YMC Contichrom® TWIN HPLC

Featuring patented MCSGP* technology for enhanced yield and purity

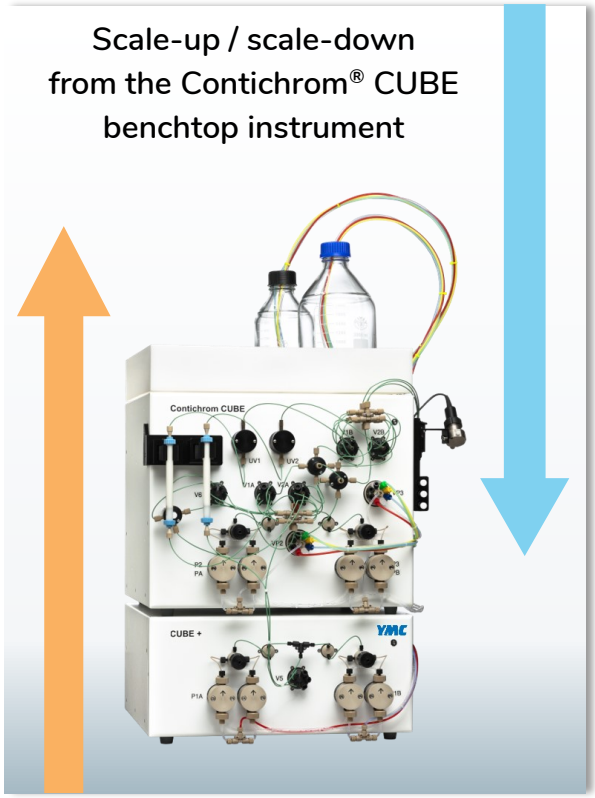
*Multi-column Counter-current Solvent Gradient Purification

No more compromise – attain both yield and purity

Conventional purification of peptides and oligonucleotides is a trade-off between yield and purity. The YMC Contichrom® TWIN two-column configuration facilitates continuous chromatography for 'tides' purification with automatic internal re-cycling and re-separation of overlapping fractions until maximum yield and purity are achieved.

Benefits of YMC's Contichrom TWIN HPLC MCSGP

- Industry-leading high-pressure pumps for maximum durability, flow accuracy, and precision throughout a wide gradient range.
- Simple, two-column design minimizes complexity, facilitates validation, and reduces maintenance.
- Panel design allows for use in hazardous locations
- Wide range of pressure and flow rates
- Improved yield by up to 30-60%
- Reduced solvent consumption
- Significant increase in productivity
- Considerable savings in the collection, storage, analysis, and blending or reprocessing of side fractions



The YMC Contichrom TWIN HPLC is capable of operating not only MCSGP, but also batch mode. This single-system solution allows for ultimate flexibility for manufacturing - save space *and* capital equipment cost without having to invest in additional (batch) equipment.

Simplicity

The two-column setup of the Contichrom TWIN accelerates validation, simplifies maintenance, reduces costly down-time, and minimizes operating expenses. The system's design is easy to use and understand, which facilitates implementation in the process development lab or production suite.

System sizes available

YMC offers a range of system capacities to suit small to large production facilities. In addition to our standardized platform, YMC can customize the system to accommodate your particular situation.

Increase yield and purity of peptides & oligonucleotides

The Contichrom TWIN HPLC is based on YMC ChromaCon's patented approach to continuous purification. The simple, two-column design is built for use in GMP environments where yield, purity, profitability, and up-time are paramount. Transform existing batch processes using your choice of chromatography resins and columns, including YMC's lineup of reliable, reproducible resins.

The opportunity with peptides

Peptides are a highly versatile class of drugs that cover a wide variety of pharmaceutical targets, have high specificity, and are generally low in toxicity. Purification can be difficult, however, due to retained impurities overlapping with the product peak. Conventional chromatographic processes can produce fractions with the desired target purity, but often at the expense of yield. Obtaining a sufficient quantity of acceptable product therefore requires larger or more numerous batches.

The innovative, automated, continuous chromatographic approach employed by the Contichrom TWIN eliminates the need to choose between yield and purity. YMC's higher yield purification system reduces the number of required synthesis batches, enhancing ROI.

A new approach to oligonucleotide purification

Single-stranded DNA and RNA oligonucleotides are being used more frequently across the industry from clinical diagnostics to new biotherapeutics. While the automated synthesis of oligonucleotides is a rather straight-forward process, purification still presents challenges. Efficient purification of target oligonucleotides depends on their length. As with peptides, yield is often sacrificed to obtain a higher purity fraction.

The MCSGP process performed with a Contichrom TWIN HPLC enables recycling and re-separation of fractions with product purity below the threshold to obtain a high purity fraction at higher yield. It can be used for both reversed phase and IEX chromatography.

The YMC Contichrom® TWIN HPLC with MCSGP is used for a variety of purification applications such as:

- synthetic peptides
- oligonucleotides
- ADCs

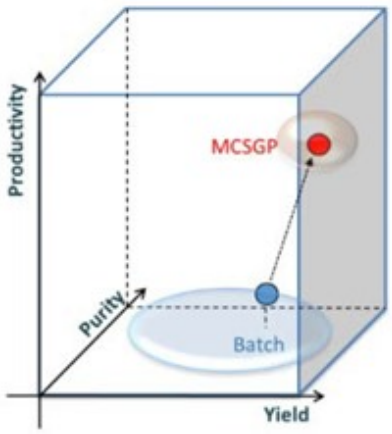


Fig. 1: The MCSGP process maximizes both yield and purity over conventional batch chromatography.

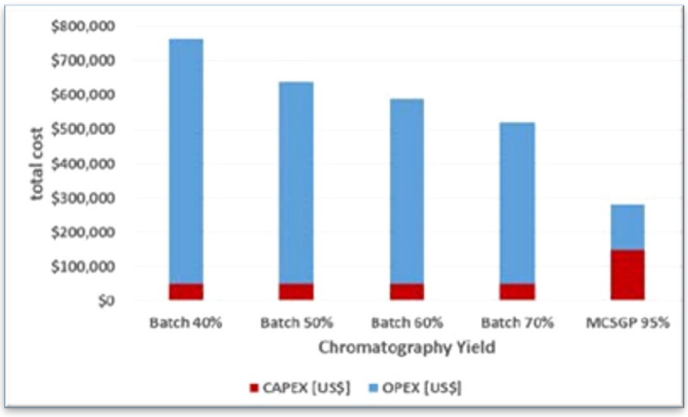


Fig. 2: CAPEX/OPEX of downstream processing of synthetic peptides for batch chromatography with varying yield and for MCSGP obtaining highest yield.

How it works

The Contichrom TWIN HPLC employs MCSGP (Multi-column Counter-current Solvent Gradient Purification). This chromatography process uses two columns of the same type with internal recycling and automatic re-separation of overlapping side-fractions to elute and recover only product of target purity at a high yield. The ability of MCSGP to recover product from overlapping fractions enables the use of conditions that improve throughput as compared to single-column batch processes.

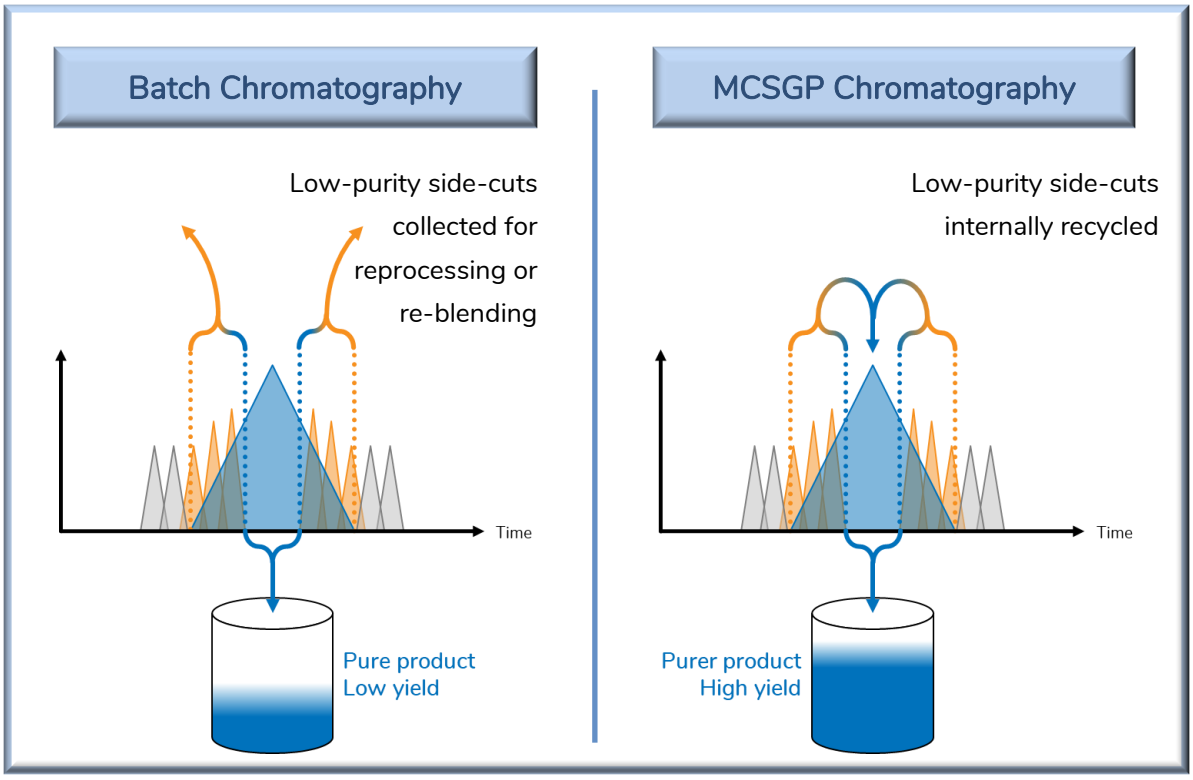


Fig. 3: Conventional single-column batch chromatography is restricted to a narrow center cut of target molecule to achieve adequate yield. MCSGP, on the other hand, continuously recycles the side fractions to achieve both high purity and high yield of the target.

Advanced fluidic design

Designed to meet the demanding requirements of next generation process systems, the Contichrom TWIN HPLC consists of digitally-controlled pumps that provide industry-leading flow, precision, and accuracy at high pressures and wide gradient ranges. The triplex pump configuration delivers nearly pulse-free flow. An optimized system flow path and specially designed multi-port valves deliver extremely low hold-up volume for exceptional chromatographic performance.

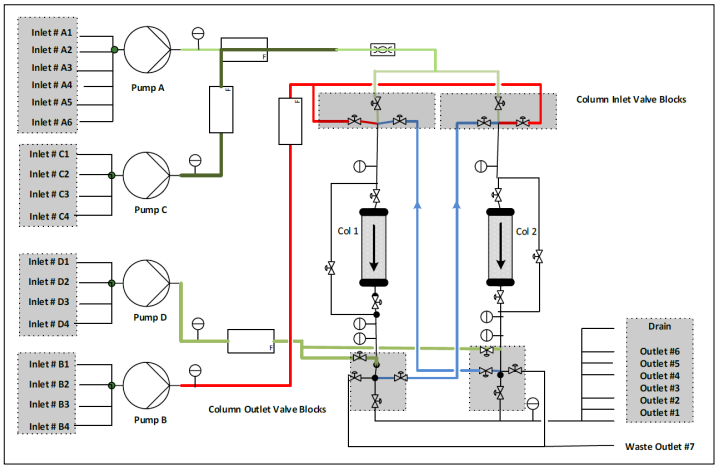


Fig. 4: Basic schematic of Contichrom TWIN HPLC for MCSGP

One system, multi-function

This advanced system can be configured to operate in multiple modes (single-column batch or continuous chromatography), thus maximizing its utility in any process development or production environment. The system's wide flow range permits the use of a variety of column diameters and process conditions.

Contichrom® TWIN HPLC	Flow rate range* (LPM)		Column ID range (cm)	
100	.01	.67	5	10
300	.03	3.33	10	20
500	.13	8.33	20	45
1000	.29	16.67	30	60

*recommended system flow rate range for MCSGP applications

Table 1: The Contichrom TWIN HPLC for MCSGP allows a wide range of flow rates and column IDs.

Save time, material costs, and space

⇒ Reduction in scale or frequency of upstream synthesis (reduced monomers, solvents)

⇒ No side fraction storage/handling/QC

⇒ Reduced QC and personnel costs

⇒ Decreased solvent demand

⇒ Smaller columns and chromatography skid

⇒ Smaller solvent / buffer tank sizes

⇒ Smaller waste treatment facilities

Scale up, scale down

A simple tool for scale-up or scale-down is the YMC Contichrom® CUBE HPLC instrument (Figure 5), which can be used to develop new processes or optimize existing ones. The Contichrom CUBE is a modular, bench-top instrument for performing MCSGP, single-column batch, integrated two-step processes, N-Rich®, and sequential polish at a smaller scale (flow 0.1 – 36 mL/min or 0.1 – 100 mL/min, up to 100 bar). Proven ChromIQ software provides enhanced functionality and visualization for continuous, cyclic processes. The industrial Contichrom TWIN software, which is 21 CFR part 11 compliant, has continuity with the lab-friendly ChromIQ software.

Fig. 5: Scale-up/scale-down is seamless between the Contichrom CUBE HPLC (shown left) and the Contichrom TWIN HPLC (right) with optional YMC DAC columns.

System Specifications

System - HPLC	Flow rate range*
Contichrom TWIN 100	0.01 – 0.67 LPM
Contichrom TWIN 300	0.03 – 3.33 LPM
Contichrom TWIN 500	0.13 – 8.33 LPM
Contichrom TWIN 1000	0.29 – 16.67 LPM

*Control system flow rate range
Note: Individual pump capacity and turndown exceed the control system range

Dual multi-channel UV detectors with variable wavelengths (200 to 800 nm).

Systems are typically engineered to fit most industrial entrances. Verify dimensions and weight with your YMC representative.

Operating pressure and temperature

Maximum operating pressure: 80 bar
Ambient temperature range: 4 – 25 °C
Process temperature range: 4 – 65 °C

Options

The base system is feature rich and ready for most modern development or production suites. YMC offers the following options to enhance the system:

- Additional inlet and outlet (fraction) valves
- Filters
- Pre-Column analytics
- Hazardous location design
- Sampling valves
- Automation through customer-selected integrator (YMC would assist in developing a functional specification.)
- Additional customizations available upon request

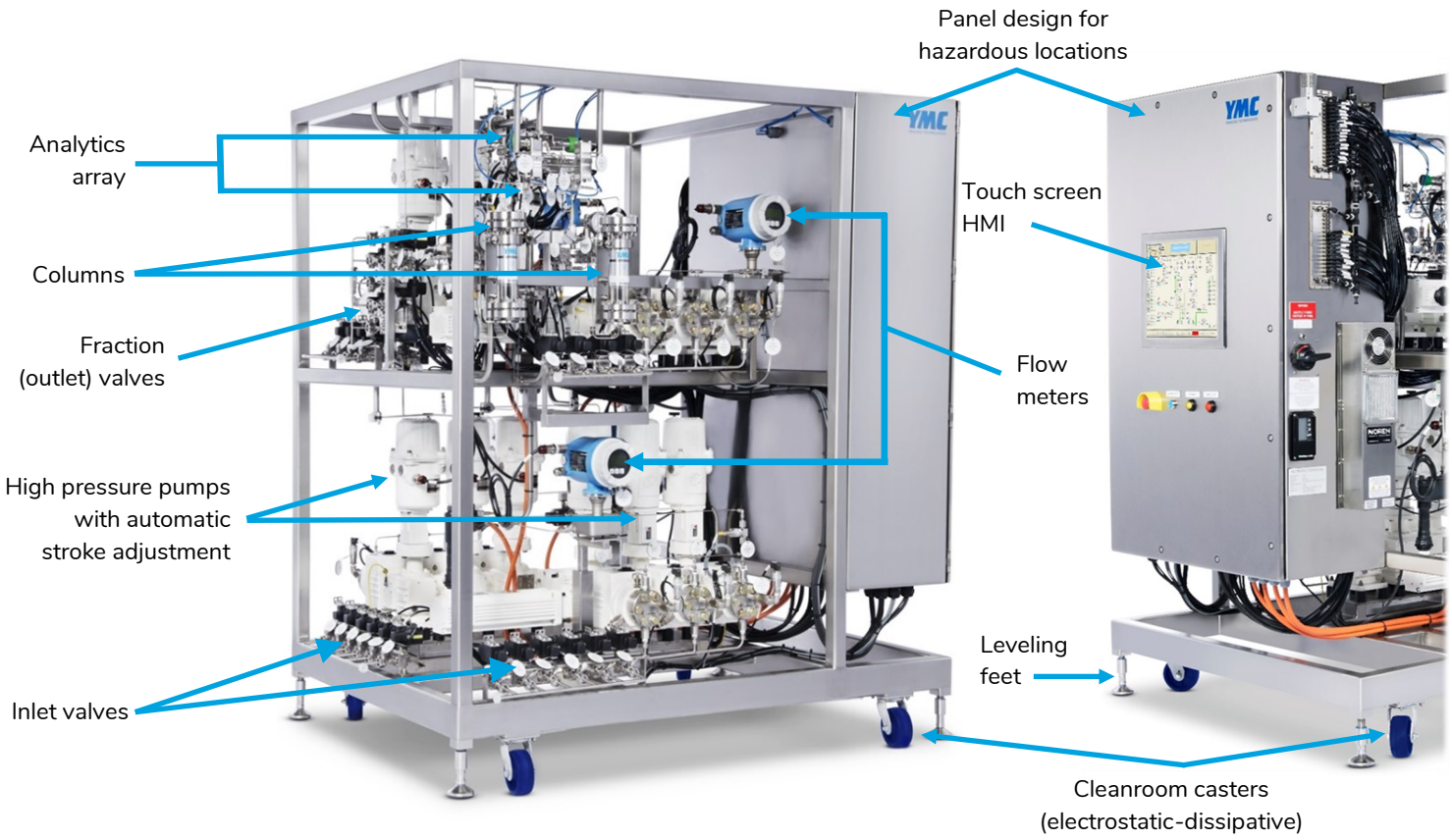


Fig. 6: TWIN MCSGP systems are feature-rich, using highest quality components selected for reliability, global availability, safety, and ease of compliance

Contichrom TWIN HPLC software

The Contichrom TWIN HPLC system uses PLC software built on Rockwell FactoryTalk® View SE to provide user-configurable control of all chromatographic parameters. The system provides recipe management with an audit trail for recipe modification as well as access control to prevent modification of a recipe by unauthorized users.

An information-rich, graphical interface displays system and process information as well as historical trends, putting relevant information in one place to facilitate informed decision-making. The main process screen can also be used to manually operate the system to simplify qualification and trouble-shooting. Batch reports can be easily generated, and data can be sent to the DCS through an OPC connection.

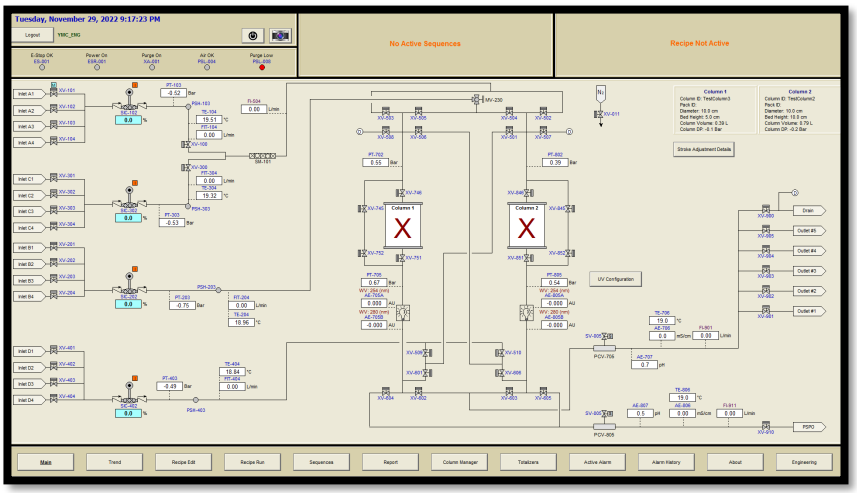


Fig. 7: Sample view of the Conitchrom TWIN HPLC software

Quality and regulatory considerations

As with all Contichrom platform equipment, the Contichrom TWIN HPLC system is built to meet high quality expectations. The design and construction of the equipment meet the following standards, assuring a safe, ergonomic system capable of performing within the guidelines of the FDA:

- System designed for GMP operation and validation
- Enables 21 CFR part 11 compliance
- USP Class VI materials and seals
- Digitally controlled metering pumps
- Operation in Class I Div. II / ATEX environments

Typical installations

The Contichrom TWIN is used in process development, pilot labs, and full-scale production suites. With its wide dynamic range and multi-functionality, it is ideal for use in for multi-product environments. In addition, the small footprint enables installation in space-constrained facilities.

Development and Training

Customers wishing to perform proof of concept evaluations can lease a Contichrom CUBE HPLC instrument. As part of a rental package, YMC will train your technicians on the proper setup and operation at your site. Rental periods are typically two months long, which allows for experimentation with a variety of conditions and resins. Contact your YMC representative for details.

Service

YMC maintains operations in multiple countries worldwide. In addition, YMC systems include remote access for automation troubleshooting and training (client-enabled). We strive to use components that are non-proprietary with global distribution for local acquisition and support. No special tools are required to perform standard maintenance.

YMC Chromatography Products

YMC is proud to be a trusted developer and manufacturer of high-quality, reliable, and reproducible resins that are used by chromatographers around the world. Our portfolio contains a wide range of product lines in reversed phase, normal phase, ion exchange, chiral, and SEC chemistries. YMC media is available in pre-packed HPLC columns as well as bulk quantities of packing material, allowing seamless scale-up to preparative applications.

We also carry glass columns, spring columns, and DAC columns, as well as the Contichrom® CUBE and TWIN LPLC / HPLC systems and other custom process skids.







Contact Information

Regional Office-USA:
YMC America, Inc.
8 Charlestown Street
Devens, MA 01434
Tel: +1 978 487 1100
www.ymcamerica.com
sales@ymcpt.com

Headquarters: YMC Co., Ltd.
YMC Karasuma-Gojo Building
284 Daigo-cho, Karasuma Nishiiru, Gojo-dori,
Shimogyo-ku, Kyoto, 600-8106 Japan
Tel: +81-75-342-4515
https://www.ymc.co.jp/en/
sales@ymc.co.jp

More Regional Offices:
https://ymc.eu/
https://ymcindia.com/
https://www.ymcchina.com/
https://www.ymckorea.com/
https://ymc.sg/
https://ymctaiwan.com/