

Quadrupoles and Components for Cluster Analysis, Nanoscale Particles

- ▶ **Hidden Analytical manufactures high-mass range quadrupole mass spectrometers and sampling inlets for advanced materials science research, including the analysis of nanoscale particles and clusters.**

Detailed product information/introduction

Clusters and nanoparticles



Quadrupoles and Components for Cluster Analysis, Nanoscale Particles

Clusters and nanoparticles can be generated from a variety of sources, such as electrospray ionisation, laser evaporation and magnetron sputtering and at pressures from sub-millibar to atmospheric. The quadrupole mass filter plays a key role in the transport and mass selection of these ions, as it possesses sufficient mass resolution and a 100% duty cycle. The production of size-selected clusters is used for two main applications, cluster deposition and spectroscopy.

For special applications, such as removal of neutrals and photons in spectroscopy prior to characterisation in an ion trap with x-rays, high transmission ion redirection components are required. For these cases, Hiden Analytical offers customized Beam Deflectors & Transfer Quadrupoles with up to 20 mm rod diameter (DLS-20).

Cluster Analysis with Hiden Analytical

The upper mass limit of a Quadrupole filter is severely constrained by the demand for RF Power that accompanies

increasing m/z . Down-sizing the Rod Diameter appears to offer a way around this problem, but comes with a significant reduction in Quad performance, limiting its effectiveness for clusters at high m/z . Hiden's High Power RF Generator provides the solution - it is capable of delivering 5,000 m/z mass range even on a 9 mm Triple Filter Quad and with a frequency of 0.8 MHz, a combination that generates outstanding performance. This brings transmission of 45% at 5,000 m/z , yielding the lowest detection limit even for the largest of clusters. Hiden's unique combination of Triple Filter, 9 mm Rods and High Frequency RF Generator, creates exceptional resolving power, even at the highest m/z .

Flexibility - optimises the balance between Resolving Power and Mass Range

With our new 20 mm Tri-Filter quadrupole and 400 kHz RF head we achieve a mass range of up to 4,000 amu and with our 9 mm Tri-Filter a mass range of up to 20,000 amu.

Applications:

- ▶ Molecular Clusters
- ▶ Cluster Deposition
- ▶ Ion Clusters
- ▶ Nano Structures
- ▶ Spectroscopy
- ▶ Ion Redirection

Key Features

- ▶ Mass Range to 20,000 amu
- ▶ Frequencies from 0.4 to 5 MHz
- ▶ Switchable Zones of Operation
- ▶ Pole Bias ('Energy') Capability
- ▶ Ultra-Stable Voltage
- ▶ 100 Watts of True RF Power*

*RF power supply is detailed in:

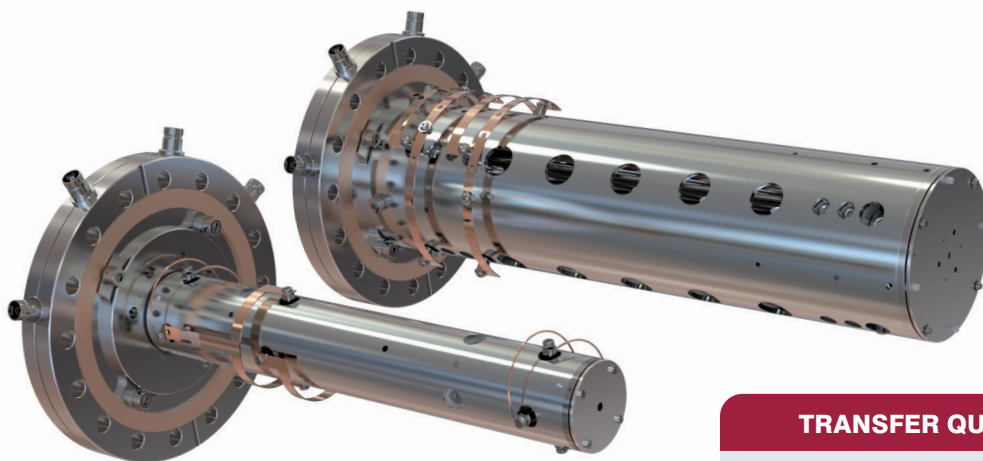
TDS 210/1 Advanced Multi Zone Quadrupole Power Supply, AMZ-QPS.

Flexibility - optimises the balance between Resolving Power and Mass Range.

Products

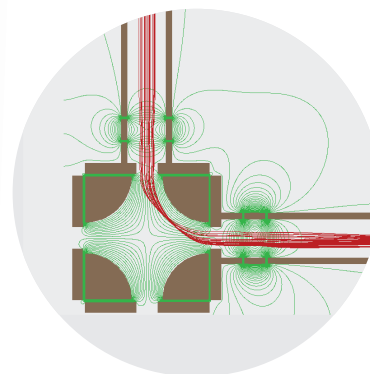
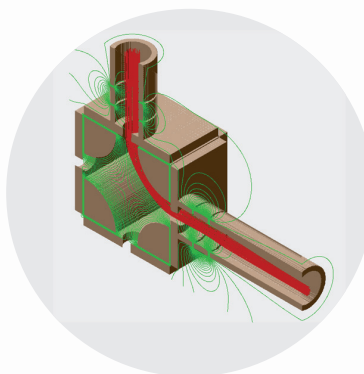
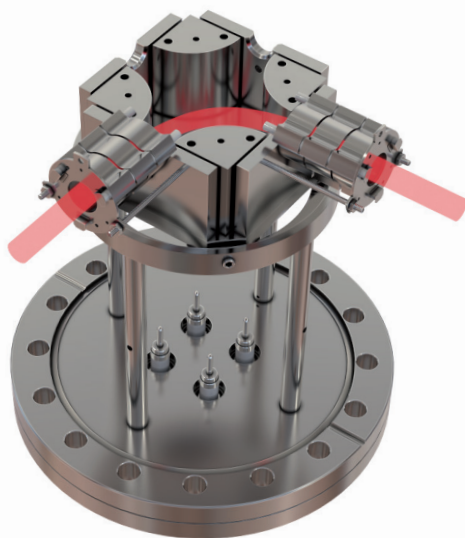
Cluster Analysis Components

Hidden Analytical develops and supplies the instruments for a new era of cluster analysis and implementation of nanoscale particles.



TRANSFER QUADRUPOLES

► 9 mm and 20 mm pole diameter quadrupoles mounted on DN-150-CF double sided Conflat flange.



BEAM DEFLECTOR

► With adjustable tilt, part number 582000.

Systems for UHV analysis of neutrals, radicals and ions including electron impact ioniser, SEM detector, and ion optics

The EPIC 1000 series boasts a mass range of up to 20,000 atomic mass units (AMU) to assist with gas-phase cluster studies, while a range of distinct sampling inlets is available upon request.

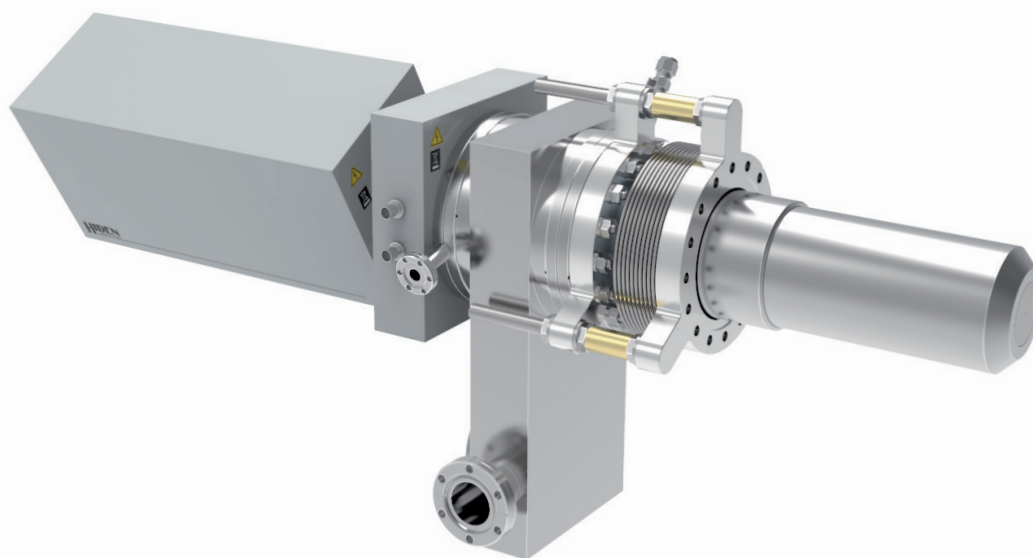
The Hiden EPIC and IDP have all the features of high performance RGAs – but with the addition of pole bias mid-axis potential and negative ion capability making them outstanding research grade mass spectrometers.

The Hiden IDP (Ion Desorption Probe) is for the direct analysis of low energy ions from UHV surface science techniques.

Applications include electron stimulated desorption, photon stimulated desorption and thermal desorption studies.

The EPIC system is factory-upgradeable for the inclusion of an energy-filter, either the Bessel box or 45 degree sector field type, ensuring compatibility with the Hiden plasma/SIMS series including the EQP, EQS, PSM and SIM probes.

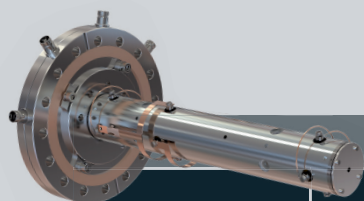
Browse our product literature and related products list to learn about the specific cluster analysis applications of our instrumentation. Or, simply contact a member of the Hiden Analytical team if you have any questions.



HIDEN EPIC 5000 SYSTEM

► With differential pumping and port aligner

System Configuration & Options

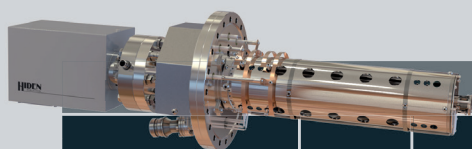


TRANSFER QUADRUPOLE MASS SPECTROMETERS PERFORMANCE FOR HIGHER MASS RANGES

		Quad	Features with Triple Filter				Relative Transmission			Resolving Power (FWHM)		Sensitivity
Product	Part	Triple Filter 3F	Rod Dia mm	Rod Length mm	Min mass	Max mass	Frequency MHz	Relative Transmission	Measured at mass	M/ΔM	Mass/amu	mA/torr
Q1000-T	581000	3F9-1000	9	256	1	1,000	1.60	43%	40	1,200	40	0.3
Q DLS-1000-T	581040	DLS-20	20	312	1	1,000	0.82	65%	40	1,800	40	1
Q2500-T	581025	3F9-2500	9	256	1	2,500	1.00	39%	40	1,500	40	0.2
Q DLS-4000-T	581045	DLS-20	20	312	10	4,000	0.40	65%*	4,000	1,500*	4,000	0.5*
Q5000-T	581050	3F9-5000	9	256	10	5,000	0.82	45%	5,000	2,500	5,000	0.1*
Q20000-T	581200	3F9-20000	9	256	100	20,000	0.40	10%*	20,000	1,000*	20,000	0.05*

Mounting flange for the transfer quadrupoles is a double sided DN-150-CF with radial feedthroughs.

*Figures based on Ion Modelling projection.



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Product	Part	Triple Filter 3F	Rod Dia mm	Rod Length mm	Min mass	Max mass	Frequency MHz	Relative Transmission	Measured at mass	M/ΔM	Mass/amu	mA/torr
EPIC 1000	571009	3F9-1000	9	256	1	1,000	1.60	43%	40	1,200	40	0.3
DLS-1000	572605	DLS-20	20	312	1	1,000	0.82	65%	40	1,800	40	1
EPIC 2500	482509	3F9-2500	9	256	1	2,500	1.00	39%	40	1,500	40	0.2
DLS-4000	572606	DLS-20	20	312	10	4,000	0.40	65%*	4,000	1,500*	4,000	0.5*
EPIC 5000	485059	3F9-5000	9	256	10	5,000	0.82	45%	5,000	2,500	5,000	0.1*
EPIC 20000	485060	3F9-20000	9	256	100	20,000	0.40	10%*	20,000	1,000*	20,000	0.05*

* Figures based on Ion Modelling projection.

HiddenAPPLICATIONS

Hidden's quadrupole mass spectrometer systems address a broad application range in:

GAS ANALYSIS

- ▶ dynamic measurement of reaction gas streams
- ▶ catalysis and thermal analysis
- ▶ molecular beam studies
- ▶ dissolved species probes
- ▶ fermentation, environmental and ecological studies



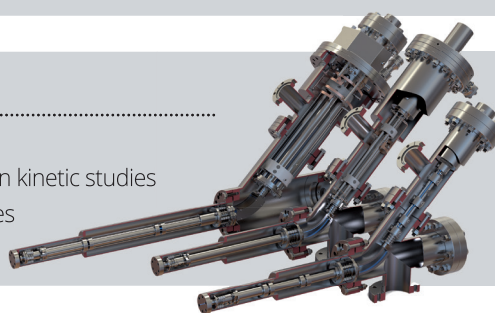
SURFACE ANALYSIS

- ▶ UHV TPD
- ▶ ToF qSIMS and SIMS analysers
- ▶ end point detection in ion beam etch
- ▶ elemental imaging – 3D mapping



PLASMA DIAGNOSTICS

- ▶ plasma source characterisation
- ▶ etch and deposition process reaction kinetic studies
- ▶ analysis of neutral and radical species



VACUUM ANALYSIS

- ▶ partial pressure measurement and control of process gases
- ▶ reactive sputter process control
- ▶ vacuum diagnostics
- ▶ vacuum coating process monitoring



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Sales Offices:

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