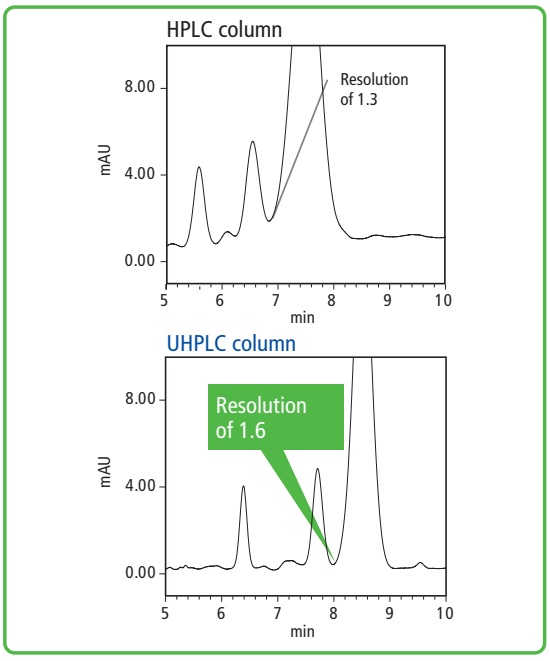
HPLC column

[Conditions]
Column: LaChrom II C18(5 µm) 4.6 mm I.D.×150 mm L.
Flow rate: 1.0 mL/min
Eluent: 20 mmol/L Phosphate Buffer/CH_3CN/CH_3OH=45/40/15
Detection: DAD 210 nm

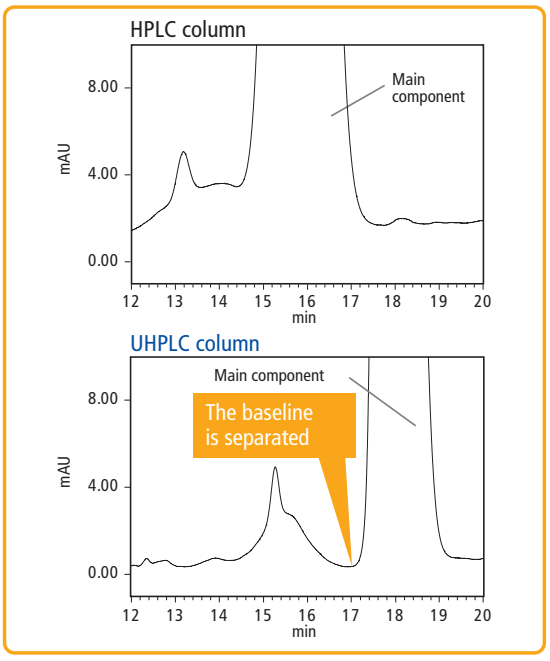
UHPLC column

[Conditions]
Column: LaChromUltra II C18(1.9 µm) 3.0 mm I.D.×250 mm L.
Flow rate: 0.710 mL/min
Eluent: 20 mmol/L Phosphate Buffer/CH_3CN/CH_3OH=45/40/15
Detection: DAD 210 nm

More satisfactory separations are attained by the use of the newly developed high resolution column for UHPLC applications.



Complete separation of related substances



Separation of the main component peak

⋆ The "complete separation" stipulated in the Japanese Pharmacopoeia is resolution of 1.5 or more.

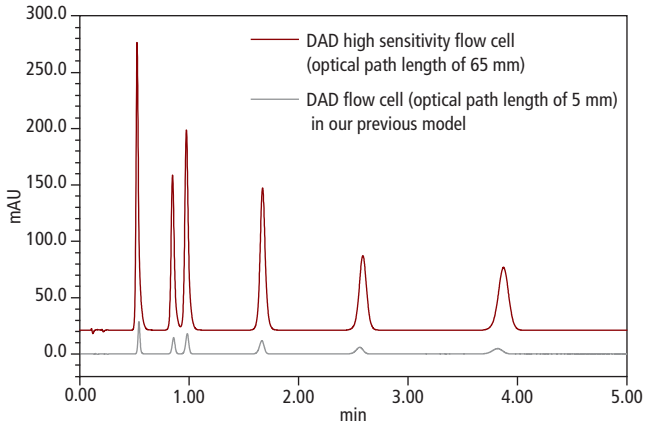
High Sensitivity

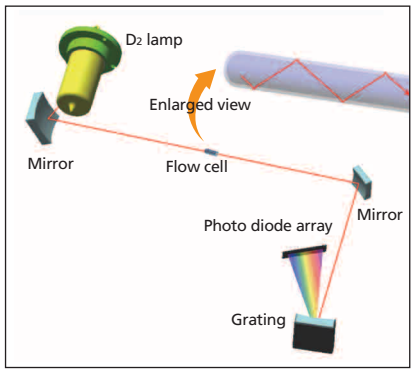
Hidden impurities will not be missed

A total reflection type capillary flow cell is incorporated into the diode array detector to cope with the increasing need for high sensitivity analyses of hazardous substances, genotoxic impurities, etc.
A high sensitivity flow cell with an optical path length of 65 mm is also available. In addition to high sensitivity analyses, carryover is reduced through the use of a double corkscrew mixer.

High sensitivity total reflection type capillary flow cell

The diode array detector (DAD) exhibits low noise and low drift, achieved through the use of a new optical system providing optimal conditions for high sensitivity analysis. The optional high sensitivity flow cell (optical path length of 65 mm) further enhances, sensitivity; about a 10-fold increase is obtained compared with our previous model (LaChromUltra), thus making possible applications including impurities from side-reactions, genotoxic impurities, etc.
The acquisition of impurity profiles during all stages of synthesis and in raw materials used in medicines and chemicals, intermediate by-products, and finished drugs would be one of the useful applications.





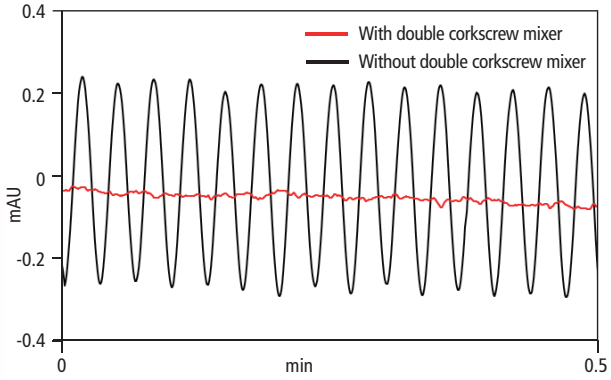
DAD optical system

A quartz glass capillary tube is adopted as the flow cell channel, and the efficient total reflection at the capillary surface is harnessed to minimize the loss of flow cell transmission light. Consequently, even with the elongated optical path length of the flow cell, the baseline performance is comparable to the previous flow cell, resulting in a sensitive detector.

Double corkscrew mixer

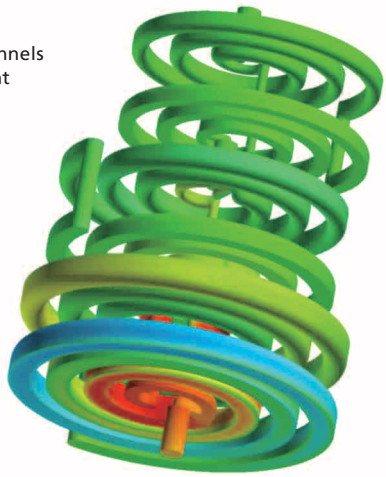
The Binary pump is equipped with the latest design in microfluidic double corkscrew mixers.
An efficient mixture is attained even for a low volume, resulting in a baseline that is extremely stable during gradient analysis, enabling higher sensitivity analysis.

Double corkscrew mixer flow path diagram



[Conditions]
Column: LaChromUltra II C18 (1.9 µm) 2.0 mm I.D.×50 mm L.
Eluent: A) 0.1% TFA/H_2O(v/v)
B) 0.1% TFA/CH_3CN(v/v)
A/B=50/50
Flow rate: 0.500 mL/min
Detection: UV 214 nm

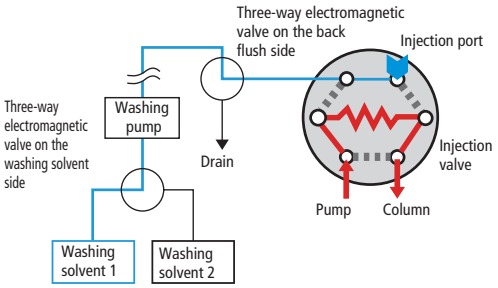
Structure of double corkscrew mixer:
Repeated branching and merging of channels within the mixer provide effective solvent mixing (mixer volume of 55 µL).

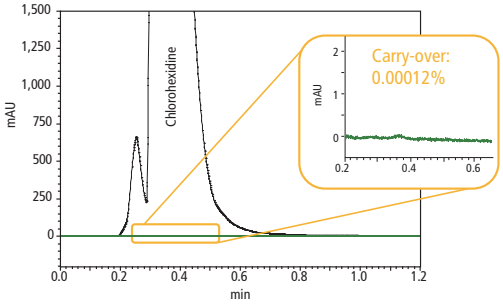


Carry-over

Low carry-over (0.001% or less) is attained via an optimized injection port structure.

- The dead volume of the injection port is reduced
- High flow rate washing is achieved through the use of a washing pump dedicated to the autosampler
- Two solvents are available for washing the needle inner wall as well as the inside of the injection valve
- A back flush function for the injection port is a newly incorporated feature





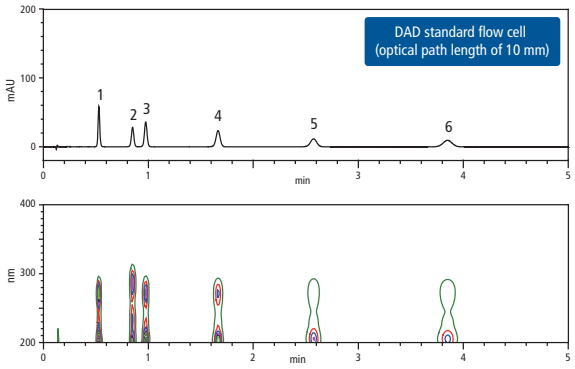
[Conditions]
Column: LaChromUltra II C18(1.9 µm) 2.0 mm I.D.×50 mm L.
Eluent: A) 0.1% TFA/H_2O(v/v)
B) 0.1% TFA/CH_3CN(v/v)
A/B=50/50
Detection: UV 257 nm
Wash Fluid: A/B=50/50

[Sample]
Chlorhexidine

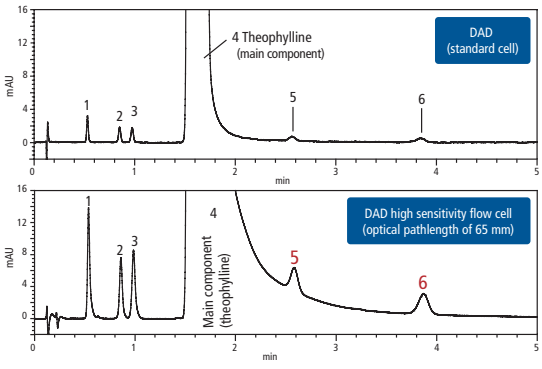
High sensitivity analysis

In developing drug and chemical materials, the characterization of active ingredients and impurities contained in raw materials and final products is an important process. Impurity profiling is achieved when high sensitivity detection of active ingredients and all impurities is complete. As an example, a model sample which contains theophylline as the main component is analyzed for comparing detection sensitivity.

Analysis of standard sample (5 mg/L)



Analysis of model sample

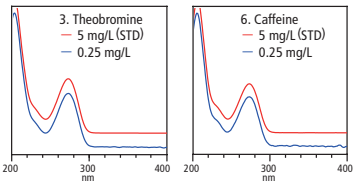


High sensitivity analysis of related substances (0.005% each) spiked into theophylline standard sample

The use of the high sensitivity flow cell demonstrates reliable detection of the related substances (0.005% each).

[Conditions]
Column: LaChrom Ultra II C18(1.9 µm) 2.0 mm I.D.×50 mm L.
Eluent: 20 mM KH_2PO_4 / CH_3CN=95/5
Detection: DAD 275 nm

[Sample]
1. 3-Methylxanthine(3-MX)
2. 1,3-Dimethyluric acid(1,3-DMU)
3. Theobromine
4. Theophylline
5. β-Hydroxyethyltheophylline(β-HET)
6. Caffeine



Qualitative analysis is also possible by spectrum comparison with the standard sample.

Operability

Ease of operation helping your analysis

Daily maintenance and replacement of consumables can be performed from the front side of the instrument, providing enhanced operational efficiency. This includes the replacement of pump plunger seals, check valve cartridges, autosampler injection port seals, the detector lamp, and flow cell. The front access for easy maintenance has been available on Hitachi HPLC products for several years, and has gained favor with users.

Wake up and sleep functions

The auto-purge valve provides automatic switching from purging action to analysis.
Furthermore, the addition of the GUI controller (optional) allows Wakeup (automatic pre-analysis tasks) and Sleep (post-analysis tasks) programs to enhance user efficiency.

Solvent selector

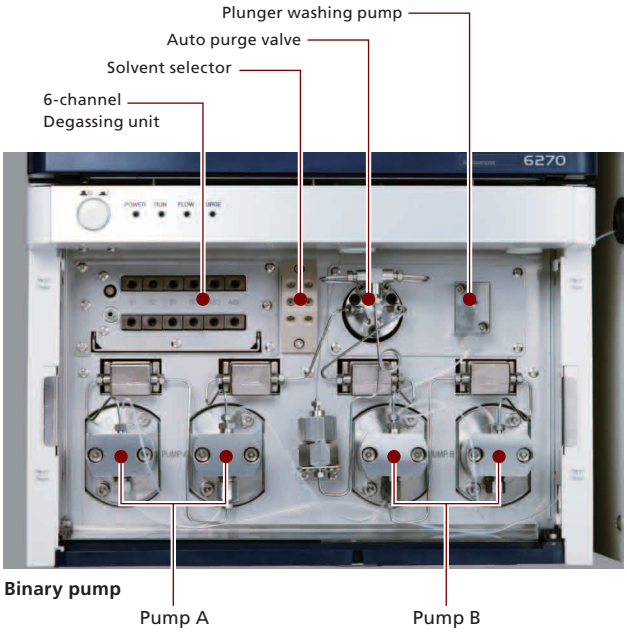
The solvent selector is standard equipment.
Two types of eluent can be selected by either pump.
This is particularly useful during analysis method development.

6-channel Degassing unit

The 6-channel degassing unit can be used for four solvents when the solvent selector is in use and for two solvents for the autosampler.
This feature prevents trouble caused by bubble generation during operation.

Plunger washing unit

Damage to the plungers caused by salt precipitation from buffer solutions or plunger seal wear from debris can be greatly reduced by using the plunger wash unit to perform automatic washes after each analysis.



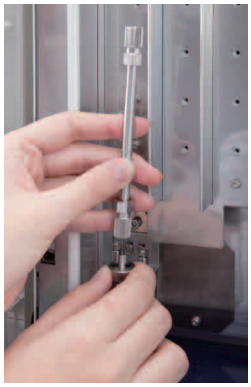
Build-up flow system

This function will minimize damage to the column resulting from rapid changes in the flow rate or column pressure. When pumping starts or during flow rate changes, the system can automatically accelerate or decelerate the flow rate to the set point.

MEM column fitting (optional)

Hitachi's own Moment Enhancing Mechanism (MEM) column fitting is a simple but very useful new development. The finger-tight integral fitting, which has a very small dead volume, is capable of safely tolerating system pressures as high as 140 MPa.

MEM column fitting



A view of operation of attaching a column

High capacity, high precision column oven

The oven temperature can be set within the range from 4°C to 90°C,*1 and the setpoint is reached quickly

- Temperature control: within ±0.1°C over the entire range of temperature settings
- Newly designed, low-volume pre-heating piping is an available option
- Up to three, 300 mm columns can be accommodated.*2

*1: The range of temperature control depends on the ambient temperature.
*2: When MEM column fitting and optional valves are not used.

A view of column oven accommodating columns

Built-in 3-liter Waste Tank

A 3-liter Waste Tank is housed within the column oven.
Typically, a waste solution container is placed underfoot, but now the space for the container can be utilized for other purposes, and safety is also improved.

3-liter Waste Tank

Autosampler with a large-size window

A large-size tinted window (155 mm in height and 280 mm in width) plus a built-in LED lamp allow easy visual confirmation of the operating conditions and the number of samples inside the autosampler during system operation.

A large-size autosampler window

Extensibility

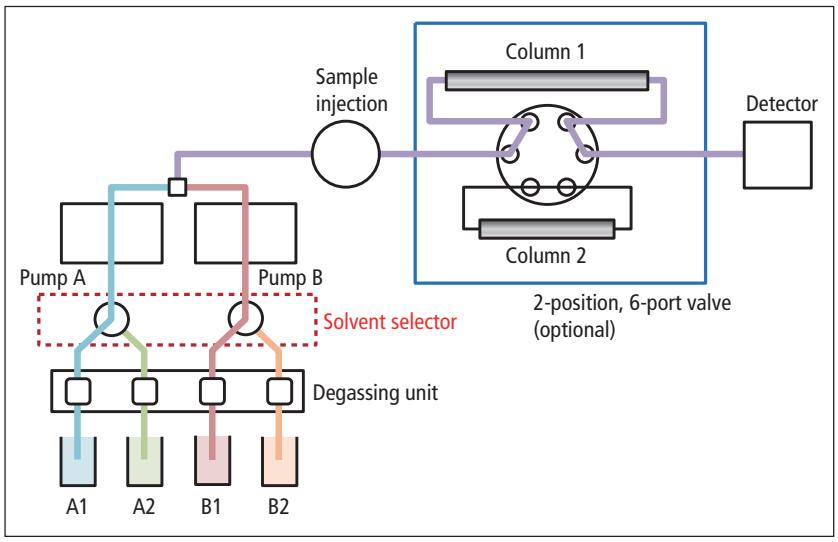
A very high degree of functionality is available to meet a broad

All sorts of features to meet your analytical needs, including column switching, column management, and an intuitive GUI controller, are offered with this system.

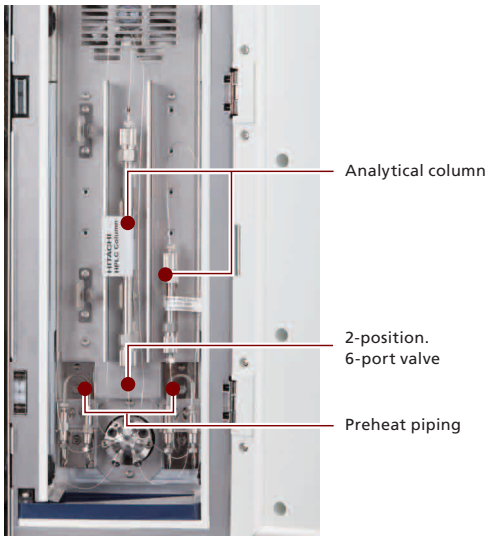
2-position, 6-port valve (optional)*

The column oven, can be fitted with an optional 2-column selector valve.
The combination of column switching and the solvent selector allows testing and analysis of various chromatographic conditions.
(When the 2-position, 6-port valve is incorporated, columns in length up to 250 mm can be used.)

*Other valve options available on request.



Demonstrating the utility of the 2-column selector



Column oven

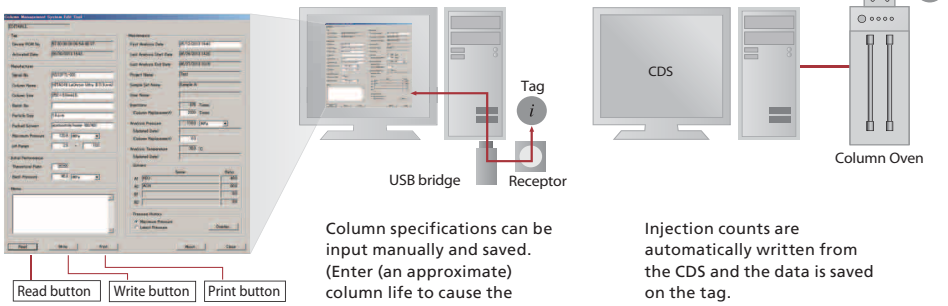
range of analysis needs

Column management system (optional)

The Hitachi column management system can be used to track 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 a USB port in the computer.

* Up to two columns can be fitted at the same time.

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 written from the CDS and the data is saved on the tag.

A view of connector for column management system connected

GUI controller (optional)

All modules can be controlled from the Graphical User Interface (GUI) controller.
The GUI is comprised of a color LCD monitor (5.7-inch color TFT display with LED back-light) and a touch panel makes for easy viewing and simple operation. Up to 10 programs including a timer function, pre-analysis tasks (Wakeup), and post-analysis tasks (Sleep) can be created for a system. The GUI controller enables you to check the status of consumables usage for 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 settings and valve switching
Detector: Lamp on/off and auto-zero

A view of GUI screen display

Operation

Maintenance (GLP)

Conditioning

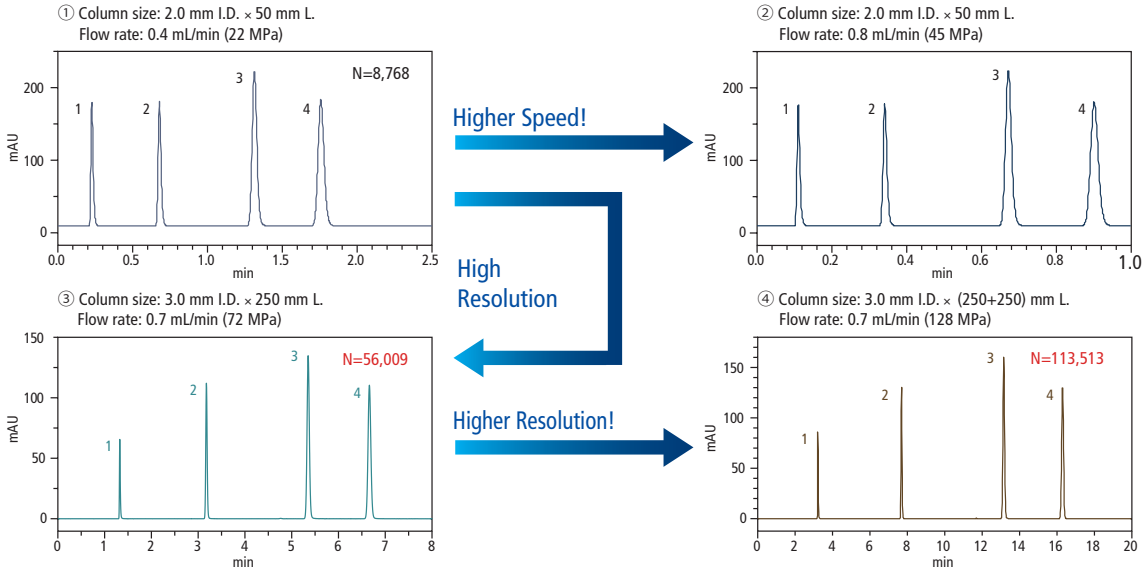
LaChromUltra II series

High resolution performance is attained through a combination of

An inorganic-organic composite type silica material, the physical and chemical durability of which is improved relative to the conventional silica gel particle, is adopted for the LaChromUltra II column. In order to fully utilize the high system pressure of UHPLC, 250 mm long columns with 1.9 µm particles can be lined up in series. The useful application of UHPLC can be expanded to high resolution analyses, and is not limited to ultra high-speed analyses.

HITACHI LaChromUltra II C18 (1.9 µm)

High resolution columns that are capable of attaining 50,000 theoretical plates will prove their capability in demanding applications such as isomer separation, multi-component analysis, etc. Furthermore, with the ChromasterUltra Rs it is possible to attain even higher resolution performance (as high as 100,000 theoretical plates) by connecting two columns of 250 mm in length.



[Conditions]

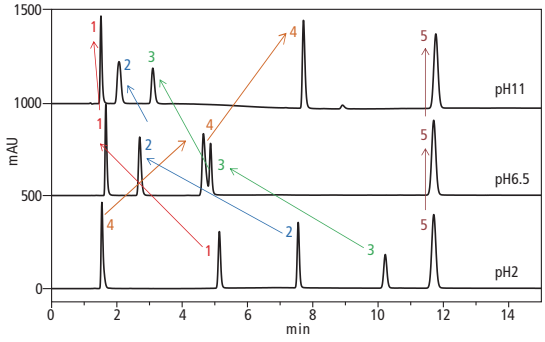
Eluent:	①② 60% CH_3CN ③④ 70% CH_3CN
Column Temperature:	40°C
Detection:	UV 270 nm
Injection Vol.:	①② 1 µL ③④ 2 µL

[Sample]
1. Uracil
2. Methyl benzoate
3. Naphthalene
4. Buthyl benzoate

* Each column has its own recommended flow rate range for analysis, and it is advisable to respect these limits in order to maintain and optimize the separation performance of any column.

"Merits of grafted material comprised of organic-inorganic silica"→ Allow method development under a broad range of pH

The LaChromUltra II (1.9 µm) and LaChrom II (3 µm and 5 µm) columns are superior in not only their system pressure tolerance, but also their peak profile and alkali resistance performance owing to polymeric surface modification. Therefore, these columns allow a broad selection of eluent at different pH values ranging from 1 to 12.
Since a wide range of choices in mobile phase composition is available to the user, the retention and selectivity of ionic compounds can be freely controlled when establishing analytical conditions.



[Conditions]

Column:	LaChrom II C18 (5 µm) 4.6 mm I.D. × 150 mm L.
Eluent:	A) 20 mM Potassium phosphate buffer(pH 2, 6.5, 11) / CH_3CN =95 / 5 B) CH_3CN
Gradient:	B 30% (0min) → 60% (3.5 min) → 60% (15 min)
Flow rate:	1 mL/min.
Column Temperature:	40°C
Detection:	UV 220 nm
Injection Vol.:	10 µL

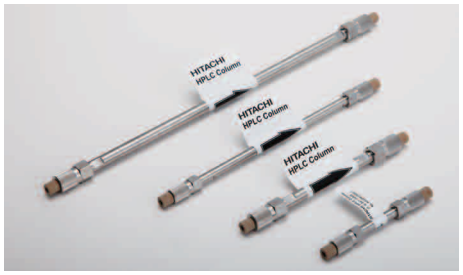
[Sample]
1. Salicylic acid 2. Ketoprofen 3. Ibuprofen 4. Quinidine 5. Naphthalene
(1-3: Acidic compounds, 4: Basic compound, 5: Neutral compound)

ChromasterUltraRs

column robustness and high system pressure

Ordering information

Product description	art.nr.
ChromasterUltra Rs UHPLC system including 6170 Binary Pump, 6270 Autosampler with cooling, 6310 Column Oven, 6430 Diode Array Detector, Organizer (including Interface control board)	903-0400
ChromasterUltra Rs UHPLC system including 6170 Binary Pump, 6270 Autosampler with cooling, 6310 Column Oven, 6420 UV-VIS Detector, Organizer (including Interface control board)	903-0401
Chromaster Ultra Rs 6420 UHPLC UV-VIS Detector with flow cell (path : 5 mm, vol. : 3.2 µl) e-line cable (0.5 m)	903-0402
Chromaster Ultra Rs 6430 UHPLC Diode Array Detector with test flow cell and flow cell (path : 10 mm, vol. : 2.2 µl) e-line cable (0.5 m)	903-0403
ChromasterUltra Rs 6440 Fluorescence Detector	903-0428
Conventional Flow Cell unit for ChromasterUltra Rs 6440 Fluorescence Detector	903-0429
Chromaster Ultra Rs double corkscrew mixer for 6170 binary pump, supplied with system as standard	903-0421
Chromaster Ultra Rs Sample loop kit (40 µl) for 6270 Autosampler, supplied with system as standard	903-0405
Chromaster Ultra Rs Thermostat rack (1.5 ml x 120), supplied with system as standard	903-0406
Chromaster Ultra Rs Sample loop kit (1 µl) for 6270 Autosampler	903-0409
Chromaster Ultra Rs Sample loop kit (100 µl) for 6270 Autosampler	903-0410
Chromaster Ultra Rs Sample loop kit (1000 µl) for 6270 Autosampler	903-0411
Chromaster Ultra Rs Thermostat rack (4 ml x 72)	903-0412
Chromaster Ultra Rs Thermostat rack (1 ml x 195)	903-0413
Chromaster Ultra Rs Thermostat micro plate rack	903-0414
Chromaster Ultra Rs Syringe kit (175 µl) for 6270 Autosampler	903-0415
Chromaster Ultra Rs Syringe kit (700 µl) for 6270 Autosampler	903-0416
Chromaster Ultra Rs 2-position, 6-port valve for 6310 Column Oven	903-0417
Chromaster Ultra Rs Column management system for 6310 Column Oven	903-0418
Chromaster Ultra Rs MEM column fitting for 6310 column oven, supplied with system as standard	903-0422
Chromaster Ultra Rs flow cell unit for 6430 Diode Array Detector (path : 10 mm, vol. 2.2 µl)	903-0423
Chromaster Ultra Rs High-sensitivity 65 mm total internal reflection flow cell for 6430 Diode Array Detector (path 65 mm, vol. 14 µl)	903-0419
Chromaster Ultra Rs GUI Controller	903-0420
Chromaster Ultra Rs flow cell unit for 6420 UV-VIS Detector (path 5 mm, vol. 3.2 µl)	903-0424
Chromaster Ultra Rs conventional flow cell unit for 6420 UV-VIS Detector (path 10 mm, vol. : 13 µl)	903-0425
Chromaster Ultra Rs USB-AID for Chromaster Ultra RS, d-line cable (0.5 m)	903-0426



Hitachi LaChromUltra II series for ultra-fast UHPLC analysis	Particle Ø (µm)	Size (mm I.D. × mm L.)	Cat. N°
Hitachi LaChromUltra II C18 high resolution column with 1.9 µm particle size for high sensitivity and high speed analysis.The superior physical and chemical resistance allows analysis method optimisation under a broad range of mobile phases.	1.9	2.0 × 50	554-4078
		2.0 × 100	554-4079
		2.0 × 150	554-4080
		3.0 × 50	554-4081
		3.0 × 100	554-4082
		3.0 × 150	554-4083
		3.0 × 250	554-4084
		4.6 × 250	554-4085

Hitachi LaChrom II series for HPLC analysis	Particle Ø (µm)	Size (mm I.D. × mm L.)	Cat. N°
Hitachi LaChrom II C18 HPLC column (3 & 5 µm) with the same packing material properties as LaChromUltra II (1.9 µm) allows easy method transfer between HPLC and UHPLC.	3	4.6 × 100	554-4086
		4.6 × 150	554-4087
	5	4.6 × 150	554-4088
		4.6 × 250	554-4089

Technical specifications

6170 Binary Pump	
Gradient type	Binary high pressure gradient
Mechanism	Built-in two double plunger, pump (variable) (binary)
Max. pressure	1400 bar (140 MPa)
System delay volume	120 µl, (pump + 55 µl mixer + AS + 40 µl injection loop + detector)
Mixer volume	55 µl (double corkscrew mixer), two mixers delivered as standard. additional double corkscrew mixer can be added giving a total volume of 110 µl
Settable flow rate range	0,001 - 2,000 ml/min. up to 1400 bar (140 MPa) 0,001 - 2,500 ml/min. up to 800 bar (80 MPa) 0,001 - 5,000 ml/min. (purge)
Flow rate accuracy	10 µl/min. or ±1,0% (0,200 - 2,500 ml/min. water)
Flow rate precision	SD 0,005 min or RSD 0,06% (1 ml/min.)
Pressure pulsation	< 1% or 0,5 MPa (water)
Composition precision	0,15% RSD or SD 0,01 min. (water/water + caffeine)
Composition accuracy	±0,5% (5 - 95%) (1 ml/min, water/water + caffeine)
Composition time setting	0,01 min.
Composition rate setting	0,10%
Solvent selector	Standard
Eluent number	4 (2 for each pump)
Degassing unit	6 ch. (standard, 2 ch. for 6270 autosampler wash)
Seal wash mechanism	Standard
Auto purge valve	Standard
Composition ripple	≤0,1 mAU (55 µl mixer, DAD) A: H2O + 0,1%TFA, B: ACN + 0,1%, TFA, 0.5 mL/min, A:B = 45:55 at 25°C

6270 Autosampler	
Max. pressure	1400 bar (140 MPa)
Injection vol.	0,1 to 20 µl (cut) (standard) 0,1 to 50 µl (cut) (optional) 0,1 to 500 µl (cut) (optional)
Injection vol. precision	Cut injection method ≤0,15% RSD (10 µl) ≤0,5% RSD (1 µl) All volume injection method ≤0,7% RSD (1 µl)
Carryover	<0,001% (sample: caffeine)
Sample capacity	195× 1 ml (option) 120× 1,5 ml 72× 4 ml (option) 2× MTP (96, 384) (option)
Injection vol. accuracy	±2% (20 µL, n = 25)
Linearity	≥0,999
Min. injection operating time	25 sec. (condition) Default condition Time between start of autosampler and switch of injection valve
Washing function	Two liquid washing function for back flush of injection port Two-solvent washing for the needle inner surface One solvent for outer surface
Thermo function	Standard (1 - 45°C)
Automatic Pre-analysis/post-analysis tasks function	Programmable via touchscreen Graphical User Interface (GUI)
Loop offline function	Standard

6310 Column Oven	
Control system	Peltier block cooling/heating with air circulation
Temperature setting range	4 - 90°C
Temperature accuracy	±0,5°C with calibration (20 - 50°C) ±1,0°C with calibration (50 - 90°C)
Temperature precision	±0,1°C (20 - 90°C)
Warm-up/ cool-down time	4 min. from ambient (= 25°C) to 40°C 9 min. from 40°C to 20°C at ambient (= 25°C)
Column capacity (without switching valve)	3x 250 mm length columns (max. 1400 bar, with MEM column fitting) 3x 300 mm length columns (with PEEK fitting)
Option valve	2-position/6-port valve
Easy column setting	Tool-less universal fitting Moment-Enhancing Mechanism (MEM) column fitting max. pressure: 1400 bar (140 MPa)

6430 DAD	
Light source	D2 (Hg for automatic wavelength check)
Wavelength range	190 - 650 nm
Detector type	1,024 bit
Wavelength accuracy	±1 nm
Spectral bandwidth	1/2/4/8/16 nm
Flow cell metric volume	Total reflection flow cell 2,2 µl (standard) 10 mm 14 µl (optional) 65 mm
Noise	0.5 x 10-5 AU or less (4 nm, TC=2 s at 250 nm) (Reference method is used when using 0.5 ml/min methanol)
Drift	0.4 x 10-3 AU/hr or less (at 250 nm, environment within 2°C/h)(Reference method is used when using 0.5 ml/min methanol)
Linearity	2,0 AU (5%)
Data rate	100 Hz (10 ms)
Cell max. pressure	60 bar (6 MPa)

ChromasterUltraRs

VWR tools for chromatographers

Application Services

Our applications chemists are highly experienced in the development and optimisation of HPLC and UHPLC methods, and provide the following services:

- Application advice
- Optimisation of existing methods
- Development of new methods
- Transfer of methods from standard HPLC systems to the ChromasterUltra Rs
- Scale-up of analytical methods to preparative HPLC
- Development and adaptation of special methods
- On-site application support
- Advice on method validation

VWR Chrom-Application library

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- Every month new applications are added
- Easy to search by full text and filter functions
- Application support from our own application labs
- Main columns used ready to order

Unique set of applications

Owing to our broad chromatography portfolio we can offer a variety of applications using the most suitable instruments, columns, chemicals and supplies. You can simply look at the overview or download the complete application. If you like, you can then order the main column used via our webshop. If you can't find what your looking for, simply ask us!

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VWR can provide training on a number of topics: Introduction to HPLC analysis; application tips, tricks and troubleshooting; operation of the VWR-Hitachi and other HPLC systems; training for different chromatography data systems along with other special software tools.
Training courses can be held either at VWR headquarters or "in-house".
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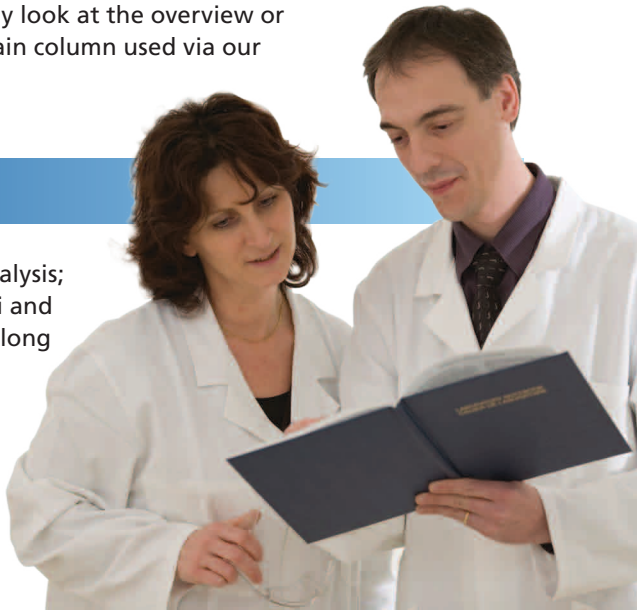

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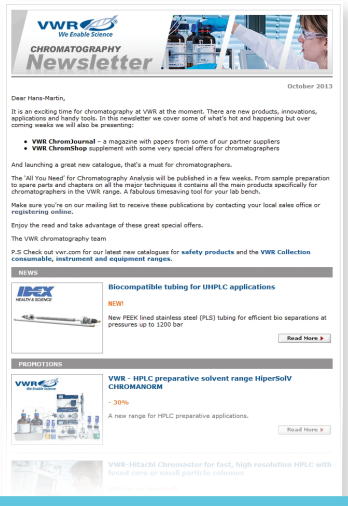
A team of software specialists is on hand to support your chromatography data systems, handle the installation and validation of your workstation or client/server systems supporting these systems through their life cycle.

NEW! PC's and accessories for the chromatography lab

HP or Dell PCs pre-configured for use with VWR-Hitachi HPLC systems and with OpenLAB CDS EZChrom edition software pre-installed. Other PCs, accessories like monitors and printers, software such as Microsoft® Office or Windows® XP plus IT services are available on request.



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Regular expert maintenance keeps your analytical systems reliable and maintains the value of your investment. A maintenance contract increases the overall productivity of the system and generates more time for the user for other important tasks. Such a maintenance contract can be adapted to frequency of maintenance and qualification and to the type of work performed.

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5. **Priority treatment**
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