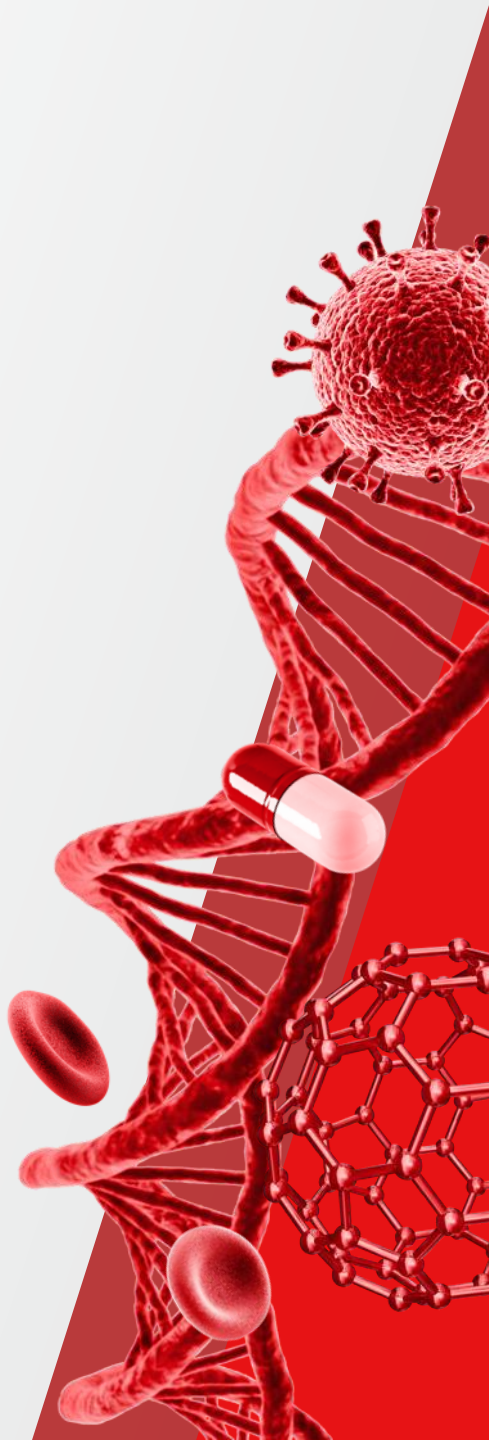
Thermo Scientific Orbitrap Astral 1.1 Instrument Control Software (AST 1.1 ICSW) –

Overview

September 2024



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Software Release

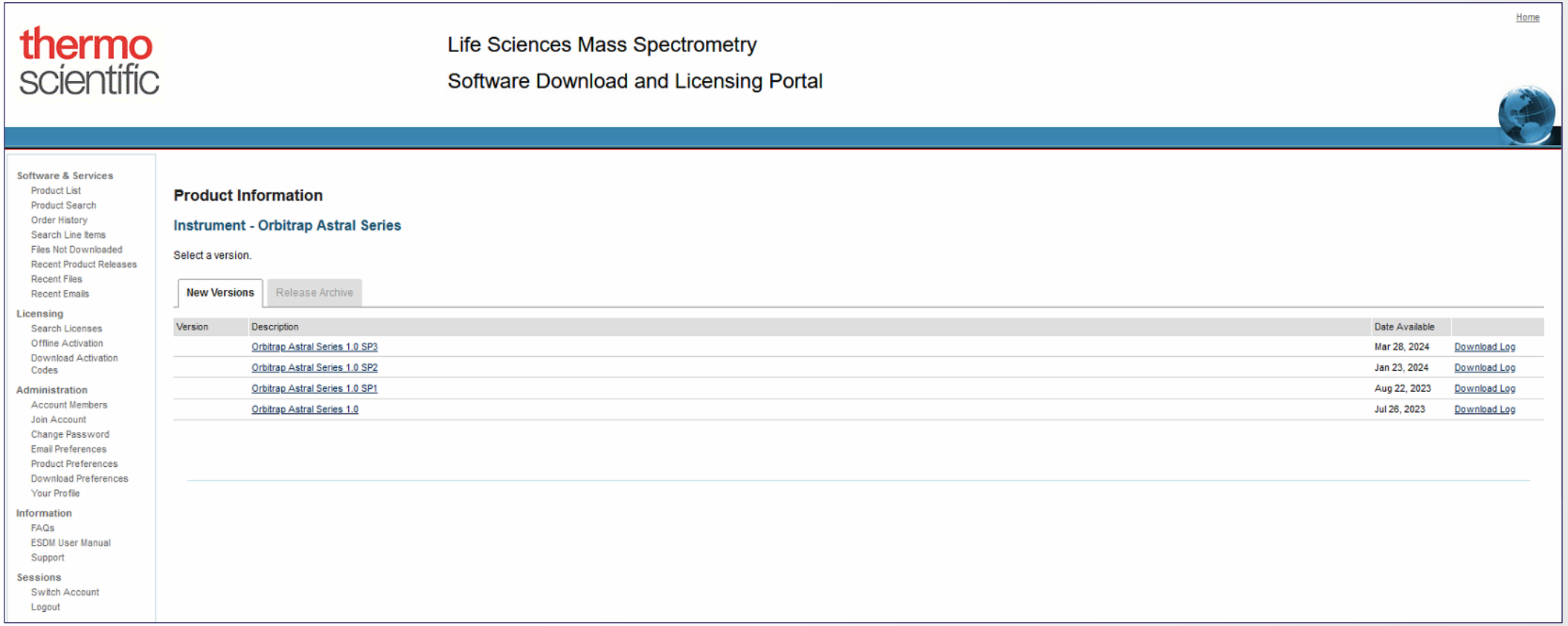
Flexera

Orbitrap Astral Series ICSW 1.1 is available to customers using Flexera software distribution site.

Customers new to the Flexera site should use the following link:
https://thermo.flexnetoperations.com/control/thmo/RegisterMemberToAccount

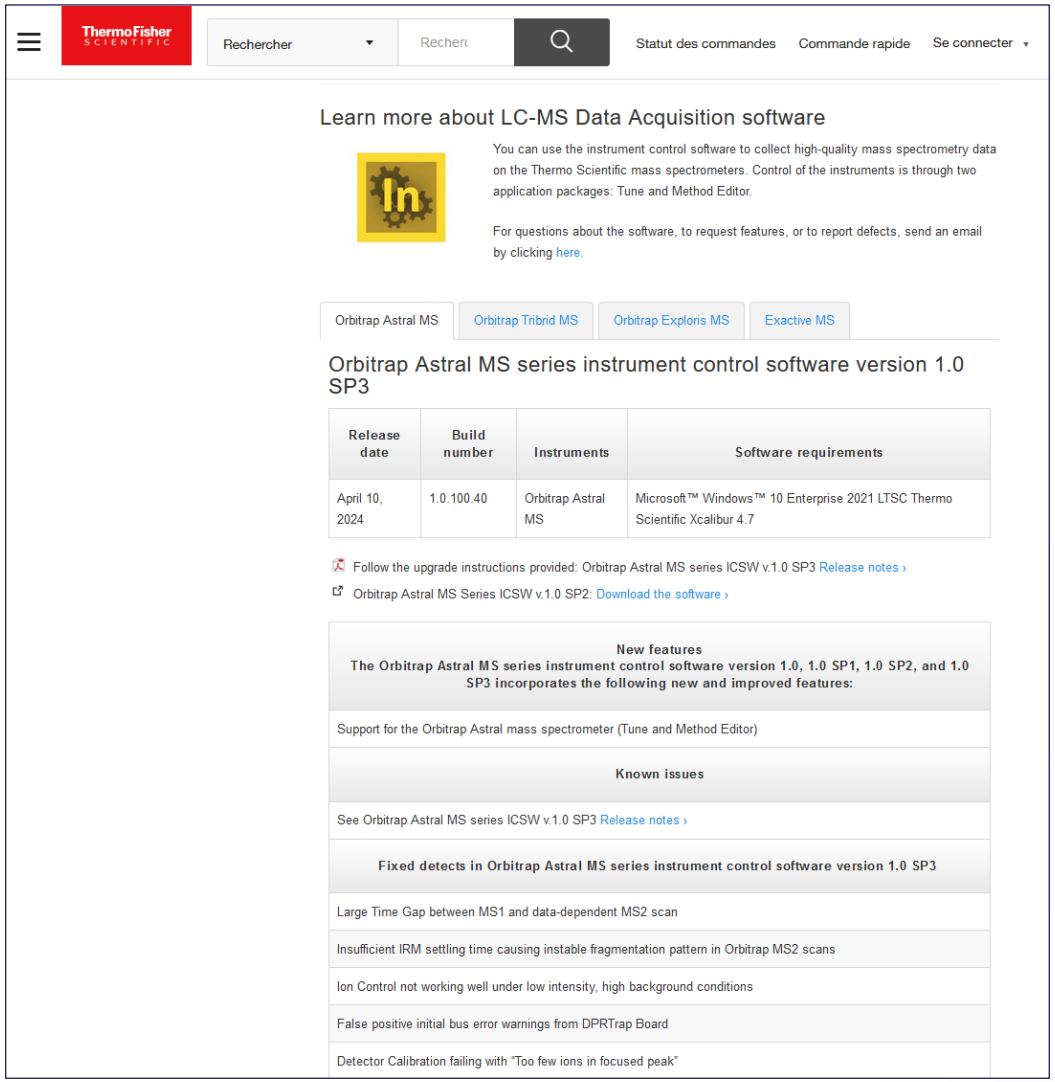
After setting up an account, customers can access the site using the following link:
https://thermo.flexnetoperations.com/control/thmo/login

In the ‘Product List’ page, find ‘Instrument – Orbitrap Astral Series’ and identify Orbitrap Astral Series 1.1 in the subfolder.



Software Release

Thermofisher.com



- Information: Thermofisher.com
  - Software information
  - Links for download
  - New Features
  - Known Issues
  - Discovered issues
  - Fixed Defects

Release Notes

Thermo Scientific Orbitrap Astral Series 1.1 Instrument Control Software Release Notes

This document lists installation notes, new features and improvements regarding the Thermo Scientific™ Orbitrap Astral Series 1.1 Instrument Control Software release. For information regarding the installation, features, functionality, and use of this product, refer to the following sources of information: *Orbitrap Astral Operating Manual*

Supported instruments

The instruments listed in table below are supplied and supported in this release.

Table 1 Supported instruments

Instrument	Instrument Control Software Version	Version No.
Orbitrap Astral MS	1.0	1.0.100.11
Orbitrap Astral MS	1.0 SP1	1.0.100.14
Orbitrap Astral MS	1.0 SP2	1.0.100.28
Orbitrap Astral MS	1.0 SP3	1.0.100.40
Orbitrap Astral MS	1.1	1.1.477.46

Source: Release Notes for AST 1.1 ICSW

System Requirements

Thermo Scientific Orbitrap Astral Series 1.1 Instrument Control Software Release Notes

Installation notes

This section describes the supported target systems and the system requirements.

Supported target systems

Thermo Scientific™ Orbitrap Astral™ mass spectrometer

System requirements

The minimum hardware and software configurations required for Orbitrap Astral Series 1.1 Instrument Control Software operation are as follows:

System	Requirements
PC	3.0 GHz Quad Core Intel™ Processor
	32 GB RAM
	512 GB SSD Hard Drive
	DVD-ROM Drive
	Display Monitor Resolution of 1920 × 1080
	Two Network Interface Cards (NIC), 1000 MBit/s
Software	Microsoft™ Windows™ 10 Enterprise 2021 LTSC
	Thermo Scientific™ Xcalibur™ 4.7

TIP: The Orbitrap Astral Series 1.1 Instrument Control Software was only tested within the delivered composition.

Note:
Xcalibur 4.7 software applies Foundation 3.1 SP9.

Source: Release Notes for AST 1.1 ICSW

List of New Features and Improvements Realized With AST 1.1 ICSW

- New Features
  - Stepped Collision Energy Astral: The user needs the ability to perform the acquisition of single MS2 scan with multiple Collision Energy values when using Astral detector Type
  - Full Profile Orbitrap: The user needs the ability to perform Orbitrap MS1 and MS2 acquisition with Full Profile in Intact Protein Mode

- Improvements
  - NSI: The user needs an updated default value of Positive Spray Voltage for NSI in ME and Tune
  - Orbitrap Astral shall automatically correct the ion foil voltage using the ICS
  - FAIMS CV switching performance shall be improved
  - The user needs the "Lock mass injection" to be a parameter in the scan properties for each scan type
  - Method Editor: The System Templates must be saved in "Astral" folder
  - The user needs the possibility to choose "Use EASY-IC" On/Off for each experiment/scan type in Timed Mode
  - The user needs to be able to see the displayed absolute AGC target values
  - Tune: Favorites/User Settings and History information must be saved in "Astral" folders
  - The user needs the ability to monitor pressure readbacks for Astral Analyzer in Tune

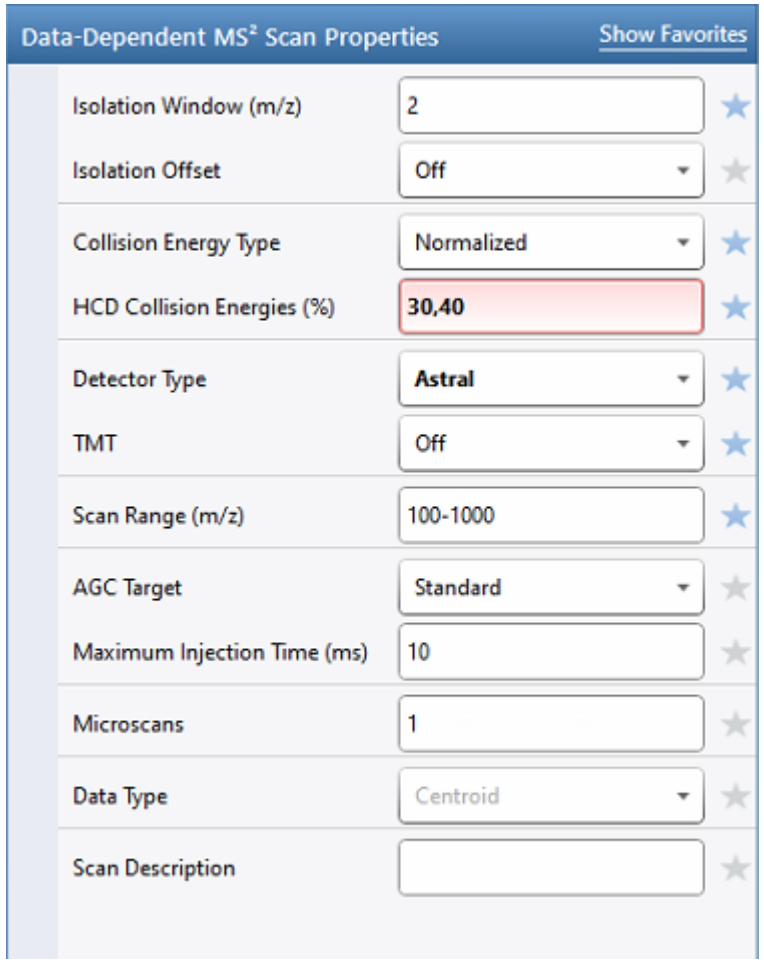
Note: It is recommended upgrading the system to benefit from these improvements

Source: Release Notes for AST 1.1 ICSW

Stepped Collision Energy for MS2 acq. with Astral Analyzer

- Method Editor and Tune User Interface

< AST 1.1



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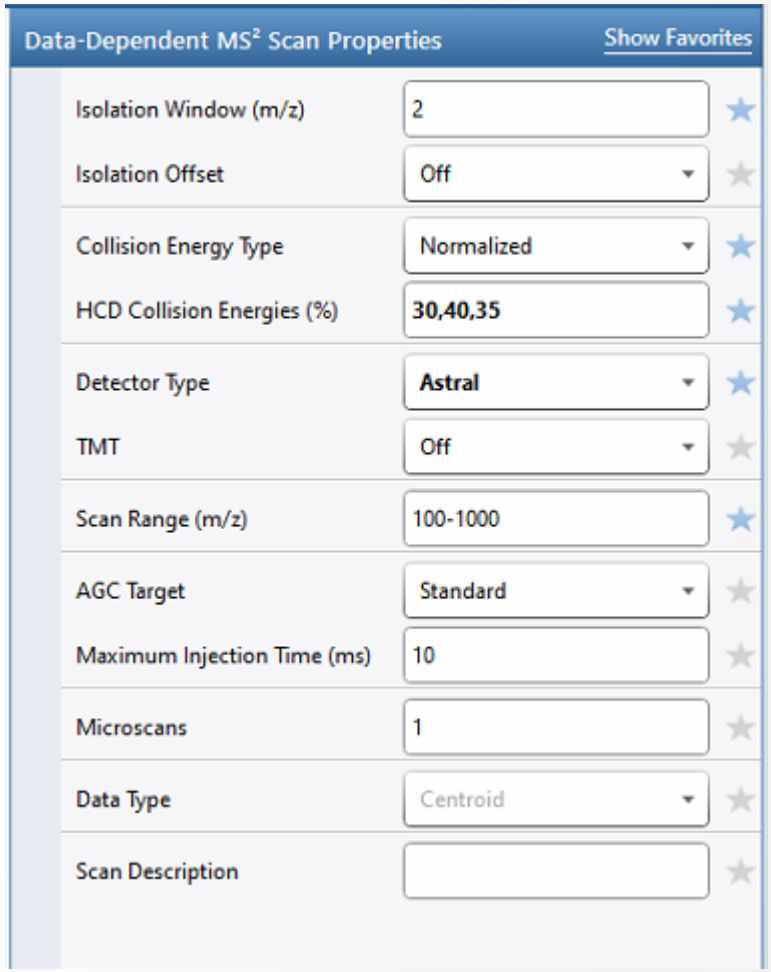
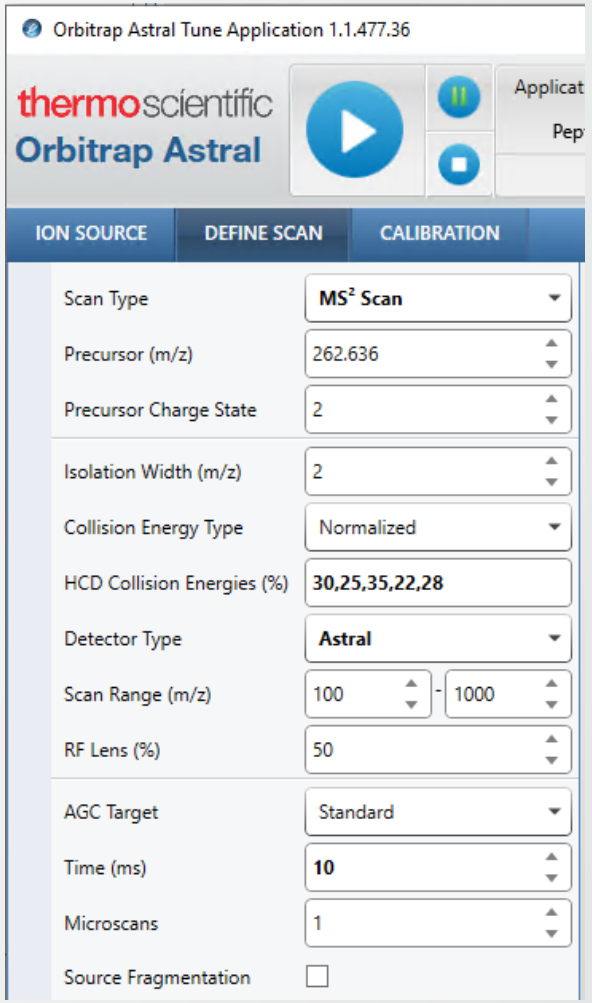
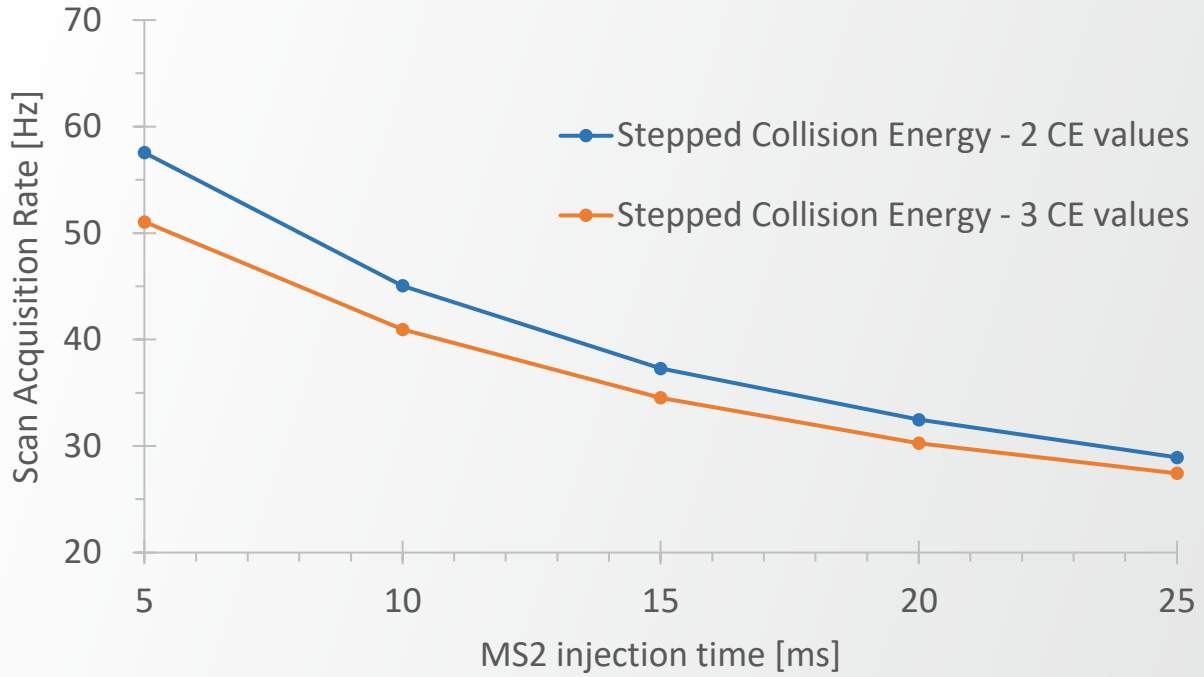




Stepped Collision Energy for MS2 acq. with Astral Analyzer

- Process
  1. Isolated precursor ions are injected into the IRM in multiple steps, each with a different collision energy
  2. Multiple ion packets are collected in the Ion Processor
  3. Combined group of ions are mass analyzed in a single Astral scan.

- DDA scan acquisition rate
  - Two stepped collision energy values
  - Three stepped collision energy values

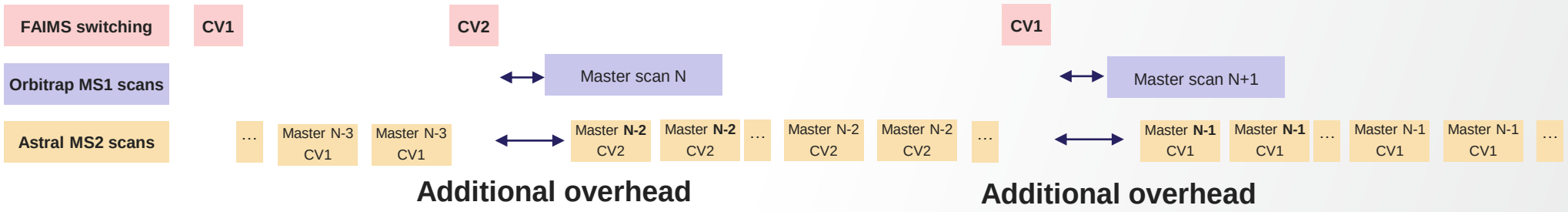


- Benefits
  - More straightforward vizualization of data
  - Accelerated data processing
    - Gains dependent on processing software
    - Processing time of DDA data with Proteome Discover is significantly reduced (Spectrum Grouper node not needed)

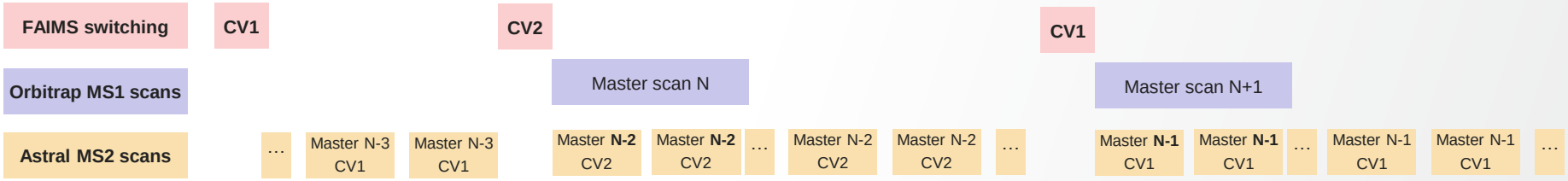
FAIMS CV Switching

Switching and Queuing Scheme (e.g. DDA with 2 CVs)

ICSW <AST 1.1



ICSW AST 1.1

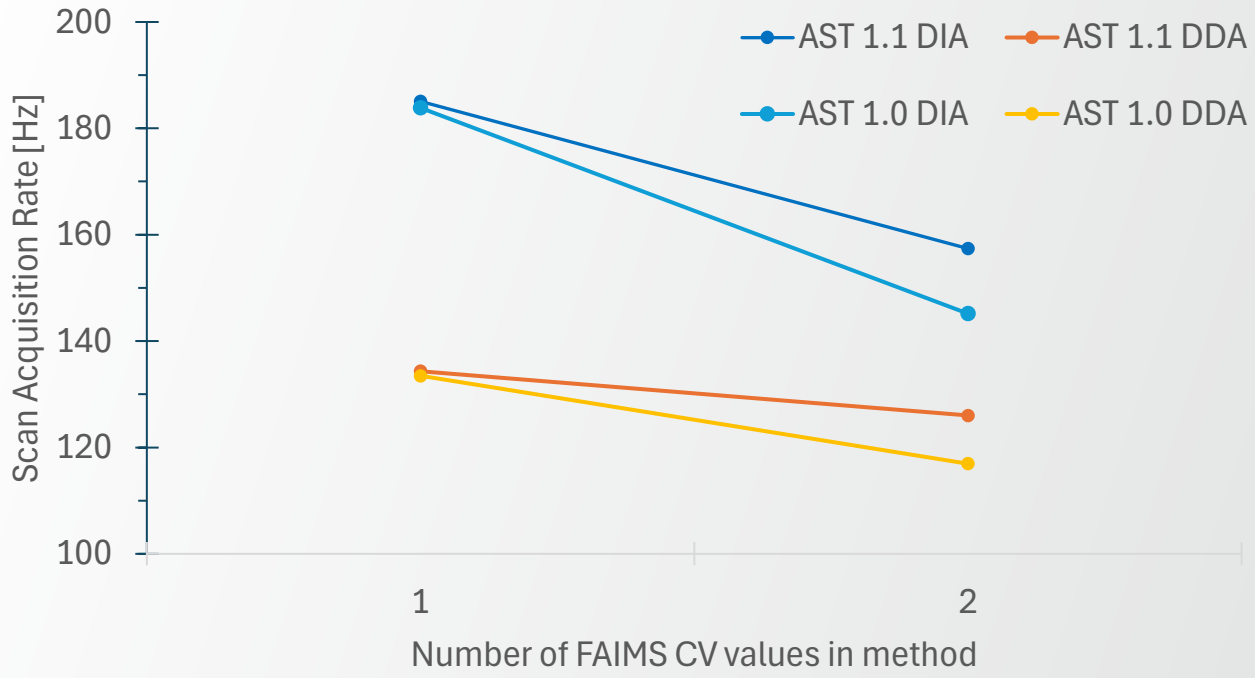


FAIMS CV Switching

Performance Gain Assessment

- Experiments
  - DDA - Full scan MS w/ Orbitrap resolution 240k; Cycle time 0.6 s; ddMS2 scans w/ 3 ms Max IT
  - DIA – Full scan MS w/ Orbitrap resolution 240k, DIA scans w/ 3ms Max IT
  - 1, 2, or 3 FAIMS CV values

- Results
  - Acquisition rate decrease due to FAIMS CV switching mitigated with AST 1.1
  - Two times lower acquisition rate decrease in DDA acquisition with AST 1.1



Updated default value of Positive Spray Voltage for NSI

In Method Editor and Tune

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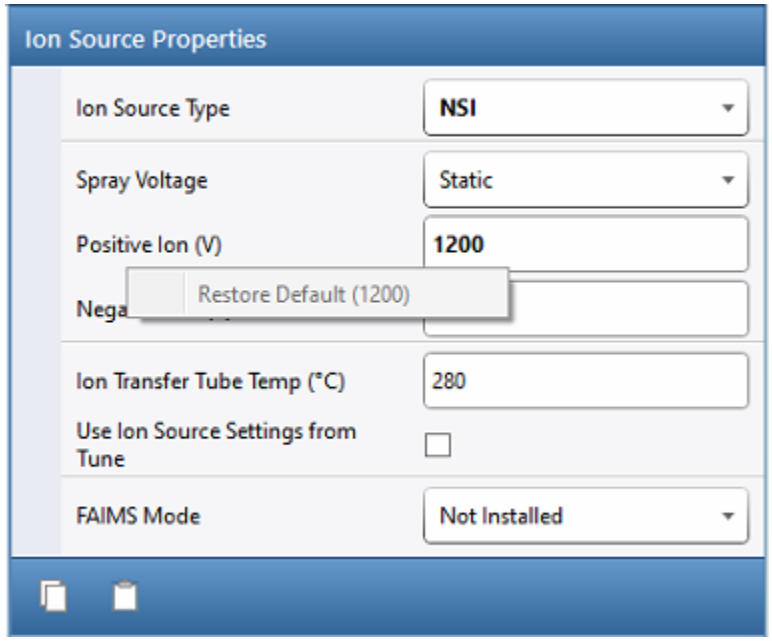

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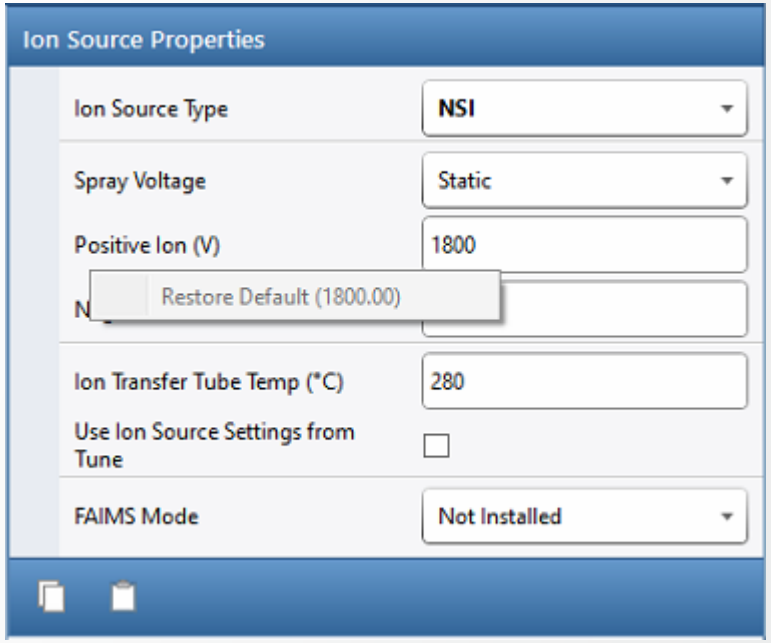
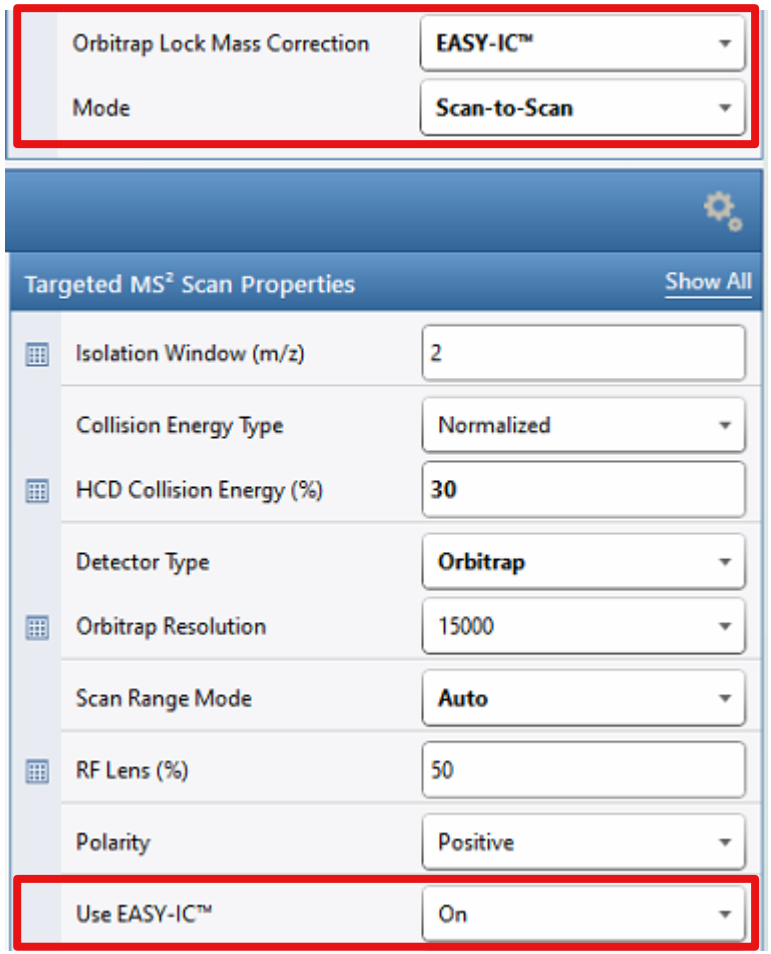


- The user is guided to more optimal settings
- In case « Use Ion source Settings from Tune » is used in the method and the instrument has rebooted, optimal default values will be employed

“Use EASY-IC“ On/Off

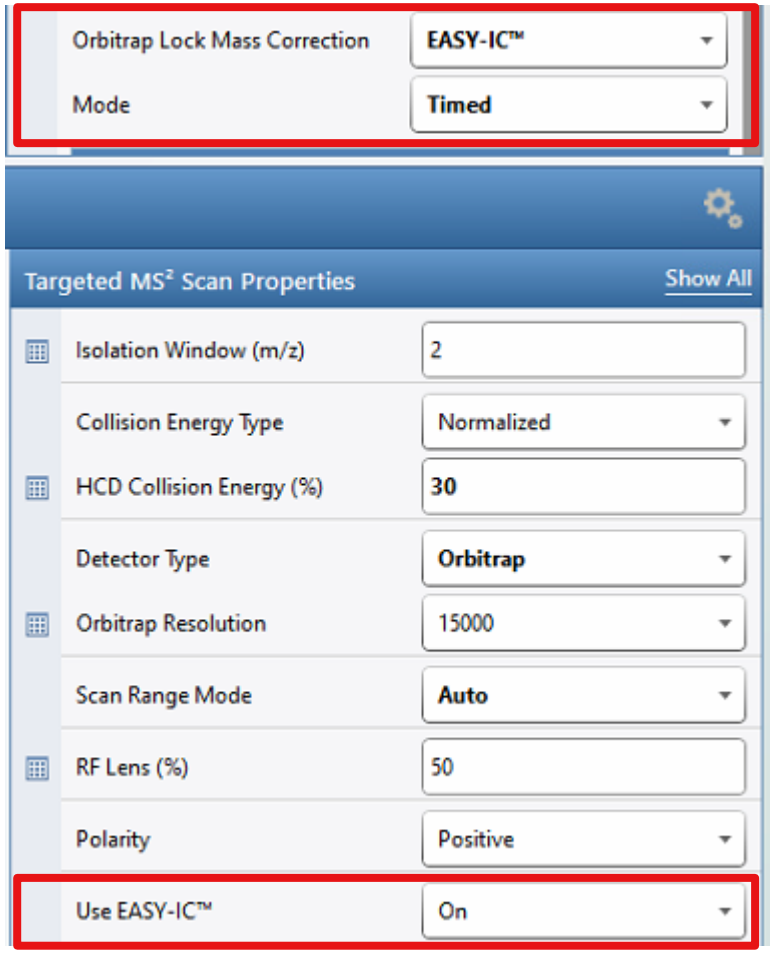
Improvement: for EACH experiment



- If “On” is selected, it provides an internal reference mass that is used for Orbitrap Lock Mass Correction during a run (Orbitrap Lock Mass Correction: EASY-IC™, Mode ≠ RunStart)
- Now available for each experiment in the timeline – here displayed for a tMS2 experiment
- This provides the possibility in mixed experiments to perform Scan-to-Scan EASY-IC only in the FullScan experiment and e.g. not in an additional tMS2 experiment
- If no lock mass is found in one scan, the system will apply the last successful locking information to this scan. Time duration of last locking and lock mass correction are provided in the scan header of the individual scan.

“Use EASY-IC“ On/Off - Timed

Improvement: also for Timed EASY-IC “On/Off“ can be chosen

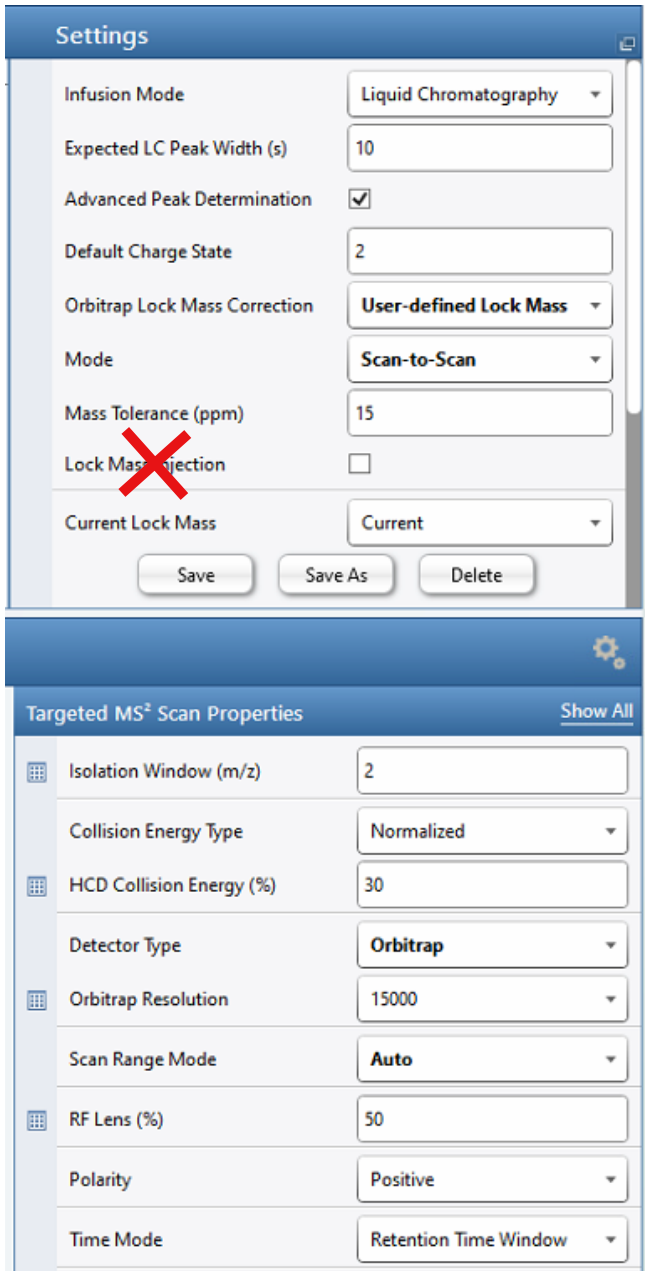


- If “On” is selected, it provides an internal reference mass that is used for mass correction during the defined time window

- If no lock mass is found in one scan, the system will apply the last successful locking information to this scan. Time duration of last locking and lock mass correction are provided in the scan header of the individual scan.

Lock Mass Injection Parameter Moved to Scan Properties

< AST 1.1



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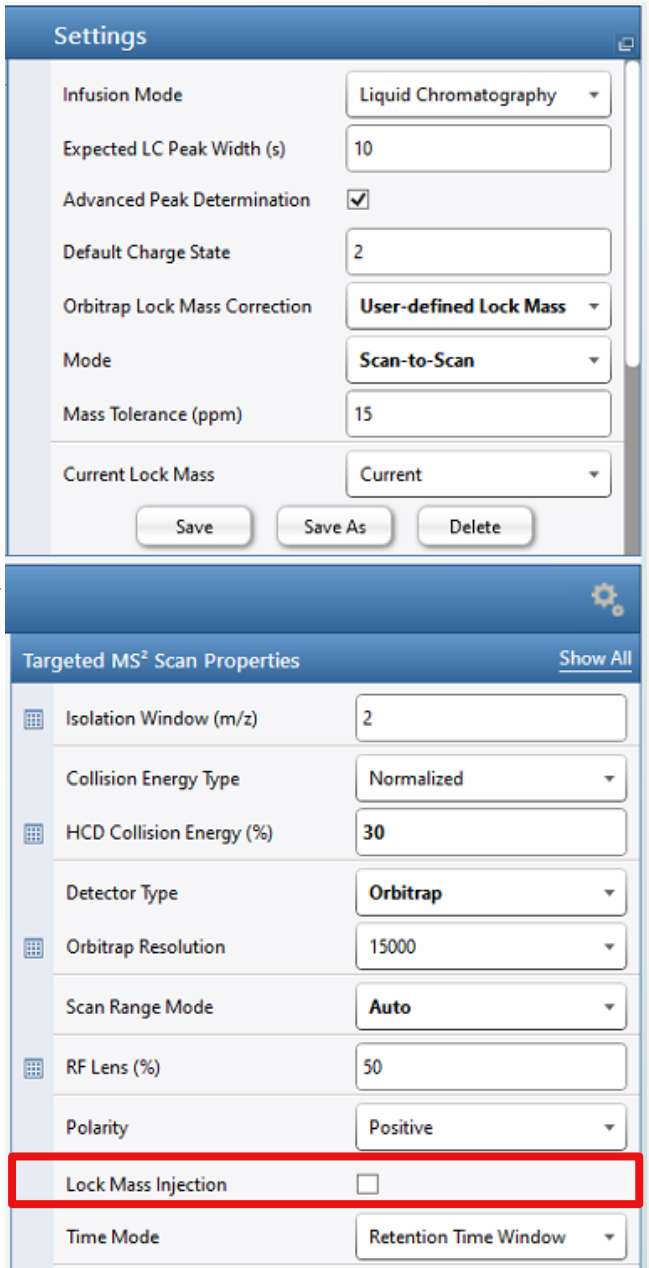
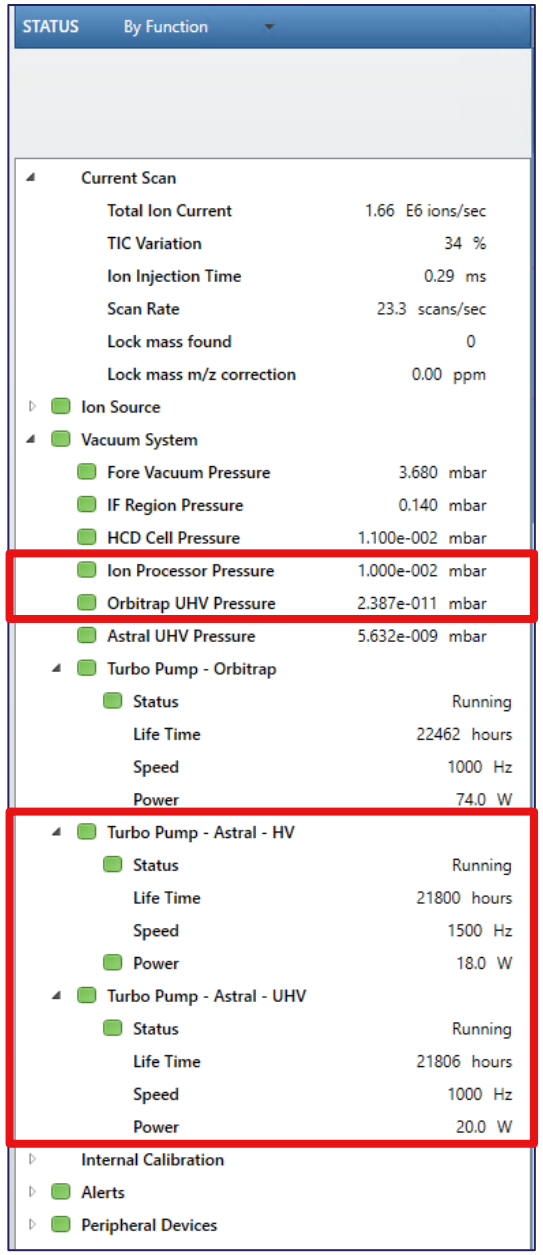


- Lock Mass Injection function available for every experiment in the timeline
- Whereas a Full Scan might not need the custom lock mass to be injected (no time penalty) the lock mass could be injected for tMS2 experiments.
- Please Note: EASY-IC™ injects the lock mass to every chosen experiment (see previous slide)

Display of the Absolute AGC Value

- If the user chooses AGC Target “Custom“, the absolute AGC Value will be displayed underneath.
- The absolute AGC target value is a conversion of the AGC percentage target set in the method into absolute values. This read-only value will be automatically updated according to the scan type and the target percentage.
- It applied to both Orbitrap and Astral detectors

Pressure Readback for Astral Analyzer in Tune



- Readbacks added for
  - Ion Processor Pressure
  - Astral UHV Pressure
- Reabacks added for
  - Turbo Pump – Astral – HV
  - Turbo Pump – Astral – UHV

ThermoFisher SCIENTIFIC

Manuals for Orbitrap Astral Series

Pre-Installation Requirements Guide

Operating Manual

Performance Maintenance Manual

Updated Software Manual and online help

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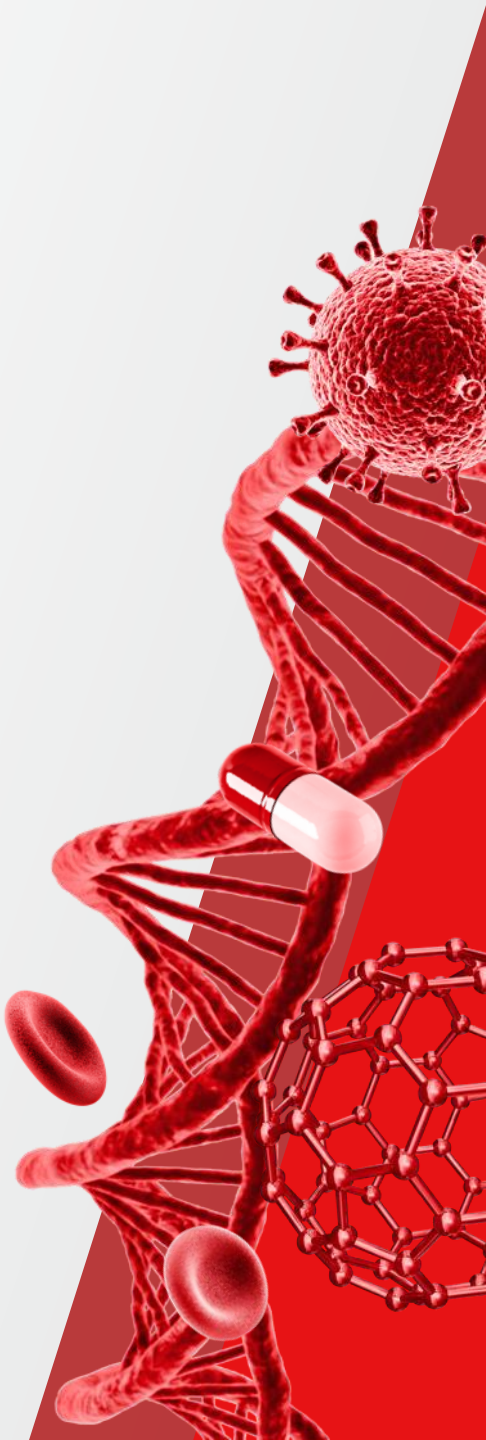
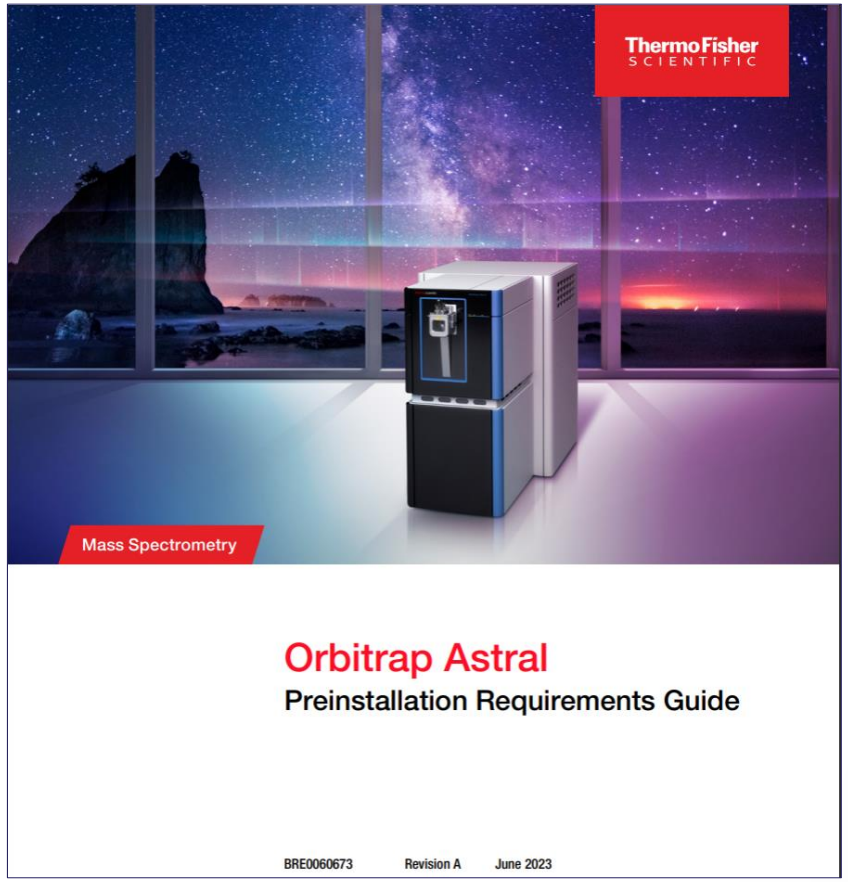


Pre-Installation Requirements Guide And Operating Manual

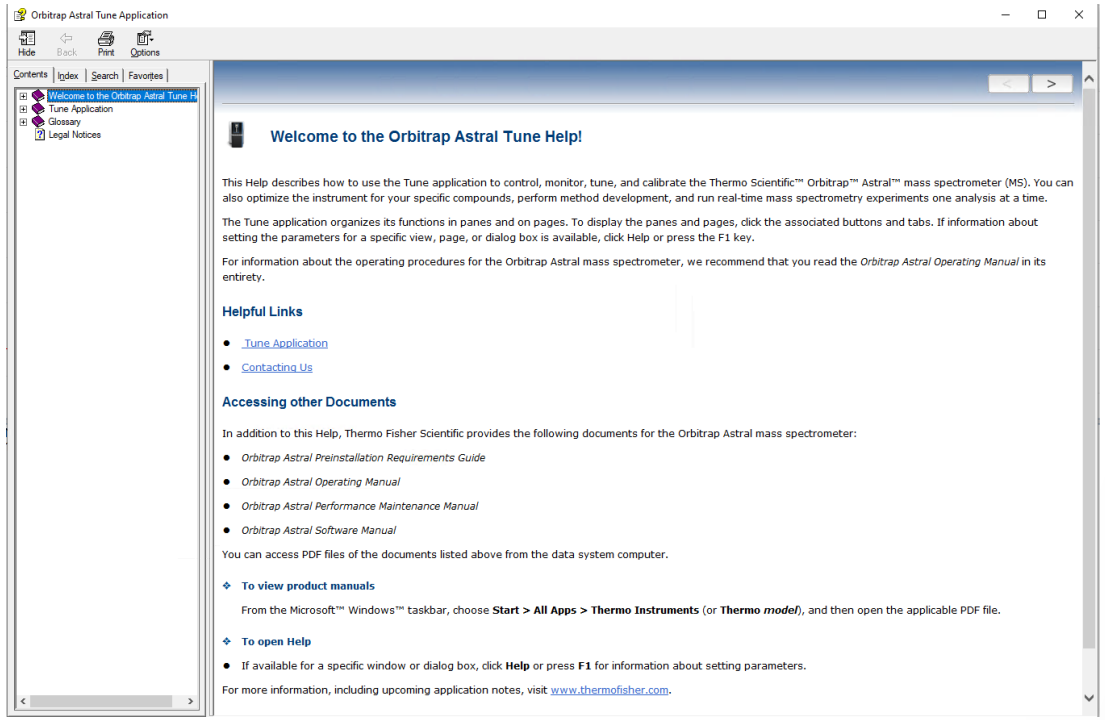
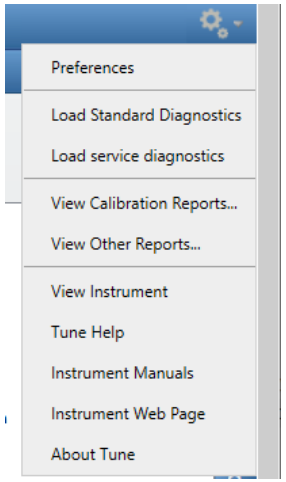
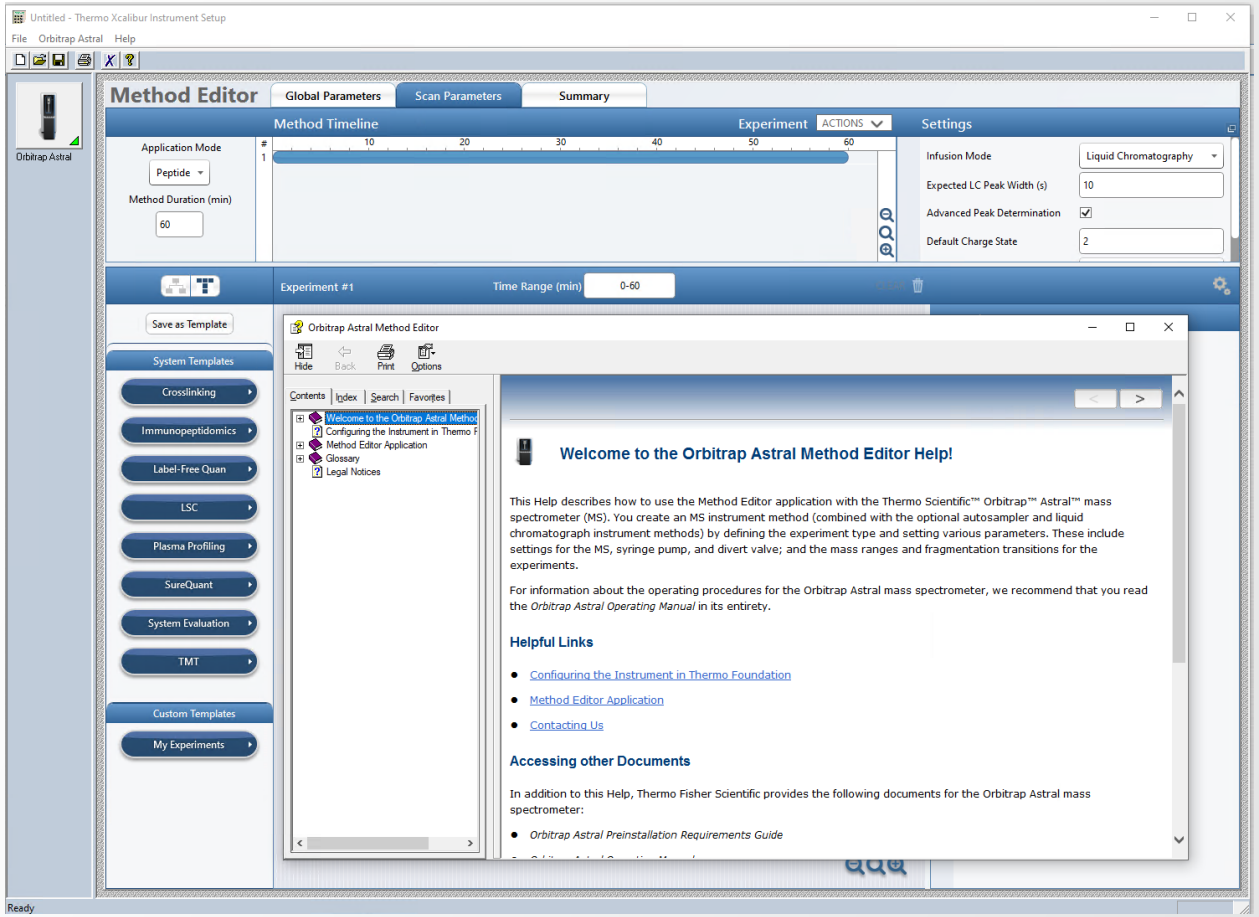
Pre-Installation Requirements Guide



Operating Manual

Pre-Installation Requirements Guide And Operating Manual

Updated with AST 1.1

Software Manual

Display Online Help – of Tune – and – of Method Editor - via Fct F1 Key