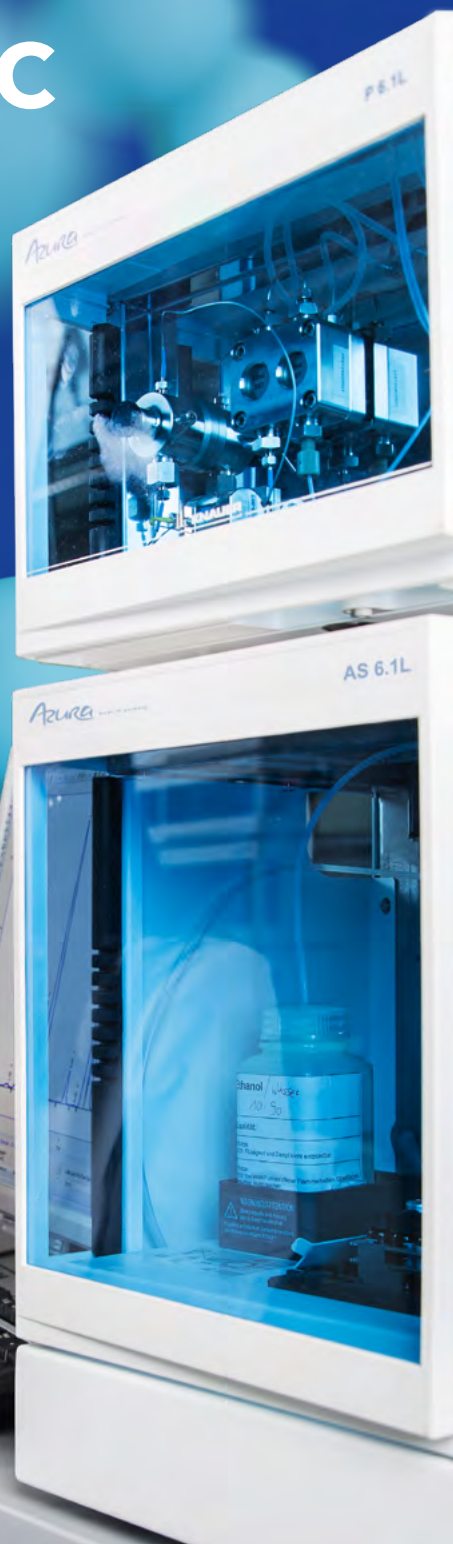


Science Together



AZURA® Analytical HPLC/UHPLC

Stay flexible regarding flow rates and upgrade options



AZURA® Analytical HPLC/UHPLC

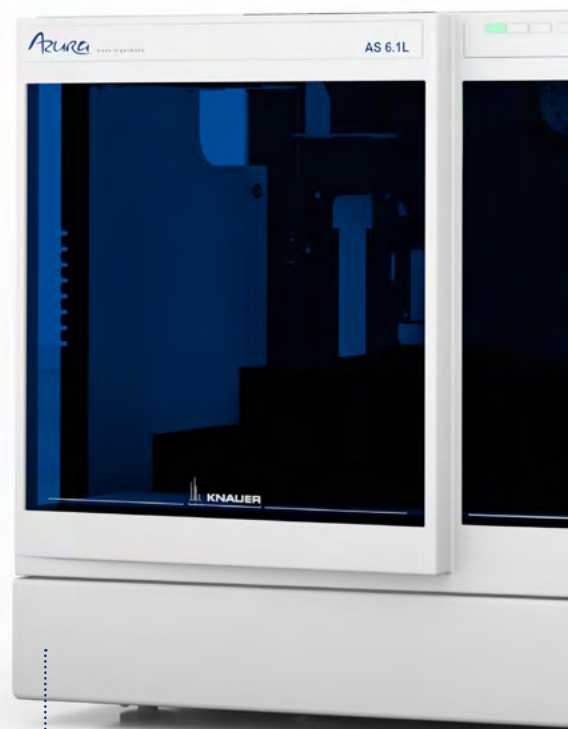
Efficient and adaptable to your needs

The analytical HPLC and UHPLC systems of the KNAUER AZURA liquid chromatography instruments are designed to support and facilitate your work. Whether doing routine analysis or demanding separation tasks, AZURA systems are the right

tool to overcome your analytical challenges. Choose between different gradient forming technologies and maximum flow rates to find the best configuration for your task.

AZURA® Analytical HPLC/UHPLC features

- Isocratic, binary high pressure gradient or quaternary low pressure gradient pump
- Pump heads allowing flow rates up to 10 ml/min at 700 bar or 1 000 bar up to 2 ml/min
- Autosampler with 0.1 µl sample aspiration at max. 1 200 bar with zero sample loss
- Choice of highly sensitive UVD, MWD, DAD, or RID detectors with intelligent temperature control
- Wide range of flow cells available, including remote cells
- Finger-tight high pressure stainless steel capillary connections “K-Connect”
- Extensive safety features such as leak management and sensors
- Frontal access of detector lamp and pump head for easy maintenance



Injection

Automatic or manual injection
(page 10)



Tempering

Column thermostats and column switching solutions (page 12)

Detection

Various detector types (UV/VIS, DAD, RI) and flow cells (page 14)

Eluent delivery

A choice of pumps available in different flow rates and pressure ratings (page 6)

Mobile control

Optional system control via tablet (page 21)

AZURA® Analytical HPLC/UHPLC

How much performance do you need?

From standard separations to demanding high-resolution analytical determinations, the AZURA analytical liquid chromatography instruments cover it all.



If you want to use HPLC columns with a smaller particle size, a higher maximum system back pressure is needed.

Max. back pressure



AZURA® Compact HPLC

AZURA® HPLC Plus

AZURA® UHPLC

AZURA® Analytical system features and options		AZURA® Compact HPLC	AZURA® HPLC Plus	AZURA® UHPLC
Available pump heads Max. flow rate in ml/min	5			+
	10	+	+	
Gradient options	Isocratic	+	+	
	LPG		+	+
	HPG		+	+
	400	+		
Max. back pressure in bar	700		+	
	1000			+
Recommended column inner diameter	4 - 4.6 mm	3 - 4 mm	3 mm or smaller	
Recommended particle size	5 µm	3 - 5 µm	3 µm or smaller	
Sample Injection	Manual injection	+	+	+
	Autosampler		+	+
	UVD	+	+	
Detector*	MWD		+	+
	DAD		+	+
	RID	+	+	+
Recommended K-Connect capillary inner diameter	0.45 mm	0.18 mm	0.10 mm	
Software	ClarityChrom	+	+	+
	OpenLAB	+	+	+
	Chromeleon		+	+

* more detection options on page 14

Eluent delivery

For highly accurate and precise HPLC and UHPLC

AZURA® Pump P 6.1L

The analytical pump AZURA P 6.1L combines all essential components of a first class HPLC pumping system. Three different configurations are available: A 2 × 2 binary high pressure gradient (HPG) for high accuracy blending of up to two eluents from two selectable solvents each; a low pressure gradient (LPG) for reliable blending of up to four eluents and a very cost-effective isocratic version for easy analyses. Excellent separations with small particle size columns can be achieved with the high-performance pump heads featuring an extended back pressure. Choose between pump heads with a maximum flow rate of 10 ml/min and 700 bar¹ backpressure, or pump heads with a flow rate of 5 ml/min and 1000 bar²

backpressure. Special pump heads for Normal Phase applications will help to deliver robustly even demanding eluents like heptane or hexane. Pumps without a degasser offer a cost effective alternative.



Choose your HPLC pump according to your application's needs. Gradient formation, mixer size and pulsation compensation will have an extensive influence.

Available pump versions

Pump head (type): material, max. pressure	P 6.1L Isocratic	P 6.1L HPG	P 6.1L LPG
5 ml: stainless steel, 1000 bar ²		+	+
10 ml: stainless steel, 700 bar ¹		+	+
10 ml normal phase: stainless steel, 700 bar ¹		+	
10 ml normal phase: stainless steel, 700 bar ¹ without degasser	+	+	
10 ml: stainless steel, 700 bar ¹ without degasser	+	+	+

Optional: P 6.1L with 50 ml pump head available (max. 50 ml/min; 300 bar)

1) > 5 ml/min: max. 400 bar

2) > 2 ml/min: max. 700 bar

AZURA® Pump P 6.1L

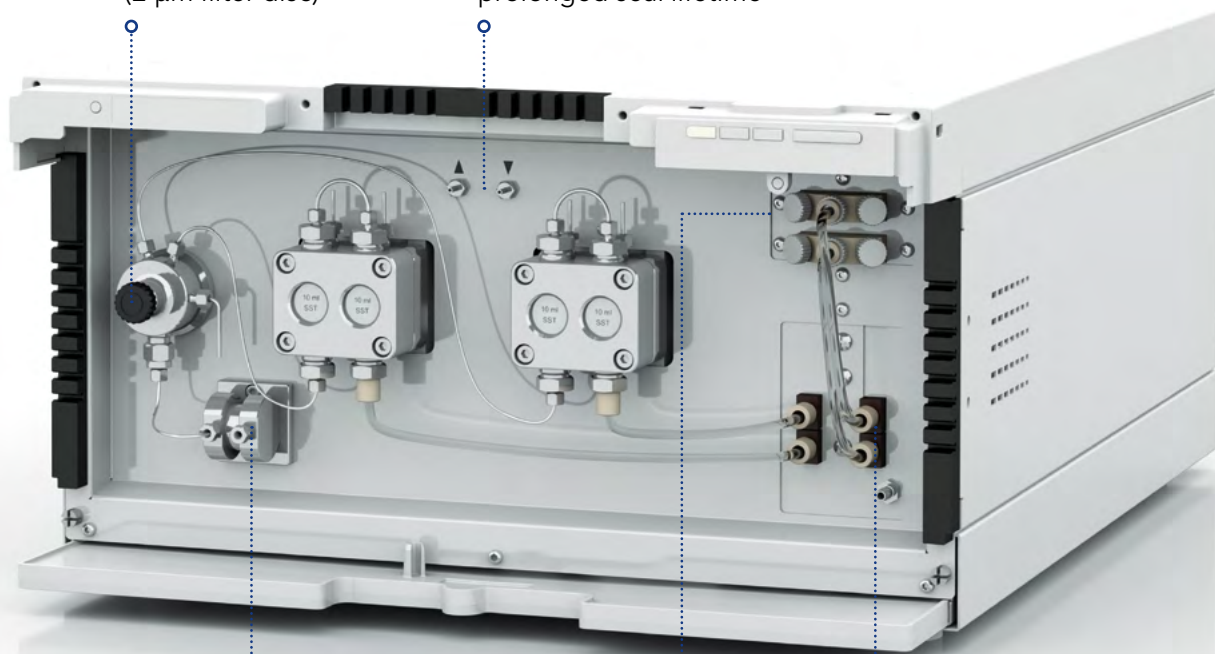
Binary HPG

AZURA® Pump Filter

Protects the column from contamination (2 µm filter disc)

Piston back flush

This standard feature of the P 6.1L will wash away contaminations for prolonged seal lifetime

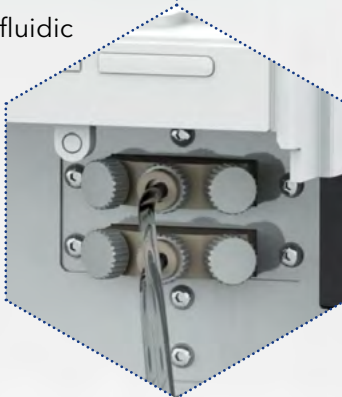


AZURA® Mixer

Highly efficient microfluidic solvent mixer

Online Degasser

Reduces baseline noise resulting in higher sensitivity



Solvent Selection Valve

Integrated in every binary HPG pump, each channel can be used with two different solvents

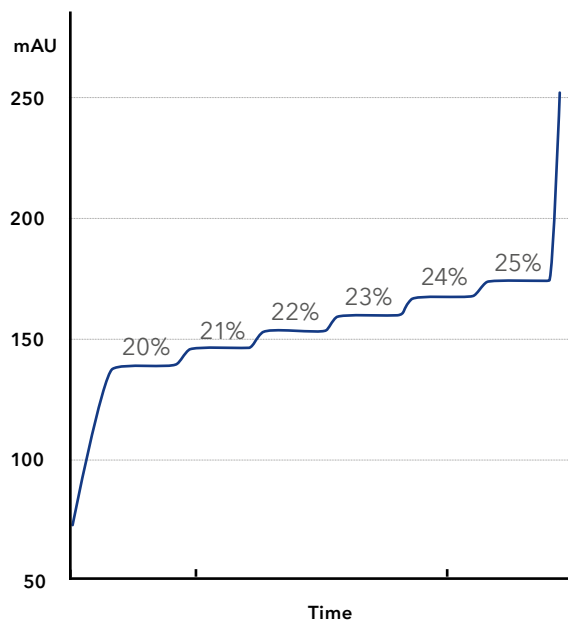
High or low pressure gradient?

The choice of gradient formation technology is essential for a HPLC/UHPLC system. AZURA systems can be equipped with either a high or a low pressure gradient pump. Both techniques have advantages and disadvantages.

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. The AZURA pump technology adapts to the mixer volume and changes the valve switching cycle time accordingly.

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

LPG	HPG
Low investment costs	Very fast gradients
Four channel blend	Smallest dead volume



Excellent gradient reproducibility of 0.3 % RSD. Overlay of 6 repetitions at 1 ml/min run with pump P 6.1L low pressure gradient version

Choose a solvent mixer according to your application

AZURA® Mixer Microfluidic solvent mixer

The sophisticated micro fluidics of the AZURA Mixer combine high mixing performance with a low dead volume. The user-changeable mixer is available in different volumes (50/ 100/ 200 µl) allowing best possible adaption to any application or flow rate.



AZURA® Pump P 6.1L

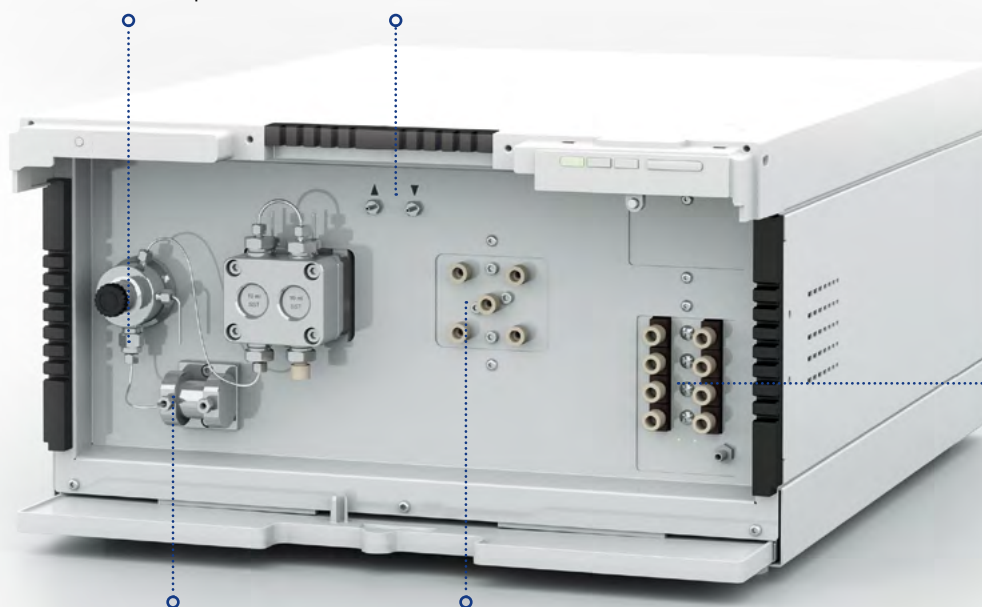
Quaternary LPG

AZURA® Pump Filter

Protects the column from contamination (2 µm filter disc)

Piston back flush

Washes away contaminations for longer seal life (standard feature of P 6.1L)



4-Channel Online Degasser

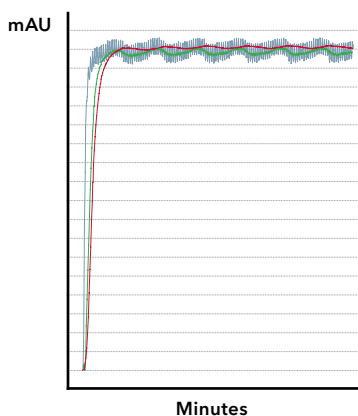
Reduces baseline noise enabling higher sensitivity

AZURA® Mixer

Highly efficient microfluidic solvent mixer

Multi-proportioning valve

Precise blending of up to 4 eluents



A small mixer volume will improve system dead volume, but might decrease mixing efficiency.

Sample injection and switching tasks

Manual injection valves are the most cost-effective option to introduce samples. KNAUER valves feature a backpressure range of up to 1000 bar with a 0.3 mm bore size.

All valves can be equipped with an automatic valve drive or can be integrated into an assistant module housing AZURA ASM 2.1L



Available valves	6-Port	8-Port
for manual injection	2-position	2-position
for actuator	2-position	2-position
for actuator	multiposition	multiposition

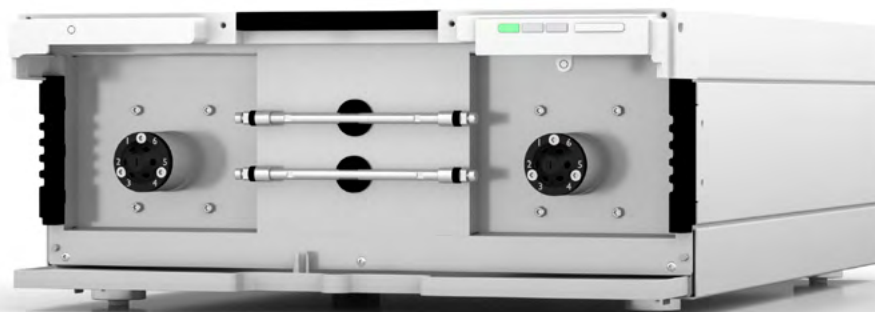
KNAUER Multitasking valves features:
 Diamond coated steel for high durability. Low port-to-port volume. Ultra-fast switching. One valve drive for all valves.



Column switching

Assistant ASM 2.1L

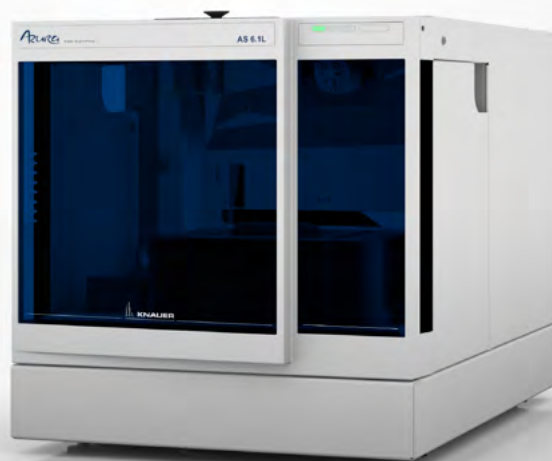
Using two valves in one ASM 2.1L to establish column switching with up to 6 columns



Autosampler AS 6.1L

The AZURA Autosampler AS 6.1L is a high precision device available for a maximum backpressure of 1 240 bar. This Autosampler can inject from up to 768 positions when equipped with microtiter plates or from up to 108 standard 2 ml sample vials. This device is equipped with an ILD™ valve, consisting of a rotor-stator combination with a central port for depressurizing the sample loop before receiving the sample. This way, the sample is not delute with solvent. The AS 6.1L is available with a pressure rating of 1240 bar, a more cost effective version with a pressure rating of 700 bar or with Preparative and FPLC options.

- Up to 1 240 bar (700 bar)
- Cooling/heating option (4 - 40 °C)
- 0.1 µl - 10 000 µl (depending on configuration) sample injection volume
- Up to 768 samples (microtiter plates) or 108 standard vials
- Intermediate Loop Decompression - ILD™



Rack for 108 standard 2 ml vials



The integrated intermediate loop decompression valve reduces sample dilution and increases measurement reproducibility

Column tempering

Column Thermostat CT 2.1

The AZURA CT 2.1 is a forced air column thermostat capable of heating or cooling from 5 to 85 °C. The powerful fan and robust peltier element prevent a column from overheating while keeping it at a very stable temperature.

- Temperature range 5 - 85 °C
- Heating/cooling rate 2 °C/min
- Temperature accuracy ± 0.2 °C
- Temperature stability ± 0.1 °C
- Optional pre-column eluent tempering
- Up to 6 columns with 350 mm max. length
- Max. 16 mm inner diameter
- Column switching option with ASM 2.1L
- Operation via software or in stand-alone mode



Using an HPLC column thermostat is highly recommended, since a stable temperature has an immense positive influence on retention time reproducibility



Principle pre-column tempering

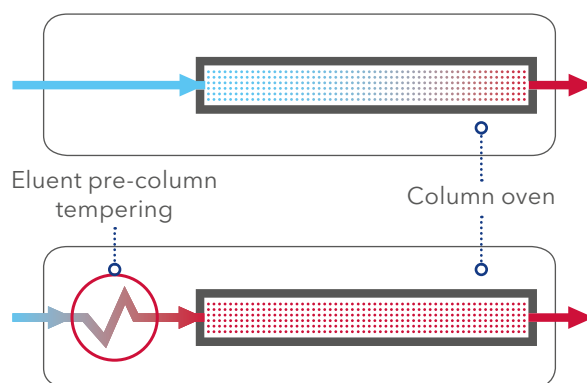
Optional eluent pre-column tempering

This device will converge solvent temperature with column temperature before entering the column and will therefore reduce temperature gradients within the column.

Available with 0.1 or 0.180 mm inner diameter (5 μ l / 18 μ l inner volume). This device can be retrofitted to the oven chamber of the CT 2.1.

Heating the column from outside only results in a temperature gradient in the column bed that can negatively influence separation results.

Heating the column and the eluent ensures a uniform temperature distribution, which is the closest-possible to ideal separation conditions.



K-Connect

Flexible capillaries and hand-tight connections provide easy handling while ensuring high pressure stability. Precision-manufactured surfaces and edges make enhanced fluid transfer possible. The K-Connect series features standard 1/16" OD capillary ends and standard 10/32" fittings for use in any HPLC system.



Detection

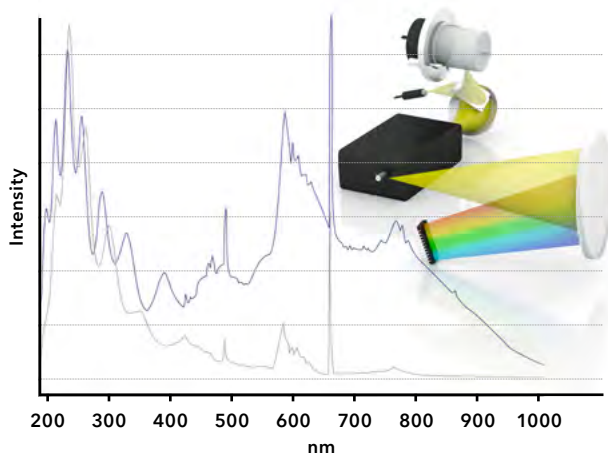
Sensitive UV/VIS detectors

We provide a choice of UV/VIS detectors, ranging from single variable wavelength to 8-channel diode array detector with LightGuide total reflection technology.

Wavelength range	190 - 500 nm	190 -750 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 multichannel 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	+	+	+	+	+
LightGuide flow cells			+	+	+
PressureProof flow cells			+	+	+
Biocompatible versions			+	+	+

The AZURA DAD 6.1L is equipped with revolutionary KNAUER Polka-Dot technology providing maximum light intensity and low noise over the

whole UV/VIS spectrum. This technology provides more light than previous shine-through lamp configurations.

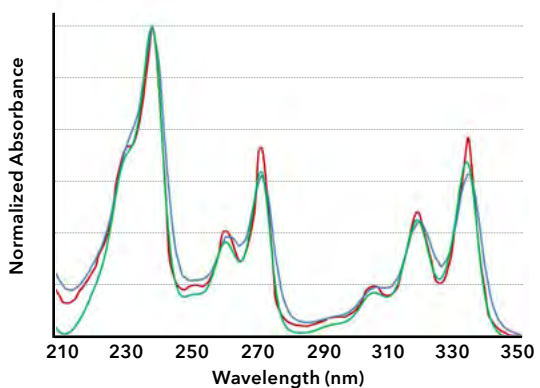


i
A halogen lamp is needed to detect analytes with a maximum absorption in the VIS range.

Intensity over wavelength comparison of Polka-Dot (blue) vs. Shine-through (grey) light mixing

Both AZURA diode array detectors DAD 6.1L and DAD 2.1L provide high spectral resolution

enabling optimized identification and sample characterization.



Spectral resolution comparison for pyrene

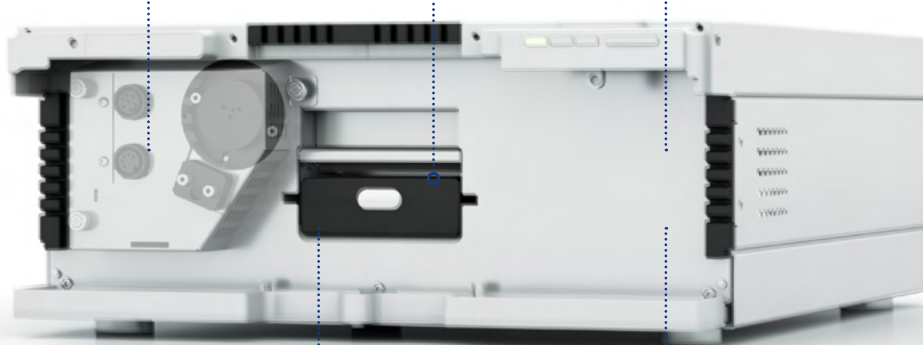
- DAD 6.1L (red)
- DAD 2.1L (blue)
- Vendor A (green)

Accessible

frontal lamp and flow cell exchange

Sensitive

LightGuide flow cells and Polka-Dot technology



Flexible

wide flow cell range for high application versatility

Robust

intelligent temperature control for minimal drift

Detection

Which flow cell suits your application best?

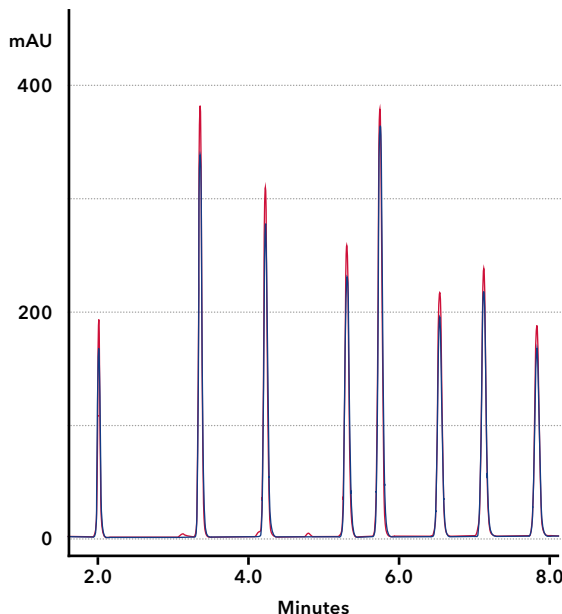
Standard HPLC

The KNAUER PressureProof flow cells are available for all AZURA UV/VIS detectors in cartridge and classic design. These highly robust and price attractive flow cells feature an increased back pressure stability (up to 300 bar) and extended flow rates range (up to 20 ml/min).

PressureProof principle



HPLC separation performed with an analytical PressureProof flow cell (blue) vs. a Standard LightGuide flow cell (red)



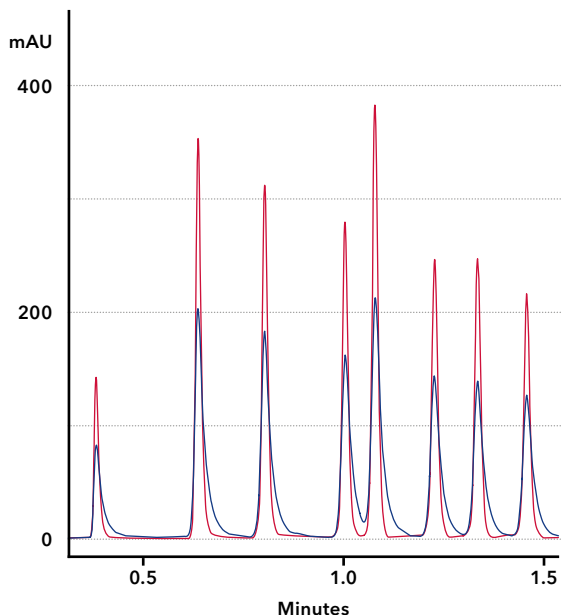
Fast HPLC

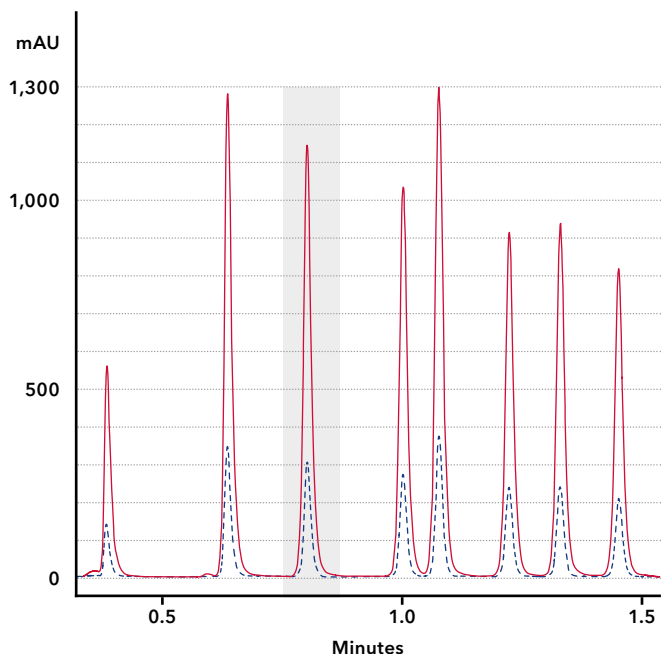
The Standard LightGuide Flow Cell Cartridge combines total reflection technology with small cell volume for high throughput and high resolution applications.

LightGuide principle



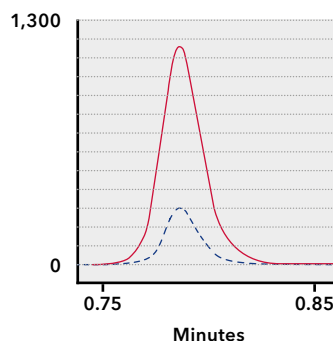
UHPLC separation performed with an analytical PressureProof flow cell (blue) vs. standard LightGuide flow cell (red)





Ultimately sensitive UHPLC

The High Sensitivity LightGuide Flow Cell Cartridge is available for the entire AZURA DAD series. With the lowest dispersion volume on the market and long path length this total reflection flow cell is the ultimate choice for demanding trace analysis.



Rapid separation performed with standard LightGuide flow cell (blue) vs. high sensitivity LightGuide (red)

Remote HPLC detection

KNAUER fiber optic technology offers the possibility to separate the flow cell spatially from the detector via fiber optic cables in a distance up to

10 meters. This enables the measurement of UV/VIS absorption in flow-through mode remotely from the detector.



Fiber optics enable the flow cell to be located very close to the column, minimizing peak broadening.

DAD with remote nano flow cell



Detection

No chromophor? No problem.

Great performance

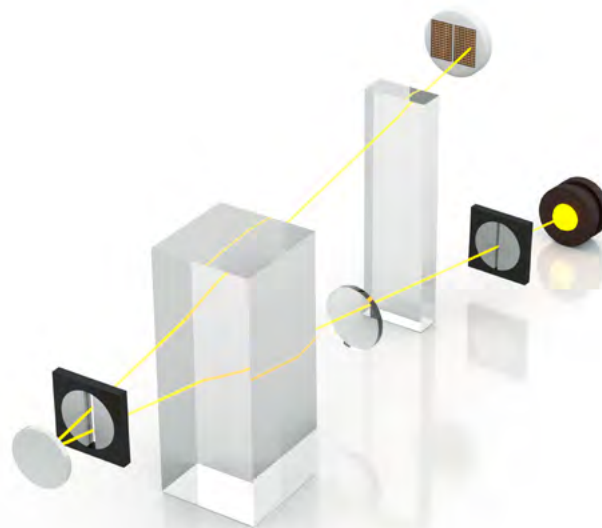
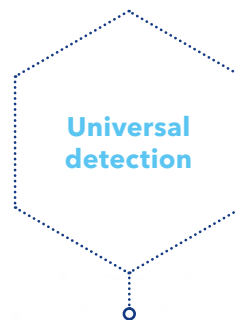
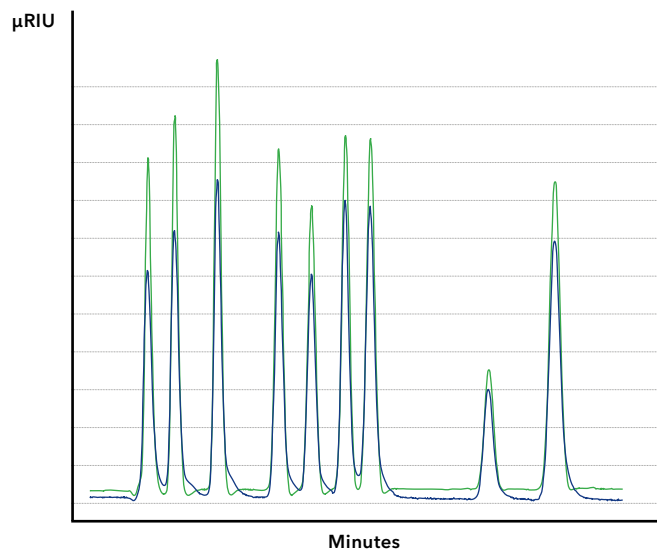
The AZURA RID 2.1L is a highly competitive and sensitive refractive index detector, ideal for fast and reliable routine analysis of non-UV absorbing substances. The intelligent temperature control guarantees fast baseline stabilization and stable operation.

Great stability

Furthermore, the long-life LED, highly pressure resistant flow cell, improved safety features and enhanced diagnostics functions guarantee easy handling and minimal maintenance.

Great versatility

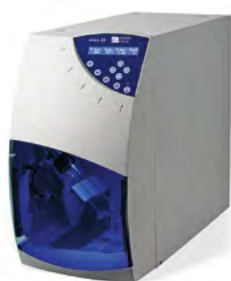
The wide linear dynamic range and 10 ml/min maximum flow rate make the AZURA RID 2.1L the perfect choice for most laboratory tasks.



AZURA RID 2.1L (green) compared to previous model (blue) displays increased sensitivity and baseline stability

A wide range of third-party detectors can be seamlessly integrated into AZURA analytical systems.

Gradient compatible universal detection



Using the unique Low Temperature technology, this Evaporative Light Scattering detector 85 LT allows universal high sensitivity analysis.

Sensitive and selective detection



The electrochemical detector DECADE Elite has been developed to meet the demands in ultra fast analysis, as to detection sensitivity, acquisition frequency and temperature specifications.

Sensitive and selective fluorophor detection

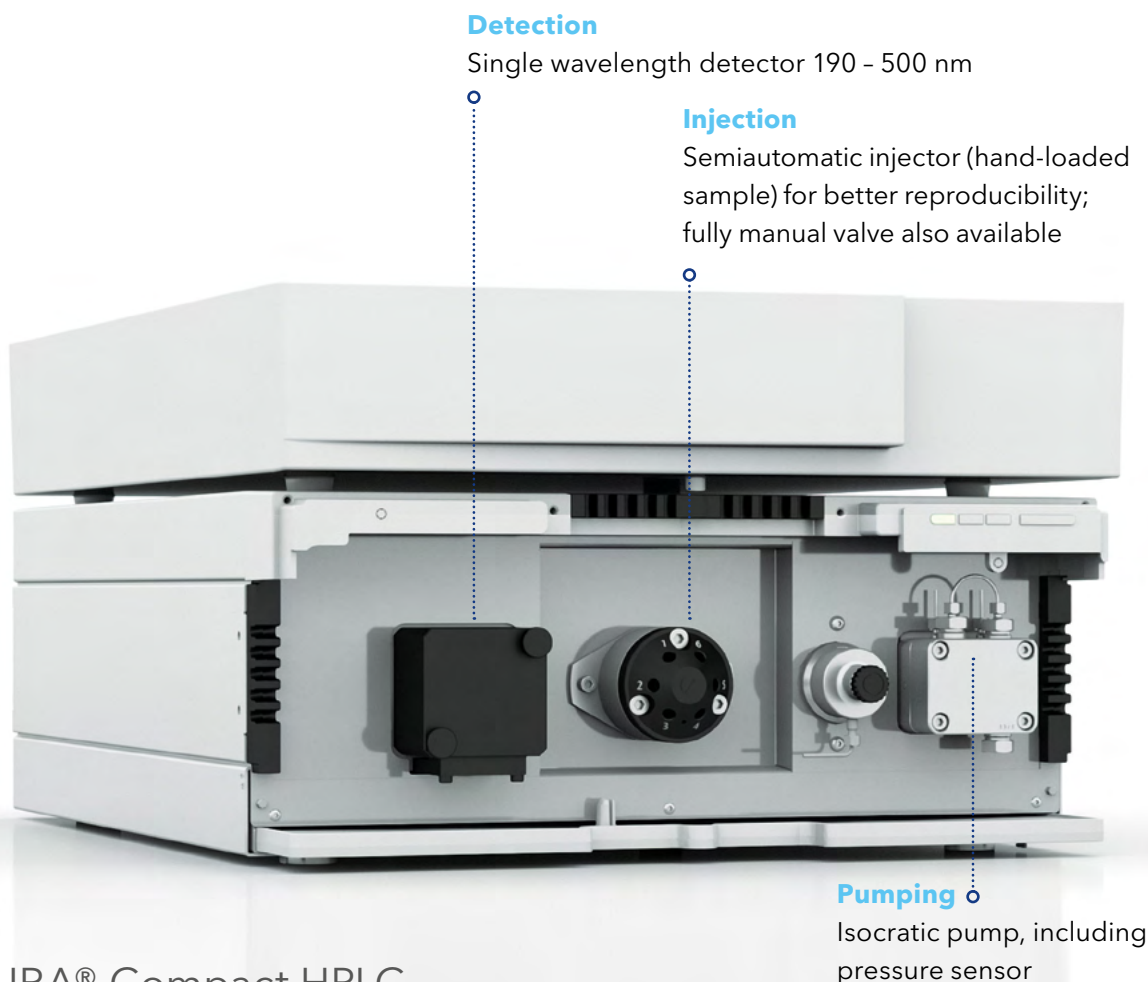


The fluorescence detector RF-20A provides world-class sensitivity, excellent maintainability and diverse validation / support functions. It supports a wide range of applications from conventional to high-performance analysis.



The KNAUER interface box IFU 2.1 LAN allows highly precise analog acquisition of data and control of third party modules over analog and relay outputs.

AZURA® Compact HPLC system



Detection

Single wavelength detector 190 - 500 nm

Injection

Semiautomatic injector (hand-loaded sample) for better reproducibility; fully manual valve also available

Pumping

Isocratic pump, including pressure sensor

AZURA® Compact HPLC Isocratic system

The AZURA compact HPLC system is a price attractive solution for educational purposes or simple separation tasks.

Complete small isocratic HPLC system

- Pump P 4.1S
- Detector UVD 2.1S
- Semiautomatic or manual injector
- Eluent Tray

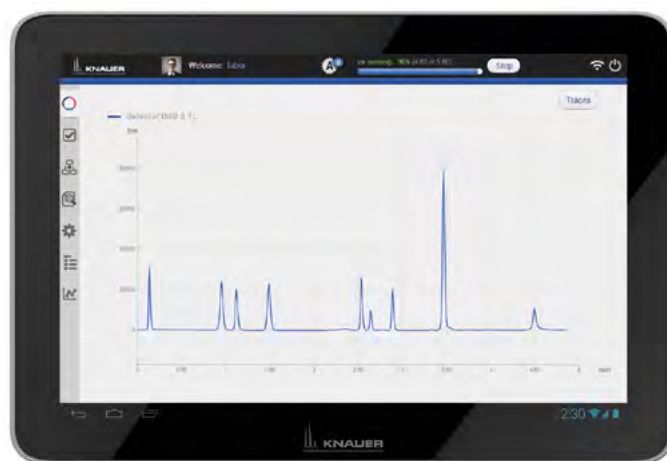
The clearly defined system layout helps to readily understand the different functions of the HPLC system. All important components are easy to access and maintain. The system is controlled by a laptop that also analyzes the measured data.

Recommended software solutions:

- Mobile Control Chrom
- ClarityChrom®

Mobile Control

AZURA® devices at your fingertips



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



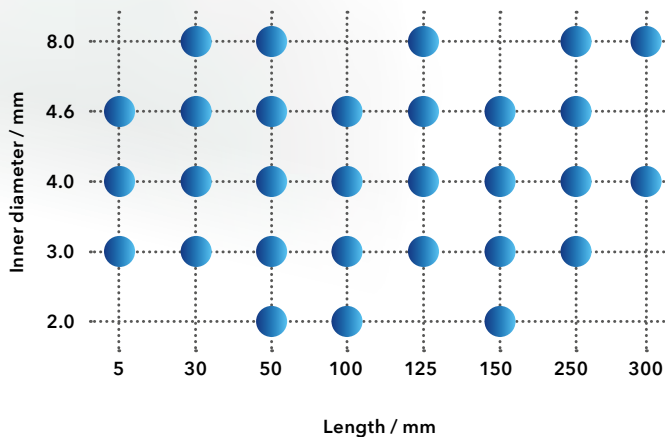
See all parameters of your system on one screen wherever you go.

Two licences:

- Mobile Control
- Mobile Control Chrom (with data acquisition)

KNAUER LC columns

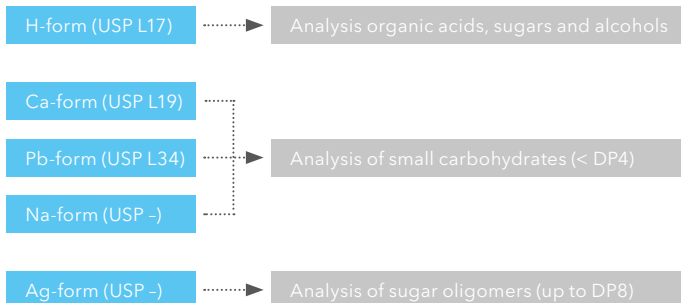
Analytical column dimensions



HPLC of sugars, organic acids and alcohols: Polymer based phases

Ideal for the organic solvent free analysis of:

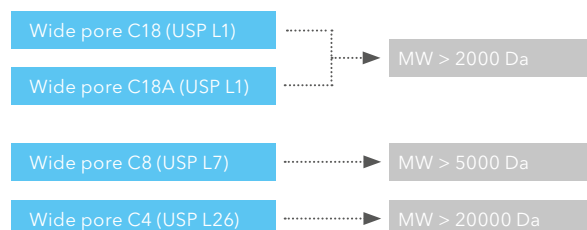
- Fruit beverages
- Soft drinks
- Wine
- Beer
- Fermentation broths



HPLC of proteins and peptides: Silica based phases

Your first choice for the analysis of:

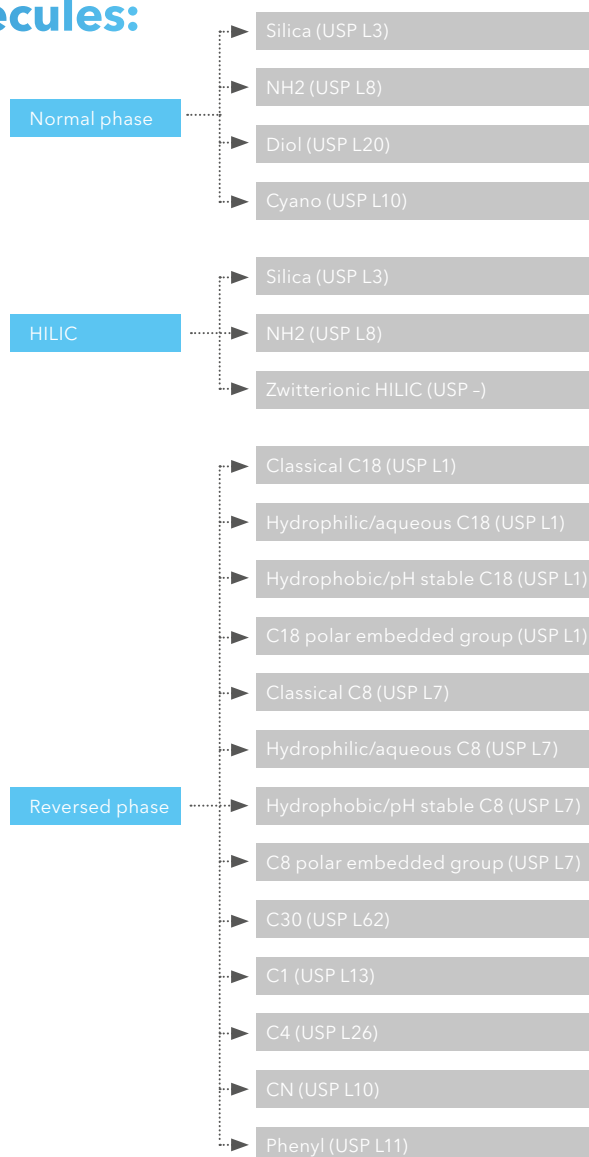
- Proteins
- Peptides
- Oligonucleotides



HPLC/UHPLC of small molecules: Silica based phases

The best choice for a wide range of application areas for small molecules (< 2000 Da)

- Reversed phase mode for water- and water/organic solvent mix-soluble samples
- Normal phase mode for water insoluble samples
- HILIC mode for highly polar samples that are not retained by RP chromatography
- Ion pair chromatography for acids and bases that are poorly retained in RP mode



We offer replacements for nearly any HPLC column on the market.

Solutions for your food analysis

Eurokat

High performance polymer phases

Modifications

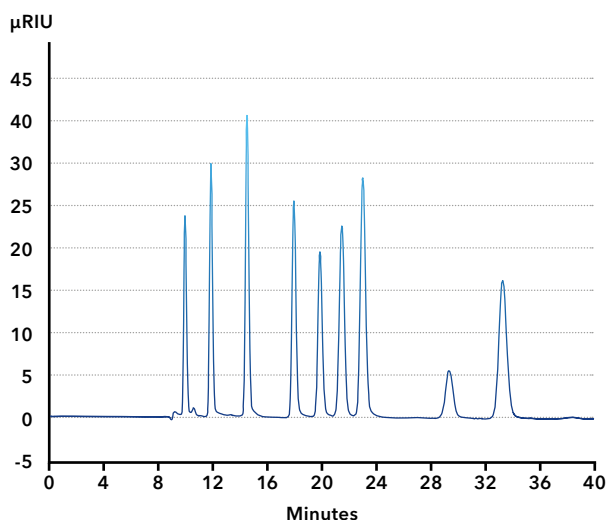
- Eurokat H: separation of organic acids, sugars, alcohols and sugar alcohols
- Eurokat Pb/Ca: Separation of carbohydrates up to DP < 4
- Eurokat Na/Ag: Separation of sugar oligomers and carbohydrates up to DP 8 (DP = degree of polymerization)



Recommended Eurokat column dimension for best results: 300 × 8 mm ID analytical column, 30 × 8 mm ID precolumn.

Key application

Separation of alcohols, carbohydrates and organic acids



Sugar HPLC system

Analytical isocratic configuration with UV and RI detection



Device	Key features
AZURA® ASM 2.1L	Isocratic analytical HPLC pump, 10 ml pump head including injection valve
AZURA® UVD 2.1S	190 - 500 nm, variable single wavelength UV detector
AZURA® RID 2.1L	Temperature controlled, extended dynamic range
AZURA® CT 2.1	Column thermostat for constant temperatures and reproducible results

Solutions for your environmental or pharmaceutical analysis

Eurospher & Eurospher II

High performance column material based on an ultra pure spherical silica gel

Highest flexibility

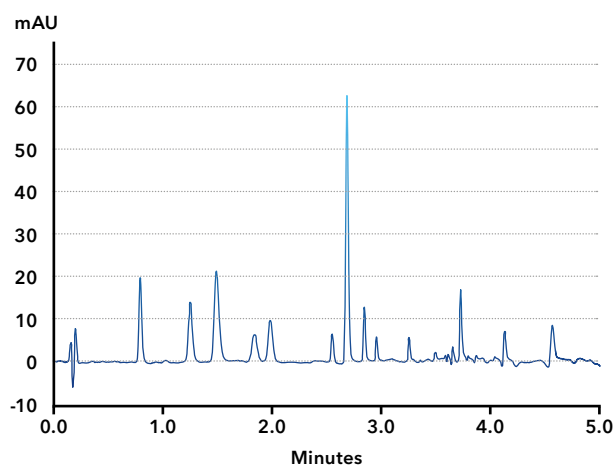
- Classical HPLC, Fast HPLC Plus, UHPLC
- 13 modification types
- 100 Å pore size
- 2 - 10 µm, up to 20 - 45 µm



Find more key applications at www.knauer.net/applications

Key application

Determination of priority pollutant phenols



HPLC Plus system

Analytical LPG configuration with DAD detection



Device	Key features
AZURA® P 6.1L	Quaternary analytical HPLC pump with degasser, 10 ml pump head
AZURA® DAD 2.1L	190 - 700 nm, diode array detector
AZURA® CT 2.1	Column thermostat for constant temperatures and reproducible results
Autosampler 6.1L	Fast and very versatile analytical HPLC autosampler, 1000 bar, 0.1 - 5000 µl injection volume

Software

Connect the KNAUER LC system to your chromatography data system (CDS)

ClarityChrom®

KNAUER ClarityChrom is a powerful, yet easy-to-use chromatography software for instrument control, data acquisition and data processing. ClarityChrom is designed for smaller laboratories. This economical solution compared to other more complex chromatography software while still offering FDA 21 CFR Part 11 compliance.

It is as an analytical chromatography software solution offers:

- Complete LC and autosampler control package
- Support for a wide range of instruments
- Scalable from 1 to 4 LC systems (instruments), each with up to 12 detectors (channels)
- Optional extensions, e.g. for PDA data handling, GPC analysis, SST for automated system tests and GC control

ClarityChrom supports all KNAUER devices that can be controlled by software. Please refer to the supported instruments list at www.knauer.net/cds-devices. Moreover, devices and systems from more than 45 manufacturers can be controlled. Additionally, data acquisition can also be performed with any detector providing a voltage output by simply connecting a KNAUER IFU 2.1 interface box or any other supported A/D converter.

Chromeleon™

Chromeleon 7 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. Chromeleon offers drivers for all AZURA L Devices.

OpenLAB® CDS EZChrom Edition

OpenLAB CDS EZChrom Edition is latest technology and successor of former ChromGate CDS. It provides chromatography data acquisition, processing and control of LC systems. It is scalable from single user/ single instrument to multi-user/ multi-instrument laboratories. Devices from KNAUER and many other manufacturers are supported.



Every software solution offers different functionality. Choose the right one that fits your needs.

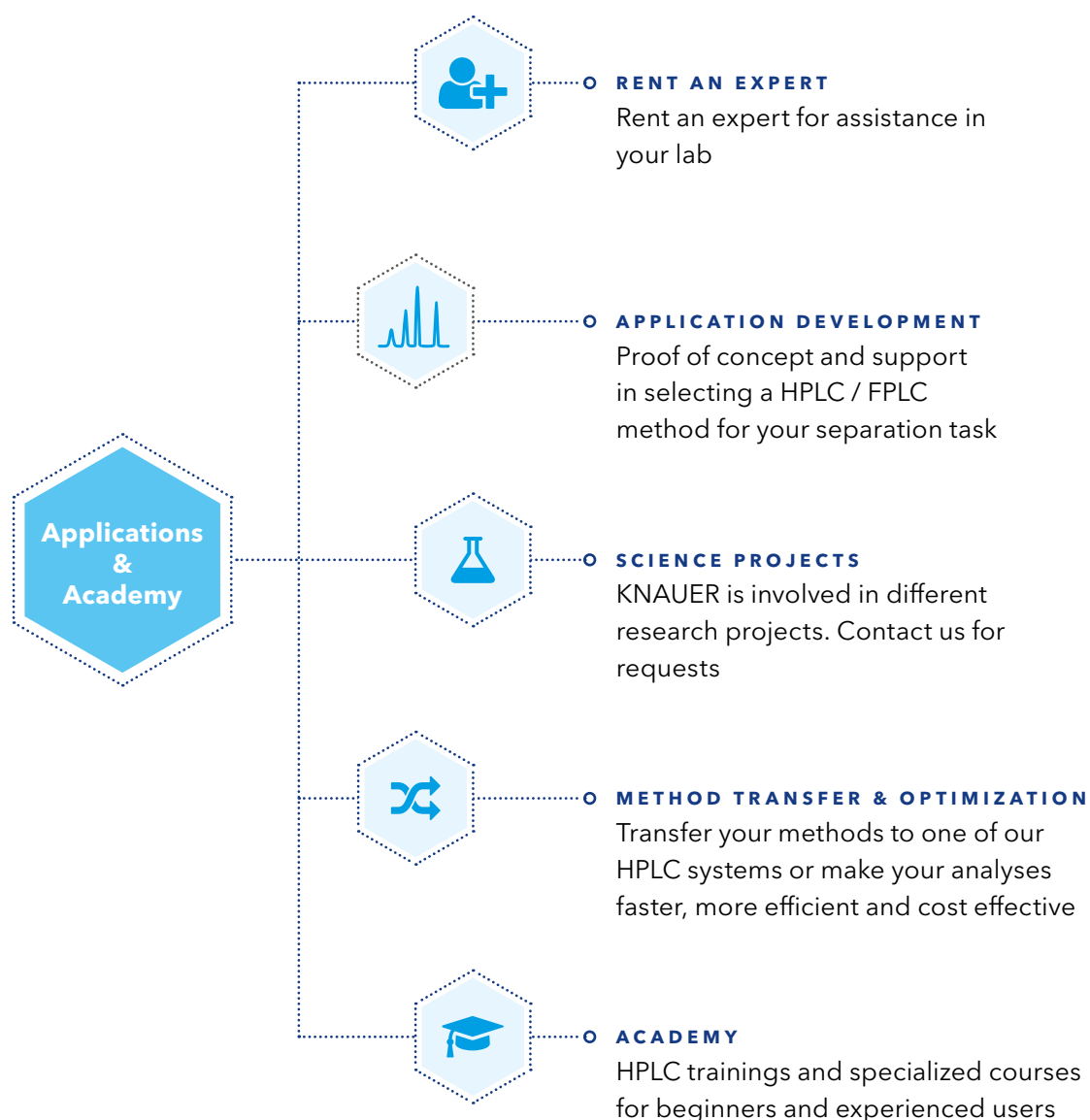
www.knauer.net/software



Applications and Academy

With profound application knowledge of analytical and preparative HPLC and FPLC, our team is at your service around the world. Our experts are

pleased to receive your inquiries and requests, and will offer attractive customized solutions.



Analytical
HPLC

Multi-Column
Chromatography,
SMB

Preparative
HPLC

FPLC

Osmometry

Dosing,
Metering,
Pumping

Detection

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