Looking for a more intelligent way to overcome these challenges in analytical LC/MS/MS?

- Need for intelligently optimized systems
- Pressure to meet increasing throughput targets
- Requirement to rapidly cross-train analysts
- Demand for better sensitivity and quantification
- Mandate to operate in a 21 CFR Part 11-compliant environment
- Need for qualification of new systems and software

High performance LC/MS/MS to meet your demanding quantification needs

Specialized quantitative applications, including ADME screening, bioanalysis, clinical analysis, as well as food safety and environmental monitoring, require high sensitivity, high performance LC/MS/MS instrumentation. Compliance with stringent regulatory guidelines may also be necessary with these applications.

Now you can achieve high performance and low detection limits in a compact, easy-to-use system that includes the Waters® Micromass® Quattro Premier XE™ Tandem Quadrupole Mass Spectrometer, featuring T-Wave™[1] (Traveling Wave) technology for complete UPLC™ compatibility. To ensure high quality, secure data—from method development to high throughput quantitative analyses—MassLynx™ Software and its dedicated Application Managers make operating your system easier than ever before.

The Waters Quattro Premier XE Mass Spectrometer with the ACQUITY UPLC™ System and MassLynx Software delivers a UPLC/MS system with unrivalled speed, sensitivity and resolution for trace quantification.

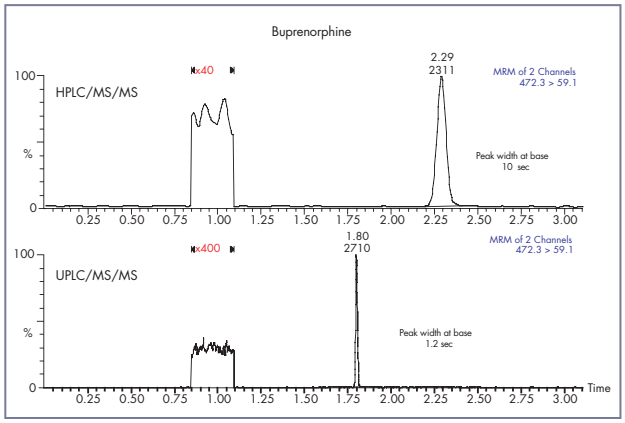
[1]The traveling wave device described here is similar to that described by Kirchner in US Patent 5,206,506 (1993).

UPLC/MS/MS

For years, HPLC/MS/MS has been the preferred analytical method for separating, detecting and quantifying compounds. With the introduction of Ultra Performance LC™ (UPLC), Waters is bringing new meaning to speed, sensitivity and resolution.

ACQUITY UPLC System for fast, sensitive separations

- Ultra-low carryover and low flow eliminates the need for flow splitting—for the ideal inlet to mass spectrometry
- Reproducible, high efficiency separations using 1.7 µm ACQUITY UPLC Bridged Ethane Hybrid (BEH) Columns
- Narrow peaks increase sensitivity and improve peak integration
- Decreased ion suppression due to improved separation of analyte species from matrix interferences
- Fast inject-to-inject cycle time
- Low system volume provides rapid gradient formation and fast system re-equilibration
- High capacity, climate-controlled sample organizer
- Dual wash capability minimizes carryover
- Connections® INSIGHT™ advanced diagnostics to maximize system uptime



Comparison of UPLC/MS/MS and HPLC/MS/MS for buprenorphine in protein-precipitated human plasma showing improvements in resolution, speed and detection level.

Powerful technology platform

The Micromass Quattro Premier XE provides a powerful platform for MS/MS analyses, upon which total system solutions may be designed to maximize performance for your application.

- **ZSpray™**—Source robustness is a key factor in the productivity of high throughput laboratories. The patented, dual-orthogonal ZSpray is the industry standard API interface, where performance is maximized for complex biological or environmental matrices.
- **Compact size**—Uses only 18.9" (48 cm) of linear bench space
- **Sensitivity**—Enhanced ion optics using T-Wave technology for high efficiency ion transmission
- **Fast analysis**—T-Wave collision cell for optimum performance at fast acquisition rates and a polarity switching time of only 20 ms ensures that the Quattro Premier XE is ideally suited to the demands of UPLC
- **ESCi® Multi-Mode Ionization Source***—APCI and ESI in the same analysis, increasing ionization coverage for a wide range of compound classes
- **Dynamic range**—up to 5 orders of magnitude for accurate determination across a wide concentration range
- **DDA™**—Data Directed Analysis for intelligent, automated MS to MS/MS switching within a single analytical run
- **Integrated syringe pump**—under MassLynx Software control
- **Gas flow control**—software regulation of source and collision gases

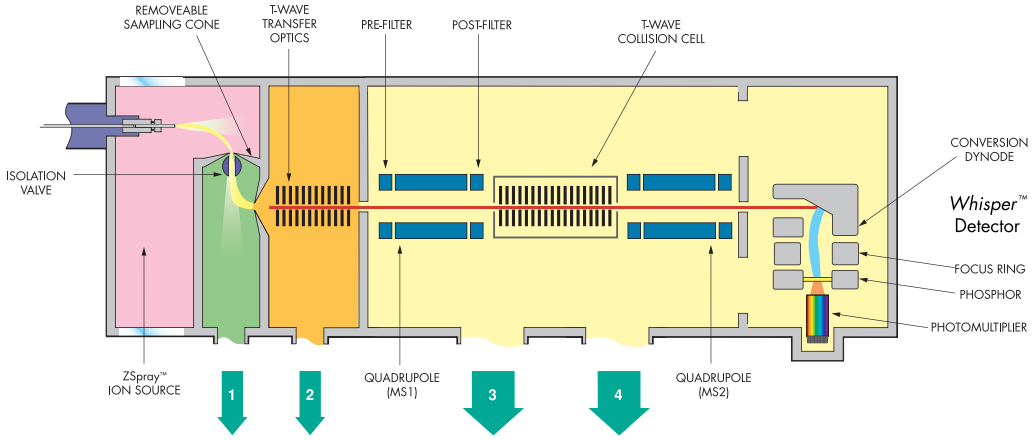
Options

- **IonSABRE™ APCI Probe**—High performance APCI probe for enhanced sensitivity at high flow rates
- **APPI™/APCI Dual Ionization Source**—Atmospheric pressure photo and chemical ionization in a single analysis for the comprehensive analysis of nonpolar compounds
- **MUX-technology™**—4-way electrospray ionization interface for high throughput parallel analyses

*Patent pending

Whisper Dynolite Photomultiplier Detector

The new low-noise *Whisper*™ detector in the Quattro Premier XE provides a detection efficiency approaching 100% for single ions. Situated after the second analyzer and featuring integral focusing optics, the detector's high voltage dynode and phosphor are positioned 90° off-axis to eliminate neutral noise. The detector can rapidly switch polarity (20 ms), allowing the detection of both positive and negative ions in a chromatographic peak. In addition, the detector's robust photomultiplier tube is sealed for life in a vacuum envelope, guaranteeing years of maintenance free service.



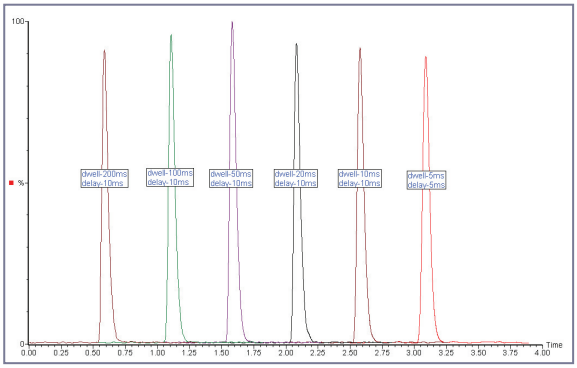
The unique conversion dynode arrangement of the Whisper detector enables stronger signal output and improved limits of detection in negative ion mode, and reduced detector noise levels in both positive and negative ion modes.

T-Wave technology

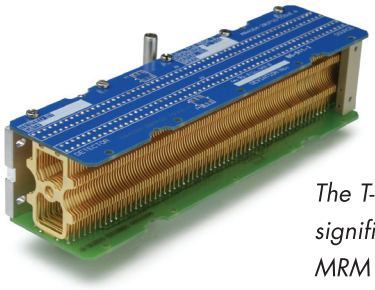
Continuing to lead the way in the development of advanced ion optics, our high-efficiency ion guide transfer region now features T-Wave technology, providing rapid and efficient ion transport for high speed, high sensitivity analyses.

The T-Wave enabled collision cell minimizes ion transit times and provides optimum performance for fast analyses. Where short cycle times are required for narrow chromatographic peaks or multiple MRM transitions (e.g. in parallel analyses), the T-Wave cell maintains signal intensity and minimizes interchannel crosstalk—even at very short dwell times.

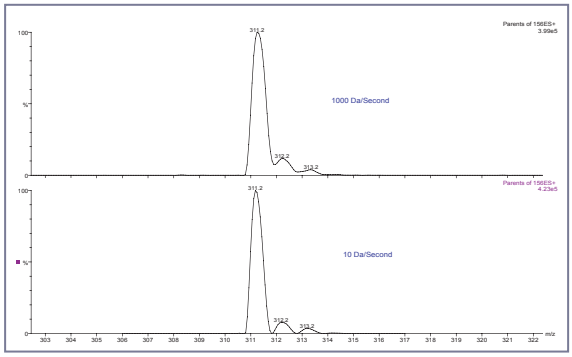
The T-Wave cell delivers enhanced sensitivity and resolution for class-specific monitoring, using precursor ion or neutral loss analysis, that is superior to standard multipole collision cells—even at higher scan speeds.



Changing MRM dwell time has no effect on signal intensity even at an acquisition rate of 100 data points per second (5 ms dwell time, 5 ms inter-channel delay).



The T-Wave collision cell significantly improves MRM performance.



Precursors of 156 m/z (sulfadimethoxine). Resolution and peak intensity are maintained even at high scan speeds.

Systematic productivity

Whether you are performing high throughput compound screening or quantifying small molecules in complex matrices, Waters Mass Spectrometry Systems incorporating the Quattro Premier XE Mass Spectrometer provide a total solution to maximize performance for your application. The fully integrated systems are controlled from a single data system, maximizing the efficiency of your data acquisition while allowing advanced analyses to be easily performed.

This Waters LC/MS/MS System integrates the Waters Micromass Quattro Premier XE Mass Spectrometer with the Waters 1525µ Binary Pump, the 2777 Sample Manager and MassLynx Software.

Quantitative Bioanalysis

- Maximum sensitivity for detection of trace level components
- Enhanced selectivity for determination of components in complex biological samples
- 21 CFR Part 11-compatible MassLynx Security Manager
- QuanLynx™ Application Manager for automated batch quantitation with the advanced ApexTrack™ peak detection algorithm
- System qualification (IQ/OQ/PQ)
- Staggered chromatography to maximize sample throughput

ADME Screening

- Environmental control for large batches of samples
- Multi-pump control for staggered chromatography or parallel analysis with MUX-technology
- QuanOptimize™ and the QuanLynx Application Manager for automated methods development and quantification

Early Candidate Profiling

- High throughput determination of physicochemical properties
- Multi-pump control for parallel analysis using MUX-technology
- ProfileLynx™ Application Manager for the automated calculation of solubility, permeability and stability of drug candidates

Food/Environmental Analysis

- High sensitivity for trace contaminant monitoring
- Enhanced selectivity for complex matrices
- TargetLynx™ Application Manager for automated quality control checks of quantitative results

Clinical Analysis

- Optimum sensitivity for potent, low-dose therapeutic drug monitoring
- QuanLynx Application Manager for automated batch quantification with the advanced ApexTrack peak detection algorithm

CGMP/GLP Compliance

Waters systems controlled by MassLynx Software are developed and produced under a certified system development life cycle process (SDLC) to ensure their readiness for use in regulated environments.

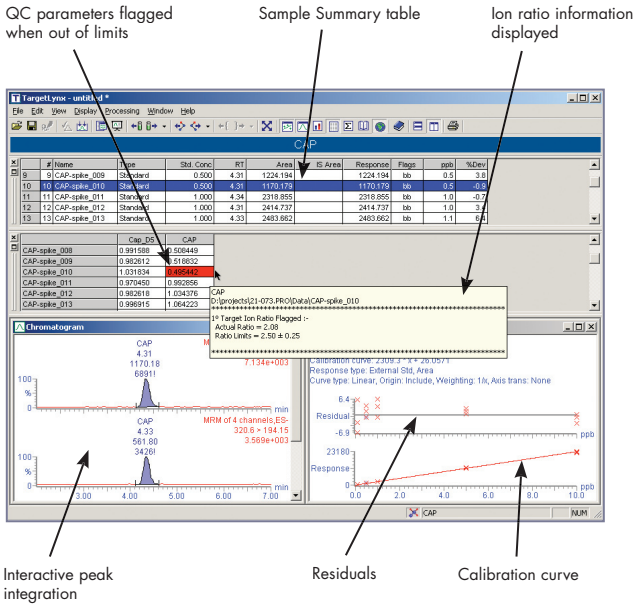
To assist owners in commissioning and maintaining their Quattro Premier XE systems in GxP regulated environments, Waters provides an extensive portfolio of Connections® Compliance Services.

Specially trained and certified Compliance Specialists are available to provide Connections Compliance Services that include:

- Pre-use Qualification Services (IQ, OQ and PQ) for new systems
- Post-use Performance Maintenance and Qualification Services (PM, OQ and PQ) for existing installations

TargetLynx™ Application Manager: Quantification with Added Confidence

The demand by regulatory authorities for assurance of confirmation in quantitative analysis is increasing. To ensure cost effective compliance, an automated solution is required, providing confidence in reported results and eliminating laborious, time consuming and expensive manual checks.



Example of TargetLynx browser showing processed data.

MassLynx Application Managers

MassLynx Software can be enhanced with a range of optional Application Managers:

- **QuanLynx Application Manager**—Provides high performance, high throughput batch quantification as well as automated LC/MS/MS method development (QuanOptimize) and tools to support 21 CFR Part 11 Compliance.
- **TargetLynx Application Manager**—Enables advanced quantification of target compounds with a full range of automatic quality control checks. Uses confirmatory ions for confident quantification of regulated compounds.
- **ProfileLynx Application Manager**—Automates the determination of physicochemical properties of early drug candidates.
- **OpenLynx™ Application Manager**—Provides walk-up LC/MS/MS capabilities and automated batch processing.
- **MetaboLynx™ Application Manager**—Automates metabolite identification with an advanced control comparison.

High throughput made easy: automated method development

With the vast range of compounds now being screened, a major bottleneck in the process is the optimization of LC/MS/MS methods for each individual compound.

QuanOptimize enables you to automate method development for quantitative LC/MS/MS. Whether your compounds are suited to ESI, APCI, positive or negative mode, QuanOptimize will automatically identify the best method for each compound, then run your batch of samples for quantitative analysis and report the results in the QuanLynx browser.

Chromatography columns

For the ultimate in speed and sensitivity, ACQUITY UPLC BEH 1.7 µm columns produce the ideal combination of ultra-performance efficiencies, wide pH range and complementary selectivities for rapid and robust UPLC/MS separations. For the best in HPLC performance, the following columns are available:

- **Symmetry® and Symmetry300™ Columns**—To meet your LC/MS method development needs, Symmetry columns provide the highest standard of "column-to-column" reproducibility with unmatched peak symmetry for maximum sensitivity and accurate quantification
- **XTerra® MS and Intelligent Speed (*IS*™) Columns**—XTerra MS columns, hybrid particle technology enables high speeds, temperatures, and pH, making them ideal for MS applications. XTerra *IS* Columns can be run at higher flow rates and lower backpressures without sacrificing resolution.
- **Atlantis™ Columns**—Atlantis columns are a difunctionally bonded, silica-based C_{18} offering that combines superior polar compound retention with exceptional peak shape and full LC/MS compatibility.

Worldwide services and support

Waters Connections® provides the solutions you need to maintain uptime across your Waters systems.

- Analytical Instrumentation and Software Services include Total Assurance Plans and Warranties that extend and enhance the original warranty you receive when you buy a Waters product. These plans minimize the level of insurance investment and deliver the value you need to avoid costly and time-consuming system downtime.
- Connections Compliance Services provide you with timely and cost-efficient solutions for your regulatory compliance challenges. You can use Waters Compliance Services to verify proper equipment operation for CGMP/GLP compliance, significantly reducing operating costs.
- Connections University is the center of our Educational Services, providing extensive HPLC and MS training and education at your site, at our corporate headquarters or at our local offices around the world.
- Representatives of Waters Global Customer Assurance Organization, trained and certified in all Waters products and current in HPLC and MS applications, are available in person, on the phone, via FAX or at www.waters.com to answer questions and provide you with service, support and information.

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US 800 252 4752

WATERS CORPORATION
34 Maple St.
Milford, MA 01757 U.S.A.
T: 508 478 2000
F: 508 872 1990
www.waters.com