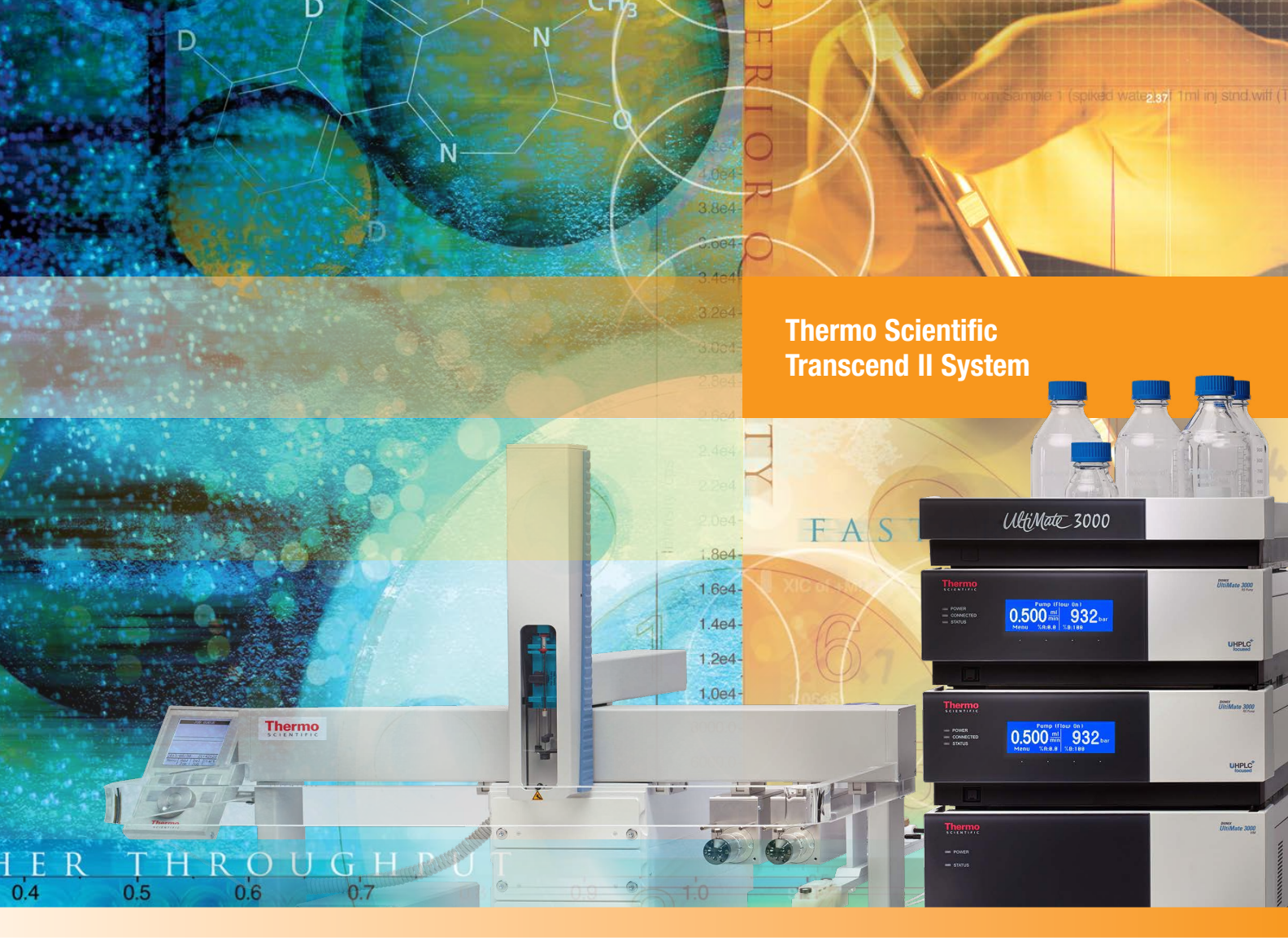


Improve data, lower costs,

and increase MS throughput

Bioanalytical Assays • Clinical Research and Forensic Toxicology • Environmental and Food Safety • Equine Sports Doping

Thermo
SCIENTIFIC

The power of online extraction, the throughput of UHPLC multiplexing

Transcend System

The Thermo Scientific™ Transcend™ II system is the most productive liquid chromatography (LC) solution available. It is powered by two valuable technologies:

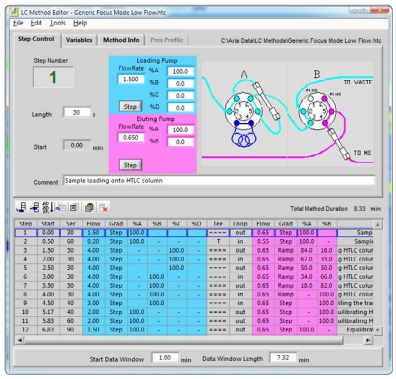
- Thermo Scientific™ TurboFlow™ technology performs selective online sample clean up of dirty or difficult matrixes prior to UHPLC separation and MS analysis.
- Thermo Scientific multiplexing technology uses multiple, synchronized UHPLC channels to increase MS utilization and throughput up to 400%.

Together they reduce sample preparation time, labor, costs, and errors, while significantly increasing throughput—without compromising data quality or sensitivity.

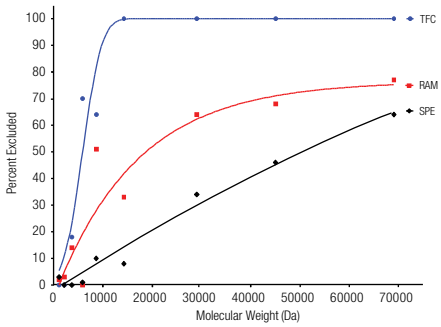
The Transcend II system can be configured to run TurboFlow methods for online sample clean-up, multiplexed HPLC or UHPLC methods for highest sample throughput, or both! A single method can be run on up to four LC channels or up to four separate methods can run simultaneously on independent LC channels.

Aria software

Thermo Scientific™ Aria™ software manages and controls all aspects of the Transcend II system. It is powerful enough to schedule and manage multiple methods on multiple channels simultaneously. At the same time, it features easy-to-use, intuitive, graphical method editing, allowing anyone to quickly develop methods and run batches of samples. Aria software is built into Thermo Scientific mass spectrometer software such as Thermo Scientific™ TraceFinder™, Xcalibur™, and LCQUAN™ software. It can also communicate with and run many other brands of mass spectrometers.



The easy-to-use Aria graphical user interface makes it simple to create and run TurboFlow and multiplexing methods.



TurboFlow technology (TFC) is better than competing technologies at efficiently removing high-molecular-weight interferences.

Transcend II system with TSQ Endura triple-stage quadrupole mass spectrometer.

TurboFlow Technology

The TurboFlow technology found in the Transcend II system uses the combined chromatographic techniques of diffusion, velocity, chemistry, and size exclusion to capture analytes of interest while eliminating unwanted matrix interferences. Depending on sample complexity, analyte abundance, and MS sensitivity, raw samples can be directly loaded or precipitated and centrifuged before loading. Once loaded, samples are automatically prepared, separated by HPLC or UHPLC, and analyzed by mass spectrometry.

Benefits

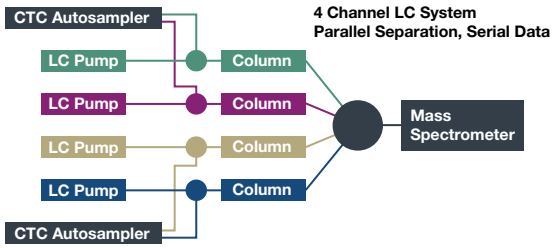
- Simplifies or eliminates offline sample preparation
- Lowers costs, labor, and time
- Reduces ion suppression through greater specificity and cleaner samples
- Streamlines method development—the same method can be used for multiple matrices
- Increases data confidence by removing interferences

Multiplexing Technology

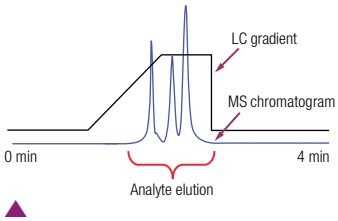
The Transcend II system's multiplexing technology dramatically increases mass spectrometer utilization. Traditional single-channel LC-MS systems process samples serially; the MS is idle during much of the LC method. The Transcend II system includes either two or four LC channels that operate independently and in parallel but feed into a single mass spectrometer. A single method can be run on all channels or each channel can simultaneously run a different method. The Aria software schedules and coordinates runs, maximizing MS utilization while ensuring the mass spectrometer is dedicated to a single LC channel for the entire length of that channel's analyte elution.

Benefits

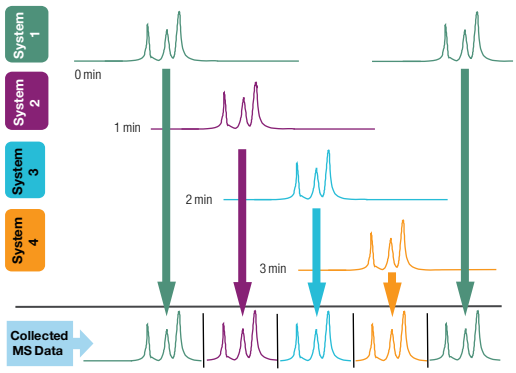
- Increases throughput up to 400% without compromising data quality or sensitivity
- Improves ROI by getting more productivity from capital equipment
- Increases flexibility by running up to four different methods simultaneously



The Transcend II system features 2 or 4 completely independent LC channels that can operate simultaneous.



Analyte elution only occurs during a small portion of the total LC method.



Multiplexing interleaves samples to maximize throughput and MS utilization.

Typical sample preparation steps using four different technologies.

Liquid-Liquid Extraction (LLE)

1. Aliquot of sample
2. Spike with IS
3. Add buffer
4. Add MTBE
5. Shake 10 min
6. Centrifuge
7. Remove organic
8. Evaporate to dryness
9. Reconstitute
10. Transfer to plate
11. Inject onto column

Solid Phase Extraction (SPE)

1. Aliquot of sample
2. Spike with IS
3. Add 0.1N HCL
4. Condition sorbent
5. Add sample to sorbent
6. Wash
7. Evaporate
8. Reconstitute
9. Transfer
10. Inject onto column

Protein Precipitation (PPT)

1. Aliquot of sample
2. Spike with IS
3. Add acetonitrile
4. Centrifuge
5. Remove supernatant
6. Reconstitute
7. Transfer to plate
8. Inject onto column

TurboFlow Method

1. Aliquot of sample
2. Spike with IS
3. Centrifuge
4. Inject onto column

Bioanalytical Assays

Most drug discovery involves large numbers of standardized analyses; high sample throughput and robustness are essential. Throughput is typically achieved through fast LC gradients and short reverse-phase columns. The Transcend II system amplifies this approach. Two or four independent LC channels operate in parallel with a single mass spectrometer for maximum throughput while maintaining high sensitivity and specificity. Existing or new HPLC and UHPLC methods from any LC platform can be implemented on the Transcend II system to increase throughput with no loss of performance or robustness.

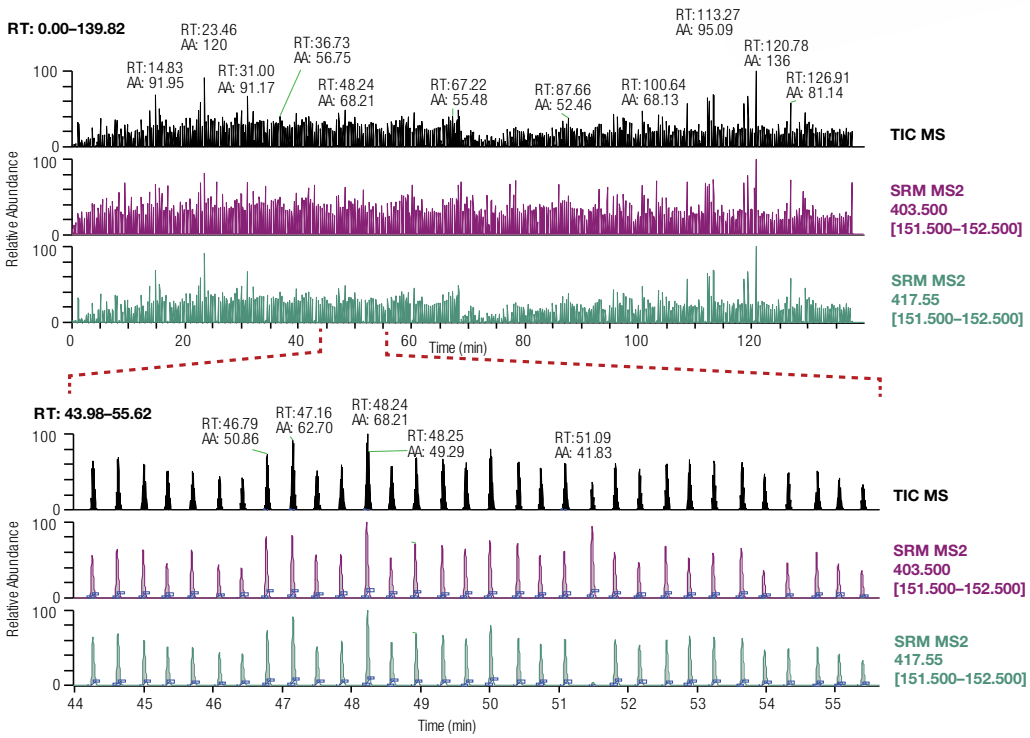
The Transcend II system also provides unmatched flexibility for samples or methods that require nonstandard analyses. Significant method and flow-path changes can be made without hardware or software reconfiguration.

Method development and secondary or follow up analysis can be enhanced with the use of the Thermo Scientific™ Multiple Column Module or the built-in TurboFlow on-line sample preparation technology.

In lead finding and lead discovery, the demand for high-throughput, label-free detection solutions is increasing. Mass spectrometry is the ideal label-free detection technology, but sample throughput is a concern with LC/MS. The Transcend II system can achieve sample cycle times as short as 15 seconds while still performing full LC separations. The result is high-throughput label-free analyses that meet the throughput and sample quality demands of pharmaceutical companies.

Benefits

- Maximum LC/MS throughput without sacrificing flexibility
- Reduce capital expense through greater MS utilization
- Advanced, multi-dimensional LC separation
- Simplified software interface and fully integrated workflows



The Transcend II system facilitates high-throughput screening . These results show all 384 samples in a 384 well sample plate.

Food Safety and Environmental Analysis

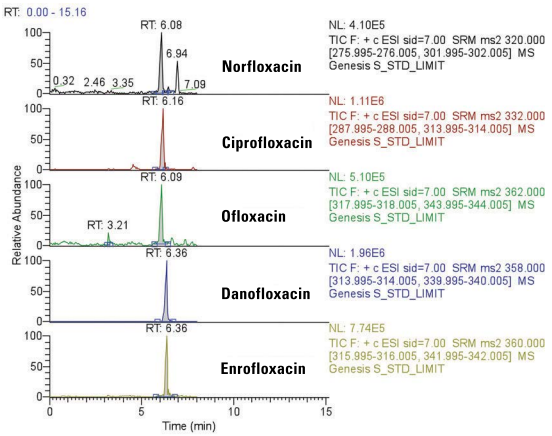
Accurate monitoring of contaminant levels in foods and agricultural products is essential to maintaining a safe food supply. Food safety analysis requires techniques sensitive enough to detect and quantify contaminants at or below the maximum residue limit (MRL) in a given sample matrix. The growing number of food safety regulations has also increased the number of samples to be analyzed, so high sample throughput is essential.

The Transcend II system uses TurboFlow automated online sample clean up of complex food and environmental matrices to ensure robust, high-quality LC/MS data. TurboFlow technology also simplifies sample testing and reduces errors by standardizing protocols; often multiple matrices can be analyzed using the same TurboFlow method.

Multiplexing technology increases sample throughput up to 400% by routing multiple independent LC channels into a single mass spectrometer. It can also reduce cross-contamination and increase data quality by providing dedicated LC channels for particular methods.

Benefits

- Reduced sample preparation, with direct injection of even difficult matrices such as milk, honey, wine, and tissue
- Simplified protocols; use one TurboFlow method for multiple matrices
- Reduced cross-contamination with dedicated LC channels for specific methods
- Increased throughput by multiplexing multiple LC channels into one MS



Chromatogram of 5 fluoro quinolone antibiotic standards at 5 ppb using online clean-up with TurboFlow technology. The system provided a sensitive and reliable analytical method of detecting a full range of antibiotics in honey.

Comparison of sample prep steps in TurboFlow method versus SPE and QuEChERs methods.

SPE	QuEChERs	TurboFlow
1. Weigh Sample	1. Weigh Sample	1. Weigh Sample
2. Extraction	2. Extraction	2. Extraction
3. SPE Loading Washing Eluting	3. Shake and Centrifuge 5 min	3. Filtration
4. Drying	4. Transfer Top Layer to Clean-up Tube	4. Inject onto column
5. Reconstitution	5. Shake and Centrifuge 5 min	
6. Filtration	6. Drying	
7. Inject onto column	7. Reconstitution	
	8. Filtration	
	9. Inject onto column	
100 Samples, 1 Week	**100 Samples, 2 Days**	**100 Samples, 3 Hours**

Clinical Research and Forensic Toxicology

Today's clinical research and forensic toxicology laboratories are frequently called upon to develop methods that are sensitive and specific, while also being fast, reliable, and easily reproducible. LC/MS is often the technique of choice. The Transcend II system with TurboFlow technology enables LC/MS to fit more effectively into the routine workflows of these laboratories. TurboFlow technology can automatically eliminate matrix interferences such as proteins, salts, and phospholipids commonly found in biological extracts, thus reducing the amount of time spent on offline sample preparation. With the Transcend II system, biological samples frequently require little or no preparation before injection.

The unique multiplexing capability of the Transcend II system increases throughput by up to four times, maximizing MS productivity and return on investment. This multiplexing capability also allows different methods to be run on separate channels simultaneously, reducing cross-contamination and the time it takes to switch between methods.

Thermo Fisher Scientific has a complete staff of application chemists and service personnel available to train and support laboratory personnel and ensure labs are up and running quickly.

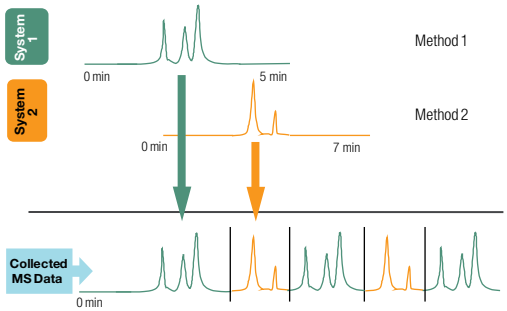
Benefits

- Reduced offline sample preparation time and costs
- Increased throughput and flexibility
- Decreased cost per sample
- Higher quality label-free data

Sample preparation of 100 filter paper disc samples was reduced from 390 minutes with liquid-liquid extraction to 60 minutes with TurboFlow technology.

Manual Handling of 100 Filter Paper Disc Samples

Liquid-Liquid Extraction	TurboFlow Method
1. Punch 3/16" disc	1. Punch 3/16" disc
2. Add IS solution	2. Add IS solution
3. Mix	3. Mix
4. Extract with ether	
5. Remove supernatant	
6. Repeat extraction	
7. Combine extracts	
8. Evaporate filter	
9. Reconstitute in mobile phase	
10. Transfer	4. Transfer
11. Inject	5. Inject
390 minutes	**60 minutes**



Multiplexing allows different methods to be run on separate channels simultaneously, reducing both cross-contamination and the time it takes to switch between methods

Sports Doping

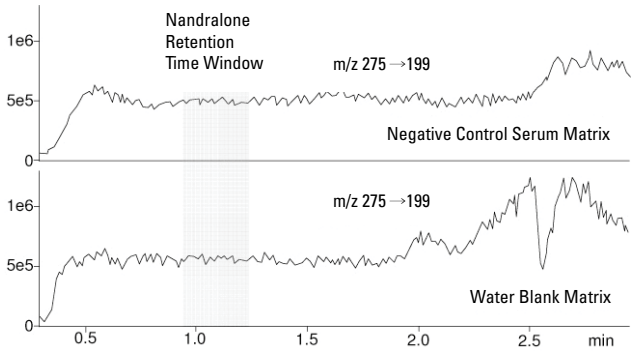
At the highest levels of competitive sports, the stakes are high—so is the temptation to use performance-enhancing drugs. To preserve the integrity of sports and ensure fairness, athletes must undergo rigorous qualitative and quantitative testing. Accordingly, sports doping and its testing results have gained considerable global attention.

Due to this focus, labs must avoid errors commonly associated with manual sample preparation methods such as SPE and LLE. With TurboFlow technology, methods can be simplified; typically serum or plasma is simply diluted, centrifuged, and placed onto the Transcend II system for automated sample clean up and LC/MS analysis.

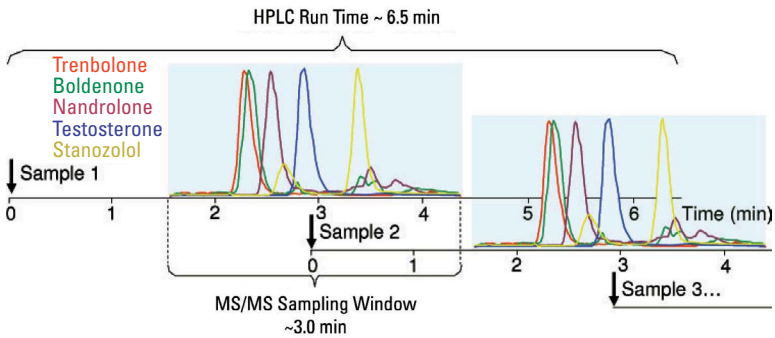
Using multiplexing technology, the Transcend II system can increase throughput and mass spectrometer utilization up to 400%. When time is of the essence, the benefits of multiplexing are priceless.

Benefits

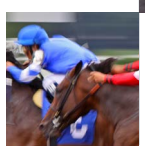
- Faster results thanks to multiplexing
- High-confidence data due to standardized, automated sample preparation
- Reduce sample prep time and money with automated, online sample clean up



The Transcend system minimizes ion suppression and matrix effects caused by salt, proteins, and phospholipids.



A multiplexed Transcend system addresses all the challenges needed to rapidly analyze low-level androgenic steroids which are used as performance-enhancing drugs in horse racing.



Complete LC-MS solutions

While most commonly paired with a triple quadrupole mass spectrometer, the Transcend II system works seamlessly with other Thermo Scientific LC-MS mass spectrometers, including ion trap and Orbitrap-based instruments, for screening, quantitation, or any other application that demands high throughput and high performance. Application-specific software, columns, sample preparation, and support, all from Thermo Fisher Scientific, round out solutions for the most complex analytical challenges.

Transcend II system with TSQ Quantiva triple-stage quadrupole mass spectrometer

Thermo Scientific TSQ-series triple quadrupole mass spectrometers are mainstays in environmental, food safety, pharmaceutical, clinical research, toxicology, sports doping, and environmental laboratories. The next-generation Thermo Scientific™ TSQ Quantiva™ and TSQ Endura™ mass spectrometers feature class-leading performance for the most challenging samples.

Transcend II system with Q Exactive Plus hybrid quadrupole-Orbitrap mass spectrometer

The Thermo Scientific™ Exactive™ Plus mass spectrometer uses the unsurpassed high resolution and mass accuracy of Thermo Scientific™ Orbitrap™ technology to make it the ultimate solution for compound screening.

The Thermo Scientific™ Q Exactive™ Plus system combines precise quadrupole precursor selection with the high-resolution accurate-mass detection afforded by Orbitrap technology to achieve Quanfirmation™ Plus, the ability to confidently and routinely characterize, quantify, and confirm in a single analysis using a single mass spectrometer.

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BR63879_E 08/16