

HPA/SPM

Modular and flexible solutions for qualitative and quantitative gas analysis

Modular and flexible solutions for qualitative and quantitative gas analysis

High Pressure Analyzer HPA 220

With the HPA 220 high pressure analyzer, we offer a flexible, modular vacuum solution that is ideal not just for analyzing gases but also for monitoring and controlling processes.

The perfectly matched combination of a mass spectrometer system and a dry HiPace turbopumping station is supplied with three different gas inlet options. This allows you to work in a pressure range of up to 50 hPa. The choice is yours! Whether you are looking for a manual or electropneumatic gas inlet, with the HPA 220 you always have the perfect solution for your application.

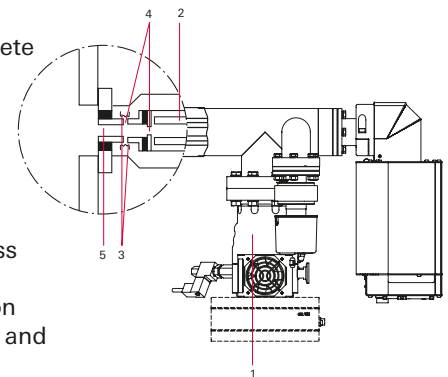
Sputter Process Monitor SPM 220

With its SPM 220 sputter process monitor, Pfeiffer Vacuum provides the perfect solution for qualitative and quantitative analysis of gases in sputtering processes. By taking a HiPace turbopumping station and combining it with a mass spectrometer system with a differentially pumped SPM ion source, it becomes ideal for use in a pressure range of up to 10 hPa.

The illustration shows a schematic view of the complete analyzer, which is attached to a process chamber. A short, wide tube forms the connection with the process area. The ion source is permanently open to the process chamber, but does not extend into it.

The special design of the SPM 220 ensures that the ionization chamber of the ion source is kept at process pressure while the filaments and the rest of the mass spectrometer system are kept at high vacuum. The ion source is equipped with orifices for electron injection and ion extraction.

This allows even the smallest impurities in the process gas to be detected by reactive gases. It also effectively prevents any falsification of readings caused by back-diffusion from the analyzer chamber.



- 1 HiPace 80 turbopump
- 2 Quadrupole mass filter
- 3 Heating filaments
- 4 Orifices into the analyzer
- 5 Orifice into the chamber with high conductivity



HPA 220

Gas analysis in the pressure range of up to 50 hPa

HPA 220 system overview:

Mass spectrometer PrismaPlus
 1 – 100 amu
 1 – 200 amu
 1 – 300 amu

Gas inlet system
 1,2) Valve interface HPI 040
 3,4) Double gate valve
 5) Gas dosing valve UDV 040

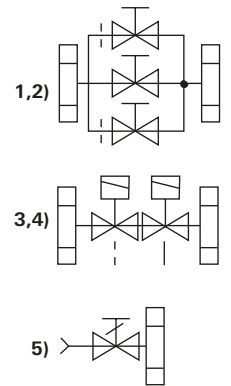


Vacuum gauge ActiveLine PKR 361
 for monitoring the pressure and for protecting the filaments

Valve control unit VCU 220
 for electropneumatic gas inlet systems

Turbopump HiPace 80 with TC 110 RS
 with 4 accessory ports + backing-pump MVP 020-3 (not shown)

19" Rack unit BRU 220
 Integrated power supply pack TPS 311. Additional options: Heating control, display and control units (DCU for turbopumps and TPG for vacuum gauges)



1,2) Valve interface HPI 040

Manually or electropneumatically operated. Consists of three valves, a bellows-sealed gate valve with a nominal diameter of DN 40 CF for residual gas analysis or leak detection up to $< 5 \cdot 10^{-7}$ hPa and two valves with exchangeable orifices in the bypass. One 0.03 mm orifice for extending the range to 8 hPa (N_2) is enclosed.

3,4) Double gate valve

Manually or electropneumatically operated. Consists of two bellows-sealed gate valves which are welded together. One gate with a nominal diameter of DN 40 CF for residual gas analysis or leak detection up to $< 1 \cdot 10^{-4}$ hPa and a second gate with an exchangeable orifice. Delivered ready fitted with a 0.1 mm orifice for the pressure range 0.05 to 0.5 hPa (N_2).

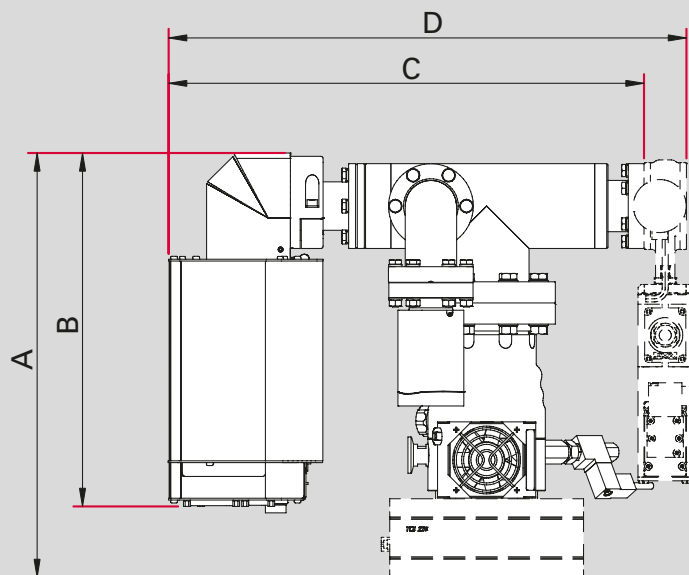
5) Gas dosing valve UDV 040

Manually adjustable gas dosing valve for pressure range from $1 \cdot 10^{-3}$ up to 50 hPa. The maximum possible and reasonable pressure range is determined particularly by the increasing gas segregation which occurs at progressively high pressures.

Advantages at a glance:

- Provides great flexibility thanks to its 5 manually or electropneumatically operated gas inlet options for analyzing, monitoring and controlling processes up to a pressure of 50 hPa.
- Easy and flexible system integration through a variety of digital and analog inputs and outputs.
- Multiplex operation allows data evaluation of several mass spectrometer systems with a single PC.
- Compact dimensions for flexible integration.

HPA 220 dimensions



Version	A	B	C	D
HPI 040 H	–	290	390	427
HPI 040 P	350	290	390	427
Double gate valve, manual	–	290	390	457
Doppelzugschieber, pneumatisch	350	290	390	457
UDV 040	–	290	390	491

Dimensions in mm

HPA 220 order matrix

Order number

PT M 5 a b c d

Mass range	a
1 – 100 amu	1
1 – 200 amu	2
1 – 300 amu	3
Ion source and filament	b
Open ion source, filament: yttriated iridium	1
Open ion source, filament: tungsten	2
Gas inlet system	c
HPI 040 H, bellows-sealed gate valve, DN 40 CF, manually operated, two bypass valves with 0.1 mm and 0.3 mm orifices, 0.03 mm third orifice enclosed	1
HPI 040 P, bellows-sealed gate valve, DN 40 CF, electropneumatically operated, two bypass valves with 0.1 mm and 0.3 mm orifices, 0.03 mm third orifice enclosed	2
Double gate valve, DN 40 CF, manually operated, one gate opens to release full cross-section, one gate with 0.1 mm orifice	3
Double gate valve, DN 40 CF, electropneumatically operated, one gate opens to release full cross-section, one gate with 0.1 mm orifice	4
UDV 040, gas dosing valve, manually operated, VCR 1/4"	5
Cable length and accessory option	d
3 m, without option	0
3 m, with TPG display and control unit	1
3 m, with DCU display and control unit	2
3 m, with TPG and DCU display and control units	3
10 m, without option	4
10 m, with TPG display and control unit	5
10 m, with DCU display and control unit	6
10 m, with TPG and DCU display and control units	7

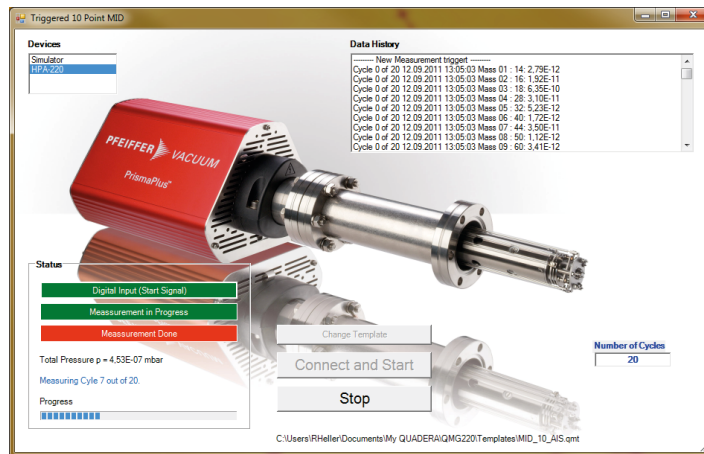
Software support

The HPA 220 is supplied with Quadera® software which can be operated intuitively. A software add-in for easy valve control is available for control units with electropneumatically operated gas inlets. In addition Pfeiffer Vacuum provides customer-specific software solutions.

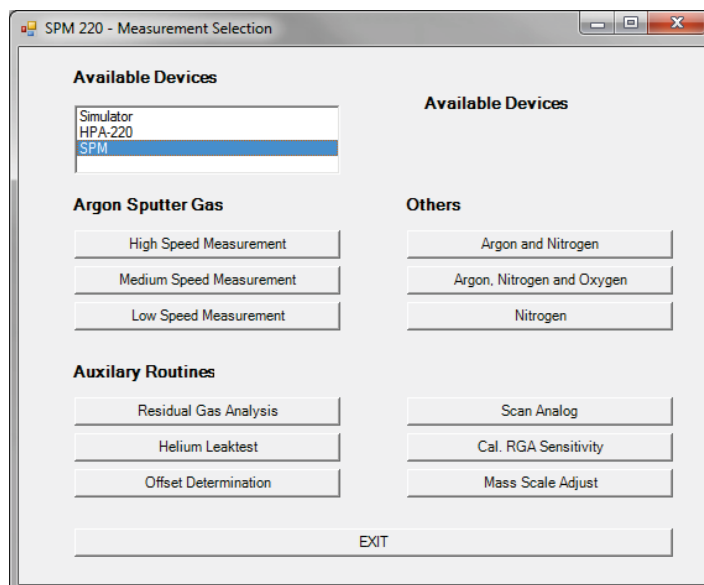
HPA/SPM

Software support

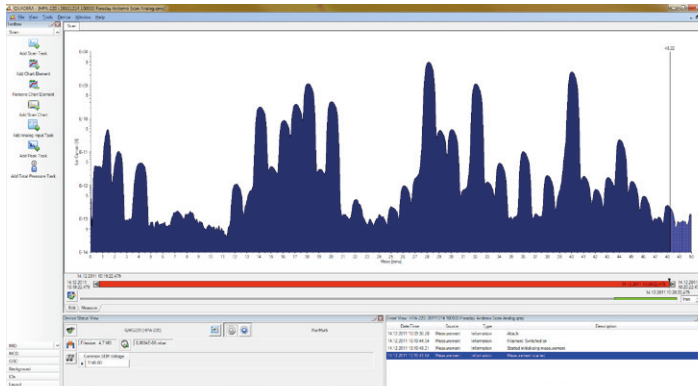
Both the SPM 220 and the HPA 220 are supplied with user-specific operating software which can be operated intuitively. The Quadera® based software package is used to operate the devices. This package contains analysis routines for the process gases Ar, Ar+N₂, Ar+N₂+O₂ and for residual gas analysis.



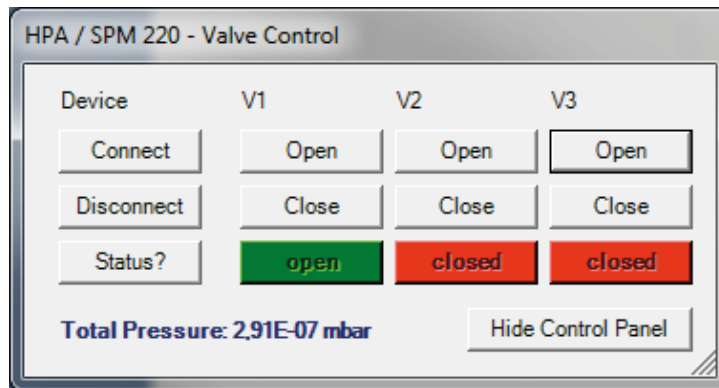
User-specific Quadera® software



Example of an SPM user interface



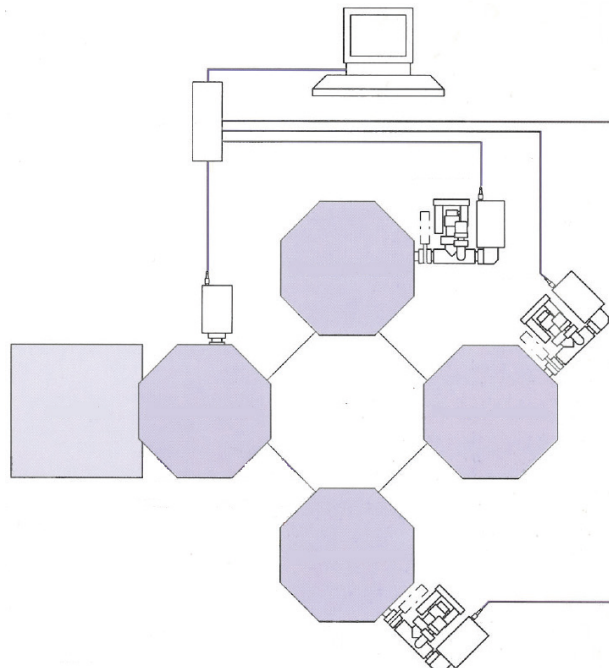
HPA-220 / air and argon



Control unit for the gas inlet system

Multiplex operation

SPM 220 and HPA 220 can be integrated in a complex system through an Ethernet connection. This enables simultaneous data evaluation of several mass spectrometer systems through a single central PC.



SPM 220

Sputtering process gas analysis in the pressure range of up to 10 hPa

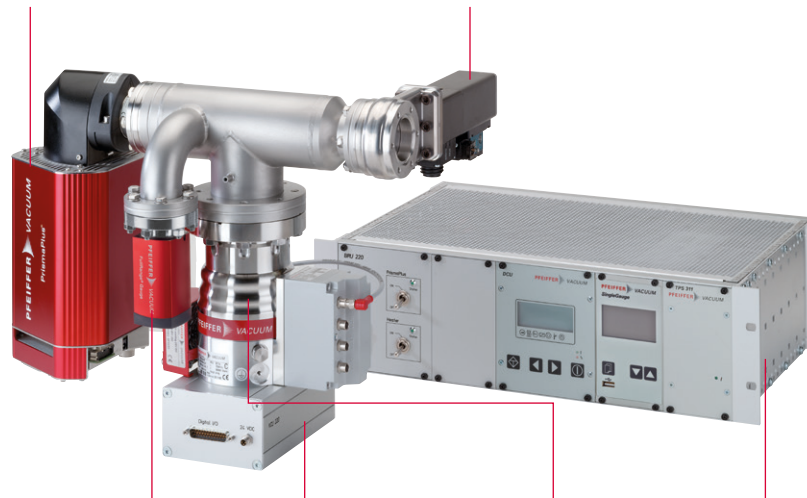
SPM 220 system overview:

Mass spectrometer

PrismaPlus
1 – 100 amu
1 – 200 amu

Gas inlet system

Safety valve SVV 040
Orifice flange (differentially pumped)



Vacuum gauge

ActiveLine PKR 361
for monitoring the pressure
and for protecting the
filaments

Valve control unit

VCU 220
for electropneumatic
safety valve SVV 040

Turbopump

**HiPace 80 with
TC 110 RS**
4 accessory ports
+ backing-
pump MVP 020-3
(not shown)

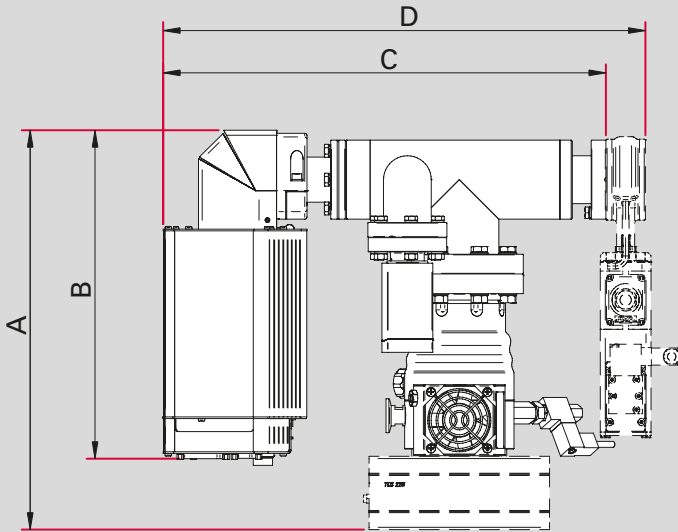
19" Rack unit

BRU 220
Integrated power supply pack
TPS 311. Additional options:
Heating control, display and
control units (DCU for turbopumps
and TPG for vacuum gauges)

Advantages at a glance:

- SPM ion source for instantaneous process monitoring
- Excellent detection limits for H₂, O₂, H₂O and CO₂
- Minimized background influence on the measurement result
- For directly analyzing, monitoring and controlling processes up to a pressure of 10⁻² hPa
- Differentially pumped version for pressures of up to 10 hPa
- Multiplex operation allows data evaluation of several mass spectrometer systems with a single PC
- Compact dimensions for flexible integration
- Easy and flexible system integration through a variety of digital and analog inputs and outputs

SPM 220 dimensions



Version	A	B	C	D
without addition	–	290	390	–
with SVV 040 safety valve	350	290	390	427
with a flange with orifice	–	290	390	400

Dimensions in mm

SPM 220 order matrix

Order number

PT M 5 a b c d

Mass spectrometer	a
PrismaPlus, 1 – 100 amu	1
PrismaPlus, 1 – 200 amu	2
Ion source and filament	b
SPM ion source, filament: yttriated iridium	3
SPM ion source, filament: tungsten	4
Gas inlet system	c
without	6
Safety valve SVV 040 PM, electropneumatically operated	7
Differentially pumped DN 40 CF flange with orifice for a pressure range of up to 10 hPa	8
Cable length and accessory option	d
3 m, without option	0
3 m, with TPG display and control unit	1
3 m, with DCU display and control unit	2
3 m, with TPG and DCU display and control units	3
10 m, without option	4
10 m, with TPG display and control unit	5
10 m, with DCU display and control unit	6
10 m, with TPG and DCU display and control units	7

Software support

The SPM 220 is supplied with a user-specific operating software which can be operated intuitively. This package based on Quadera® software contains analysis routines which are specially adapted to the sputtering processes. There are also basic programs available for residual gas analysis and leak detection. In addition Pfeiffer Vacuum provides programming for customer-specific software solutions.

VACUUM SOLUTIONS FROM A SINGLE SOURCE

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