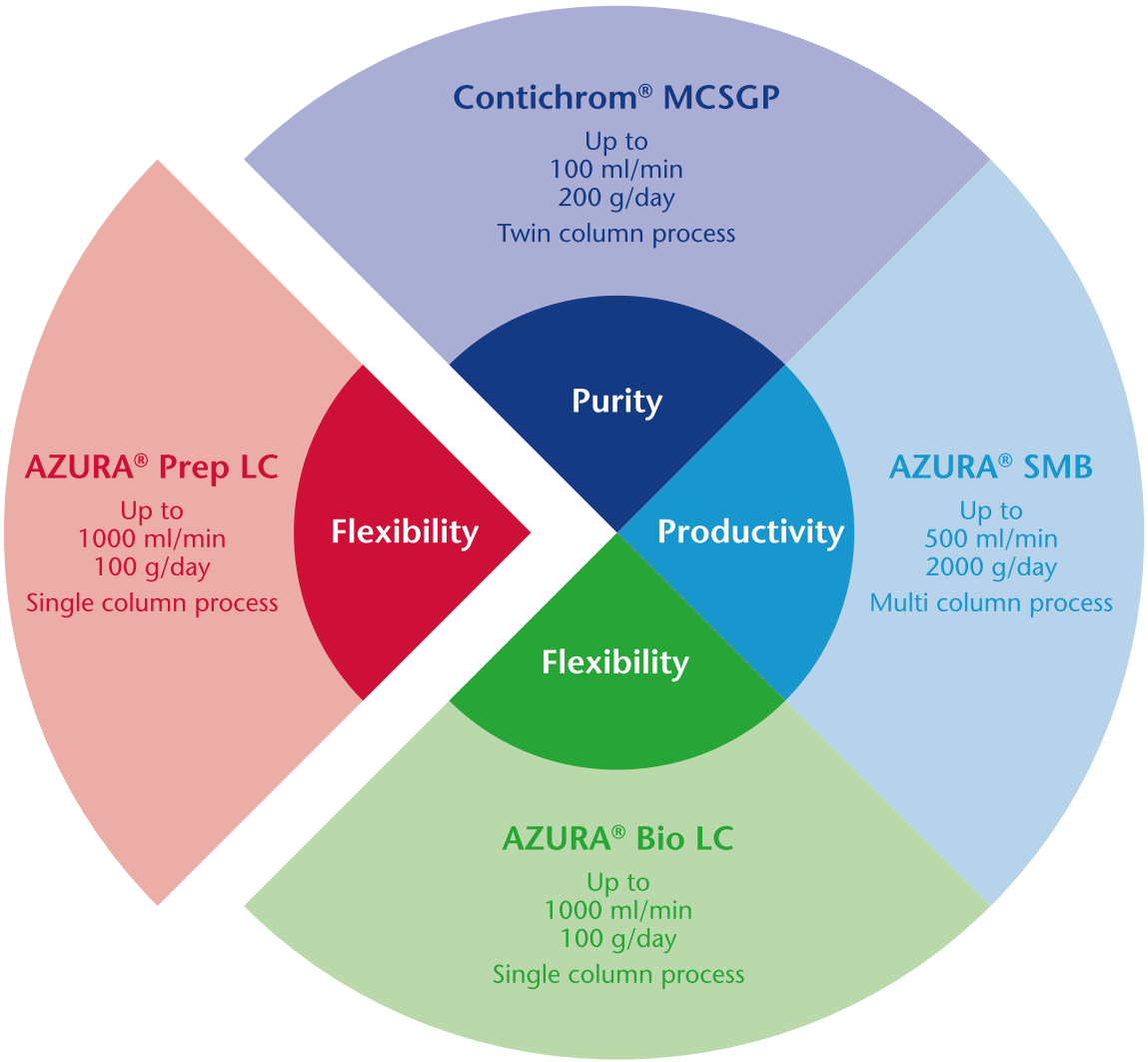
KNAUER

AZURA® Prep LC

▶ What do you want to purify today?

Select the right purification process for your sample

**A preparative HPLC system should be as versatile as possible, since purification tasks can change frequently. AZURA Prep LC was designed for flexibility and to comfortably handle large sample volumes.
Easy to operate and maintain the AZURA Prep LC systems are perfectly suited for the purification of your products such as synthesis stages or active ingredients. The systems can be optimally adapted to the scale you need. The KNAUER team will support you in designing the system of your choice.**



About KNAUER

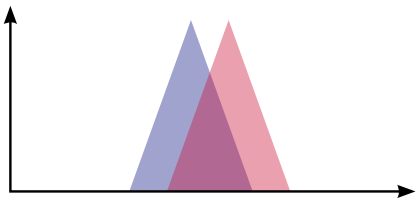
KNAUER is an owner-managed middle-sized company situated in Berlin, Germany. Since 1962, we have been developing and manufacturing laboratory instruments for customers around the world. We are the oldest German manufacturer of instruments for HPLC, FPLC, simulated moving bed (SMB) chromatography and osmometry.

What's your priority?

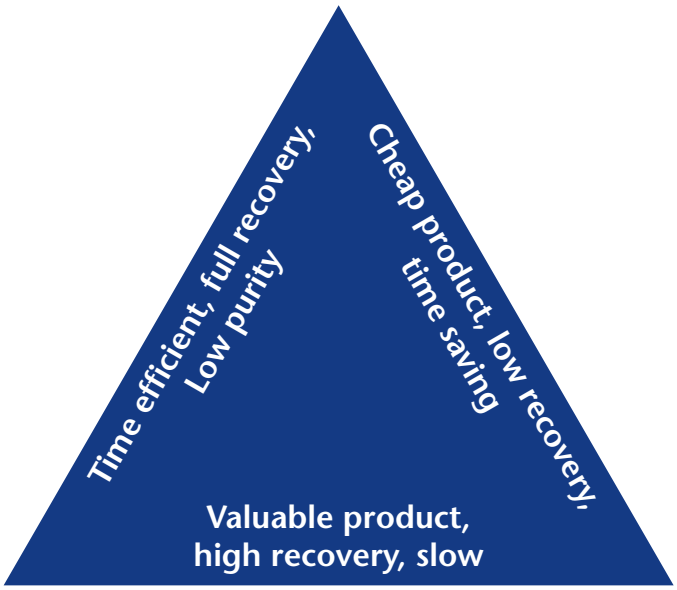
The dependencies between throughput, purity and yield always have to be considered in LC purifications. Whatever priority you decide for, with the AZURA Prep LC systems you can successfully adapt.

Throughput

Saving time

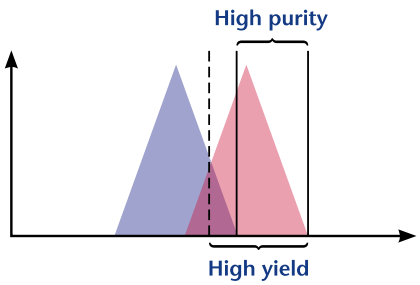


Short run time, low purity or yield



Recovery and yield

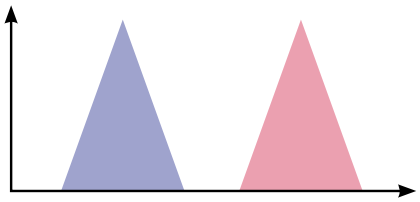
Maximizing product



Higher yield, lower purity

Purity

Reducing impurities



Long run time, baseline-separated

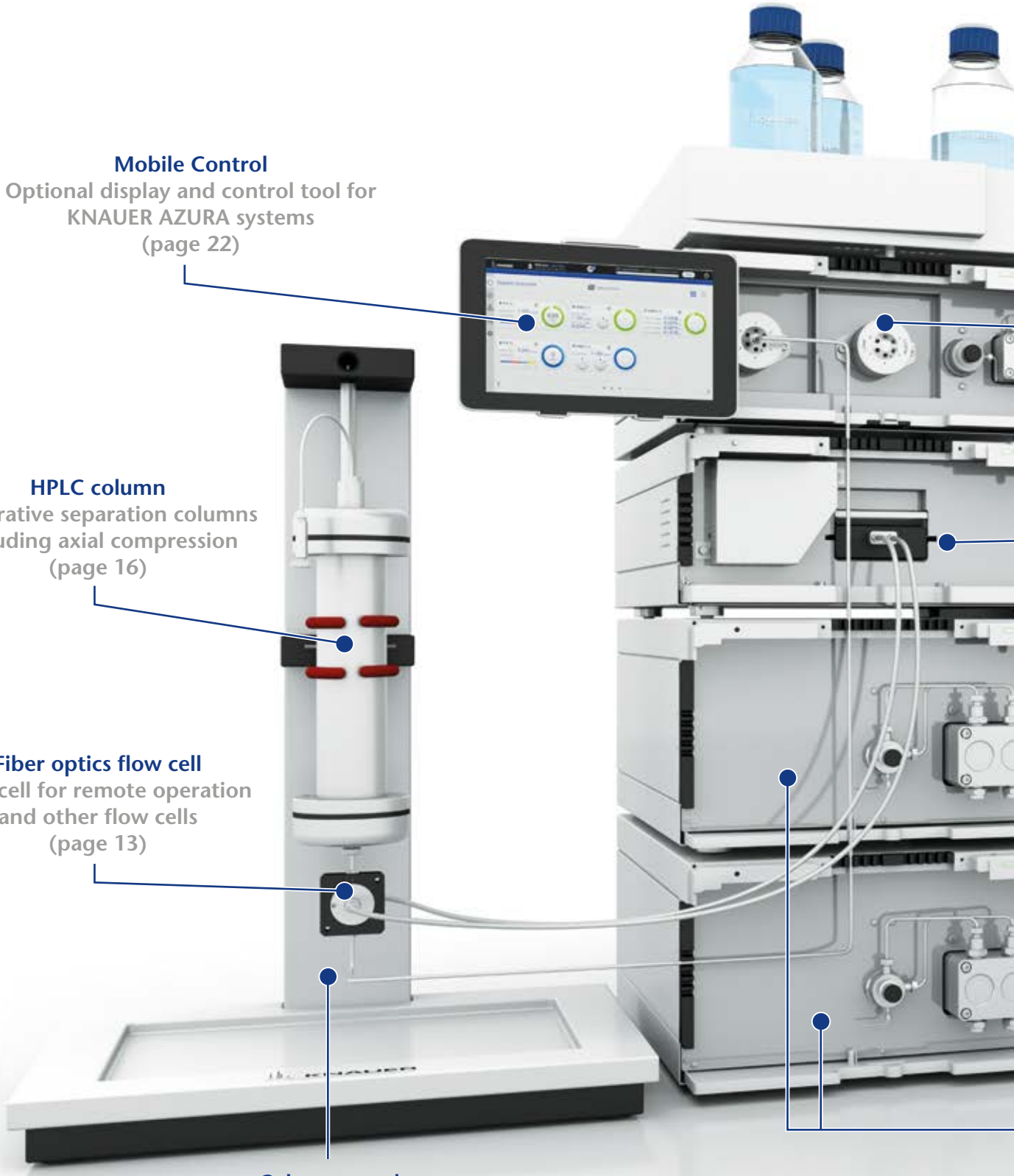
www.knauer.net/azuraprep

Flexibility and performance!

Mobile Control
Optional display and control tool for KNAUER AZURA systems
(page 22)

HPLC column
Preparative separation columns including axial compression
(page 16)

Fiber optics flow cell
Flow cell for remote operation and other flow cells
(page 13)



Column stand
(page 20)

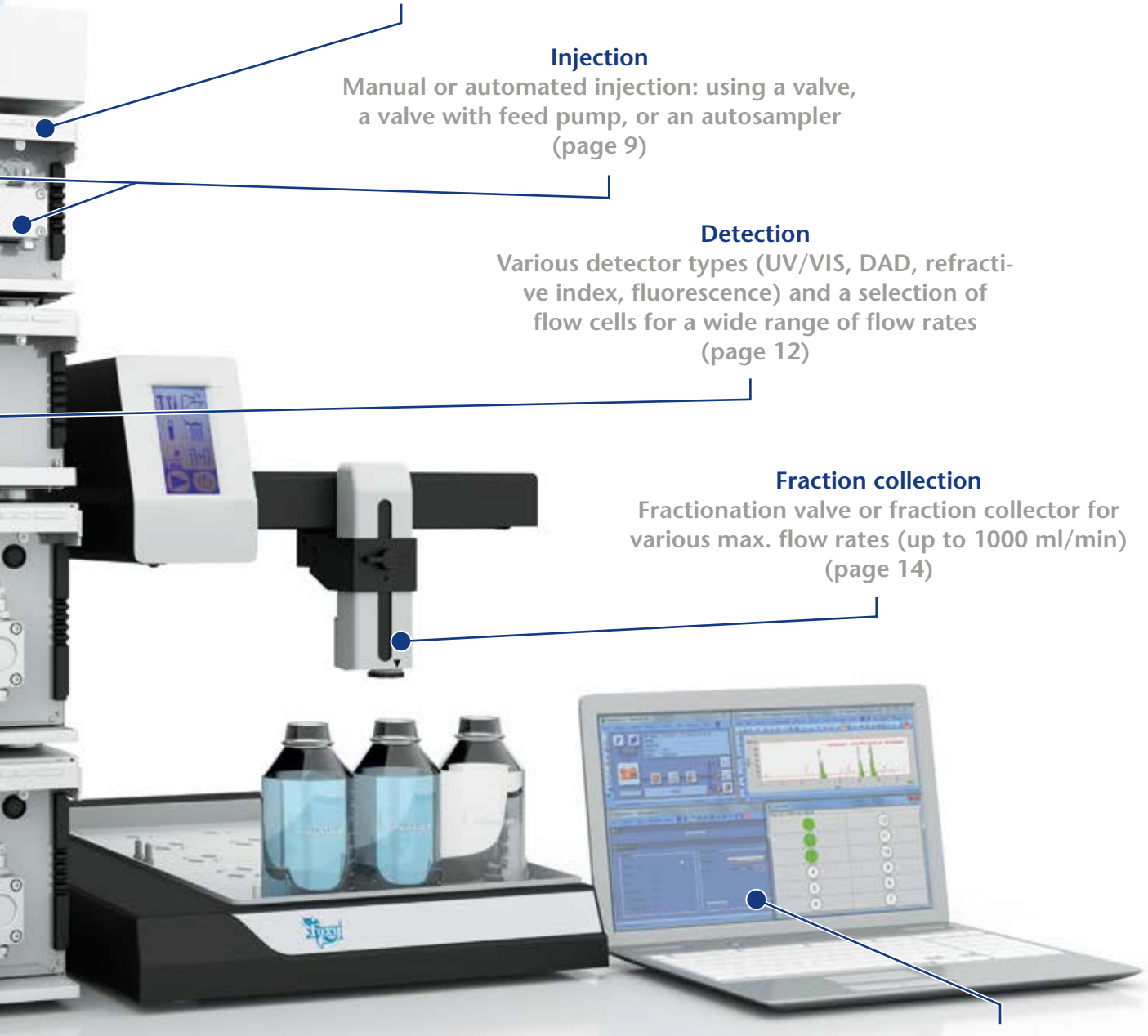
www.knauer.net/azuraprep

Assistant
Customizable combination modules integrate up to three units in one device e.g. for column switching (page 8)

Injection
Manual or automated injection: using a valve, a valve with feed pump, or an autosampler (page 9)

Detection
Various detector types (UV/VIS, DAD, refractive index, fluorescence) and a selection of flow cells for a wide range of flow rates (page 12)

Fraction collection
Fractionation valve or fraction collector for various max. flow rates (up to 1000 ml/min) (page 14)

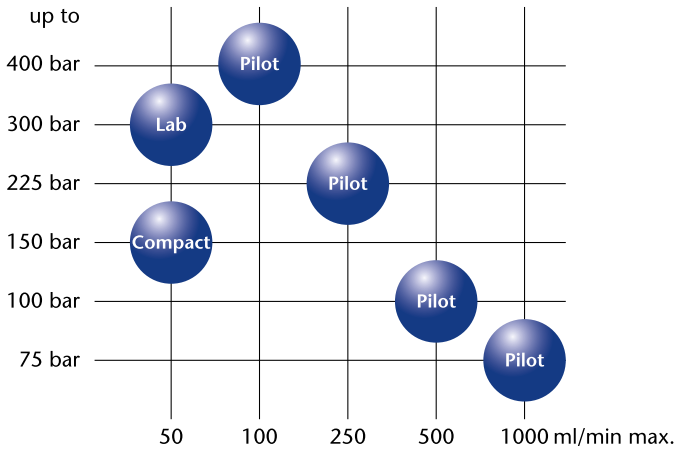


Eluent delivery
A choice of pumps with pump heads available in different materials allows maximum flow rates from 50 to 1000 ml/min. Isocratic, low and high pressure gradient forming are possible (page 10)

Control software
Several solutions for purifications available (page 21)

AZURA® Prep LC Purification solutions
What is your scale?

The modular AZURA Prep LC platform offers you the opportunity to build a purification system best suited to your needs.



▶ AZURA® Compact Prep LC

Flow rate max. 50 ml/min
Isocratic

AZURA system features and options	Available pump heads Max. flow rate in ml/min					Gradient options	
	50	100	250	500	1000	LPG	HPG
AZURA Compact Prep LC	✓						
AZURA Lab Prep LC	✓						✓
AZURA Pilot Prep LC		✓	✓	✓	✓	✓	✓

AZURA® Lab Prep LC

Flow rate max. 50 ml/min
Isocratic/HPG

AZURA® Pilot Prep LC

Flow rate max. 1000 ml/min
Isocratic/LPG/HPG

Peak parking	Recycling options		Injection volume		Feed pump option	Fractionation options		All LC detectors usable
	Peak	Solvent	Manual valve	Autosampler		Valve	Foxy R1/R2	
✓	✓	✓	up to 40 ml	up to 10 ml	✓	✓	✓	✓
✓	✓	✓	up to 40 ml	up to 10 ml	✓	✓	✓	✓
✓	✓	✓	up to 40 ml	up to 10 ml	✓	✓	✓	✓

www.knauer.net/azuraprep

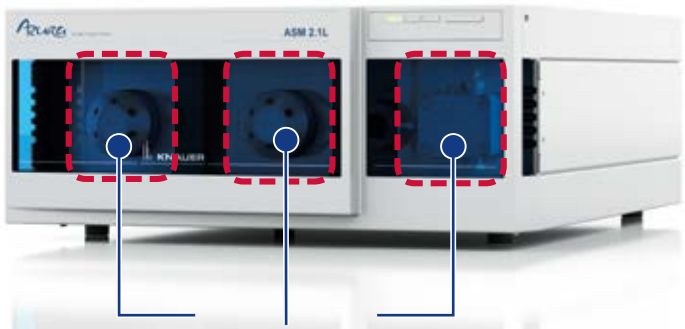
How often have you wished for an assistant?

AZURA® ASM 2.1L is your LC assistant

A unique multifunctional device that can be equipped with combinations of up to three integrated modules.

Configuration examples

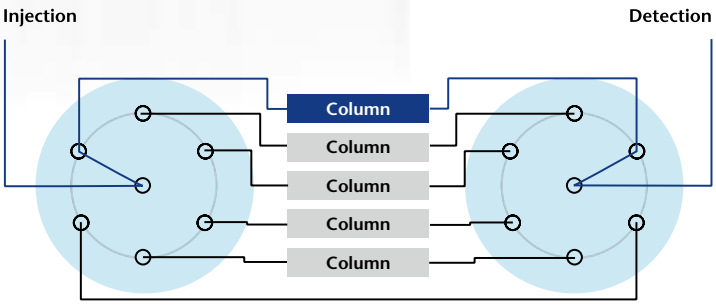
- Injection (feed pump and two valves)
- Fractionation (valve/s, cascadable)
- Column switching and optional back flush (two to three valves)
- AZURA Compact Prep LC (pump, valve and UV detector)



Can be equipped with combinations of: valve(s), pump(s), or detector

▶ Column Switching Assistant

Switching valves are ideal for screening, up-scaling or just for being flexible. These valves can be easily integrated into your system and can be used at pressures up to 400 bar and maximum flow rates of 300 ml/min (depending on the valve type).



Injection

Available sample injection methods range from manual to automated using injection with feed pump or autosampler.

AZURA® Pump P 4.1S

Integrated into an assistant or as a standalone module:
The compact pump AZURA P 4.1S is perfect for feed injection.

- Flow rate range: 0.01 – 50 ml/min
- 10 and 50 ml exchangeable pump head
- Pump heads available in stainless steel or ceramics

Sample Injection Assistant ASM 2.1L

The AZURA sample injection assistant for preparative LC is based on the multifunctional AZURA element ASM 2.1L. This assistant includes a sample pump and two 6-port-3-channel valves. It is possible to inject small sample volumes via a sample loop and injection syringe or large sample volumes via the integrated sample pump.

Autosampler 3950

Do you want to process many different samples fully automated? The Autosampler 3950 can inject up to 10 ml per injection and is well-suited for an automated purification system.

For an overview of available sample loops see ...
www.knauer.net/sample-loops

www.knauer.net/azuraprep

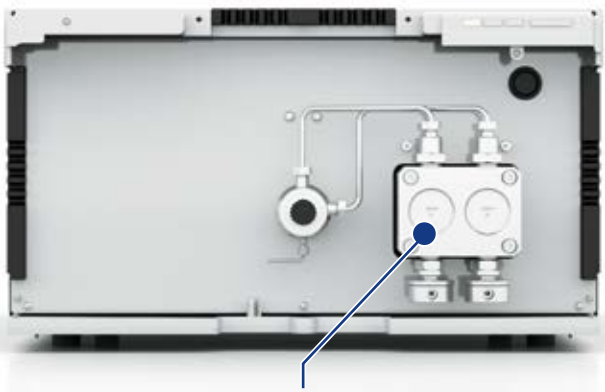
Eluent delivery

Precise and reliable pumps covering a wide flow rate range, gradient and solvent selection options.

AZURA® Pump P 2.1L

The preparative HPLC pump AZURA P 2.1L covers a wide flow rate and pressure range. It has been designed for the purification of milligram to gram samples. The integrated automatic RFID pump head recognition allows for quick adaption to various applications.

- Flow rate up to 1000 ml/min
- LPG and HPG gradient options
- Supports constant pressure mode



Exchangeable pump heads
(stainless steel or titanium)

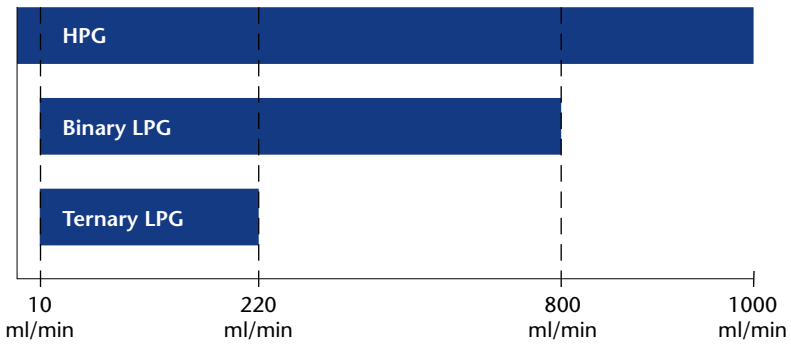
High or low pressure gradient?

A **low pressure gradient** (LPG) module dynamically composes the eluent on the inlet-side or low pressure side of the pump head, by quickly switching between the different solvent channels. We offer binary or ternary LPG upgrade modules for the isocratic P 2.1L.

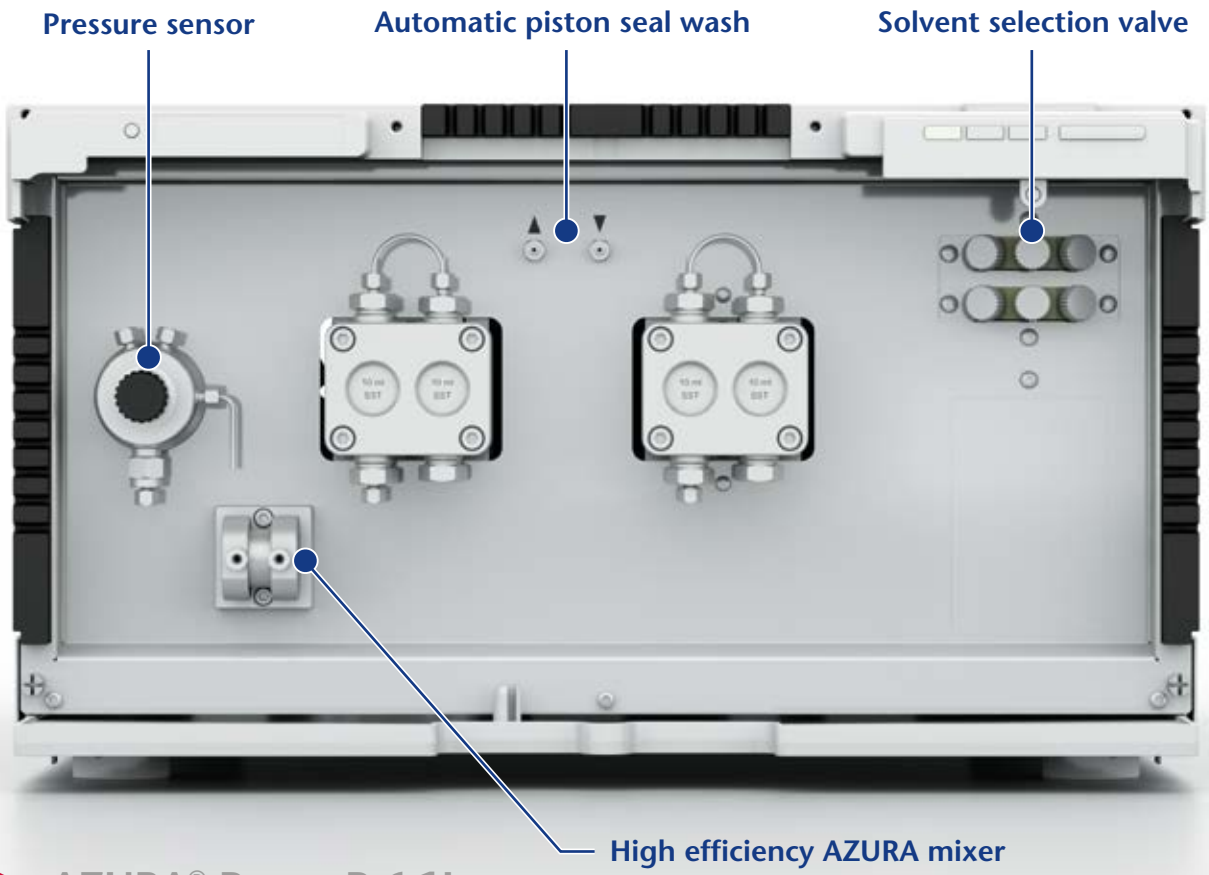
The eluent in a binary **high pressure gradient** (HPG) system is composed by combining the solvent flows of two isocratic pumps.

LPG	HPG
Low investment costs	Less wear
Limited flow rate range	No flow rate limitation
Channel usable for feeding or solvent selection	High accuracy

Covered flow rate



Binary LPG valve block for the pump head



AZURA® Pump P 6.1L

The AZURA semi-preparative Pump P 6.1 with 50 ml pump head can be used as an isocratic or binary HPG pump. It is made for medium-size purification tasks and upscaling processes. It also supports constant pressure mode.

- Flow rate up to 50 ml/min
- Flow rate increment: 0.01 ml/min
- Binary gradient with solvent selection valve (2 x 2 solvents)
- Up to 300 bar

Solvent selection

Do you often have to change your solvent? The Pump P 6.1L features a built-in 2 x 2 solvent selection valve, but any AZURA system can be extended with a valve for solvent selection, useful e.g. in method development. Choose your valve with up to 12 ports.

www.knauer.net/azuraprep

Detection

Which detector do you need for your target molecule?

We provide a choice of UV/VIS detectors, ranging from single variable wavelength to 8-channel diode array detector with 3D scan capability.

Wavelength range	190–500 nm	190–700 nm	190–700 nm	190–700 nm	190–1000 nm
AZURA detector	**UVD 2.1S**	**UVD 2.1L**	**MWD 2.1L**	**DAD 2.1L**	**DAD 6.1L**
	Compact and versatile UV detector	Reliable UV/VIS detector for a wide spectrum of applications	Robust multi-channel UV/VIS detector	Versatility through a wide flow cell range	High-end diode array detector with outstanding performance
Channels	1	1	8	8	8
3D data acquisition				✓	✓
Data acquisition rate	50 Hz	50 Hz	100 Hz	100 Hz	100 Hz
Fiber optics available	✓	✓	✓	✓	✓

AZURA® RID 2.1L

Refractive index detector

- Active temperature control
- RI range: 1.00–1.75 RIU

For cost-effective, fast and reliable analysis of non-UV absorbent compounds such as carbohydrates and sugars, etc.

AZURA® CM 2.1S

Conductivity and pH Monitor

- Flow rates up to 100 ml/min
- 1 µS/cm–999 mS/cm
- pH range 2–12

Basic and versatile monitor for biopurification applications.

Flow cells for UV/VIS and DAD detectors

Select from an impressive range of easily exchangeable preparative and semi-preparative flow cells for UV/VIS and DAD detectors. With capillary connections ranging from 1/16" to 3/4", optional fiber optics technology and a variety of flow cell wetted materials, a wide spectrum of applications can be covered.

Max. flow rate	Connectors	Path length	Volume	Max. pressure	Fiber optics version
100 ml/min	1/16''	3 mm	2 µl	300 bar	✓
100 ml/min	1/16''	0.5 mm	3 µl	200 bar	✓
500 ml/min	1/8''	0.5/1.25/2 mm	1.7/4.3/6.8 µl	200 bar	✓
1000 ml/min	1/4''	0.5/1.25/2 mm	1.7/4.3/6.8 µl	200 bar	✓

Process-scale flow cells also available with TRI-Clamp connection up to 3/4''

Fiber optics technology for more flexibility

Versatility Highlight

Fiber optic cables offer the possibility to separate the flow cell from the detector. This enables demanding applications such as measuring directly after a heated LC column or in hazardous environments, allowing safe operation of the instrument while maintaining performance.

Fiber optics flow cell with TRI-Clamp connection for high flow applications

Fiber optics also allow working in hazardous environments

www.knauer.net/detectors

Fraction collection

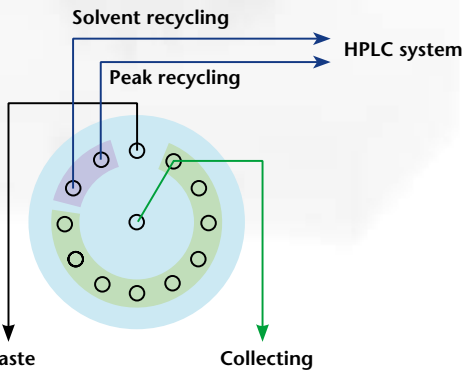
How do you typically collect your sample?

Manually – valve switching triggered by user via instrument or chromatography software
Time-based – collection in time intervals
Peak-based – collection according to detector signal

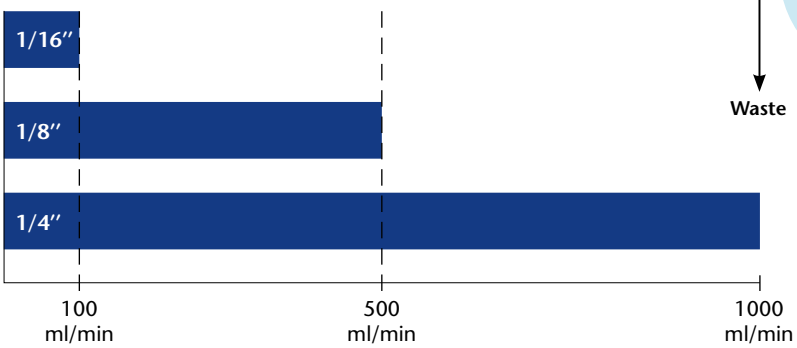
… KNAUER supports all of these methods

Fraction collecting with KNAUER valves

The simplest, yet very effective option for fraction collecting are our multi-position valves. Regardless if you just want to collect your product or want to improve your purification by solvent and peak recycling – our valves offer you all the options – available as a single device or integrated into an Assistant ASM 2.1L.



Fractionation valves max. flow rate



Which collection device fits your method?

Device	Max flow rate (ml/min)	Racks	Different rack types	Max. fractions (1/16″; 1/8″; 1/4″)	Stand alone	Cooling/ heating option	RFID rack recognition
Valve	1000			16/12/10	✓		
Foxy R1	25/125	1	15	up to 144	✓	✓	
Foxy R2	125/1000	2	15	up to 288	✓		✓

Fraction collectors Foxy R1 or R2

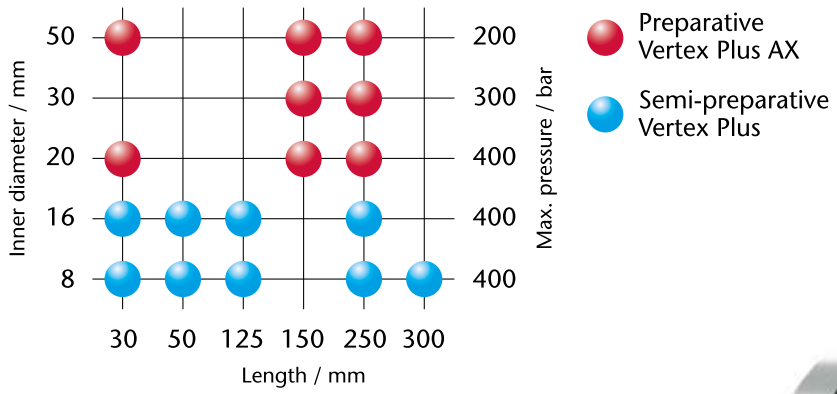
The fraction collectors Foxy R1 and Foxy R2 can collect samples in the working range of up to 1000 ml/min (R2), depending on rack type used. The Foxy R1 can be cooled.
The two-rack fraction collector Foxy R2 uses radio frequency identification to automatically recognize collection racks for easy setup.

- Choice of racks: capacities from two 96 well microtiter plates up to nine 480 ml bottles, or virtually unlimited fraction volumes with funnel racks
- Your sample is kept stable either via cooling option or coldroom usage
- User-friendly touch screen
- In stand-alone mode, fractions can be collected by time, drop count or pumped volume

www.knauer.net/fractionation

KNAUER preparative columns and AZURA Prep LC systems – a perfect match!

Available column dimensions



High performance

- Excellent performance due to optimum packed bed density and stability in a universal design
- Reproducible column efficiency

Pre-columns

Application flexibility with ...

▶ Eurospher II

- Silica material is available in 13 different modifications
- Particle sizes of 5 µm, 10 µm, 15 µm, 20–45 µm, ideal for prep. LC
- Can replace e.g. Kromasil, Nucleosil, Inertsil, Betasil …

▶ Eurokat

High performance polymer phases for the separation of complex mixtures of organic acids, carbohydrates, and alcohols.

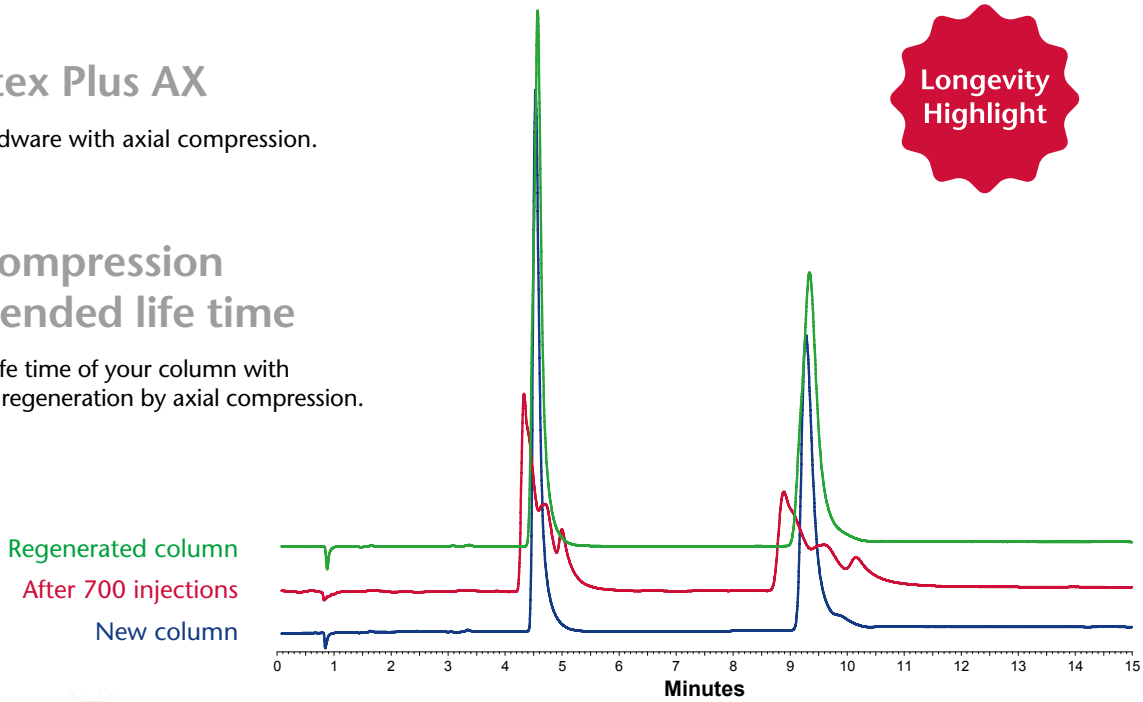
▶ Vertex Plus AX

Column hardware with axial compression.

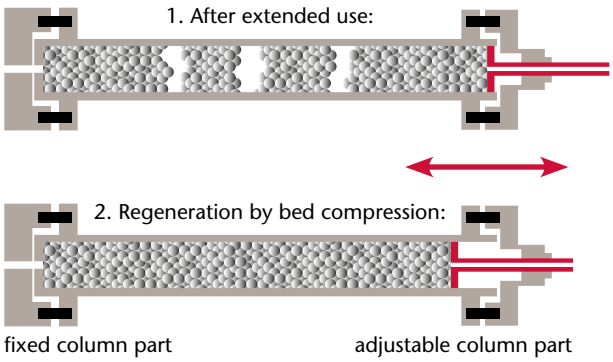
Longevity Highlight

Axial compression for extended life time

Extend the life time of your column with column bed regeneration by axial compression.



Principle of axial compression



Demanding application conditions can deteriorate separation performance through small bed fissures. Regain performance by compressing the bed with the adjustable column part of the Vertex Plus AX column.

Refill service

Only for Vertex Plus AX: Save up to 20 % of the original column price.*

*no refill service for precolumns

Cost-effective

Taking the features and advantages of the KNAUER Vertex Plus AX preparative HPLC columns into account, we offer a highly competitive product.

www.knauer.net/prepcolumns

Eurospher II, a true application allrounder

Eurospher II is a high performance column material for analytical, semi-preparative and process-scale applications.

- Ultra pure spherical silica gel
- Narrow particle and pore size distributions
- Outstanding mechanical stability
- Particle sizes: 5, 10, 15, 20–45 µm
- Pore size: 100 Å

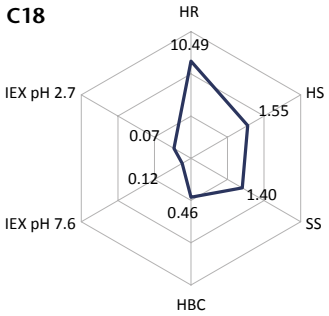
With the wide range of different surface modifications available, all application fields in reversed phase and normal phase modes are covered.

Normal phase mode

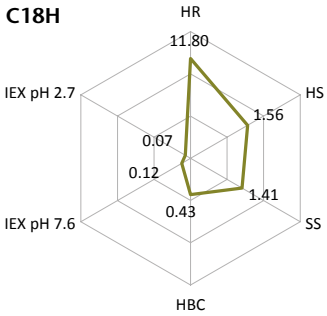
Phase/USP code		Key application	
CN **USP L10**	Allrounder for applications in normal as well as reversed phase mode	Pharmaceuticals	
Diol **USP L20**	Alternative to the silica packing with shorter equilibration time and comparable selectivity	Phospholipids in lecithine	
Si **USP L3**	Wide range of different applications, also for normal phase HPLC; good choice for analytical and preparative purposes to separate polar compounds	Fat soluble vitamins	

Eurospher II is also available in the following modifications: Phenyl, C8, C8 A, C4, NH_2, HILIC

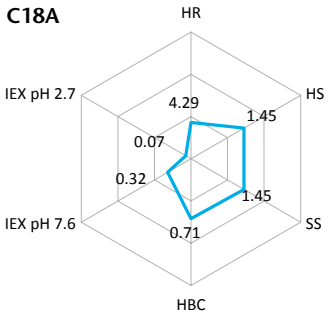
C18



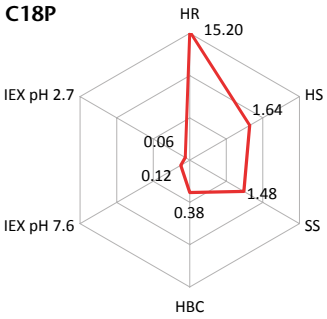
C18H



C18A



C18P



Selectivity plots for phases are based on Tanaka tests:
HR: hydrophobic retention
HS: hydrophobic selectivity
SS: steric selectivity
HBC: hydrogen bonding capacity
IEX pH 7.6: ion exchange capacity at pH 7.6
IEX pH 2.7: ion exchange capacity at pH 2.7

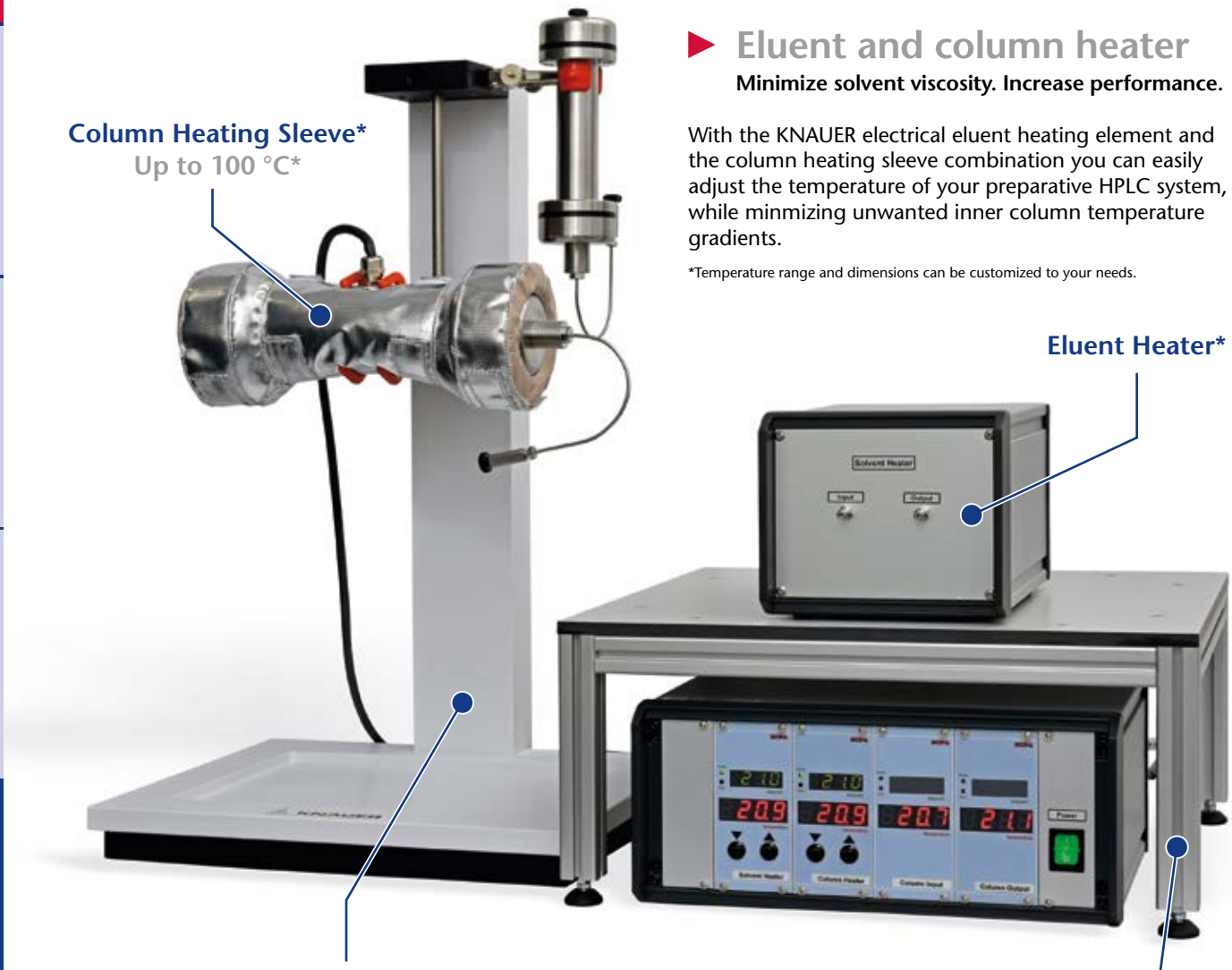
Reversed phase mode

Phase/USP code		Key application	
C18 **USP L1**	Classical C18 phase for acidic, basic and neutral analytes	Steroids	
C18A **USP L1**	Polar endcapped C18 phase for alternative selectivity and 100 % aqueous eluents	Water soluble vitamins	
C18H **USP L1**	For acidic, basic and neutral analytes with extended pH range from pH 1 to 12	Acidic and basic analytes	
C18P **USP L1**	High 20 % carbon load, fully endcapped; excellent shape selectivity (steric cis-trans separations) and pH stability	Enantiomers like hop constituents	

www.knauer.net/eurospherii

Accessories

Improve system performance, organize your lab bench, and work more conveniently with the right accessories.



Eluent and column heater

Minimize solvent viscosity. Increase performance.

With the KNAUER electrical eluent heating element and the column heating sleeve combination you can easily adjust the temperature of your preparative HPLC system, while minmizing unwanted inner column temperature gradients.

*Temperature range and dimensions can be customized to your needs.

Multi Column Base

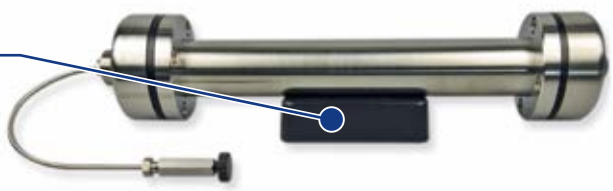
A robust column stand for up to three preparative LC columns. The included stand rod allows for flexible attachment of other accessories.

Benchtop Racks

Available in different heights to easily stack components with different footprint like fraction collectors or autosamplers.

Prism Column Holder

Made to reliably hold a single column (max. ID: 50 mm).



www.knauer.net/accessories

Software solutions

ClarityChrom®

ClarityChrom is an easy-to-use chromatography data system for workstations. The optional extensions for GC control, PDA, GPC and MS make the software adaptable to a wide spectrum of applications. Practically all KNAUER HPLC devices can be controlled.

Additionally, devices and systems from more than 45 manufacturers are also supported. ClarityChrom® includes the drivers for several fraction collectors and supports peak recognition by level and/or slope.

The manual fraction control and the option to use the KNAUER electric valves for fractionation give you even more flexibility.

- Fraction collecting via peak recognition (level only, slope only, level AND / OR slope – incl. self-learning) or single event (unconditional, timed event)
- Easy to collect: waste, collect to position / collect to next, solvent recycling
- Direct control during a run – manually switch to: collect, waste, solvent recycling
- Consecutive runs: easily find your chromatogram by clicking on your fraction

More supported software packages:

OpenLAB® CDS EZChrom Edition

The OpenLAB CDS EZChrom Edition offers advanced functionality with a user-interface known from the ChromGate CDS. The direct fraction control and the option to use the KNAUER electric valves for fractionation give you additional flexibility.

PurityChrom®

The software PurityChrom is designed for liquid chromatography purification tasks. Although pre-set for volume-based operation, you have the freedom of creating methods also based on volume or time. Advanced fractionation options include logical combinations of detection criteria and can be carried out using a fractionation valve as well as a fraction collector.

Chromeleon™

Chromeleon is one of the most wide-spread chromatography data systems. Its intuitive handling benefits laboratory workflow and the highly developed algorithms simplify data processing. It offers a broad range of third-party drivers and can be easily used with existing HPLC systems. KNAUER offers drivers for a lot of its devices.

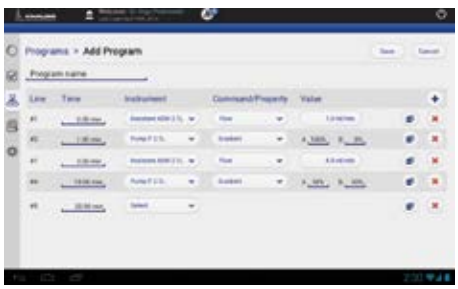
www.knauer.net/software

Mobile Control

AZURA® devices at your fingertips

Usability Highlight

AZURA® Mobile Control



With the Mobile Control app you have your AZURA devices at your fingertips: Easily check the status or set parameters of several devices or several systems simultaneously, even outside the laboratory. With the possibility of data acquisition, the Mobile Control is the perfect addition to the AZURA Compact Prep LC system. This combination represents a truly space-saving HPLC solution. No additional computer or software is needed. Control every AZURA system in your laboratory with one tablet.

Mobile Control is safe: it ensures that device parameters can only be changed by authorized operators.
The Mobile Control app can be run from a tablet or PC with Windows 8 or higher. Depending on the hardware control is possible via WLAN or Ethernet.

- Control your devices or systems from your desktop
- Easily switch between your AZURA systems and monitor all of them
- Create different user accounts to securely manage your systems
- Work effortless with the intuitive user-interface
- Optionally record data and control fraction collection

www.knauer.net/mobilectrl

Benchtop purification

▶ AZURA® Compact Prep LC

This system fits on any lab bench and allows purification tasks up to 50 ml/min. Additional devices can be easily added any time due to the modular design of AZURA.

Multi-position valve
for fractionation

Recycling option available

Manual injection valve

Detector UVD 2.1S
190–500 nm
Variety of flow cells
Fiber optics option for remote flow cell applications

Pump P 4.1S
with 50 ml pump head, made of stainless steel or ceramic

How flexible do you need to be?

AZURA® Lab Prep LC

The Lab Prep LC system is designed for your more demanding semi-preparative separations. You can customize a highly flexible LC system with the freely combinable components. With a maximum flow rate of 50 ml/min it is possible to separate up to several hundred milligrams per run.

Assistant

Combine up to three additional devices (valves, additional pumps or UV detector). Fractions can be collected via multi-position valve or – if you desire even more flexibility – with the fraction collector Foxy R1/R2.

Detector

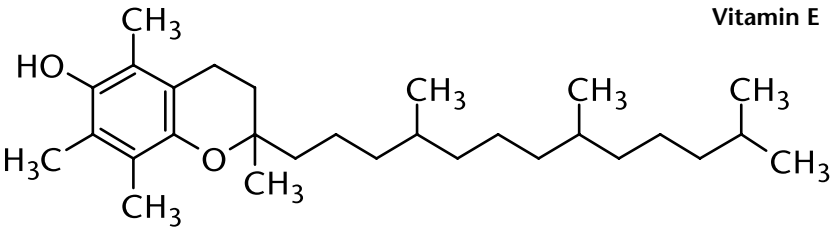
Choose between detection types: UV (variable wavelength, multiple wavelength, diode array), RI, ELSD, conductivity, pH, or fluorescence.

Pump

Regardless if an isocratic or HPG system is needed, the P 6.1L is the perfect pump for your semi-preparative separations up to 50 ml/min and 300 bar.

Peak and solvent recycling

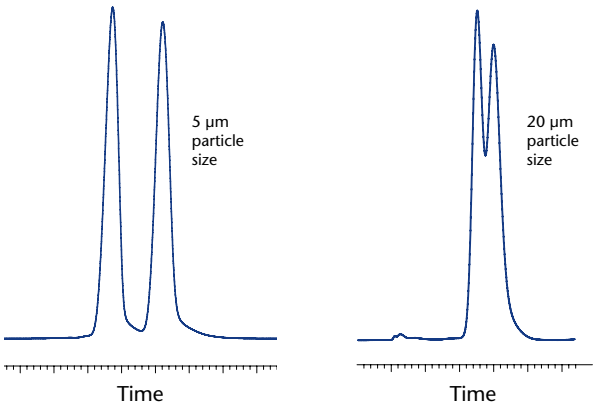
Reduced cost and increased purity



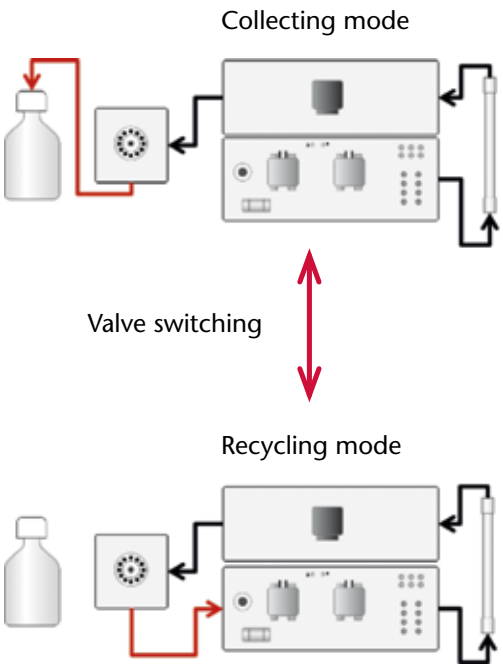
An example

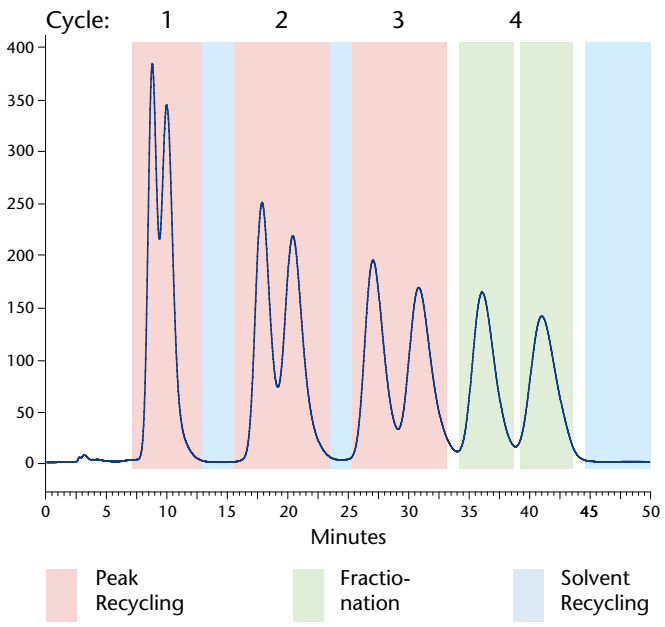
A separation can be much more demanding after upscaling from analytical to preparative scale. In many cases a baseline separation is not possible anymore, so time and money consuming method development or hardware adjustments have to be done. The AZURA Lab Prep LC system is well-suited to apply peak recycling technique to solve demanding resolution tasks.

Additionally, solvent recycling can be applied to save eluent, if it can be considered clean.



Comparison of analytical and preparative chromatogram.





Successful peak separation with recycling mode.

www.knauer.net/azuraprep

The upscaling expert!

AZURA® Pilot Prep LC

Choose the Pilot Prep LC system if you want to increase your productivity even more. As for the AZURA Lab Prep LC system you can freely build up your system. Flow rates up to 1000 ml/min and loads up to several grams are possible. Optional peak and solvent recycling can be set up to increase separation power and reduce separation costs significantly.

Sample Injection Assistant

Feed assistant for manual injection or sample injection via pump.

Detector

Variable wavelength UV detector. Other detectors supporting up to 1000 ml/min can also be combined with the AZURA Pilot Prep LC.

Fraction collection

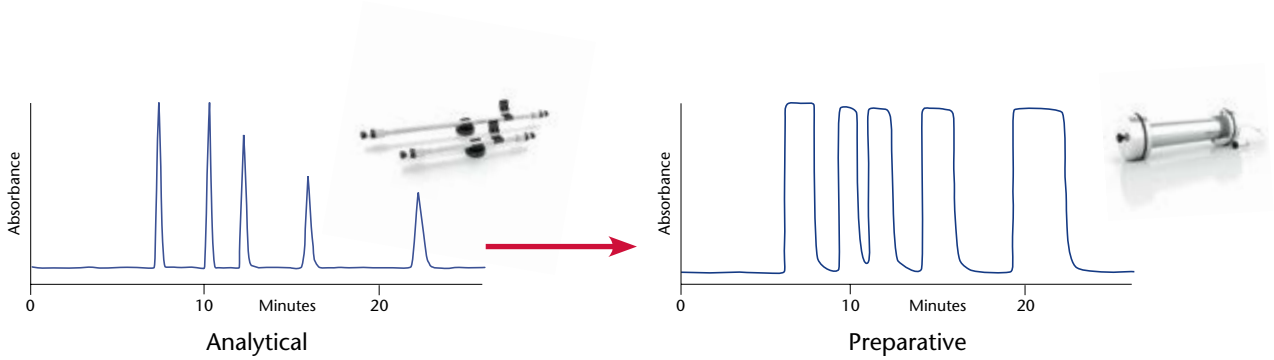
Fraction collection is possible via multi-position valve for up to 16 fractions. Alternatively the Foxy R2 can be used if more fractions need to be collected (flow rate up to 1000 ml/min).

Pump

The pump AZURA P 2.1L with 100 ml pump head can be used for flow rates from the analytical range to 100 ml/min. The pump performs very well in the whole flow rate range. This makes the system very suitable for up-scaling tasks. The LPG module connected to the pump head adds binary gradient functionality to system (ternary also available).

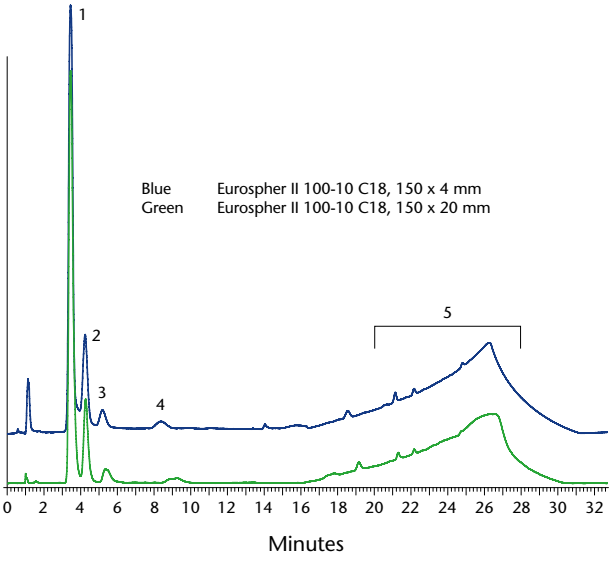
Pump heads can be easily exchanged. The max. available flow rate is 1000 ml/min.

Upscaling in one system



The AZURA Pilot Prep LC is the ideal solution for your upscaling tasks. The 100 ml pump head allows you to run your system under analytical conditions before adapting your method to preparative scale.

Scaling up of a separation of apple flavors from extract



1 trans-2-Hexen-1-al
2 trans-2-Hexen-1-ol
3 Methyl 2-methylbutyrate, Ethyl isobutyrate, Ethyl butyrate, n-Butyl acetate
4 Ethyl 2-methylbutyrate, Ethyl valerate, 3-Methyl-butyl acetate, 2-Methylbutyl acetate
5 other compounds (elution with higher Ethanol concentration)

Get started!

With the KNAUER ScaleUp Converter, you can easily calculate the method parameters to start from, e.g. how to move from a 4 mm ID column to a 30 mm ID column.

www.knauer.net/azuraprep

Preparative HPLC columns

HPLC columns for lab-scale purification tasks, featuring axial compression of the column bed. Significantly longer-lasting performance than standard columns.

www.knauer.net/precolumns

KNAUER ScaleUp Converter

Method transfer from analytical to preparative HPLC becomes easy with this free software tool. Enter analytical parameters and get the required parameters for your scaled-up LC method.

www.knauer.net/scaleupconv

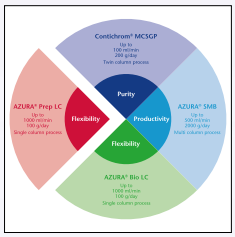
How do you control your HPLC system?

With the AZURA Mobile Control App you can control selected AZURA devices from your tablet. As addition to your CDS or for stand-alone use.

www.knauer.net/mobilectrl

Preparative HPLC intro

This presentation gives a brief introduction to the topic of LC purification.



www.knauer.net/prepintro

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Application support

Benefit from our experience in preparative chromatography and our extensive laboratory equipment. Our HPLC experts support you to find the best solution for your task.

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