

Preparative HPLC

LC-4000 Series Fraction Collection System



Performance
Innovation
Reliability



The LC-4000 Series Preparative HPLC system has been developed to offer a flexible approach to isolation and purification of a wide range of target analytes with diverse chemistries from simple molecules to complex natural products. The key elements of the system are carefully matched to the user's requirements, including sample scale, chemistry and fractionation.

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Introduction to purification and isolation

Choosing a system for preparative HPLC requires careful consideration of the sample chemistry and the potential separation that can be readily achieved. Column chemistry and separation parameters can be easily determined using an analytical HPLC column, and scaling factors can be applied.

When selecting a column for preparative scale separation, the parameters to consider are particle size, inner dimension and length. Particle size determines the sample loading capacity and resolution; smaller particles provide greater surface area but cause increased back pressure.

Wider columns contain more packing material (as the inner diameter doubles, the volume increases by a factor of 4), offering higher sample loading. Longer columns offer more resolution but also increase back pressure.

The optimal column will have the largest practical particle size with the shortest length to achieve separation. It is important to maintain linear velocity in the column. If larger columns are used with a low flow rate, band broadening may occur due to diffusion. It is important to match the pump flow rate to the column type.

Capacity *	Column ID	Particle size	Flow rate
For method development	4.6 mm	5, 10 μm	1 - 2 mL/min
10s to 100s mg	10 - 20 mm	5, 10 μm	5 - 40 mL/min
100s mgs to grams	50 mm	10, 20 μm	approx. 100 mL/min

* These values are theoretical and should be used only as a guide.

Solvent delivery and recycling

The scale of the solvent delivery depends on the quantity of material to be isolated and purified. Once this is determined, the column that will define the relevant flow rate range can be selected. The solvent delivery systems used in the LC-4000FC Series include the following:

PU-4180

flow rate up to 10mL/min, max. pressure 70 MPa

PU-4086

flow rate up to 20mL/min, max. pressure 50 MPa

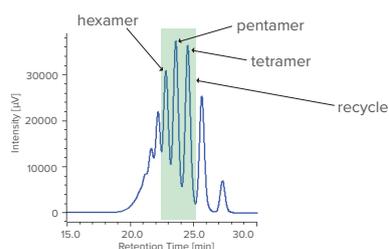
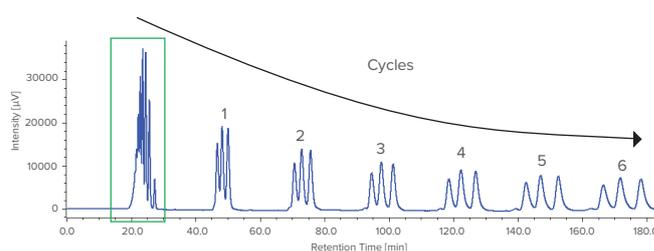
PU-4087

flow rate up to 50mL/min, max. pressure 30 MPa

PU-4088

flow rate up to 100mL/min, max. pressure 30 MPa

Each of the pumps can be configured for isocratic or binary solvent delivery with an optional online vacuum degasser. The RCY-4000 recycle option can be used to cycle the peaks through the column until the separation is improved sufficiently to provide optimum recovery.



Recycle option:
Resolve closely eluting peaks for improved isolation and recovery.

Sample injection and autosamplers

Sample injection can be done either manually using a simple injection valve or automatically using an autosampler. The simplest manual injector is the 7725i manual injector with a range of loop sizes up to 10mL.

There are 3 autosampler options depending on the number of samples and injection volume required... The autosamplers have a preload feature that eliminates the wait time between injections, saving time and solvent usage / costs.

AS-4050

60-sample autosampler

100 µL injection volume with 1 mL option

AS-4150

180-sample autosampler

100 µL injection volume with 1 mL option

AS-4058

Large-volume autosampler

Injection volume 5 mL with 10 mL option



Pumps and detectors

The comprehensive range of pumps and detectors can be used to isolate and purify virtually any type of compound. Multiple detection techniques can be used on one system for advanced identification and purification.



UV-4070/4075

UV-visible detector

Wavelength range: 190 to 600 nm (or 900 nm), with short path length prep flow cells



MD-4010/4015

UV-visible PDA detectors

Wavelength range from 190 to 650 nm (or 900 nm) with short path length prep flow cells



FP-4025

Fluorescence detector

Single- or dual-wavelength excitation and emission



RI-4030

Refractive index detector

High flow rate capability (up to 100 mL/min)



CD-4095

Circular dichroism detector

Two-pump binary gradient



PU-4086

Recycle pump

Recycle switching unit with recycle valve

Mass-directed fractionation

expression CMS
Single quadrupole mass spectrometer
For mass-directed fractionation



ChromNAV FC software suite

Instrument control

Control up to four systems simultaneously. The LC-NetII/ADC is the hardware interface between your PC and the system components. Up to four channels of analog data can be acquired by each LC-NetII/ADC.

Select detection signals

Configure up to four chromatogram channels for controlling fractionation. This allows the user to select signals from multiple detectors to select a variety of peak start and end options for the fraction.

For complex separations, this allows the user to select different detectors for target analytes where they may have different optical properties. This is especially useful for compounds which have no chromophore or may require a more selective detector such as fluorescence or mass spectrometry.

Smart fractionation

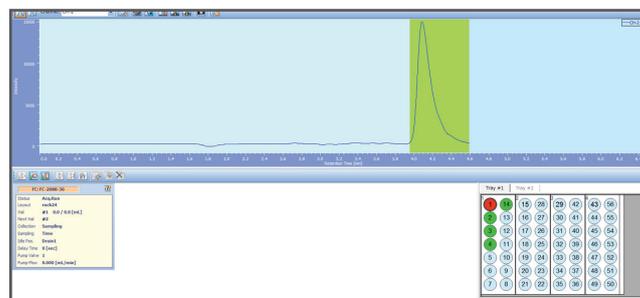
Boolean logic can be applied to the detection signal for each fraction channel. Combining slope, threshold and time with both positive and negative signals (useful for chiral and refractive index detectors) offers a wide array of peak detection parameters.

Fraction simulation

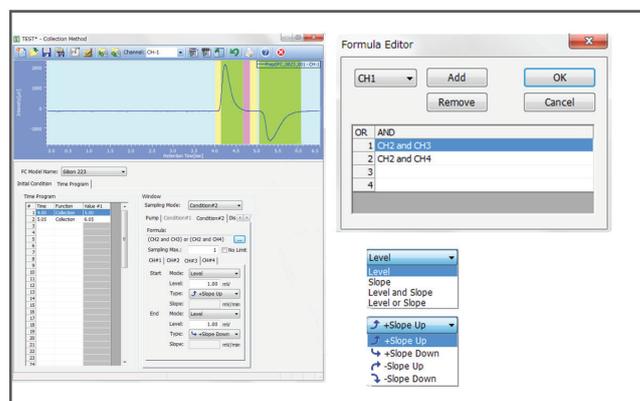
For simple setup of the fractionation conditions, ChromNAV FC includes a graphical simulation, a previously acquired chromatogram is used to define and review the fractionation parameters, these are then saved in the fractionation method for simpler future purifications.

Powerful data analysis

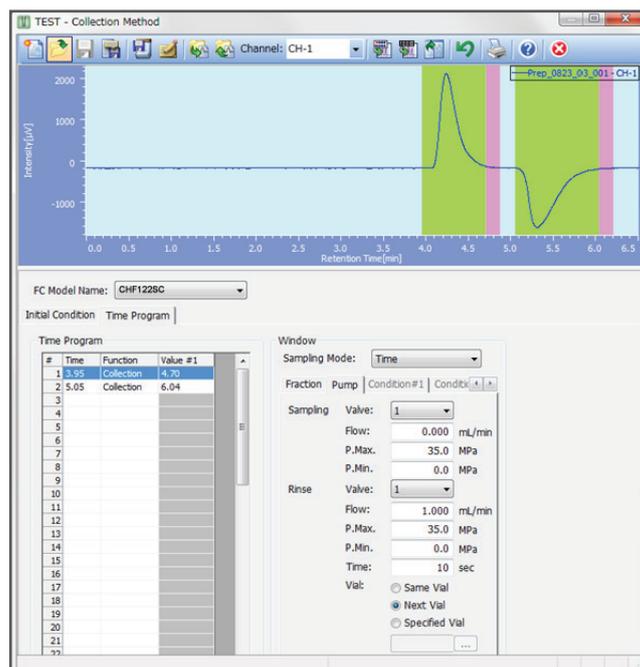
ChromNAV includes all standard chromatography calculations, such as reliable peak integration and identification, powerful and easy quantification, a quick user-defined reporting format and versatile data conversion for data export. Peak calculation results can be sent to Microsoft® Excel automatically.



Identify peak positions in the sample tray.



Set parameters for powerful fractionation control.



Use fraction simulation to identify sample peaks.



FAST & FLEXIBLE FRACTION COLLECTION

Experience precise control with the CHF122SC fraction collector. The XYZ sample bed, with a flexible tray configuration, supports everything from 96 well plates and test tubes to large-scale bottles. Use the three-way diverter valve to switch the eluant to waste between fractions, speeding up the movement from sample to sample and preventing eluant drips onto the sample tray.



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Products described herein are designed and manufactured by ISO-9001- and ISO-14001-certified JASCO Corporation