



product note

The ExpressHT™-Ultra system: designed for high throughput bioanalysis with excellent reproducibility, while saving up to 95% of the solvent consumption.

The predominant analytical approach for quantitative pharmacokinetic and drug metabolism studies is to utilize HPLC in combination with mass spectrometry. However, the growing number of samples that are being analyzed in today's drug discovery and development labs are pushing the limits of current LC/MS system performance and throughput.

In response to these increasing demands, MS vendors continue to refine their systems for faster and more sensitive detection and quantitation. In contrast, a general-purpose HPLC system with inadequate flow control and response time for such fast separations is used for many LC/MS/MS bioanalyses. As a result, only a fraction of the potential analytical throughput is being realized.

With the release of the new ExpressHT-Ultra, Eksigent meets this challenge by delivering a short-cycle time, high-throughput HPLC system specifically designed to maximize the performance of today's mass spectrometer.

The ExpressHT-Ultra's maximum pressure of 10,000 psi enables the use of small particle size stationary phases that deliver narrow peaks to mass spectrometers. Plus, the ExpressHT-Ultra incorporates proprietary Microfluidic Flow Control (MFC) technology to ensure excellent flow rate precision for small molecule analyses. The use of small internal diameter columns, combined with low flow rates and fast cycle times, results in up to 95% of solvent savings.

Because the pneumatically driven pumps have very few moving parts, the system is extremely reliable. It is very easy to operate via an intuitive user interface with the ability to integrate into major MS software packages.

Now, scientists conducting discovery, pre-clinical development and clinical trial research can take advantage of Eksigent's state-of-the-art HPLC system that produces fast gradients with excellent reproducibility while requiring only a small fraction of the solvent used by conventional systems.

expressHT•ultra



Achieve high throughput for small molecule analyses with Eksigent's next generation HPLC.

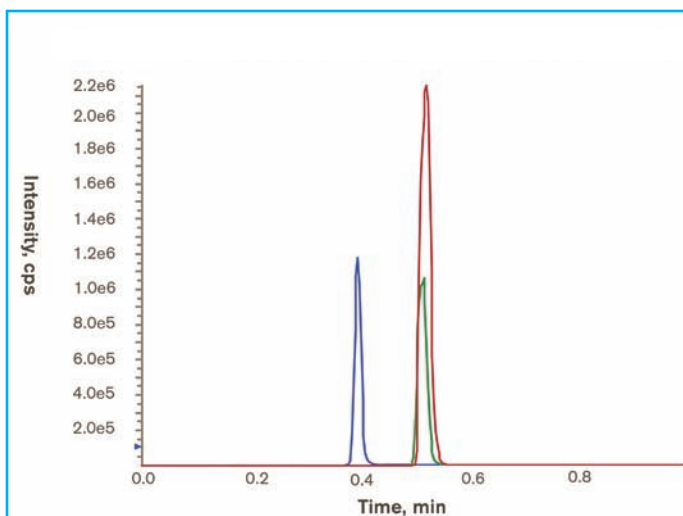
Key advantages of the new ExpressHT-Ultra

Cycle times as short as 60 seconds

The ExpressHT-Ultra's solvent delivery system is based on a binary gradient pumping system designed for 1 mm ID HPLC columns. A benefit of small diameter columns is a reduction of the required mixing volume. Less volume means shorter gradient delays and faster separations. Column and system re-equilibration also take much less time. The net result is a system with cycle times as short as 60 seconds for high analytical throughput.

Maximum pressure of 10,000 psi

The entire system is designed to operate at pressures up to 10,000 psi. This allows the use of columns with small diameter stationary phase particles (1.5 to 3 μm) delivering fast, ultra-high resolution separations (Figure 1).

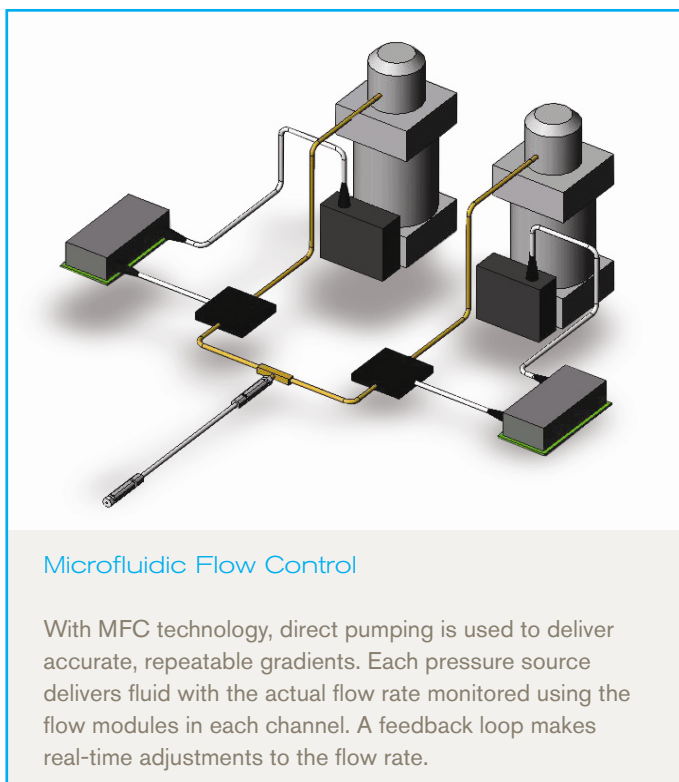


50 x 1 mm Halo™ C18 column
A = Water/0.1% Formic Acid
B = Acetonitrile/0.1% Formic Acid
Gradient: 5% B to 90% B in 0.6 min
Flow rate = 150 $\mu\text{L}/\text{min}$; 2 μL injection

Figure 1. Analysis of terfenadine, alprazolam and buspirone in rat plasma.

Excellent retention time reproducibility

Although mass spectrometers have the ability to discriminate between two masses with high resolution, retention time reproducibility is very valuable. Eksigent's Microfluidic Flow Control technology ensures precise and stable flow rates. By continuously monitoring the flow from each of the binary system's pumps, the flow rate can be adjusted many times per second. The result is retention times with an RSD typically below 0.3%.



Microfluidic Flow Control

With MFC technology, direct pumping is used to deliver accurate, repeatable gradients. Each pressure source delivers fluid with the actual flow rate monitored using the flow modules in each channel. A feedback loop makes real-time adjustments to the flow rate.

Precise metered injections

Precise and accurate pump flow control, in combination with a high speed injection valve, allow for programmable metered injections with volumes as low as 100 nL.

The filled injection loop is switched to the inject position for a pre-determined length of time to displace the programmed amount of sample. This feature can be extremely useful in cases where the upper dynamic range of a linear calibration curve is insufficient to cover samples of unexpected high concentration. Instead of diluting the entire series of samples and re-analyzing them, one can simply re-inject the same samples using a smaller injection volume.

As illustrated in Figure 2, by reducing the injected volume from 5 μL to 0.5 μL , the upper linear dynamic range is effectively extended by an order of magnitude. There is no need for additional sample dilution steps or exchange of the injection loop.

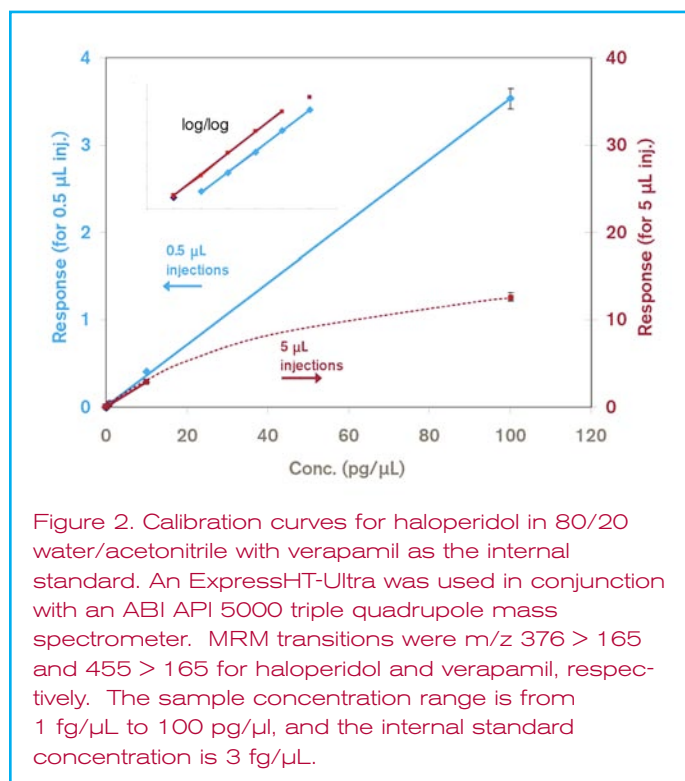


Figure 2. Calibration curves for haloperidol in 80/20 water/acetonitrile with verapamil as the internal standard. An ExpressHT-Ultra was used in conjunction with an ABI API 5000 triple quadrupole mass spectrometer. MRM transitions were m/z 376 > 165 and 455 > 165 for haloperidol and verapamil, respectively. The sample concentration range is from 1 $\text{fg}/\mu\text{L}$ to 100 $\text{pg}/\mu\text{L}$, and the internal standard concentration is 3 $\text{fg}/\mu\text{L}$.

Extreme reliability

Compared to a conventional reciprocating pump with an electric motor, Eksigent's pneumatically driven pump design reduces the number of moving parts significantly. The end result is an extremely reliable pump requiring minimal preventive maintenance. The same pump design has been a key component of Eksigent's widely adopted line of NanoLC systems that have been in successful operation since 2004.

Easy operation

With Eksigent's Control Software, users can rapidly create or modify separation methods. An intuitive interface makes the system easy to learn, and the specialized diagnostics tools make it easy to operate and maintain. The software continuously monitors pressure and flow rate, and provides real-time views of gradient composition and column backpressure.

Green HPLC

In general, bioanalyses using 1 mm ID columns use flow rates from 50-150 $\mu\text{L}/\text{min}$. With typical run times as short as 60 seconds, this means less than 250 μL of solvent is consumed per analysis. Compared to a conventional system running at 1 mL/min for 5 minutes using 4.6 mm ID columns, the ExpressHT-Ultra saves up to 95% of the solvent.

In addition to reduced solvent acquisition/disposition costs, lower flow rates and lower solvent consumption will ease the burden on your mass spectrometer source and vacuum system, reducing service downtime and environmental emissions.

Save space

The ExpressHT-Ultra's compact design takes less than 25 inches of bench space. Standing less than 30 inches tall, the entire system easily fits on a laboratory cart for easy mobility.

Integrated system configuration

External Column Oven

The ExpressHT-Ultra includes a column heater that can be mounted near the mass spectrometer to reduce post-column bandspreading. Capable of operating from 5°C above ambient to 80°C, the column oven increases separation efficiency, improves retention time reproducibility, and shortens analysis times.

CTC autosampler

The industry-standard HTC PAL autosampler from CTC Analytics injects the sample into the ExpressHT-Ultra for analysis. The system incorporates dual wash stations for minimum carryover without increasing the total analysis cycle time. The CTC Cool Stack sample hotel has six sample tray positions which can hold 54 2mL sample vials, standard or deep 96-well microplates or 384-well microplates.

ESI Probe

To maintain the highest separation performance, an optimized ESI probe is available for most mass spectrometers.

MS data systems

Control of the ExpressHT-Ultra can be integrated into major mass spectrometry software packages. Drivers are currently available for ThermoFisher Xcalibur, Bruker Daltonics HyStar and ABI/MDS Sciex Analyst software.

Preliminary system specifications

Dimensions	25" x 20" x 28" (W x D x H)
Weight	55 lbs.
Power	100 – 240 V AC
Maximum pressure	10,000 psi
Flow rate range	50 - 200µL/min
Flow rate accuracy	< ± 1%
Flow rate precision (RSD)	< 0.5% @ 150µL/min
Sample capacity	<ul style="list-style-type: none"> ▪ 6 tray positions ▪ 54 – 2mL vials ▪ Standard or deep 96-well microplates ▪ 384-well microplates
Injection valve	<ul style="list-style-type: none"> ▪ 1/32" connection Port-to-port volume < 60nL ▪ Maximum pressure 10,000psi ▪ 316 Stainless steel; proprietary coating
Injection volume range	Programmable from 0.1 – 10µL
Injection reproducibility	<ul style="list-style-type: none"> ▪ Full loop: < 1% RSD ▪ Partial loop: < 2% RSD
Sample cooling	4°C to 40°C
Gradient delay	Less than 10 µL
Column oven	Ambient +5°C to 80°C
Column length	3 – 10cm
Wetted parts	316 Stainless steel, PEEK, PEEKSil, fused silica and FEP
Instrument control	Eksigent software with plug-ins for ThermoFisher Xcalibur, Bruker Daltonics HyStar and ABI/MDS Sciex Analyst software

About Eksigent Technologies

Eksigent is creating new possibilities for life science research, drug discovery & development, and medical devices with its innovative MicroFlow™ and NanoFlow™ fluid delivery systems.

Eksigent's LC systems deliver dramatic increases in analysis speed, throughput, and sensitivity. Eksigent's drug delivery systems bring new levels of precision to portable drug delivery.

Today, leading research, pharmaceutical, and biotechnology firms around the world use Eksigent's innovative solutions.

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