



EUV Lithography

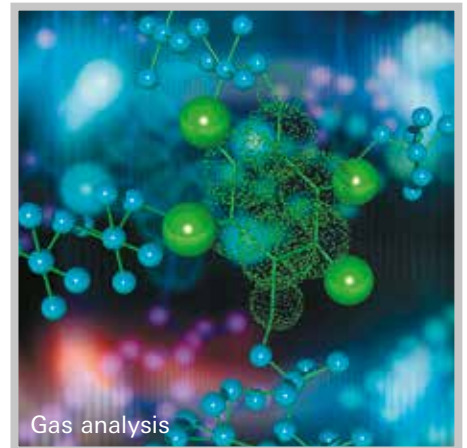


Research & Development



## HiQuad<sup>®</sup> Neo

New high-end mass spectrometer!  
Flexible, long-term stable and with high resolution



Gas analysis

# HiQuad® Neo

New high-end mass spectrometer!  
Flexible, long-term stable and high resolution



Modular design

Your added value



Simple operation



Excellent long-term stability

## Modular solution for mass spectrometry

With the new HiQuad® Neo mass spectrometer, Pfeiffer Vacuum combines high performance, flexibility and simple operation. The HiQuad® Neo can be optimally integrated into your application as a stand-alone device. Depending on the application, we offer the following options:

- Mass ranges
- Rod system materials
- Cable lengths
- Ion sources
- Filament materials
- Interfaces

The mass spectrometer achieves an extremely high measuring speed of up to 125  $\mu\text{s}/\text{u}$ . It is characterized by maximum sensitivity and a large dynamic range. With the help of the PV MassSpec, the mass spectrometer is particularly easy to operate. These features make the HiQuad® Neo ideal for research and development applications as well as for integration into analysis systems. We will put together the right solution for your application!



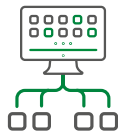
**Highest sensitivity and large dynamic range**



**High measurement speed**



**PV MassSpec software**



**Uncomplicated system integration**



**Sustainable solution**

### **Technology optimization for a greener future**

Devices from previous generations can be upgraded to the latest HiQuad Neo technology. Some components, such as the analyzer, can continue to be used, which reduces costs and creates less waste. We will be happy to advise you and provide you with a customized quote for an upgrade kit.

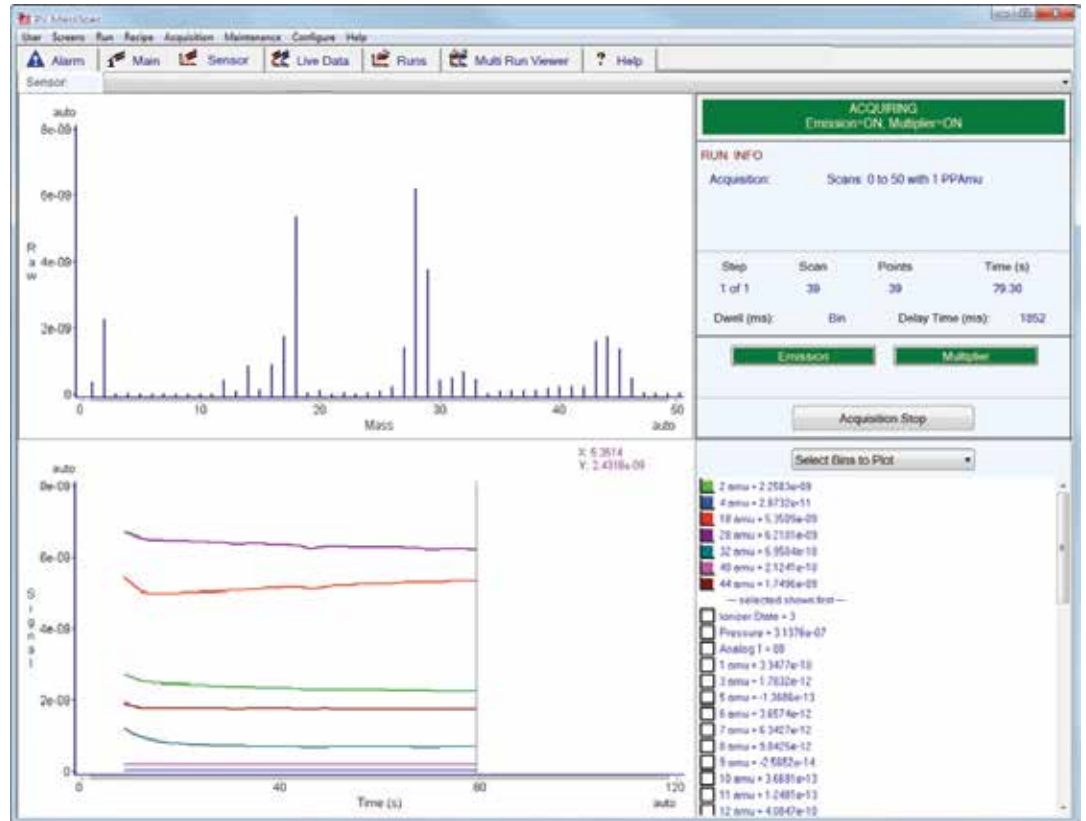
### **PV MassSpec – New software for HiQuad® Neo**

Another milestone is the PV MassSpec software specially developed for the HiQuad® Neo. It offers a clear and user-friendly platform for recording and displaying measurement data and parameter sets. The intuitive operability makes it easier for the user to work with the system. Thanks to the integrated sequencer, complete measurement sequences can be programmed easily and automatically. One click is all it takes to carry out leak detection and vacuum diagnostics. The software also enables automated calibration and tuning. It is easy to define measurement recipes and it is possible to link mass spectrometric data with external signals. Alternatively, it is also possible to communicate directly with the HiQuad Neo via the Ethernet interface (via OPC-UA).

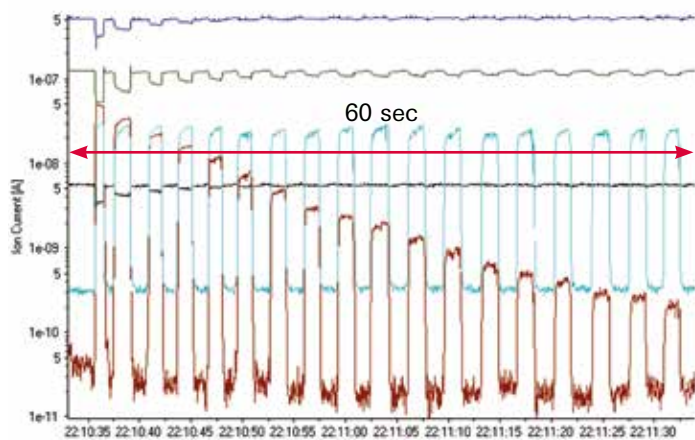
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## PV MassSpec measurement routine

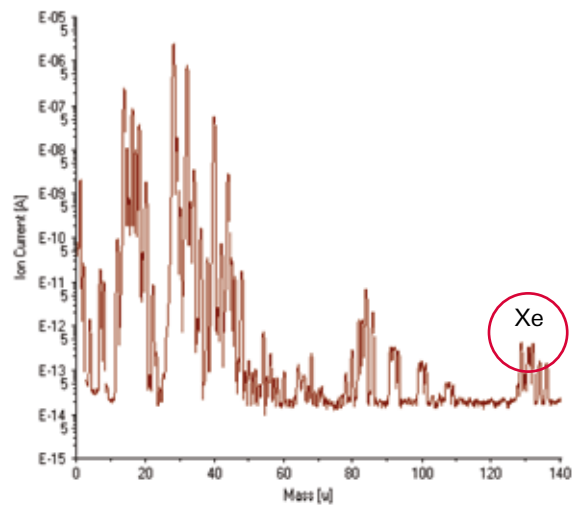


## High measurement speed – up to 125 $\mu$ s/u



With the HiQuad<sup>®</sup> Neo mass spectrometer, very fast measurements can be carried out. The example shows a gas spectrum during a breath gas analysis. With a very fast cycle time, N<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub> are detected.

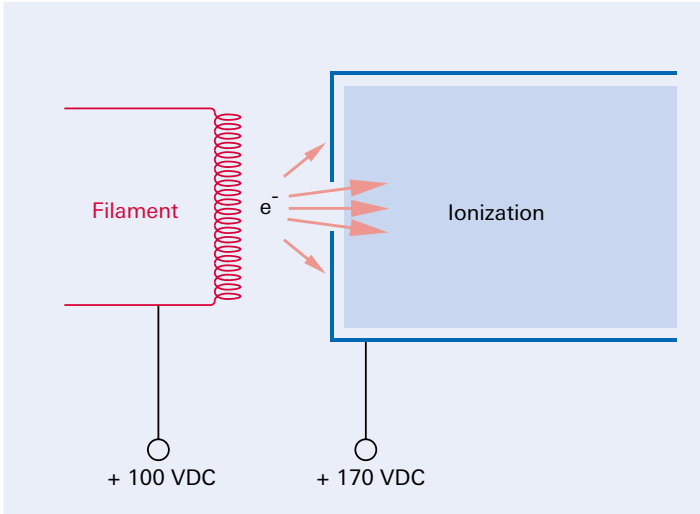
## Large dynamic range



The figure shows a spectrum of the air. In addition to the main components of N<sub>2</sub>, O<sub>2</sub>, Ar and CO<sub>2</sub> even the smallest concentrations of Xe are detected. The ion current on mass 136 is equivalent to a concentration of 7.8 ppb Xe in air. The ion current is several decades above the background, so that a large dynamic range of 10 decades is achieved.

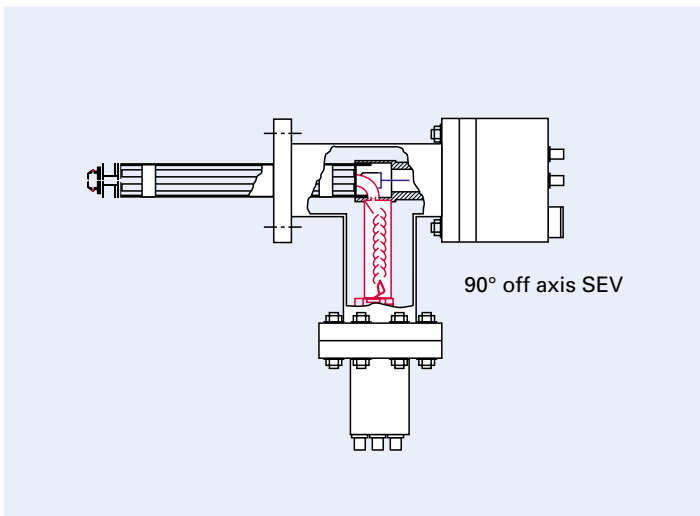
**Technologies at a glance**

**Electrically elevated ionization chamber**



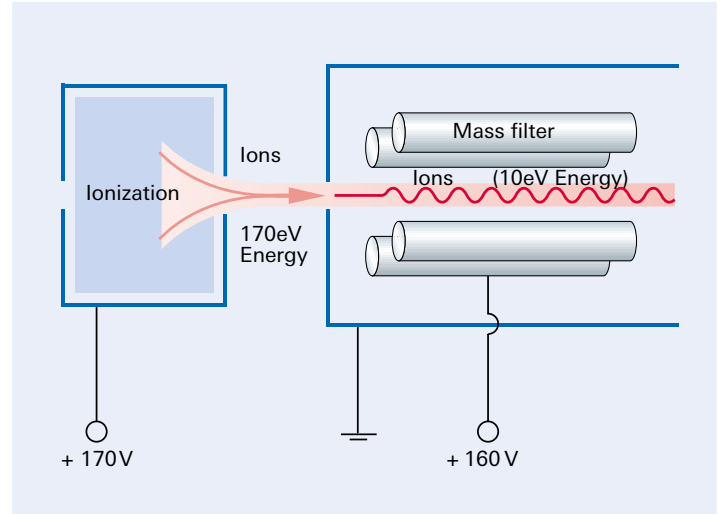
An extremely low background signal is achieved by electrically elevating the ionization chamber. The electron-emitting filament is at a positive potential of 100 to 150 VDC compared to earth. This concept prevents gas particles on the walls from desorbing and thus generating an undesirable background signal (ESD = electron stimulated desorption).

**90° off axis secondary electron multiplier (SEV)**



The task of the secondary electron multiplier is to increase the sensitivity of the mass spectrometer. In the HiQuad® Neo, the multiplier is mounted in a vacuum at right angles to the rod system. This prevents soft X-rays and photons from reaching the detector and creating a background.

**Field axis technology**



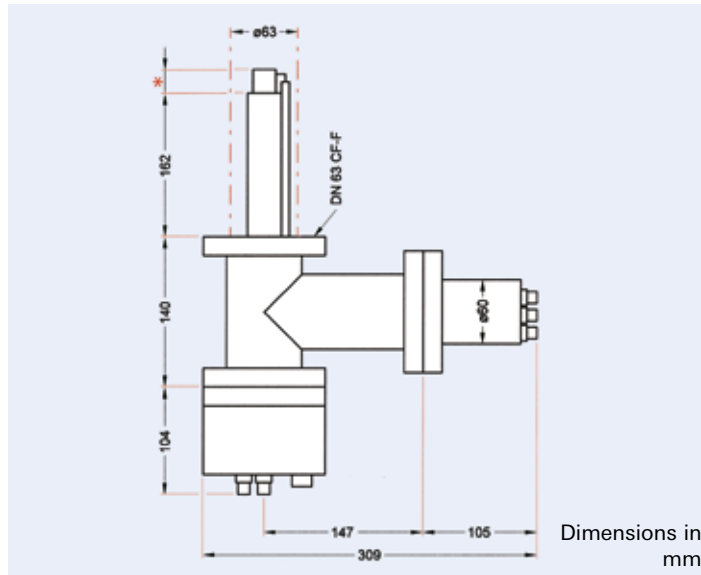
One of the most important factors for the performance of a mass spectrometer is the transmission of ions from the ion source into the mass filter. With the help of field axis technology, the ions bridge the boundary fields of the separation system without significant losses. This achieves a high sensitivity (A/hPa).

# HiQuad® Neo

Dimensional drawings, technical data,  
order number matrix

## Dimensional drawings

QMA 400, QMA 430 with 90° off axis SEV



\*

- Axial ion source = 26 mm
- Grid ion source = 27 mm
- Cross-beam ion source = 35.5 mm (23.5 mm to the center of the sensitive volume)
- Gas-tight cross-beam ion source = 48 mm (gas connection in axial direction)
- Cross-beam ion source with axial ion optics = 43.5 mm

## Technical data

Mass range in u			1 – 300	1 – 512 <sup>3)</sup>
Detection limit		hPa	$< 2 \cdot 10^{-15}$	$< 1 \cdot 10^{-15}$
Sensitivity for Ar, min. <sup>1)</sup>		A/hPa	$2 \cdot 10^{-4}$	$5 \cdot 10^{-4}$
Operating pressure, max.	Faraday, max.	hPa	$1 \cdot 10^{-4}$	$1 \cdot 10^{-4}$
	SEV, max.	hPa	$1 \cdot 10^{-5}$	$1 \cdot 10^{-5}$
Partial pressure ratio with	SEV	ppb	$< 1$	$< 0,5$
Measurement speed, min.			125 $\mu$ s/u – 60 s/u	125 $\mu$ s/u – 60 s/u
Analyzer			QMA 430	QMA 400
Rod system, material/diameter		mm	Stainless steel/8	Mo/8
High frequency generator (HF)			QMH 800-3	QMH 800-5
Electrometer preamplifier			EP 822	EP 822
Operating temperature/analyzer		°C	150	150
Bake-out temperature/analyzer <sup>2)</sup>		°C	400	400
Connecting flange			DN 63 CF-F	DN 63 CF-F

<sup>1)</sup> Faraday in the deflection unit, unit resolution, cross-beam ion source with magnet, emission 1 mA

<sup>2)</sup> With magnet, max. 300 °C

<sup>3)</sup> Stability  $< 0.1\%$  over eight hours, contribution to the neighboring mass  $< 0.1$  ppm for mass 40 and 41 u

HiQuad® Neo

**$< 1 \cdot 10^{-15}$  hPa**

Detection limit

**125  $\mu$ s/u**

Measurement speed, min.



## Interface

	IO 820
Analog inputs	5; 0 to 10 V
Analog outputs	4; 0 to 10 V
Resolution	14 bit
Digital inputs	4
Digital outputs	16
Connection for ActiveLine total pressure transmitter	1
Connection for DigiLine total pressure transmitter	1

Order number system

# PT Q 2 a bc d e f g

**a – Analyzer/mass range**

- 4 – QMA 430 / 1 – 300 u / QMH 800-3
- 5 – QMA 400 / 1 – 512 u / QMH 800-5



QMH 800

**b – Cable set**

- 1 – 3 m
- 2 – 1.5 m
- 3 – 10 m

**c – Ion source**

1 – Axial ion source	High sensitivity and good linearity
2 – Cross-beam ion source	For a direct gas beam inlet without interaction with the walls
3 – Cross-beam ion source with magnet	As 2, but increased sensitivity
4 – Gas-tight cross-beam ion source	Low gas consumption, high signal-to-noise ratio
5 – Gas-tight cross-beam ion source with magnet	As 4, but increased sensitivity
6 – Grid ion source <sup>1)</sup>	Low outgassing and desorption rate

<sup>1)</sup> Ion sources with tungsten filament only



Axial ion source



Cross-beam ion source



Grid ion source

**g – Interface options**

- 0 – None
- 3 – IO 820



IO 820

**f – Preamplifier**

- 1 – EP 822
- 4 – 2 x EP 822



EP 822

**e – Detector and high voltage supply**

- 1 – SEV 217 + HV 801

**d – Filament**

- 1 – Tungsten
- 2 – Yttrated iridium

## Your Success. Our Passion.

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