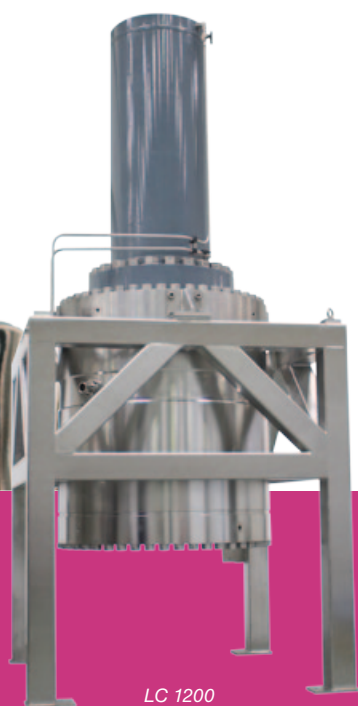




Stéphane Raoult
Technology

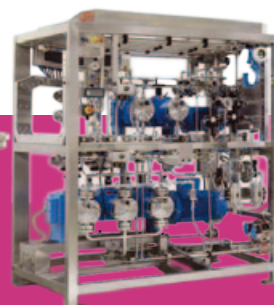
**At Novasep, we can
provide you with
the best-in-class
preparative HPLC systems**



LC 1200



LC 600



LC 80

Standard Preparative HPLC Solutions:

**Prochrom® DAC Columns
Prochrom® Hipersep HPLC Systems**

www.novasep.com



Pure Performance for the Life Sciences

Preparative High Performance Liquid Chromatography Offering

We pioneered preparative and industrial High Performance Liquid Chromatography (HPLC) in the 1980's. Since then, we have continuously improved our technology and have gained much experience in the purification of active pharmaceutical ingredients, fine chemicals, natural extracts, synthetic peptides and biopharmaceuticals.

Our HPLC offering, backed by our expert process development services, includes:

- Automated Prochrom® Hipersep chromatography systems
- Prochrom® DAC (dynamic axial compression) columns
- Solvent storage and recycling systems

Our solutions for preparative and industrial scale HPLC separations enable:

Efficiency & Scalability

Our Prochrom® DAC columns are available with the internal diameter ranging from 50 mm up to 1.6 m. Prochrom® DAC columns' optimized packing technology coupled with our advanced fluid distributors ensure highest efficiency, constant performance over time as well as easy and direct scale-up of your separations.



Prochrom® Hipersep M with LC 300

Robustness & Performance Guarantees

We fully master the design, manufacturing and testing of our chromatography systems, from engineering and component selection to final assembly and on-site installation, to provide you with performance guarantees.

Range of our Standard HPLC Solutions

All our HPLC systems can be operated under cGMP conditions. They are fully qualified and extensively tested during factory acceptance testing (FAT) and site acceptance testing (SAT). Our equipment complies with EC directives (DESP guidance) or conforms to ASME code of construction.

Column Name	Column Diameter (mm)	Maximum Bed Length (mm)	Prochrom® Hipersep Systems	Typical Flow-Rate (L/h)	Max. Operating Pressure (bar)
LC50.500.VE100	50	300	Lab I	6 - 12	100
LC80.600.VE100	80	350	Lab I	15 - 30	100
LC100.650.VE100	100	350	Lab II	24 - 48	100
LC110.650.VE100	110	350	Lab II	30 - 60	100
LC150.700.VE100	150	400	Lab II / S	55 - 110	100
LC200.700.VE100	200	400	S / M	100 - 200	100
LC300.700.VE100	300	400	M / L	225 - 450	100
LC450.700.VE100	450	400	M / L	400 - 800	100
LC590.700.VE70	590	400	L / XL	900 - 1800	70
LC800.700.VE70	800	400	XL	1600 - 3200	70
LC1000.700.VE70	1000	400	XL	2500 - 5000	70
LC1200.700.VE70	1200	400	XL	3600 - 7200	70

Other sizes, pressure ratings and features are available upon request. Please contact us!

Prochrom® Hipersep Chromatography Systems

Our fully automated Prochrom® Hipersep HPLC systems are designed for process development, pilot-scale and production-scale chromatographic separations. Scalability is ensured using the same design from lab to large industrial units.

Prochrom® Hipersep systems offer maximum performance with Prochrom® DAC columns. **The proven design of our Prochrom® Hipersep systems will meet your specific process needs:**

- Optimal industrial design allowing **24/7 continuous operation** thanks to the careful selection and testing of robust and proven components
- **PAT-compliance** with high performance in-line dilution and gradient systems as well as smart fraction collection control
- **High productivity and yield** resulting from high accuracy and stability of operating parameters (flow rate, eluent composition, temperature, etc.) as well as excellent process reproducibility
- Reliability of instrumentation and “open design” (providing easy access to parts) for **reduced maintenance** and, thus, reduced operating costs
- **Validated and user-friendly software** for easier start-up, training and on-site qualifications



Prochrom® Hipersep L with LC 450



Prochrom® Hipersep XL

Prochrom® Hipersep Systems	Lab I	Lab II	S	M	L	XL
Flow-Rate Range (L/h)	6 - 40	20 - 90	90 - 200	150 - 500	300 - 1000	500 - 2500
Adapted Column Diameter (mm)	50 to 80	100 to 150	150 to 200	200 to 450	300 to 590	590 to 1600
Max. Operating Pressure (bar)	100					70
Injection - Detection - Collection Features	Low or high pressure injection UV detector (other detector as an option) Automated fraction collection (5 or 10 valves) Column backflush and recycling valves as an option					
Implementation	Gen. purpose lab.		Hazardous area rated (ATEX Zone II - Class 1 Division 2)			

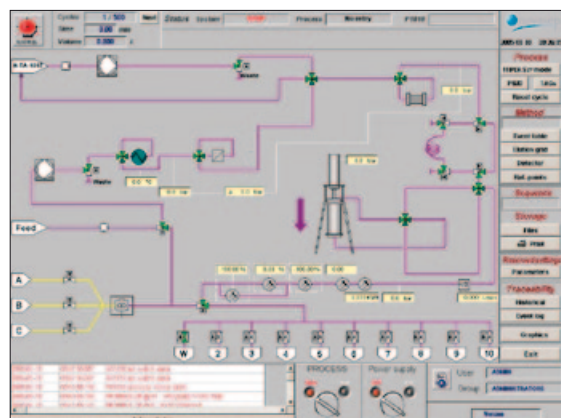
Automation - Hipersep® SC

Hipersep® SC control software provides automated and safe operations of the solvent module under cGMP conditions:

- Industrial Programmable Logic Controller (PLC) equipped with PC interface
- Validated software based on GAMP 5 and compliant with 21 CFR part 11
- Same software from lab to industrial scale for seamless scale-up
- User-friendly graphical interface and intuitive recipe building
- Multiple safety interlocks and administrator controls

Hipersep® SC software provides user-friendly, secure and traceable chromatography processes. It includes:

- Historical data logging
- Batch management
- Real-time monitoring of all process parameters
- Recipe editor
- Manual/automatic operations
- Multi-level access control
- Alarm management



Prochrom® DAC Chromatography Columns

The Broadest Preparative Chromatography Column Range

We provide preparative chromatography columns adapted to your needs:

- A range of standard columns with internal diameters from 50 mm up to 1.2 m
- Customized columns up to 1.6 m diameter
- Adjustable column bed length
- Operation at high pressure - up to 100 bar
- Thermostated jacket for temperature control



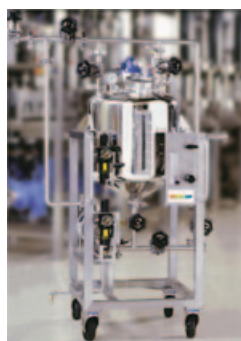
Dynamic Axial Compression (DAC) Principle

Dynamic Axial Compression provides the optimum packed bed density and stability, thereby ensuring optimum separation efficiency and consistent performance for an extended period of time. The column includes a movable piston attached to a hydraulic jack. The piston is used to pack and unpack the column, and keep the stationary phase under dynamic compression, ensuring the highest efficiency and bed stability at any scale.

For more information on the DAC principle, please visit www.novasep.com/DAC.

Ease of Use

Based on our experience as chromatographers, we have developed many features and accessories for fast and easy operation of our Prochrom® DAC columns. These include piston and flange manipulation tools, quick connect clamps, etc. A single operator can safely use Prochrom® DAC columns up to 1.6 m diameter.



Slurry Packing Systems

Our convenient packing units safely and reproducibly mix stationary phase with an appropriate solvent and then transfer the resulting slurry by gravity or with a pump into the column. The units are equipped with cleaning in place devices. Different units and volumes are available, depending on your column size.

The Prochrom® Pack-n-Sep Concept for Lab Scale Separations

Pack-n-Sep™ columns (available in 50 or 80 mm diameter) combine the advantages of both Prochrom® DAC columns and an ultra fast packer with column packing or unpacking performed in less than 5 minutes. The columns can be used on the packer in DAC mode or detached, a unique patented device which maintains bed compression. Only one packer is needed for several columns.



Solvent Storage and Recycling Solutions

At large scale, solvent recycling is mandatory to minimize solvent consumption and thus reduce both associated costs and environmental impact.

We have developed efficient solvent storage and recycling solutions for both isocratic and gradient elution modes that can be fully integrated within our chromatography systems. Depending on your scale of operation and molecule/process constraints, our solvent recycling solutions may include automated rotary, wiped or falling film evaporators and/or distillation columns.

Peptides ●

● **Isomers**

● **Insulin**

APIs ●

Lipids ●

Natural Extracts ●

Oligonucleotides ●

● **Proteins**

● **Enantiomers**

Highly Potent APIs ●

● **Hormones**

Expert Process Development Services

Whether you need to develop a complete purification process, a multi-step synthesis or a single chromatographic step, our teams of chemists, biochemists and process engineers will provide you with a complete and guaranteed solution.

- We develop your process
- We design customized chromatography units that suit your facilities and specific process needs
- We provide process performance guarantees for our standard and customized systems



Full Customer Service for your Preparative HPLC Systems

More than 2,000 Novasep laboratory and production chromatography units are installed worldwide for the production of pharmaceuticals, biopharmaceuticals and fine chemicals.

Local Technical Support Services

- Customer service teams in France, the USA & China for prompt and courteous service, when and where you need it
- Local inventory of standard parts to ensure quick delivery

Training Services & Expertise

- Tailor-made, on-site training provided by our experienced technical staff, to help you maintain optimum process performance
- Performance optimization for new or existing equipment



Novasep combines the expertise of specialists in purification processes, biomanufacturing and chemical synthesis. We strive to provide you with the best solution for obtaining pure active molecules.

EUROPE - Novasep Process
Phone: +33 (0)3 83 49 70 00
pharma-systems@novasep.com

NORTH AMERICA - Novasep Inc.
Phone: +1 610 494 0447
pharma-systems.north-am@novasep.com

REST OF THE WORLD - Novasep Process
Phone: +33 (0)3 83 49 70 00
pharma-systems@novasep.com

ASIAN COUNTRIES - Novasep Asia
Phone: + 86 21 6045 1600
pharma-systems.asia@novasep.com

INDIA - Novasep Partner, Nilsan Nishotech
Phone: +91 22 41515151
pharma-systems.india@novasep.com

JAPAN - Novasep Japan K.K.
Phone: +81 03 3221 1960
japan@novasep.com

www.novasep.com



Pure Performance for the Life Sciences

Copyright and Trademark Information: Groupe Novasep SAS and/or its affiliates (hereafter Groupe Novasep) own or license the copyrights, trademarks, names, logos, and other rights to the information on this brochure. No right or licence is granted to any other party. Any unauthorized use without the express prior written consent of Groupe Novasep is prohibited. Disclaimers: The information contained on this brochure is provided "as is", for informational purposes only, without any representation or warranty of accuracy or completeness. In no event will Groupe Novasep be liable to any party for any damages or any other losses (no access or reliance upon any information contained on this brochure). - © Novasep 2010