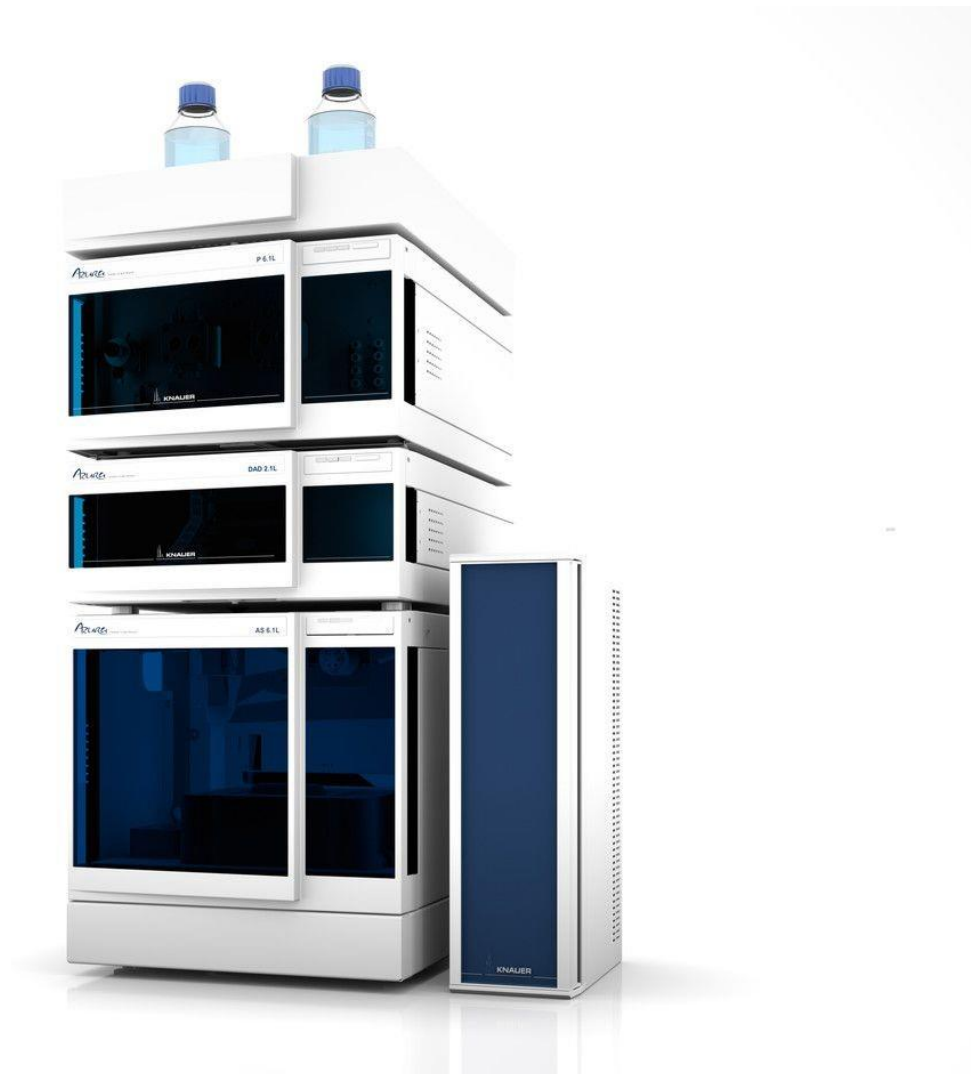


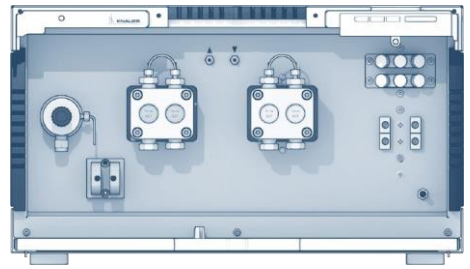
AZURA

**Official KNAUER AZURA Series
Specification Compendium (U)HPLC
Updated July 2022 – Rev01.02**

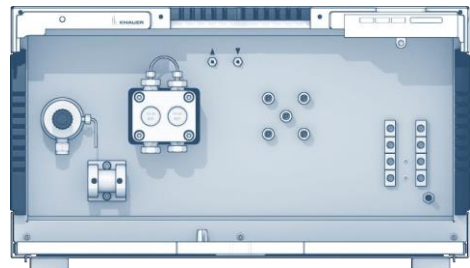




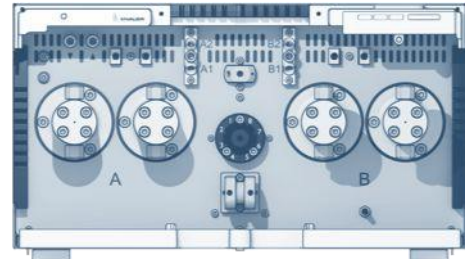
All AZURA® P 6.1L Pumps	
Solvent delivery (electronic control)	
Pump type	Analytical HPLC pump
Delivery system	Dual Serial Piston Pump
Pulsation and solvent compensation	Automatic compensation: pressure, compressibility and pulsation
System flushing piston seal	Standard wash (standard active wash)
Flow rate range	0.001 – 10 ml/min
Flow rate increment	0.001 ml/min
Flow rate accuracy	± 0.25 %
Flow rate precision	≤ 0.04% RSD
System protection	Soft start, Pmin und Pmax are programmable
Gradient range	0 - 100 % in 0.1 % increments
Solvent selection valve	Binary Gradient version only
Gradient formation	Quaternary/ binary gradient, low-High pressure gradient pump (LPG/HPG pump)
Liquid temperature range	4–60 °C (39.2–140 °F)
Binary gradient accuracy	± 0.3 % at 1 ml/min, details see P6.1L Binary Gradient Pump
Binary gradient precision	< 0.1 % RSD at 1 ml/min, details see P6.1L Binary Gradient Pump
Quaternary gradient accuracy	± 0.3 % at 1 ml/min, details see P6.1L Quaternary Gradient Pump
Quaternary gradient precision (Composition)	± 0.1 % RSD (composition precision)
Pump head	12500 psi
Delay Volumen	260 µl
Integrated Degasser	
Degasser channels	4 channels/chamber (independent), purge
Max. flow rate/channel	10 ml/min
Degassing method	Gas Permeation trough Teflon(R) AF amorphous fluoropolymer membrane
Degassing efficiency	< 0.5 ppm dissolved O2 at 1 ml/min
Degassing chamber volume	280 µl volume per channel
Solvent applicability	Universal, with exception of hydrochloric acid and halogenated hydrocarbons
Wetted materials	PEEK, Tefzel® (ETFC), Systec AF TM
System flushing piston seal	Standard wash
Communication	
Display	3 status LEDs, optional: Mobile Control App Display to attach
Inputs	LAN, Pin header connectors (Analog IN, Start In, Error IN)
Analog inputs	Flow rate, 0 - 10 V via pin header connectors
Analog control input	Flow rate and start/stop
Level/event outputs	8 event outputs (TTL, OC, Relays) and 24 V
Control	LAN, Analog and event control, Mobile Control
Technical parameters	
Leak sensor	Yes, programmable
Special features	Pump Head is detected automatically using Radio frequency identification (RFID)
Ambient conditions	4-40 °C (39.2-104 °F) Air humidity below 90%, non-condensing
General	
Line voltage	100 - 240 V; 50 - 60 Hz; Maximum power consumption 100 W
Dimensions (height x width x depth)	361 mm x 208.2 mm x 523 mm
Weight	14.1 kg



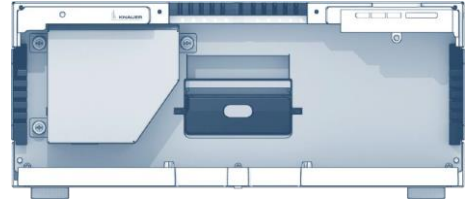
Module: AZURA® P 6.1L Binary Gradient Pump with degasser	
Pump specifications	
Pump heads	10 ml, stainless steel (2 pump heads)
Flow rate range	0.001 - 10 ml/min
Binary gradient accuracy	± 0.3 % at 1 ml/min, 150 bar (ethanol/caffeine tracer) ± 1 % (5 - 95 %, measured at 0.1 – 10 ml/min, water/caffeine tracer)
Binary gradient precision	< 0.1 % RSD at 1 ml/min, 0.3% RSD overall, based on retention time at constant room temperature
Maximum delivery pressure	10150 psi / 700 bar / 70 MPa up to 5 ml/min; 5800 psi / 400 bar / 40 MPa up to 10 ml/min
Wetted materials	GFP, Stainless Steel, FKM, PEEK, Sapphire, Aluminiumoxide, Ruby, Zirconiumoxide
Mixing volume	100 µl
Flow rate increment	0.001 ml/min
Best working conditions	0.1 - 8.0 ml/min
Continuous working conditions	0.1 -4.0 ml/min
Pumphead material	Stainless Steel



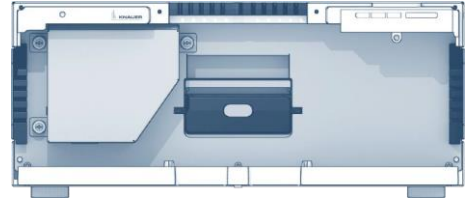
Module: AZURA® P 6.1L Quaternary Gradient Pump with degasser	
Pump specifications	
Pump head	10 ml, stainless steel (1 pump head, 4 valves)
Flow rate range	0.001 - 10 ml/min
Quaternary gradient accuracy	± 0.25 %
Quaternary gradient precision	± 0.1 % RSD (composition precision)
Pump head pressure	12500 psi
Wetted materials	GFP, Stainless Steel, FKM, PEEK, Sapphire, Aluminiumoxide, Ruby, Zirconiumoxide
Mixing volume	100 µl
Flow rate increment	0.001 ml/min
Best working conditions	0.1 - 8.0 ml/min
Continuous working conditions	0.1 -4.0 ml/min
Pumphead material	Stainless Steel
Solvent conveyance (electronic control)	Quaternary low-pressure gradient pump (LPG pump)
Delay volume (mixer)	260 µl



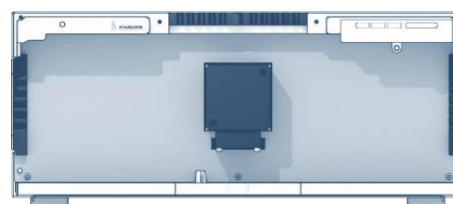
AZURA® Pump P 8.1L	
Article numbers	APF45PA HPG/binary pump APF46PA LPG/quartarnary pump
Solvent delivery	
Pump type	Analytical UHPLC pump
Delivery system	Dual serial piston pump with each piston actuated separately
Pulsation compensation	Automatic pulsation compensation
Pulsation	≤ ±1 %, or ≤ ±5 bar, whatever is greater
Piston seal washing	Active wash
Flow rate accuracy	tbd
Flow rate precision	tbd
System protection	Soft start, Pmin und Pmax are programmable
Gradient range	0 - 100 % in 0,1 % increments
Solvent selection valve	HPG only
Gradient formation	LPG / HPG
Liquid temperature range	4–60 °C (39.2–140 °F)
Degasser module	
Degasser channels	4 channels (LPG Versions), 2 channels (HPG Versions); optional
Max. flow rate/channel	5 ml/min
Degassing method	Gas Permeation trough Teflon(R) AF amorphous fluoropolymer membrane
Degassing efficiency	< 0.5 ppm dissolved O2 at 1 ml/min
Degassing chamber volume	280 µl volume per channel
Solvent applicability	Universal, with exception of hydrochloric acid and halogenated hydrocarbons
Wetted materials	PEEK, Tefzel® (ETFC), Systec AF TM
Communication	
Display	Mobile Control (optional)
Digital I/O	2 x LAN Port, 10/100 Mbit, TCP/IP protocol, standard RJ45 connector; USB 2.0 Port
Analog I/O	+5 V Output (62mA), +24 V Output (250 mA); Analog Input for Flowrate 0 – 10 V, 16 bits resolution; Analog Input for Flowrate 4 – 10 mA, overload protected, 16 bits resolution; Analog Output for Pressure 0 – 10 V, 16 bits resolution; Event Inputs: Error In; B39Event Outputs: Start Out, Error Out via open collector
Technical parameters	
Leak sensor	Yes
Ambient conditions	4-40 °C (39.2-104 °F) Air humidity below 90%, non-condensing
Pump head specifications	
Pump head	5 ml
Flow rate range	0.001 - 5 ml/min
Maximum delivery pressure	1240 bar / 18.000 psi / 124 Mpa up to 5 ml / min
Wetted materials	PE, Stainless Steel, FKM, PEEK, Sapphire, Aluminiumoxide, Ruby, Zirconiumoxide, Polyimid
Pumphead material	Stainless Steel



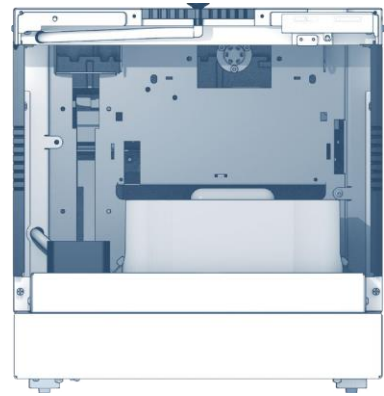
AZURA® Detector DAD 2.1L	
Key Features	
Wide application range	
Large choice of flow cells	
Fiber optics adapter available	
Leak management	
Made in Germany	
Specifications	
Detection	
Detector type	Diode array detector
Number of diodes	256
Pixel pitch	2 nm/diode
Detection channels	8 (Digital)/4 (Analog)
Light source	Deuterium (D ²) lamp with integrated GLP chip
Wavelength range	190 - 700 nm
Spectral bandwidth	<10 nm at H α line (FWHM) /Note: digital bandwidth 1 - 32 nm
Wavelength accuracy	± 1 nm
Noise	± 5 μ AU at 254 nm (ASTM E1657-98)
Drift	400 μ AU/h at 254 nm (ASTM E1657-98)
Linearity	> 2.0 AU at 274 nm (ASTM E1657-98)
Maximum data rate	100 Hz (LAN)/12.5 Hz (analog)
Flow cell	Not included (see Accessories / Spare parts)
Time constants	0.00 / 0.01 / 0.02 / 0.05 / 0.1 / 0.2 / 0.5 / 1.0 / 2.0 / 5.0 / 10.0 s
Integration time	Automatic
Wavelength verification	Internal holmium filter and deuterium lines
Leak sensor	Yes
Communication	
Inputs	Error (IN), Start (IN), Autozero
Outputs	Events 1 - 2 (Relay and TTL compatible, respectively), Error (OUT), + 5 V, Valve + 24 V, Valve (OUT)
Analog outputs	4 x 0 - 5 V, 20 bit, offset adjustable
Control	Mobile Control, software, event control, analog, terminal protocol
Interfaces	LAN (RJ-45), USB (service only), multi-pin connector, analog (RCA cinch connector)
Technical parameters	
GLP	Detailed report including lamp recognition, operating hours, lamp operating hours, number of lamp ignitions
Display	Mobile Control (optional)
Ambient conditions	Temperature range: 4 - 40 °C, 39.2 - 104 °F, Humidity: below 90 % noncondensing
General	
Line voltage	100 – 240 V, 50 – 60 Hz, 75 W
Dimensions (height x width x depth)	361 x 158 x 523 mm
Weight	12.2 kg
Other	
Note	Flow cells are not included and must be ordered separately (see Accessories / Spare parts)



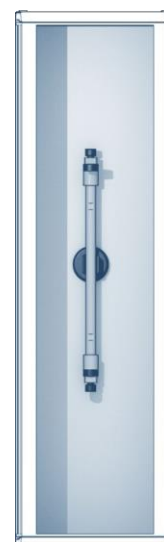
AZURA® Detector DAD 6.1L	
Key features	
Wide application range	
Large choice of flow cells	
Fiber optics adapter available	
Attractively priced	
Made in Germany	
Specifications	
Detection	
Detector type	Diode array detector
Number of diodes	1024
Pixel pitch	0.8 nm/diode
Detection channels	8 (Digital)/4 (Analog)
Light source	High brightness deuterium (D ²) lamp and halogen lamp with integrated GLP chip
Wavelength range	190 - 1000 nm
Spectral bandwidth	< 3.5 nm at H α line (FWHM) /Note: digital bandwidth 1 - 32 nm programmable
Wavelength repeatability	\pm 0.1 nm
Wavelength accuracy	\pm 1 nm
Noise	\pm 3.5 μ AU (3.5 x 10 ⁻⁶ AU) at 254 nm, peak-peak (ASTM E1657-98)
Drift	300 μ AU/h at 254 nm (ASTM E1657-98)
Linearity	> 2.5 AU at 274 nm (ASTM E1657-98)
Maximum data rate	100 Hz (LAN)/12.5 Hz (analog)
Flow cell	Optional: 6, 9, 10, 12 μ L - (see Accessories / Spare parts)
Time constants	0.00 / 0.01 / 0.02 / 0.05 / 0.1 / 0.2 / 0.5 / 1.0 / 2.0 / 5.0 / 10.0 s
Integration time	Automatic
Wavelength verification	Internal holmium filter and deuterium lines
Leak sensor	Yes
Communication	
Inputs	Error (IN), Start (IN), Autozero
Outputs	Events 1 - 2 (Relay and TTL compatible, respectively), Error (OUT), + 5 V, Valve + 24 V, Valve (OUT)
Analog outputs	4 x 0 - 5 V, 20 bit, offset adjustable
Control	Mobile Control, software, event control, analog, terminal protocol
Interfaces	LAN (RJ-45), USB (service only), multi-pin connector, analog (RCA cinch connector)
Technical parameters	
GLP	Detailed report including lamp recognition, operating hours, lamp operating hours, number of lamp ignitions
Display	Mobile Control (optional)
Ambient conditions	Temperature range: 4 - 40 °C, 39.2 - 104 °F, Humidity: below 90 % non-condensing
General	
Power supply	100 – 240 V, 50 – 60 Hz, 75 W
Dimensions	361 x 158 x 523 mm (W x H x D)
Weight	13.8 kg
Other	
Note	Flow cells are not included and must be ordered separately (see Accessories / Spare parts)



AZURA® Detector UVD 2.1L	
Key Features	
Large choice of flow cells	
Leak management	
Made in Germany	
Specifications	
Detection	
Detector type	Variable single wavelength UV detector
Detection channels	1
Light source	Deuterium (D ²) lamp with integrated GLP chip
Wavelength range	190 - 750 nm
Spectral bandwidth	11 nm at H α line (FWHM)
Wavelength accuracy	± 2.5 nm
Wavelength precision	0.3 nm (ASTM E275-93)
Noise	± 15 μ AU at 254 nm (ASTM E1657-98)
Drift	300 μ AU/h at 254 nm (ASTM E1657-98)
Linearity	> 2.0 AU at 270 nm (ASTM E1657-98)
Maximum data rate	50 Hz (LAN)/20 Hz (Analog)
Flow cell	Not included (see Accessories / Spare parts)
Time constants	0.0 / 0.1 / 0.2 / 0.5 / 1.0 / 2.0 / 5.0 / 10.0 s
Integration time	Automatic
Leak sensor	Yes
Communication	
Inputs	Error (IN), Start (IN), Autozero, 0 - 10 V Analog IN
Outputs	Events 1 - 3, + 5 V, 24 V Valve
Analog outputs	1 x 0 - 5 V scalable, 20 bit, offset adjustable
Control	Digital: LAN, remote connector/Analog: wavelength control/Manual: Mobile Control (optional)
Programming	Timed: wavelength, events, fraction valve, links, wake up (program, link); 9 programs, 50 program lines
Technical parameters	
GLP	Detailed report including lamp recognition, operating hours, lamp operating hours, number of lamp ignitions
Display	Mobile Control (optional)
Ambient conditions	Temperature range: 4 - 40 °C, 39.2 - 104 °F, Humidity: below 90 % noncondensing
General	
Line voltage	100 - 240 V, 50 - 60 Hz, 75 W
Dimensions (height x width x depth)	361 x 158 x 523 mm
Weight	5.9 kg
Other	
Note	Flow cells are not included and must be ordered separately (see Accessories / Spare parts)



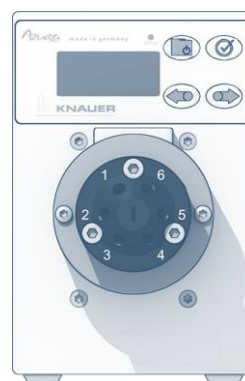
AZURA® Autosampler AS 6.1L	
Specifications	
Sample injection	
Sample capacity	Analytical: 108 x 2.0 mL vials
Autosampler Flow Path	see device versions
Maximum back pressure	see device versions
Vial/plate dimensions	max. plate/vial height: 47 mm (incl. septa or capmat)
Injection volume range	0.1 – 100 µl or 0.1 – 400 µl. Note: Knauer has additional loops (kits) for large injection volume
Sample loop	see device versions
Dispenser syringe	see device versions
Headspace pressure	built-in compressor, only for sample vials with septum
Switching time inj. valve	< 100 ms
Piercing needle precision	± 0.6 mm
Sample carrier cooling/Heating	Optional. With cooling/heating function 4-40 °C
Stability/accuracy temperature	4-40 °C: ± 1°C stability, 0.5 °C accuracy
Vial detection	missing vial/well plate detection by sensor
System Integral Needle flushing	Active and programmable
Wetted materials	Tefzel® (ETFE), Glass, Teflon® (PTFE), Kel-F® (PCTFE), stainless steel, PEEK, Vespel
Analytical performance	
Injection modes	Full loop filling, partial loop filling and microliter pickup; PASA™ (pressure-assisted sample aspiration)
Injection precision (%RSD)	full loop filling: <0.25% (from 5 µl to 1000 µl), partial loop injection at injection volume>5 µl: <0.5%, microliter pickup injection at an injection volume>5 µl: <1.0%.
Accuracy	±0,5% using a 250 µl syringe partial loop fill with dispensing 10% of a full syringe stroke
Sample carryover	Analytical: < 0.0015 % (UV conditions, caffeine)
Injections per vial	Automatic programmable, max. 9 injections
Injection cycle time	minimum 7 s from the same vial, 14 s from different vials;< 60 s for>100 µl sample injection in all injection modes, incl. 300 µl needle wash
Analysis time	max. 9 h, 59 min, 59 s
Special functions	A mix method can be programmed for the autosampler to automatically mix or dilute the sample fluid
Communication	
By software (PC)	ClarityChrom version 8.7, OpenLab EZChrom and Chromeleon software
Inputs	2 programmable TTL inputs (next injection, freeze, stop)
Outputs	1 programmable relay output (inject marker, auxiliary, alarm)
Control	Ethernet (LAN)
Interfaces	LAN, analog
Technical parameters	
Ambient conditions	Temperature range: 10–40 °C; 50–104 °F, air humidity: 20 - 80%
General	
Error handling	The system identifies error or outage through ClarityChrom and OpenLab Software
Interruptions	Errors or interruptions can be found in the system operation manual (user manual)
Line voltage	95–240 V 50-60 Hz AC 100 W/ 250 W
Dimensions (height x width x depth)	377 x 300 x 510 mm
Weight	30 kg



AZURA® Column Thermostat CT 2.1	
Specifications	
Thermostatting	
Heating and cooling system	microprocessor controlled Peltier element for heating and cooling, fan supported 2-way air circulation
Temperature range	5–85 °C
Heating/cooling rate	2 °C/min
Temperature accuracy	± 0.2 °C
Temperature stability	± 0.1 °C
Column compartment	
Number of columns:	Up to 4 columns (300 x 4.5 mm ID) with pre-column and valve selection. 8 column (125 x 4.6 mm) / 4 column (250 x 4.6 mm)
Dimensions, internal	90 x 390 x 47 mm (W x H x D)
Safety	self-check and auto-calibration at power-on, selectable turn-off temperature
Leak sensor	adjustable sensitivity, acoustic signal, turn-off switch
Communication	
Control	Direct electronic and stand-alone functionality: keyboard unit with LCD Mobile Control
Interfaces	LAN Interface
General	
Line voltage	90–230 V, 50–60 Hz, 100 W
Dimensions (height x width x depth)	150 x 470 x 310 mm (W x H x D)
Weight	8.4 kg
Other	
Optional accessories	Cartridge for Eluent pre-heating for capillary with an ID of 0.1 or 0.18 mm

PROMINENCE RF-20A Detector Shimadzu	
Specifications RF-20A	
Light Source	Xenon Lamp
Wavelength range:	
Standard	0, 200 nm to 650 nm
Extended (with photomultiplier R928-08)	200 – 900 nm (Part No. 200-75021).
Spectral bandwidth	20 nm
Wavelength accuracy	± 2 nm
Wavelength reproducibility	± 0.2 nm
Sensibility (Signal/Noise (S/N))	Water Raman Peak S/N: 1200
Cell capacity	12 µL; 2 MPa (approx. 20 kgf/cm ²); SUS316L, PTFE (fluororesin), quartz
Control (PC)	By ClarityChrom and OpenLab EzChrom Software

AZURA® ASM AS 2.2L	
Communication	
Interfaces	LAN
Control	Mobile Control, Software
Inputs	Error (IN), Start (IN), Autozero, 0–10 V Analog IN
Outputs	Event 1–2, Error (OUT) (OC), + 5 V, + 24 V
Analog outputs	Integrator output (detector signal)
General	
Power supply	100 – 240 V, 50-60 Hz, maximum 130 W
Dimensions	361 x 208 x 523 mm (W x H x D)
Weight	About 17 kg (depending on integrated modules)
Leak sensor	Yes
Ambient conditions	Temperature range: 4 - 40 °C, 39.2 - 104 °F Air humidity: 10–90 %, non-condensing



AZURA® Valve Unifier VU 4.1	
Key features	
One valve drive for all valves	
Ultra fast switching cycle	
Easy maintenance	
Compact	
Multiple interfaces and drivers available	
Specifications	
Communication	
Interfaces	LAN, RS-232, display, terminal strip
Control	Display, software, event control
Inputs	Binary control; Home, Backward/Inject, Forward/Load, Start IN
Outputs	Trigger out, Event
General	
Line voltage	External DC 24V, 65 W
Dimensions (height x width x depth)	80 x 123 x 153 mm (without adapter); 80 x 123 x 192 mm (with adapter)
Weight	2 kg
Ambient conditions	Temperature range: 4–40 °C; 39.2–104 °F; below 90 % humidity (non condensing)
Valve drive	
AWA01	Valve drive VU 4.1 for V 4.1 valves

Ports	Position	Stator material	Rotor material	Capillary connection	Max. pressure [bar]	Bore size [mm]	Order no.
6	2	SST DLC*	Vespel	1/16" (UNF 10-32)	1200	0.3	AVC28AC
	Multi	SST DLC*	Vespel	1/16" (UNF 10-32)	1200	0.3	AVR28AC
8	2	PEEK	PEEK	1/16" (UNF 10-32)	240	0.75	AVD24CE
	Multi	SST DLC*	Vespel	1/16" (UNF 10-32)	1200	0.3	AVC38AC
	Multi	SST DLC*	Vespel	1/16" (UNF 10-32)	1200	0.3	AVR38AC
	Multi	PEEK	PEEK	1/16" (UNF 10-32)	240	0.75	AVS34CE
12	Multi	PEEK	PEEK	1/8" (M8x1)	50	2,0	AVU32CE
	Multi	PAEK	cPTFE	1/16" (UNF 10-32)	50	0.4	AVZ52CE
16	Multi	PEEK	PEEK	1/16" (UNF 10-32)	50	0.75	AVS62CE

ClarityChrom version 8.7

Key features

- All devices, Knauer distributes and which are controlled and supported in ClarityChrom 8.7 by Knauer.
 - Data processing even when the system is running the analysis.
 - The software can control all chromatographic parameters as temperature, flow and modules as injector, column oven, detectors and others. Additionally, all components and parameters of each device controlled by ClarityChrom can be viewing in the mean screen of the software
 - PDA Scan: 2D, 3D data is acquired within defined range.
 - High capacity for processing result and data storage (methods and results).
 - Chromatogram operation: Overlay view, customs labels and settings (ability to assign name and identification compounds).
 - Calculation: determination of noise/drift.
 - Calibration, Internal and external standard calculation methods, calibration of groups of peaks (compounds) and reference peaks simultaneously.
 - Summary result table: Display and print selected items (parameters, results) and chromatograms from all simultaneously displayed chromatograms.
 - Export: Optional exportation of all results, with or without the chromatogram, in various formats, into a file PDF, EXCEL or clipboard is supported.
 - Other devices (this list may not be complete; for KNAUER devices, refer chapter "KNAUER devices") Links to GCs, HPLC Systems, HPLC Pumps, HPLC Detectors, PDA Detectors, LC-MS Detectors, GC-MS TOF Detectors, Other HPLC components, GC Accessories, Autosamplers, HPLC Autosampler Accessories, HPLC Column Ovens, Fraction Collectors, Valves, Amino Acid Analyzers.
 - Clarity Chromatography Software, MS EXTENSION
- Additional software: MS – Mass Spectroscopy. Common applications for data processing. methods libraries and mass spectral databases (commercial or free) are available.

Important note:

The specifications described in this document has been updated to July 2022 and will be updated soon in the corresponding sections of our website, downloadable manual, brochure, etc.

The specifications of Knauer modules and components (as well as part numbers) are subject to change without notice.

For more information about the latest updated or information about our product and services, please contact your local authorized Knauer distributor or with Knauer (info@knauer.net)

Analytical
HPLC

Multi-Column
Chromatography,
SMB

Preparative
HPLC

FPLC

Osmometry

Dosing,
Metering,
Pumping

Detection

HPLC · SMB · Osmometry

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