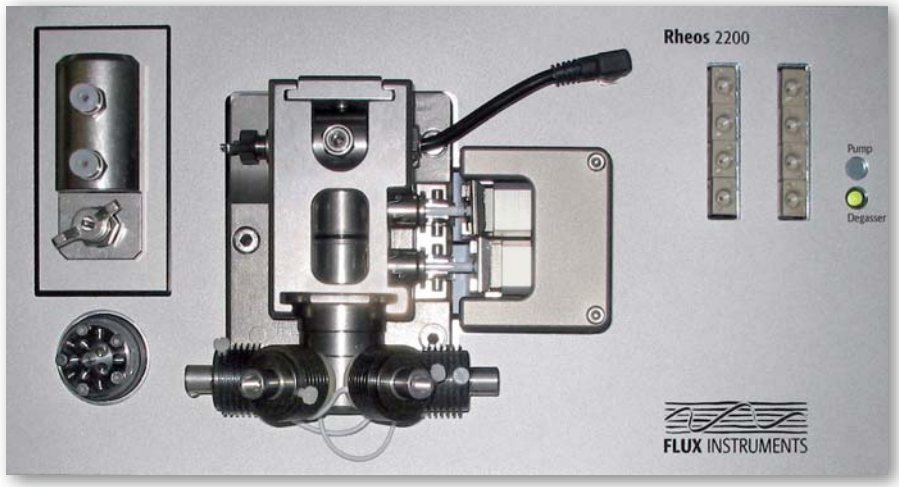
Introducing the new **Rheos** 2200 Advanced Chromatography Platform

FLUX INSTRUMENTS

Rheos 2200 Advanced Chromatography Platform and Janeiro-CNS Software

The Rheos 2000 has over the last few years established itself as a hot tip for a growing community of analytical chemists. This has been mainly due to its reliability, low delay volume and extreme accuracy in delivering solvents at low flow rates. The total biocompatibility of all wetted surfaces in this system really sets it apart from its competitors. It has proven itself as the LC of choice for use with Mass Spectrometry (MS).

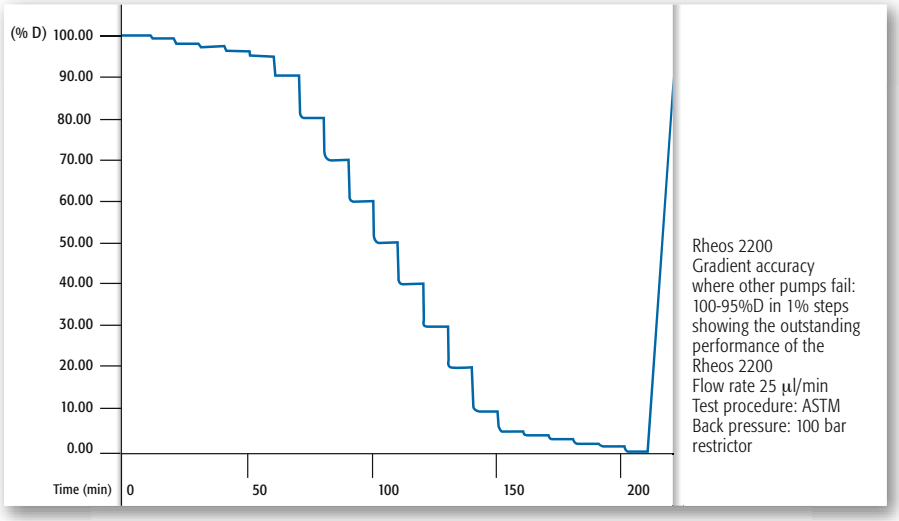


The Rheos 2200 platform represents the next evolutionary leap of this exceptional concept. Amongst other things, the algorithm defining the cam shape has been further optimized, along with the micromechanics to further extend the performance at the lowest flow rates. The electronics have been refined and the four-channel degasser has now been integrated into the system.

Why is the Rheos 2200 special?

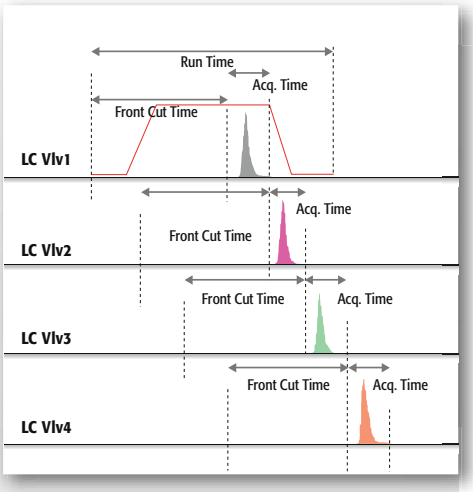
The core of the Rheos 2200 platform is a combination of sophisticated micro and precision mechanics and state of the art electronics. The outstanding gradient reproducibility results from a proprietary proportioning valve design with millisecond response times. The kinematics that is encoded in the shape of the cam driving the pistons has been extensively studied and optimised. The result is an excellent precision of gradient formation over the entire flow range.

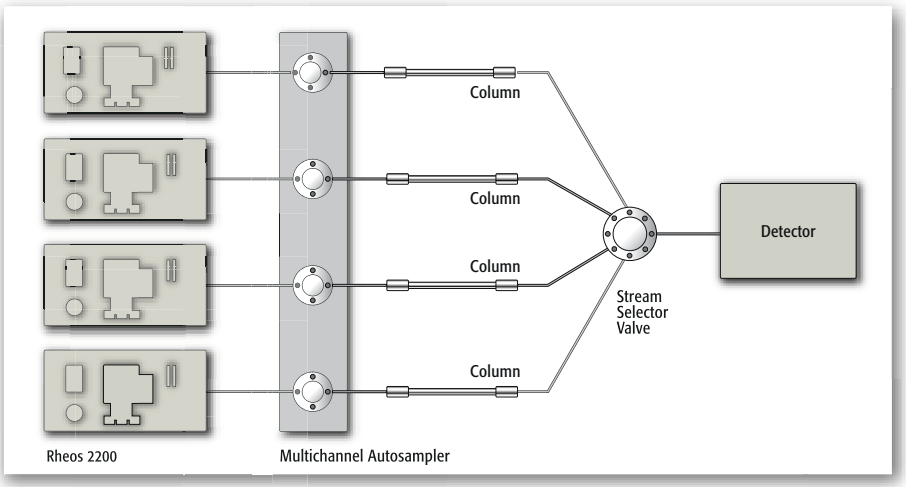
A high torque drive system with digitally controlled DC motor guarantees virtually pulse-free flow down to the lowest flow rates and highest pressures. Residual pulsation, due to solvent compressibility is minimised by a pre-compression stroke. Now in addition, the Rheos HPG high-pressure gradient system delivers the most precise gradients down to 10µL/min without splitting.



High-pressure gradient formation: step gradient at low flow rates

The patented Liquid Displacement Assembly is charcterised by a unique low delay volume of only 75µL that minimizes equilibration and system cycle time. The low delay volume enables the excellent high throughput performance and also the nanoflow capability in combination with a flow splitter.





All wetted components are made from sapphire, titanium, PEEK or PTFE, which means that the system is fully biocompatible and chemically aggressive media can be pumped.

The integrated four-channel degasser with ZHCR® (zero hysterisis constant run) technology further optimises pump performance. The constant vacuum suppresses baseline noise resulting from the intermitting operation applied in conventional degassers.

Hardware Features overview

Feature	Benefit
Minimal delay volume	enables fast gradients and capillary and nano-LC
Biocompatibility	is necessary for enzyme work, high sensitivity in (phospho-) peptide analysis, and electrochemical detection
Lowest flow rate 100nL/min	is the basis for capillary LC and precise high-pressure gradient formation at low flow rates
High-pressure gradient formation	achieves best precision of gradient formation, especially at low flow rates
ZHCR® degasser	suppresses baseline noise

Janeiro-CNS software for advanced applications

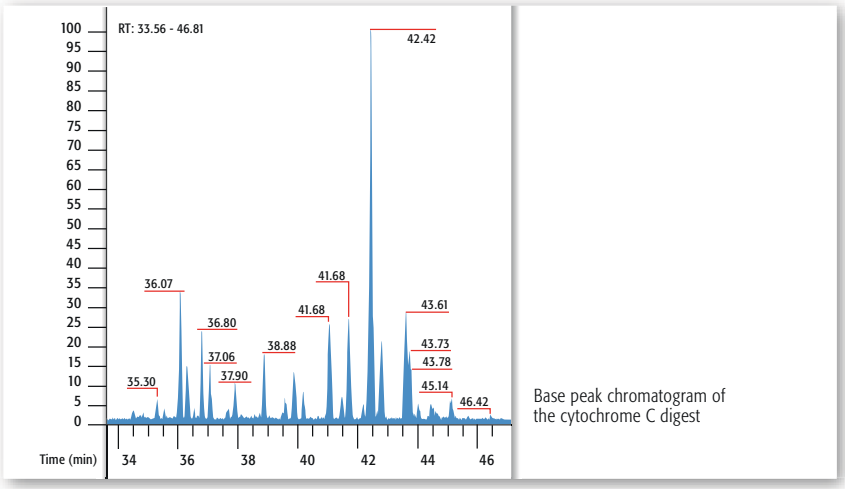
Like the central nervous system in the human body Janeiro-CNS is the centre for processing and dispatching of information in our system. In combination with Janeiro-CNS, a sophisticated plug-in for Thermo's Xcalibur™ software the user can now realise advanced chromatographic solutions using one system, rather than trying to synchronise a setup of separate software modules. This allows to effortlessly manage applications such as 2D-chromatography or column switching. With the HP Gradient Wizard Janeiro-CNS equally enables a special high-pressure gradient formation system (Rheos HPG system).

Software functionalities

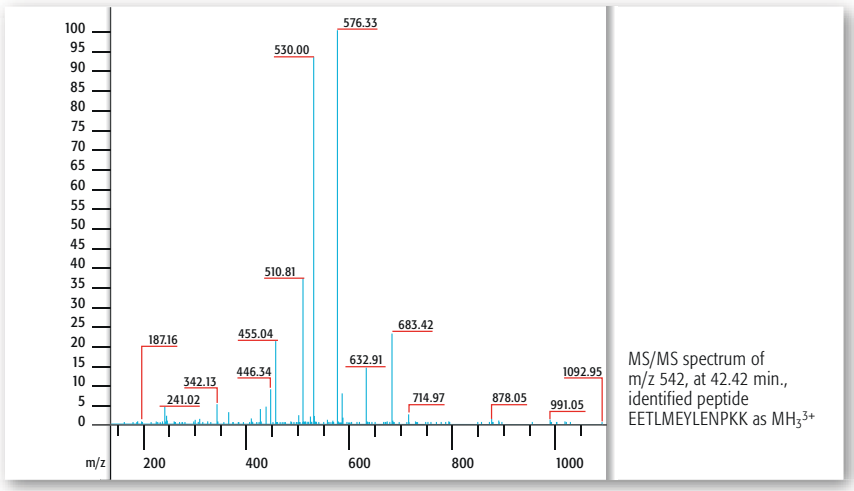
- controls 2 pumps with 2 independent gradients
- enables the high-pressure gradient formation
- controls switching valves for 2-dimensional chromatography or column switching
- controls autosamplers
- controls fraction collectors

Advanced LC-MS application of the Rheos 2200 in proteomics

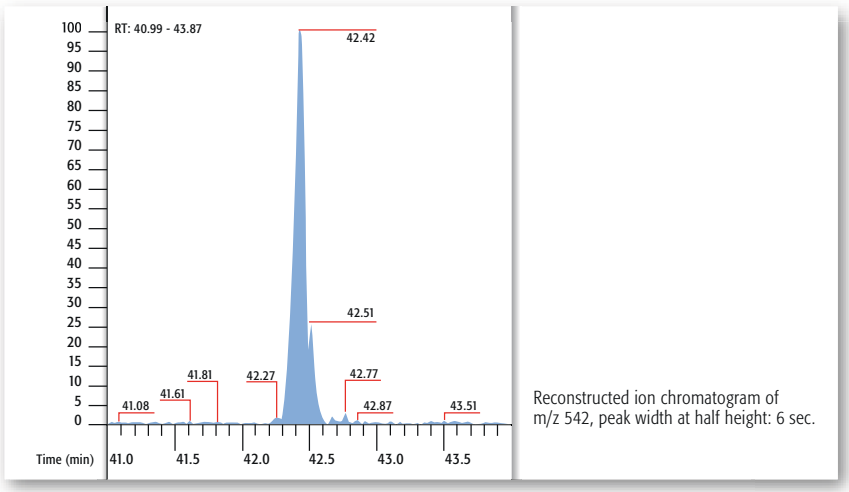
The chromatogram shows the analysis of 100 fmol of a tryptic digest of horse cytochrome C on a 100µm ID column (100mm long, Magic C18) coupled to a Thermo LTQ™ ion trap mass spectrometer. The Rheos 2200 delivered the gradient at 100µL/min. Using a T-piece and restriction capillaries a column flow rate of 400 nL/min was achieved, as measured with the AFM 2.



Base peak chromatogram of the cytochrome C digest



MS/MS spectrum of m/z 542, at 42.42 min., identified peptide EETLMEYLENPKK as MH_3^{3+}



Reconstructed ion chromatogram of m/z 542, peak width at half height: 6 sec.

Accessories

The **AFM 5** micro-flow meter and the **AFM 2** nano-flow meter are essential tools for capillary and nano-flow chromatography. Only the AFMs measure precisely the flow rate through the capillary column in gradient or isocratic mode. A signal feedback to the Rheos 2200 enables a system check and a shutdown option in case of a clogging column.

For high-pressure gradient formation we offer additionally to the standard static mixer a 15 µL or a 75 µL **dynamic mixer** in stainless steel or titanium.

A **10-port zero dead volume switching-valve** for nanoflow applications can be integrated and fully controlled.

The **IC8 automation tool** helps to integrate complex analysis systems comprising multiple pumps, autosamplers, switching valves and detectors.

Systems for special applications:

Rheos HPG:
The high-pressure gradient system that meets highest standards in gradient precision comprising an isocratic and a binary Rheos 2200 pump, degasser, static and 15 µL dynamic mixer, Janeiro-CNS software and Janeiro HP Gradient Wizard.

Rheos HTS:
Designed for column switching and high-throughput applications this package comprises 2 Rheos 2200 binary pumps, degasser, switching valve, and Janeiro-CNS software.

Rheos HR:
This package is a solution to complex bioanalytical problems comprising 2 Rheos 2200 quaternary pumps, biocompatible nano 10-port switching valve, precision flow splitter, AFM 2 nano-flow meter and Janeiro-CNS.

Specifications Rheos 2200

Low pressure or high-pressure gradient formation
Gradient delay volume 75 µL
2 µL with high-pressure gradient formation
(no mixer, 18 µL with mixer)

Flow accuracy +/- 1% @ 200 µL/min methanol
Flow precision < 0.2% RSD @ 200 µL/min methanol
Flow range 0.1 - 2000 µL/min
Gradient flow range, without splitter 10 µL/min - 1500 µL/min (with high pressure option)
Maximum pressure 400 bar (5800 PSI)
Wetted surfaces sapphire (ruby), zirconia, titanium, PTFE, PEEK
Residual pulsation < 2% @ 100 bar with methanol

Gradient composition
Accuracy +/- 1% absolute
Precision +/- 0.2% absolute
Gradient capability
binary, quaternary

Dimensions 17.5 x 35.5 x 38 cm (H x W x D)
Weight 15.6 kg

Communication
via RS-232; remote inputs:
Run/stop , analogue
Flow rate control
4 digital outputs, 2 digital inputs
Ready, run, timed events
Analogue pressure signal

Computer requirements PC with Windows2000™ or WindowsXP™

Specifications are subject to change without prior notice

For further information about our products, accessories and applications please contact sales@flux.ch or your local dealer.

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