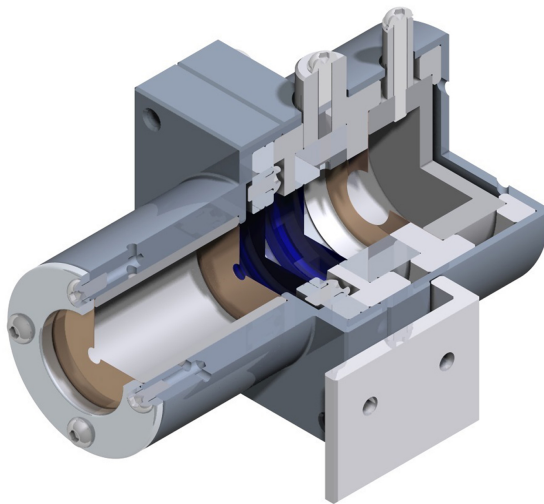
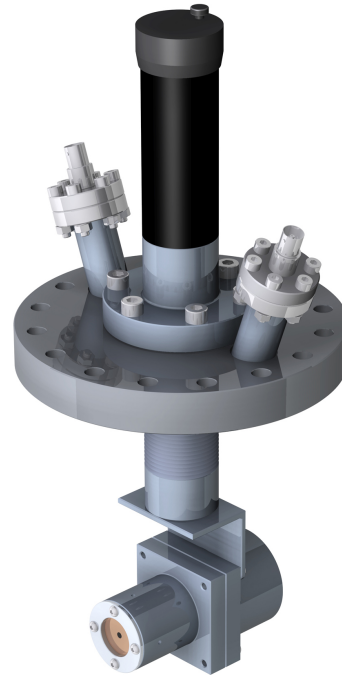


# RETARDING FIELD ANALYZER

## - ENERGY DISTRIBUTION ANALYSIS OF CHARGED PARTICLE BEAMS -



Retarding Field Analyzer



The Retarding Field Analyzer (RFA) is an electrostatic charged particle beam energy analyzer which allows for measuring the kinetic energy distribution and the energy spread of charged particles. The system mainly consists of three meshes, the central one being set on high voltage to establish the retarding field, and a Faraday cup at the end detecting the beam current. Furthermore, the RFA features a collimator with changeable apertures of 1 mm, 2 mm, or 3 mm diameter to optimize the setup considering beam intensity versus required energy resolution.

The setup can be mounted onto a linear motion feedthrough with the beam axis perpendicular to the DN 160 CF support flange normal but also at the end of a beamline directly onto a DN 100 CF flange. The maximum mesh voltage is limited to 15 kV meaning that energy distributions of particles up to 15 keV per charge state can be analyzed.

To analyze the energy distribution of a charged particle beam the potential of the retarding field mesh is increased stepwise while measuring the beam current on the Faraday cup. The measured dependency  $I_{\text{ion}} - U_{\text{RFA}}$  can then be differentiated. The result is the beam energy distribution  $\delta U_{\text{ion}} / \delta I_{\text{RFA}}$  which can be fitted by a Gaussian. Thereby, the mean energy of the charged particles is defined as the maximum of the curve and the energy spread is represented by the full width at half maximum (FWHM) of the distribution.

The Retarding Field Analyzer is delivered with hardware and software for remote controlling the device and automated RFA measurements. This includes a high-sensitivity picoamperemeter/electrometer for beam current or charge detection. With the analysis software package, several measured curves can be compared and differentiated for an instant comparison of beam energy distributions.

## SCOPE OF DELIVERY

- Retarding Field Analyzer mounted on DN 160 CF flange with vertical linear feedthrough or on DN 100 CF flange as horizontal end cup
- power supply (up to 15 kV) incl. HV cables
- beam current/charge measurement device (picoamperemeter/electrometer)
- computer control unit with measurement and analysis software

## OPTIONAL EQUIPMENT

- remote controllable linear motion feedthrough
- vacuum chamber with beamline connection flanges according to customer specifications

## TECHNICAL PARAMETERS

### RETARDING FIELD ANALYZER PARAMETERS

beam energy acceptance	up to 15 keV·q
max. beam power without additional cooling	20 mW
collimator aperture diameters	1 mm, 2 mm, or 3 mm
collimator aperture distance	50 mm
collimator opening angle	1.72°, 0.88°, or 0.57°
support flange	DN 160 CF (on vertical linear feedthrough) or DN 100 CF (as horizontal end cup)
vertical travel (on vertical linear feedthrough)	50 mm (other travel distances on request)
RFA diagnostic unit dimensions	130 mm x 80 mm x 105 mm
RFA diagnostic unit weight	1 kg (2.2 lbs)
overall RFA weight incl. flange	10 kg (22 lbs)
max. bake-out temperature	150 °C
vacuum conditions during operation	from $1 \cdot 10^{-10}$ mbar up to $1 \cdot 10^{-6}$ mbar

## CONTACT

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