
To effectively turn your everyday challenges into competitive advantages, accept no substitutions for Waters Purification. Because only Waters workflow solutions are powerful enough to streamline the entire process. Find the system that’s right for your lab.

Visit waters.com/prep
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LC Prep Product Portfolio Overview

From semi-automated modular systems to fully automated mass directed systems, Waters’ solutions are fully adaptable.

**LC PREP AUTOPURIFICATION SYSTEMS**
- Unique dual flow path for analytical to preparative scale on the same platform
- Sophisticated solution for complex purification needs
- High throughput
- UV and mass spec direction fraction collection

**LC PREP 150 SYSTEM**
- Basic prep system
- Analytical to preparative scale
- A simple solution ideal for simple purification needs
- Low to medium throughput
- UV and mass spec directed fraction collection

**LC PREP MODULAR SYSTEMS**
- Analytical to preparative scale
- Various detection, injection methods and solvent delivery managers to achieve the functionality and capacity required
- Low to medium throughput
- UV directed fraction collection
LC PREP AUTOPURIFICATION SYSTEMS
Waters’ advanced AutoPurification HPLC System offers robust, scalable solutions for every purification requirement. The flexible, expandable platform grows with your lab’s needs – from UV-based fraction collection of a few dozen samples to mass-directed purification when your workflow demands high-throughput, parallel runs for selective fraction collection of hundreds of samples.

KEY TECHNOLOGIES
- Automatically process hundreds of samples, or just a few, with configurable UV/Vis or MS-directed detection options
- FractionLynx™ Application Manager automates purification processes, tracks samples/fractions, and presents results in an easy-to-view format
- User-friendly software features help you manage solvents and samples, whether you do manual or automated injections
- ACQUITY™ QDa™ Detector enables the selectivity required to maximize throughput and efficiency
LC PREP 150 SYSTEM
Waters LC Prep 150 System has been designed as a dedicated purification system, enabling quick compound isolation with performance you can rely on. Versatile systems satisfy low throughput requirements of only a handful of samples to higher throughput needs with unattended operation. Tailored systems controlled by intuitive easy-to-navigate software suit your purification scale requirements of milligrams to grams.

KEY TECHNOLOGIES
- ChromScope™ Software provides simplistic system control with robust functionality designed with helpful tools to increase efficiency
- Flexible solvent delivery systems provide gradient mixing, large sample volume loading, and flow rates up to 150 mL/min
- Manual or automated injectors satisfy workflow and throughput requirements
- Analytical to preparative scalability are available to accommodate your laboratory purification needs
- UV or mass-directed fraction collection

LC PREP MODULAR PURIFICATION SYSTEMS
Waters' complete line of modular purification solutions are perfectly suited for purifying a limited number of samples that do not need the advanced features or automation of a full preparative system. Satisfying analytical to preparative scale workloads, these systems offer various detection, injection methods, and solvent delivery managers to achieve the functionality and capacity your application requires.

KEY TECHNOLOGIES
- With either manual or automated injection capability, system configurations can vary by throughput and scale requirements
- Flexible solvent delivery capabilities with flow rates up to 300 mL/min
- Flexible collection formats designed for use in both small-scale and large-scale work environments
- User-friendly console and software features help you manage solvents and samples, whether you do manual or automated injections
SFC Prep Product Portfolio Overview

Waters’ scalable, environmentally friendly systems satisfy the most challenging purification needs while minimizing costs.

**SFC PREP 150 AP SYSTEM**
- Leverage automated sample handling, column switching, fraction collection and tracking for fast separations, high resolution and high throughput
- Support a robust, efficient, and cost-effective open access

**SFC PREP 150 MGM SYSTEM**
- Ideally designed for high-throughput, semi-prep to preparative scale purifications made for repeat injection
- Easily operate at higher flow rates than traditional HPLC without significant increase in back pressure
- High speed SFC purification and improved resolution of compounds for higher purity isolations

**SFC PREP 350 SYSTEM**
- Ideally suited for large compound campaigns
- Modified stream injection improves sample loading without peak distortion caused by strong solvent effects
- Stacked injection capability improves isocratic purification productivity

**SFC PREP INVESTIGATOR SYSTEM**
- For analytical scale development and preparative scale purification
- Fast method development and scale-up on the same system

**SFC PREP 15 SYSTEM**
- Versatile automated and high-throughput platform
- Perform a complete purification process: analytical method development/optimization, semi-preparative purification, and post-purification fraction analysis
SFC PREP 150 AP SYSTEM

Bringing increased efficiencies and productivity to purification laboratories, the SFC Prep 150 AP System is perfectly suited to those high-throughput laboratories seeking to adopt a greener approach to purification. With flow rates up to 100 mL/min, the system is ideally suited for high throughput library compound purification, isolation of low-level impurities, and target compound isolation in complex sample matrices. With the addition of the ACQUITY QDa Detector, the benefits of mass directed SFC purification have just become more attainable. While retaining the high specificity and sensitivity essential to MS directed purification, its intuitive user interface and small footprint make the ACQUITY QDa Detector a natural fit for the SFC Prep 150 AP System.

KEY TECHNOLOGIES

- 2545 QGM Pump provides accurate solvent delivery for applications that require low co-solvent percentage and improved gradient chromatography, combined with P200X CO₂ pump to deliver total flow of up to 150 mL/min
- Column oven, with unique pull-out drawer design for easy access, supports up to six, 2 to 3 cm preparative columns
- ACQUITY QDa Detector offers information-rich detection and efficient mass triggering
- Gas-liquid separator enables open bed collection with uncompromised recovery
- Optional stacked injection improves isocratic purification productivity
- MassLynx™ Software with FractionLynx Application Manager can manage and automate sample purification process

SFC Prep 150 AP System with ACQUITY QDa Detector.
SFC PREP 150 MGM SYSTEM
With their leading performance in chiral compound purification and cost benefits, the Waters’ suite of bulk purification SFC systems, including the SFC Prep 150 Mgm System, have led the way in pushing the boundaries of prep SFC applications beyond traditional isocratic chromatography. Featuring best-in-class pump technology, the system provides superior accuracy in mobile phase delivery at low co-solvent percentage and low flow rates to maintain chromatographic fidelity, and enable purification of many historically challenging, low retentive compounds as well as improved gradient chromatography for complex samples. This bulk purification SFC system is suitable for isolation and purification of up to six target compounds from milligram to 100’s grams scale.

<table>
<thead>
<tr>
<th>Prep SFC 150 Mgm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal column I.D.</td>
</tr>
<tr>
<td>Recommended total flow rate</td>
</tr>
<tr>
<td>Typical throughput</td>
</tr>
<tr>
<td>Fractions</td>
</tr>
</tbody>
</table>

KEY TECHNOLOGIES
- 2545 QGM Pump provides accurate solvent delivery for applications that require low co-solvent percentage and improved gradient chromatography
- Patented modifier stream injection improves sample loading without peak distortion caused by strong solvent effects
- Stacked injection improves isocratic purification productivity
- Low pressure collection assembly offers easy operation and easy clean up to minimize carryover, ideally suited for small to medium size purification campaigns
- Enhanced, easy-to-use ChromScope Software allows maximum flexibility for instrument control, method programming, stacked injection capability, and data analysis
SFC PREP 350 SYSTEM

One of the largest lab-scale SFC purification systems on the market, Waters SFC Prep 350 System is slated for 100’s gram to kilogram scale compound purification. Ruggedness, simplicity, and productivity are the key principles reflected throughout the instrument design. Classic cyclonic collection is easy-to-use and durable, ideally suited for large compound campaigns. Modified stream injection and stacked injection capability are also featured in the SFC Prep 350 System for high productivity.

<table>
<thead>
<tr>
<th>Prep 350 SFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal column I.D.</td>
</tr>
<tr>
<td>Recommended total flow rate</td>
</tr>
<tr>
<td>Typical throughput</td>
</tr>
<tr>
<td>Fractions</td>
</tr>
</tbody>
</table>

KEY TECHNOLOGIES

- Modifier stream injection improves sample loading without peak distortion caused by strong solvent effects
- Stacked injection improves isocratic purification productivity
- Cyclonic collection is easy-to-use and can be integrated with Waters CO₂ recycler for improved cost-effectiveness
- CO₂ bulk delivery system (BDS) enables cost savings and improves energy efficiency
SFC PREP 15 SYSTEM
The SFC Prep 15 System is a versatile automated and high throughput purification platform capable of performing a complete purification process, including analytical method development/optimization, semi-preparative purification, and post-purification fraction analysis. Enabled by its patented gas-liquid separator (GLS), the system adopts an open-bed collection format that’s familiar to many LC purification users and can be seamlessly incorporated into their existing purification workflow. The optional ACQUITY QDa Detector allows for fraction collections with high specificity, improving overall purification productivity.

KEY TECHNOLOGIES
- Fluid Delivery Module (FDM) supports flow rates up to 15 mL/min for both the CO₂ and co-solvent, suitable for both analytical and semi-preparative applications
- Column oven, with unique pull-out drawer design for easy access, houses up to 10 analytical and columns of 4.6 mm or 10 mm I.D.
- Automated sample handling and column switching
- Patent-pending gas/liquid separator for open-bed collection
- Fully automated MS- or UV-directed fraction collection
- MassLynx Software and FractionLynx Application Manager streamlines the purification process, from analytical to preparative
- ACQUITY QDa Detector offers information-rich detection and efficient mass triggering

SFC PREP INVESTIGATOR SYSTEM
The SFC PREP Investigator System, capable of performing both analytical scale method development and semi-preparative purification, offers a flexible SFC platform for a wide variety of applications, allowing for fast method development in an automated fashion. Once the optimal chromatographic parameters, including mobile phase, stationary phase, temperature, and pressure, are determined from analytical screening, the method can be easily scaled up for purification on the same system.

KEY TECHNOLOGIES
- Optional mass detection for information-rich sample analysis and characterization
- Fluid Delivery Module (FDM) supports flow rates up to 15 mL/min for both the CO₂ and co-solvent
- Column oven, with unique pull-out drawer design for easy access, supports up to 10 columns of 4.6 mm or 10 mm I.D.
- Enhanced, easy-to-use ChromScope Software allows maximum flexibility for instrument control, method programming, stacked injection capability, and full spectra acquisition/data analysis
- Fraction Collection Module accommodates up to 12 collection vessels
Purification System Components

LC Solvent Managers
Waters’ reliable and robust solvent managers provide a wide range of capabilities for purification.

<table>
<thead>
<tr>
<th>Typical column I.D. (mm)</th>
<th>Max flow rate (mL/min)</th>
<th>Solvent manager</th>
<th>Sample load</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 to 19.0</td>
<td>22.5</td>
<td>1525</td>
<td>µg to tens of mg</td>
<td>MassLynx or Empower™</td>
</tr>
<tr>
<td>4.6 to 30.0</td>
<td>50.0</td>
<td>2535 Quaternary Gradient Module</td>
<td>mg to g</td>
<td>MassLynx, Empower, or stand-alone console software</td>
</tr>
<tr>
<td>4.6 to 50.0</td>
<td>150.0</td>
<td>2545 Quaternary Gradient Module</td>
<td>mg to g</td>
<td>MassLynx, Empower, ChromScope, or stand-alone console software</td>
</tr>
<tr>
<td>4.6 to 50.0</td>
<td>150.0</td>
<td>2545 Binary Gradient Module</td>
<td>mg to g</td>
<td>MassLynx with FractionLynx Application Manager or ChromScope</td>
</tr>
<tr>
<td>7.8 to 75.0</td>
<td>300.0</td>
<td>2555 Quaternary Gradient Module</td>
<td>mg to tens of g</td>
<td>MassLynx, Empower, or stand-alone console software</td>
</tr>
</tbody>
</table>

1525 EF
The 1525, with EF (Extended Flow) heads, is an integrated, high-pressure, binary HPLC pump that features on-board pulse dampening and efficient mixing. Pulse-free solvent flow at semi-preparative flow rates makes it ideal for smaller scale purifications.

2535 QUATERNARY GRADIENT MODULE (QGM)
The 2535 QGM is a four-solvent, low pressure mixing gradient pump with a flow rate maximum up to 50 mL/min (up to 6000 psi) for columns up to 30 mm I.D. Two fluidic pathways (small-scale and large-scale) accommodate column selection while maintaining chromatographic efficiency.

2545 QUATERNARY GRADIENT MODULE (QGM)
The 2545 QGM is a four-solvent, low pressure mixing gradient pump that features up to 150 mL/min capability (6000 psi up to 100 mL/min with a roll off to 5000 psi at 150 mL/min) for columns up to 50 mm I.D. for purification of material ranging from milligrams to grams.

2545 BINARY GRADIENT MODULE (BGM)
The 2545 BGM is a high-pressure mixing binary gradient pump that serves as the primary solvent delivery device for the Waters AutoPurification System, enabling subsequent isolation and purification of targeted compounds. It provides excellent performance at analytical and preparative flow rate scales (0.50 to 150.00 mL/min) with a maximum operating pressure of 6000 psi.

2555 QUATERNARY GRADIENT MODULE (QGM)
The 2555 QGM is a four-solvent, low pressure mixing gradient pump with a maximum flow rate of 300 mL/min (3000 psi at 200 mL/min with a roll off to 2500 psi at 300 mL/min) used with columns up to 75 mm I.D. for grams of material.
Sample Managers/Collectors
Waters offers an array of easy-to-use advanced sample managers and collectors to accommodate automated purification systems.

2707 AUTOSAMPLER
The 2707 Autosampler is a versatile, compact sample management system that makes highly precise and reproducible injections. It is ideally suited for laboratories where reduced carryover, maximized repeatability, high accuracy, and application flexibility are of concern.

- Compact design yet easily serviceable
- High-resolution syringe control for high-precision injections
- Interchangeable fixed-volume sample loops
- Variable-volume partial-loop injection capability
- Optional sample cooling for sample stability
- Pressure-assisted sample aspiration injection capability
- Use of plates or vials, alone or in combination, for varied sampling formats

3767 SAMPLE MANAGER
The 3767 Sample Manager is a high-capacity sample processing system that easily and automatically manages sample aspiration and injection, collection, and fraction analysis on a single platform. Designed for use with Waters Purification systems, the 3767 Sample Manager has separate sampling and fraction dispensing probes ensuring sample integrity and purity.

- Configured with analytical and preparative injectors, as standard, allows accurate isolation and purification without hardware changes
- High capacity platform allows for variable sample formats: microtiter plates (up to 15), test tubes (up to 480), scintillation vials or conventional autosampler vials (up to 2160)
- Collection of sample fractions sequentially or with one-to-one mapping of sample and fraction
- Self-venting probes that perform accurate sample injections from tightly covered containers
- High velocity wash pump (>30 mL/min flow) to rapidly and efficiently flush the sampling needle and tubing, while maintaining high sample throughput
- Optional fume hood for ventilation of hazardous vapors
FRACTION COLLECTOR III (WFC III)
The WFC III is a reliable easy-to-use collector for highly precise sample collection. Use it alone or as part of a Waters Purification system for even greater sample collection capacity.

- Flexible collection racks and vessel options accommodating a variety of fraction sizes whether you are transferring or collecting to microtiter plates or multiple containers
- Able to accommodate flow rates as high as 300 mL per minute
- Multiple collection modes – from simple time/threshold based to more advanced collection such as pooling of repeated runs – allow for maximum control and usability

WATERS FRACTION MANAGER – ANALYTICAL
The Waters Fraction Manager – Analytical (WFM-A) is an analytical fraction collector for UPLC and HPLC Systems that minimizes fraction loss and carryover to better manage low volume peaks and allows for efficient collection of small amounts of materials for further assays. Because UPLC Technology allows the collection of smaller, purer peaks, especially from complex mixtures, the ideal solution is a purposefully built analytical scale fraction collector.

- Isolate and recover small samples for additional analyses with greater efficiency
- Increase recovery when separating even the most complex samples
- Low internal divert valve volume for minimal dispersion and enhanced collection of narrow UPLC peaks
- Innovative bio-compatible needle with tapered tip allows for optimized collection of minute fractions
- Advanced fluidic design enables exceptional recovery and high purity
- Precisely controlled sample compartment from 4 to 40 °C accommodates thermally labile compounds
- Mass directed fraction collection with an ACQUITY QDa Detector and FractionLynx
Detectors

Waters low-dispersion optical detectors enable you to analyze a wide variety of compounds. When paired with their accessories, such as flow cells or nebulizers, you can obtain more information per run, fulfilling multiple detection strategy requirements.

2489 UV/VISIBLE DETECTOR
A high sensitivity universal detector for routine UV-based applications to low-level impurity identification and quantitative analysis.
- Offering both single and dual wavelength capability
- Low noise performance (<5 µAU)
- Flexible sampling rate (1 to 80 Hz) for both normal and fast separations
- Patented TaperSlit™ flow cell technology channels light through the cell for better energy throughput, resulting in minimal RI effects and enhanced sensitivity
- Independent optimization of highspeed data rates and filter time constants allows for the accurate integration of narrow, sharp peaks

2998 PHOTODIODE ARRAY (PDA) DETECTOR
A highly sensitive detector designed for trace impurity identification and quantitative analysis, compound identification, and method development applications.
- Low noise performance (<10 µAU)
- Flexible sampling rates for normal and fast separations (1 to 80 Hz)
- Patented TaperSlit flow cell technology ensures high sensitivity while maintaining optimal spectral performance

2424 EVAPORATIVE LIGHT SCATTERING (ELS) DETECTOR
A low dispersion detector, featuring a temperature-controlled nebulizer, produces analysis results that you can have confidence in for compounds that lack UV/V is chromophores including triglycerides, sugars, and natural products.
- High sensitivity and low noise performance
- Full control and time programming of all control parameters including events, temperature, photomultiplier tube, and gas pressure
- Addresses laboratory safety needs with automatic solvent, gas shut-off switches and leak detection alarms
- Flexible sampling rate (1 to 80 Hz)
SQ DETECTOR 2 MASS DETECTOR
Using the SQ Detector 2 as part of a Waters Purification system for HPLC and SFC provides users with the most accurate way to collect the purest fractions possible.

- Engineered Simplicity™ – our design philosophy ensures every analyst can consistently generate the highest quality data with minimal training.
- IntelliStart™ automates routine tasks, such as resolution and calibration checks, allowing you to focus on isolating and collecting the purist fractions possible.
- Universal Ion Source Architecture offers the most extensive range of interface capabilities able to service the broadest range of applications.
- Mass range of 3000 m/z

ACQUITY QDa DETECTOR
The ACQUITY QDa Detector provides the specificity of mass directed purification affordably and with the simplicity of an optical detector.

- Power on the ACQUITY QDa Detector and quickly begin purifying your samples; the self-optimizing detector does not require user calibration or adjustments, allowing you to focus on isolating your fraction and maximizing your throughput.
- Seamlessly integrate the compact mass detector into your LC or SFC purification system with confidence.
- Mass range of 1250 m/z
Software

Laboratory informatics solutions convert the scientific data generated in the lab into valuable information throughout your organization – compile, analyze, find, and share your purification data for faster and more effective decision-making.

MassLynx with FractionLynx

FractionLynx Application Manager manages and automates your sample purification process. FractionLynx controls fraction collection and tracks your samples, their fractions, and associated data, all accessible through the FractionLynx browser.

- FractionLynx offers you flexible compound detection, fraction triggering and collection capabilities.
- Fraction triggering options using time-based criteria or signal intensity threshold and slope.
- Fraction collection options include sequential (continuous in one tube after another), one-for-one (collects fractions into a single location), and reserved tubes (allocates a specified number of tubes for a single sample analysis).
- The dedicated FractionLynx browser presents sample and fraction information and data in one interactive location. You may review chromatograms, fraction spectra and fraction information. Further, the browser allows you to manually modify sample and fraction status if necessary.
- FractionLynx’s AutoPurify™ features automated sample analysis, purification, and fraction assessment. By automating the transition between these processes, AutoPurify provides you with an integrated solution to the overall purification and analysis process.

Empower

From acquisition to real-time monitoring and total results management, you’ll never be more than a few clicks away from the purification answers you are looking for.

- Controls the Waters Fraction Collector III (WFC III), enabling the user to configure collection vessels and program collection routines; Real-time feedback from the fraction collector indicates the state of the collection process and the location of the collected fractions
  - Perform these different collection techniques:
    - Collection of everything with time slicing
    - Time-based collection of specific segments of the run
    - Collection of eluent between triggered fractions
    - Detector-triggered collection based on:
      - Threshold
      - Slope
      - Slope and threshold

ChromScope

Waters ChromScope Software, for use on Waters supercritical fluid chromatography (SFC) and liquid chromatography (LC) systems, enables fully automated instrument control and facilitates the process of developing SFC methods and LC methods.

- Its simple work-flow-based architecture and intuitive user-friendly interface makes routine chromatographic analysis, reporting, and fraction collection easy. Simple wizards guide users through a stepwise process of creating new sequences, including method screening, purification, and calibration curve building
- When there is a large amount of sample to be purified, ChromScope includes a stacked injection wizard. Stacked injections allow the system to optimize the collection of the same samples over multiple injections. In all cases, fractions can be collected based on a number of criteria, and there is a graphical interface to aid in the determination of optimal settings
Optional Components

**FlexInject**
The FlexInject is a manual dual-injector module that can be mounted on the side of any of the fluid delivery systems (2545 BGM, 1525EF Binary HPLC Pump, 2535 QGM, 2545 QGM, and 2555 QGM).

- With dual flow paths for both analytical and preparative operation, selectable with an integrated valve, the FlexInject module is designed to complement the dual inlet AutoPurification flow cells for the 2489 TUV and 2998 PDA detectors. It provides a no-compromise small or large volume injector for flow rates up to 150 mL/min

**SYSTEM FLUIDIC ORGANIZER**
The System Fluidic Organizer (SFO) is an integrated valve and instrument communications module, which also houses the leak detection system. The Ethernet-controlled valves provide:

- Switching mechanisms for up to two preparative and three analytical columns
- Flow path changes for sample flow coming from either the analytical or preparative columns to the UV and MS detectors
- The on-board pump control module can integrate with up to three additional 515 pumps providing unique capabilities such as At-Column Dilution, solvent modifier addition, and a MS makeup flow for mass-directed purification. The ethernet hub provides the communications hub for the various detectors and solvent delivery systems
Chemistry

**OBD PREPARATIVE COLUMNS FOR HPLC PURIFICATION**

Why struggle with inconsistencies in column-to-column performance, diminished column lifetimes, lost samples, repeat purification runs, and poor scalability? Increase your productivity through higher recoveries and longer column lifetimes.

With Optimum Bed Density (OBD™) Preparative Columns, you have the ability to:

- Achieve fast, efficient, lab-scale separations for greater throughput
- Directly scale from UPLC, UHPLC, or HPLC screening to lab-scale purification
- Select robust chromatographic particles designed for purification.

OBD Prep columns are available in a multitude of scalable chemistries designed to achieve high purity and recovery for all your compounds.

- XBridge™ OBD Preparative Columns
- XSelect™ OBD Preparative Columns
- Atlantis™ OBD Preparative Columns
- SunFire™ OBD Preparative Columns
- XTerra™ OBD Preparative Columns
- Peptide Separation Technology (PST) OBD Preparative Columns
- Oligonucleotide Separation Technology (OST) OBD Preparative Columns

**OBD PREPARATIVE COLUMNS FOR SFC PURIFICATION**

**Viridis™ SFC Columns**

Utilizing our patented OBD Technology, Viridis SFC Columns are available in six chemistries. Viridis hybrid particles are designed to better control silanols on the particle surface, helping to achieve excellent peak shape without the use of mobile phase additives, and elute longer remaining basic compounds.

- Viridis BEH 2-EP (2-Ethylpyridine) Columns
- Viridis BEH Columns
- Viridis CSH™ Fluor-Phenyl Columns
- Viridis Silica 2-EP Columns
- Viridis Silica Columns

**TORUS SFC COLUMNS**

Utilizing our patented OBD Technology and patented two-stage functionalization of BEH particles, Torus™ Columns offer robust chromatographic performance and excellent peak shape in a broad range of selectivities for achiral separations. Torus columns are available in four scalable chemistries:

- Torus 2-PIC
- Torus DEA
- Torus DIOL
- Torus 1-AA