

Orbitrap Exploris 120 Mass Spectrometer

## Productivity redefined

### Benefits

- Keep your laboratory running seamlessly with single-click calibration lasting at least five days and maximum mass accuracy using built-in Thermo Scientific™ EASY-IC™ ion source internal reference mass
- Focus on your science, not instrument set up with intuitive tuning, drag-and-drop method setup, and predefined experiments driven by next-generation software
- Process more samples with improved scan speed and fast polarity switching
- Improve space utilization and deliver maximum business value with compact footprint when bench-top space is limited

The Thermo Scientific™ Orbitrap Exploris™ 120 mass spectrometer is a Thermo Scientific™ quadrupole-Orbitrap™ mass spectrometer which is based on proven hardware and instrument control software designs of next-generation Thermo Scientific™ mass spectrometers and incorporates extensive customer and service engineer feedback.<sup>1</sup>

The Orbitrap Exploris 120 mass spectrometer extends the Thermo Scientific Orbitrap Exploris mass spectrometer portfolio, with productivity made easy and rugged for laboratories performing high-throughput targeted screening and quantitation. High-resolution accurate-mass (HRAM) capability provides the fast path to accurate results in a solution with everyday operational usability and consistent performance.

## Hardware features

### Ion source

#### **Thermo Scientific™ OptaMax™ NG ion source**

- Ultimate sensitivity with an efficient, heated electrospray ionization (H-ESI II) probe to deliver maximum performance with minimal optimization
- Additional non-heated low-flow calibrant sprayer for optimal mass and system calibration
- Enhanced system ruggedness and reduced chemical noise with sweep gas
- Flow rates from 1  $\mu\text{L}/\text{min}$  to 1,000  $\mu\text{L}/\text{min}$ ; OPTON-30139 (low-flow needle; 1–10  $\mu\text{L}/\text{min}$ ), OPTON-30694 (high-flow needle; 5–1,000  $\mu\text{L}/\text{min}$ )

### Ion optics

The atmospheric pressure ionization (API) interface consists of:

#### **Round bore transfer tube**

- Removable, heated ion transfer tube
- Vent-free maintenance

#### **S-lens**

Progressively spaced stacked-ring ion guide (S-Lens) captures and efficiently focuses ions into a tight beam while minimizing in-source dissociation. Large variable spacing between electrodes allows for better pumping efficiency and improved ruggedness.

#### **Advanced active beam guide (AABG)**

Axial field and injection filtering reduce noise by preventing neutrals and high-velocity clusters from entering the quadrupole mass filter using a double bent design geometry

#### **Advanced quadrupole technology (AQT)**

- Segmented quadrupole mass filter for precursor ion selection with variable precursor isolation width from 0.4 to 1200 Da
- MS/MS precursor ion selection with high transmission from  $m/z$  40 to 2,000

#### **Ion-routing multipole (IRM)**

- Robust ion trapping for MS scans and higher energy collisional dissociation (HCD)
- Selection of absolute collision energy (CE) or normalized collision energy (NCE) for precursor fragmentation
- Nitrogen collision gas

### Automatic gain control (AGC)

Reliable AGC measurements for controlled injection of the number of ions is ensured by the novel Independent Charge Detector

### Thermo Scientific™ Orbitrap™ mass analyzer

- High-field Orbitrap mass analyzer
- Low-noise-detection pre-amplifier
- 4kV central electrode voltage

### Vacuum system

- A compact single turbo pump design provides the adequate vacuum in six stages for the aluminum high-vacuum analyzer chambers
- Advanced vacuum technology reduces pressure in the ultra-high vacuum regions, enhancing transmission of ions to the Orbitrap mass analyzer

### Thermo Scientific™ EASY-IC™ ion source

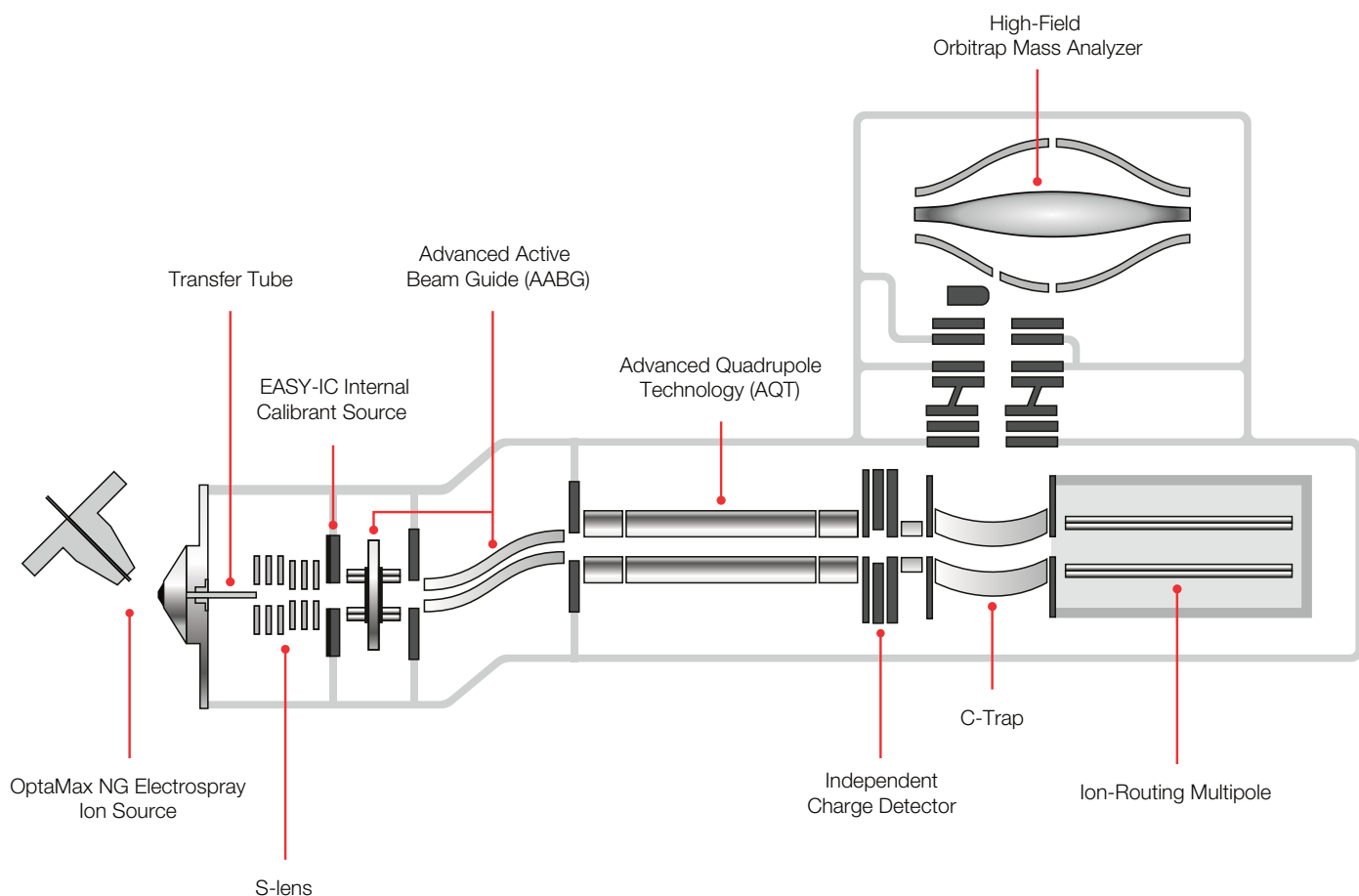
- Provides <1 ppm RMS mass accuracy under defined conditions with minimum effort for at least five days
- Generates optional internal reference ions for real-time mass correction of spectra in both positive and negative modes

## Optional hardware

### APCI probe for OptaMax NG ion source

- Compatible with flow rates from 50  $\mu\text{L}/\text{min}$  to 1,000  $\mu\text{L}/\text{min}$  without splitting
- The APCI probe can be upgraded to APPI

## Orbitrap Exploris 120 mass spectrometer ion path



## Performance specifications

Mass Range	Standard mass range $m/z$ 40–3,000
Orbitrap mass analyzer Resolution	Up to 120,000 at $m/z$ 200
Scan Rate*	Up to 22 Hz at resolution setting 15,000 at $m/z$ 200
Mass Accuracy*	External calibration achieves <3 ppm RMS drift over 24 hours; Internal lock mass calibration achieves <1 ppm RMS drift over 24 hours; EASY-IC achieves <1 ppm RMS drift for at least 5 days
Sensitivity	MS/MS: 200 fg reserpine on column S/N 100:1 tSIM: 200 fg reserpine on column S/N 250:1
Dynamic Range	>5,000 within a single Orbitrap mass analyzer spectrum
Polarity Switching	one Full Scan cycle** <700 ms equals >1.4 Hz one tSIM Scan cycle** <600 ms equals >1.6 Hz
Multiplexing	Up to 2 precursors per scan for tMS <sup>2</sup> and up to 20 compounds per scan for tSIM
Analog Inputs	Channel 1 analog input ( $\pm 10$ V), Channel 2 analog input ( $\pm 10$ V)

\* Under defined conditions

\*\* one cycle consists of acquiring one Full scan in positive mode and one Full scan in negative mode at resolution setting 60,000  
one tSIM scan in positive mode and one tSIM scan in negative mode at resolution setting 60,000

## Data acquisition system

### Data system

- High-speed real-time data acquisition and instrument control
- High-performance PC with Intel® microprocessor
- High-resolution LED color monitor
- Microsoft® Windows® 10 Enterprise (Long Term Servicing Channel) operating system

### Thermo Scientific™ Orbitrap Exploris™ instrument control software

- Tune application for instrument mass and system calibrations and checks, diagnostics, and manual data acquisition
- Method Editor with a comprehensive application-specific template library, method setup supported by tooltips, and a drag-and-drop user interface to facilitate method development
- Consistent instrument control software whether using Thermo Scientific™ Xcalibur™ or Thermo Scientific™ Chromeleon™ Chromatography Data Systems (CDS) for data acquisition

## Data acquisition and optional analysis software

### Thermo Scientific™ Xcalibur™ software

- Xcalibur software is the control software for the next-generation Thermo Scientific mass spectrometer portfolio
- Accelerates familiarization and reduces training needs

### Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS)

Streamlined chromatographic and MS screening and quantitative workflows within an enterprise and compliance-ready single software application

### Thermo Scientific™ TraceFinder™ software

Acquire and process your high-throughput screening and quantitation with built-in intelligence, drives productivity gains from data acquisition and processing to reporting.

### Thermo Scientific™ Compound Discoverer™ software

Streamlines small-molecule unknown identification, determination of real differences between samples, and elucidation of biological pathways with an integrated suite of data analysis tools.

## Operation modes

### Resolution settings

Ranging from 15,000 to 120,000 at  $m/z$  200

### Application-specific system templates

Sets optimal default instrument parameters and manages application-specific system templates for easy method development and execution.

### Scan functions

#### Full MS scan

#### *MS<sup>2</sup> by Data-Dependent Acquisition (DDA) following a master scan (i.e., a Full MS scan):*

- With Top4, 14 Hz MS<sup>2</sup> (discovery)
- With Targeted Mass Filter (confirmation)
- HCD Collision Energy set value is definable per compound
- By performing a dependent scan on the most intense ion, if no target mass is found (optional)

#### *tMS<sup>2</sup>*

- Targeted MS<sup>2</sup> with Mass List Table (confirmation)
- Isolation Width, HCD Collision Energy, RF Lens, Resolution, Polarity set values are definable compound-dependent (w/o msx)
- Multiplexing for up to 2 compounds
- Isolation Width set values can be defined compound-dependent (w/ msx)

#### *tSIM*

- Targeted SIM with Mass List Table
- With Targeted Mass Filter for ddMS<sup>2</sup> (confirmation)
- Isolation Width, RF Lens, Resolution, Polarity set values are definable compound-dependent (w/o msx)
- Multiplexing for up to 20 compounds
- MSX ID, multiplexing groups definable
- Isolation Width set values is definable compound-dependent (w/ msx)

#### *AIF*

- All Ion Fragmentation

## DIA

- Data-Independent Acquisition (DIA) as MS<sup>2</sup>
- Isolation Width minimum: 50 u—fixed for a given experiment
- Number of scan events: 1 to 20
- Multiplexing for up to 20 DIA windows
- MSX ID, multiplexing groups definable

## General

- Up to three (timed) experiments can be set up within one method
- One experiment can contain combinations of multiple scans, e.g. Full MS and ddMS<sup>2</sup> with Targeted Mass Filter
- ‘Mild Trapping’ can be applied optionally for particularly labile compounds; it is a global setting and applies to the entire run
- ‘Collision Energy Type’ can be selected: ‘Normalized’ and ‘Absolute’
- ‘Collision Energy Mode’ can be selected: ‘Fixed’ and ‘Stepped’

## Installation requirements

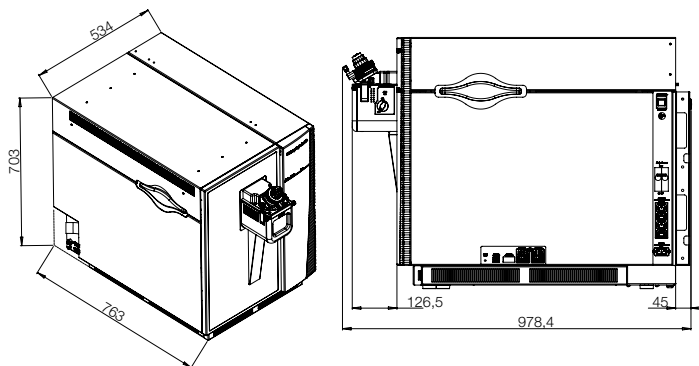
### Power

- 2×208–240 Vac single phase, 15 A, 50/60 Hz, with earth ground for instrument and source vacuum pump
- 208–240 Vac single phase, 15 A, 50/60 Hz, with earth ground for the data system

### Gas

- Source gas: high-purity nitrogen gas supply (>99% pure at 600 ±50 kPa [6.0 ±0.5 bar, 87 ±7 psi])
- A pre-regulator might be required to keep the source gas pressure stable within the required limits
- HCD collision gas: ultra-high-purity nitrogen
- For EASY-IC: ultra-high-purity nitrogen (UHP > 99.999% pure<sup>†</sup>) at 600 ±50 kPa [6.0 ±0.5 bar]

<sup>†</sup> with less than one ppm each water and oxygen



## Dimensions (w, d, h)

- 534 × 763 × 703 mm (21 × 30 × 27.7 in)

## Weight

- 120 kg (265 lb) without data system, vacuum rough pumps, and optional items

## Environment

- System averages 3,440 W (11,730 Btu/h) output when considering air conditioning needs
- Operating environment must be 18–27°C (64–81°F). Relative humidity must be 20–80% with no condensation
- Designed for indoor use at an altitude of up to 3,000 m (10,000 ft) above sea level

## Reference

1. Thermo Scientific™ Orbitrap™ Tribrid™ mass spectrometers, Thermo Scientific™ TSQ Altis™ triple quadrupole mass spectrometer, Thermo Scientific™ TSQ Quantis™ triple quadrupole mass spectrometer, Thermo Scientific™ TSQ Fortis™ triple quadrupole mass spectrometer, and Thermo Scientific™ Orbitrap Exploris™ mass spectrometers

Find out more at

[thermofisher.com/OrbitrapExploris120](https://thermofisher.com/OrbitrapExploris120)