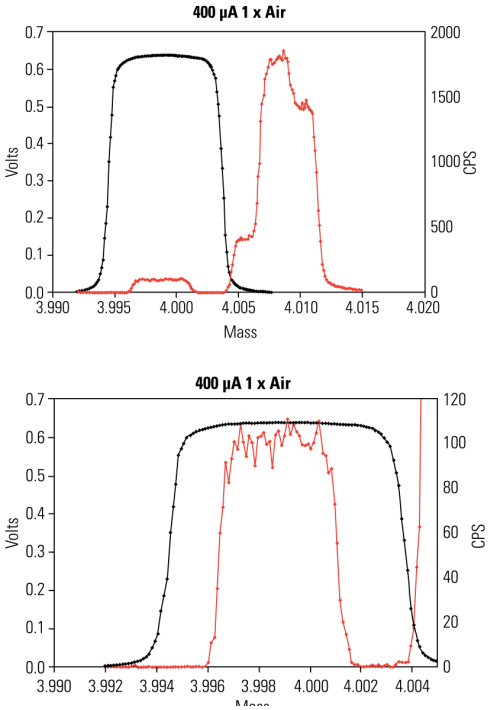
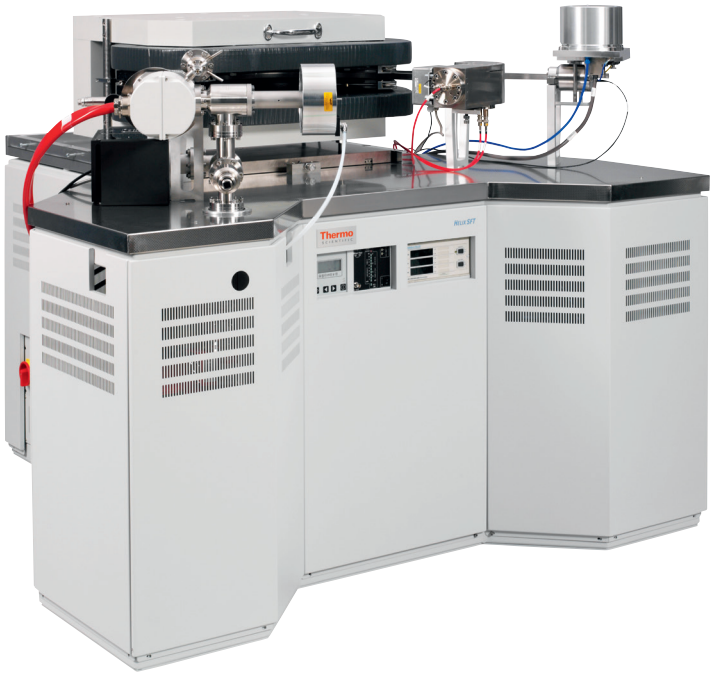
# Thermo Scientific HELIX SFT

## Split Flight Tube Noble Gas Mass Spectrometer

The Thermo Scientific™ HELIX SFT™ static vacuum mass spectrometer is a state-of-the-art magnetic sector mass spectrometer for the isotopic analysis of small samples of the noble gases. It comprises a magnetic sector analyzer with 35 cm, 120° extended geometry ion optics.




Scans taken with the HELIX SFT showing $He^3$ resolved from HD (upper) and typical peak shapes (lower). Helium data supplied by Caltech, California, USA.



The HELIX SFT system is capable of analyzing all the isotopes of the noble gases but is in particular suited to the simultaneous collection of the two isotopes of helium at masses 3 and 4. The geometry combines excellent ion optic performance with two-direction focusing and high dispersion. The analyzer incorporates novel design elements that have hitherto been unavailable in static vacuum systems.

### Electromagnet

The electromagnet is fashioned from soft iron, mounted on roller bearings and has rotational and translational adjustment in all three planes to optimize peak shape and flatness. The exit pole face for each collector can be rotated independently to fine tune the focal length for each detector.

- Excellent results for peak jumping acquisitions
- Delivers extended mass range
- Electromagnet can scan over the entire analyzer operating range
- High stability achieved with a temperature controlled field probe
- Fully controlled by Thermo Scientific Qtegra™ Intelligent Scientific Data Solution™ (ISDS) software allowing rapid peak jumping between masses whilst maintaining maximum sensitivity

Thermo SCIENTIFIC

## Ion Source

Flange mounted "Nier" type ion source designed for easy de-mount, filament change and cleaning. The source is self-realigning on assembly.

- Source filament self-aligning
- Maximized ion production for high sensitivity
- Simple design, easy to clean and maintain

## Vacuum System

The vacuum system of the HELIX SFT is designed for true UHV performance. The system is manufactured using stainless steel with minimum of welds present in either the source or collector housings. The flight tube however is manufactured from a new composite material that is a mix of titanium and stainless steel. This new material is almost magnetically transparent and therefore has no impact on the ion optics.

The UHV pumping is achieved utilizing a 40 L/s ion pump designed specifically for pumping the noble gases and a 80 L/s turbo molecular pump backed by a two-stage diaphragm pump. The ion pump isolation valve is a CF40 all metal valve, which is pneumatically controlled. The inlet valve to the mass spectrometer is manually controlled and the connection to the sample preparation system is via a mini conflat flange. The mass spectrometer also includes one SAES NP10 non-evaporable getter pump located in its own water cooled jacket, the getter can be isolated from the system via a CF19 all metal valve.

- 40 L/s Ion pump with controller
- Vacuum typically $10^{-10}$ mbar
- 80 L/s turbo-molecular pump mounted beneath the bench
- Dry-pumped backing line
- Ion gauge for vacuum monitoring (optional)
- NP10 SAES getter with controller
- Optional pneumatic/manual valves have helium leak rates for valve and body $< 1 \times 10^{-10}$ cc STP/sec
- Heaters and controls to bake mass spectrometer to 350° C are included

## Electronic Control Systems

Source electronics - All tuning parameters are computer controlled, interfacing to a suite of electronics that operate the HV, Focus, Electron Volts, Ion Repeller, Trap and Steering.

- Intelligent Interface - Controls communication between the PC and the source, the magnet and all valve controls
- Output lines for implementation of full valve control
- High stability, high gain amplifier
- Additional data collection channels for prep system inputs

## Collector Array

The detectors fitted to the HELIX SFT system are, on the low mass spur, a Balzers SEV217 ion counting multiplier detector and on the high mass spur a voltage suppressed deep Faraday bucket. The low mass spur also incorporates a 50 mm electrostatic analyzer for extreme abundance analysis.

- Resolution set for the Faraday detector at > 400
- Resolution set for the multiplier detector at > 700
- ESA for the low mass spur
- Electron multiplier - ion counting efficiency ~ 75% or better with inherent noise less than 10 CPM

## Data System and Software

Qtegra is the dedicated data acquisition and control software utilized to create the HELIX SFT system software. Operating under Windows® 7 and in conjunction with the embedded computer system this provides comprehensive system control, acquisition and reporting.

- Full computer control and storage of all source parameters including trap current and ion repeller voltage
- Full color display, including a numeric and graphical display of ion beams and pressure gauges and a graphical valve status display
- Full access to valve control when automatic sequences not in operation
- Ion beams and isotope ratio display during data acquisition to allow operator assessment of data quality during analysis
- All raw data stored
- Operating parameters for the mass spectrometer and preparation systems are stored in parameter files for recall and control of automated sample runs
- Manual control routines for scan control, source tuning, and valve operation
- True multi-tasking enabling concurrent operation of multiple programmes including access to Microsoft® Excel for off line data handling whilst analysis is still taking place

## Standard Specifications

The HELIX SFT system is an extended geometry 35 cm radius 120° magnetic sector analyzer with an internal volume of ~ 1400 cc.

| | |
|---|---|
| Mass range | 1 to 140 Daltons |
| Background | $\geq 5 \times 10^{-14}$ cc STP at $^{36}Ar$ |
| Sensitivity | Helium: $> 2 \times 10^{-4}$ Amp/Torr @ < 1.2 mA source, 4.5 kV<br>Argon: $\geq 1 \times 10^{-3}$ Amp/Torr @ < 1 mA source, 4.5 kV |
| Resolution | For Faraday detector resolution > 400 @ 10% peak valley<br>For multiplier detector resolution > 700 @ 10% peak valley |
| Peak side stability | $m/z$ $^{40}$Ar: ± 50 ppm stability/30 min |
| Rate of rise | @$^{40}$Ar $< 1 \times 10^{-12}$ cc STP/min |
| Abundance sensitivity | < 1 ppb in 30 min for adjacent masses (3 contribution from 4) at a pressure of $1 \times 10^{-7}$ mbar. Note the individual partial pressures of other gases present, including neon and argon, must be less than 5% of that of the helium. |

**www.thermofisher.com/HelixSFT**



**Africa-Other** +27 11 570 1840
**Australia** +61 3 9757 4300
**Austria** +43 1 333 50 34 0
**Belgium** +32 53 73 42 41
**Canada** +1 800 530 8447
**China** +86 10 8419 3588
**Denmark** +45 70 23 62 60
**Europe-Other** +43 1 333 50 34 0
**Finland/Norway/Sweden** +46 8 556 468 00
**France** +33 1 60 92 48 00
**Germany** +49 6103 408 1014
**India** +91 22 6742 9434
**Italy** +39 02 950 591
**Japan** +81 45 453 9100
**Latin America** +1 561 688 8700
**Middle East** +43 1 333 50 34 0
**Netherlands** +31 76 579 55 55
**New Zealand** +64 9 980 6700
**Russia/CIS** +43 1 333 50 34 0
**South Africa** +27 11 570 1840
**Spain** +34 914 845 965
**Switzerland** +41 61 716 77 00
**UK** +44 1442 233555
**USA** +1 800 532 4752

Thermo SCIENTIFIC
A Thermo Fisher Scientific Brand

PS30165_E 11/16S