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Waters ACQUITY TQ Detector

The Waters® ACQUITY® TQ Detector is an advanced bench top tandem quadrupole mass detector designed for ultra high performance LC/MS/MS applications. With a wide range of ionization options including Atmospheric Pressure Photo Ionization (APPI) and the Atmospheric Solids Analysis Probe (ASAP), the TQ Detector is ideally suited for a wide range of qualitative and quantitative applications.

The system includes IntelliStart™ Technology, for automated system optimization and status monitoring, ensuring that the highest quality data is routinely available to users of all levels.

SYSTEM HARDWARE SPECIFICATIONS

API sources and ionization modes	High performance ZSpray™ dual-orthogonal API sources: 1) ESI (standard) 2) Multimode source – ESI/APCI/ESCi® (standard) 3) Dedicated APCI (optional) 4) Dual-mode Atmospheric Pressure Photo Ionization (APPI)/APCI source (optional) 5) Atmospheric Solids Analysis Probe (ASAP) (optional) Vacuum isolation valve Tool free access to customer serviceable elements Plug and play probes De-clustering cone gas Software control of gas flows and heating elements
Ion source transfer optics	High efficiency hexapole ion guide
Mass analyzer	Two high resolution quadrupole analyzers (MS1/MS2), plus prefilters to maximize resolution and transmission while preventing contamination of the main analyzers.
Collision cell	T-Wave™1 enabled for optimal MS/MS performance at high data acquisition rates Software programmable gas control
Detector	Low noise, off axis, long life photomultiplier detector Digital dynamic range up to 4 x 10^6
Vacuum system	Single, split-flow air-cooled vacuum turbomolecular pump evacuating the source and analyzer One rotary backing pump

Dimensions	Width: 34.5 cm (13.8 in.) Height: 53.3 cm (20.8 in.) Depth: 88.5 cm (34.6 in.)
Regulatory approvals/marks	CE, CB, NRTL (CAN/US), RCM

SYSTEM SOFTWARE SPECIFICATIONS

Software	Systems supported on MassLynx® 4.1 or Empower® 2 software (and later versions)
IntelliStart Technology	System parameter checks and alerts Integrated sample/calibrant delivery system plus programmable divert valve Automated mass calibration Automated sample tuning Automated MRM and SIR method development LC/MS System Check – automated on-column performance test
Quantification methods database*	Quanpedia™ – a database for storing and sharing user defined LC/MRM acquisition methods and associated processing methods for the targeted quantification of named compounds. Database entries for a number of applications are also provided. Quanpedia is an optional software item included with the purchase of the TargetLynx Application Manager.
MRM acquisition rate assignment*	Dwell time, inter-channel delay time, and inter-scan delay times for individual channels in a multiple MRM experiment can be automatically assigned (using the Auto-Dwell feature) to ensure that the optimal number of MRM data points per chromatographic peak are acquired. The Auto-Dwell feature can dynamically optimize MRM cycle times to accommodate retention time windows that either partially or completely overlap. This greatly simplifies MRM method creation, irrespective of the number of compounds in a single assay, while at the same time ensuring the very best quantitative performance for every experiment.
MRM acquisition window assignment*	Multiple MRM experiments can be scheduled (manually or automatically using the Quanpedia database) using retention time windows to optimize the cycle time for each MRM channel monitored. If required, MRM retention time windows can overlap partially or completely. This ensures that MRM data acquisition rates will be optimal for the quantification of all analytes in a given assay.

PERFORMANCE SPECIFICATIONS

Acquisition modes	Full scan MS Product ion scan Precursor ion scan Constant neutral loss Selected Ion Recording (SIR) Multiple Reaction Monitoring (MRM)
Survey scan modes*	Full scan MS triggered product ion scan
Mass range	2 to 2048 *m/z*
Scan speed	Up to 10,000 Da/s
Examples of achievable acquisition rates	10 scans per second (*m/z* 100 to 1000) 20 scans per second (*m/z* 50 to 500)
Mass stability	Mass drift is <0.1 Da over a 24 hour period
Linearity of response	The linearity of response relative to sample concentration for a specified compound is five orders of magnitude from the limit of detection
Polarity switching time	20 ms to switch between positive and negative ion modes
ESCi mode switching time	20 ms to switch between ESI and APCI
MRM acquisition rate**	Minimum dwell time of 3 ms per MRM channel
Inter-channel cross talk	The inter-channel cross talk between two MRM transitions, acquired using an MRM dwell time of 10 ms and an inter-channel delay time of 10 ms, will be less than 0.02%.
Number of MRM channels***	Up to 16,384 MRM channels (512 functions, 32 channels per function) can be monitored in a single acquisition; up to 1024 MRM channels when operating in GLP/secure mode (32 functions, 32 channels per function).
Mass resolution	Automatically adjusted (IntelliStart) to desired resolution; The valley between the 2034.63 Da and 2035.63 Da peaks is <12% of the average height of the two peaks.
MRM sensitivity (ESI+)	A 1 pg on-column injection of reserpine will give a chromatographic signal-to-noise greater than 2,000:1 (Gradient separation, LC mobile phase flow rate of 0.8 mL/min, MRM transition *m/z* 609 > 195).
MRM sensitivity (ESI-)	A five pg loop injection of chloramphenicol, with a mobile phase flow rate of 200 µL/min will give a chromatographic signal-to-noise for the transition 321 > 152 *m/z* greater than 180:1.
MRM sensitivity (APCI+)	A 100 pg loop injection of 17-α-hydroxyprogesterone, with a mobile phase flow rate of 1000 µL/min will give a chromatographic signal-to-noise for the transition 331 > 109 *m/z* > 150:1.

It should be noted that the above are not standard installation specifications. All TQ Detector instruments will be installed and tested in accordance with standard performance tests as detailed in Waters document ACQUITY TQD System Installation Check List (715001460EN). Test criteria are routinely reviewed to ensure quality is maintained and are therefore subject to change without notice. See Site Preparation Guide and Product Release Notes found on Waters website (www.waters.com) for additional product and specification information.

* *Feature is only available on systems controlled by MassLynx 4.1 SCN#714 or later.*

** *3 ms dwell is only available with systems controlled by MassLynx 4.1 SCN#714 or later.*
Systems controlled by Empower 2 have a minimum of 5 ms dwell. Both systems have 5 ms inter-channel delay.

*** *512 function operation is only available with systems controlled by MassLynx 4.1 SCN#714 or later.*
Empower 2 controlled systems monitor a maximum of 1024 MRM or SIR channels (32 functions, 32 channels per function).

References

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

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