

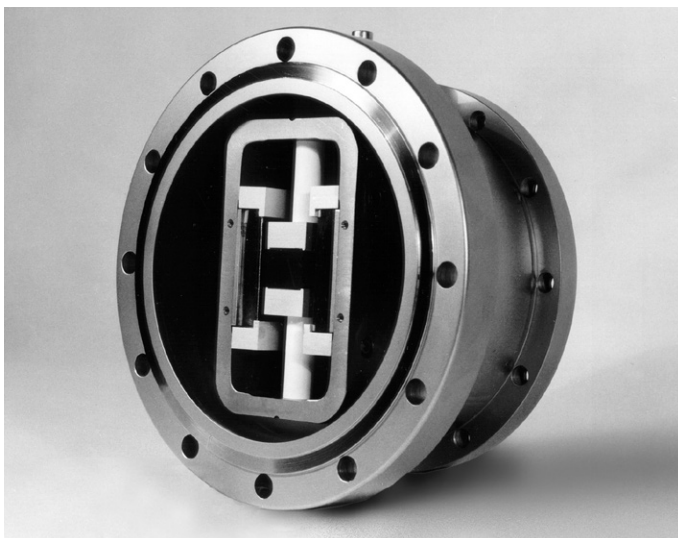


# ANALYZING COMPONENTS

## National Electrostatics Corp.

## Crossed Field Velocity Selectors

The NEC Crossed Field Velocity Selectors provide mass and charge analysis. Models are available for use in high potential terminals and for analysis of exterior ion source beams.



### DESIGN

All NEC velocity selectors are of all metal and ceramic construction and utilize all metal seals. They are able to perform mass or charge analysis without changing the beam direction.

The electrical field is applied between two parallel plates, each of which is supported by insulating pillars which are mounted on opposite sides of the support tube, secured to the vacuum housing end flange. Voltage to the plates is applied through two high voltage shielded feedthroughs. Two ceramic permanent magnets provide a uniform magnetic field at the center. The magnets are clamped to the support tube made of heavy wall rectangular steel plates and their faces are protected from sputtering by thin stainless steel sheets. The selector is provided with field terminal plates at both ends and the selection aperture is mounted on the support frame.

### PRINCIPLES OF OPERATION

#### Mass Analysis:

For a fixed energy, the velocities of the different mass components are different, and only the selected mass passes undeflected. See below example.

Assume a beam of charged particles moving with velocity  $v$  in the  $+Z$  direction. Under the combined influence of an electrical field  $E$  in the  $+X$  direction and a magnetic field  $B$  in the  $+Y$  direction, the net force on the particles is  $F = q(E - vB)$ , where  $q$  is the charge on the particles. Particles with velocity  $v = E/B$  experience no net force and pass undeflected.

#### Charge Analysis:

With a beam of several charge states accelerated through a fixed potential, the velocity selector may be used to select a certain charge state.

### OPTIONS

The four available options of NEC Crossed Field Velocity Selectors are models VS5-502, VS5-504, VS5-506, and VS5-508.

**VS5-502:** Compact. Mass-analyzes beam in the high potential terminal of an accelerator prior to acceleration.

**VS5-504:** Longer than the VS5-502, the VS5-504 mass-analyzes light ions for the S-series tandem accelerators.

**VS5-506:** A more compact version of the VS5-504 with a higher magnetic and electric field.

**VS5-508:** A more compact version of the VS5-502 with a higher magnetic field.

## SPECIFICATIONS

Catalog Number	Model VS5-502 2EA067730	Model VS5-504 2EA067750	Model VS5-506 2EA067720	Model VS5-508 2EA056070
Electric Field Plates: (long)	3" (7.6 cm)	6" (15.2 cm)	4-7/16" (11.3 cm)	2" (5.1 cm)
(wide)	7/8" (2.2 cm)	7/8" (2.2 cm)	1" (2.5 cm)	7/8" (2.2 cm)
Electric Plate Gap:	5/8" (1.6 cm)	5/8" (1.6 cm)	5/8" (1.6 cm)	5/8" (1.6 cm)
Magnet Poles: (long)	2-9/10" (7.4 cm)	6" (15.2 cm)	4-1/5" (10.7 cm)	2" (5.1 cm)
(wide)	1-9/10" (4.8 cm)	1-9/10" (4.8 cm)	2-1/10" (5.3 cm)	2-1/10" (5.3 cm)
Magnet Pole Gap:	1.23" (3.1 cm)	1.2" (3.1 cm)	1-1/2" (3.8 cm)	1-1/4" (3.2 cm)
Apertures: * (entrance)	3/8" dia. (0.95 cm)	3/8" dia. (0.95 cm)	9/16" dia. (1.4 cm)	9/16" dia. (1.4 cm)
(exit)	3/64" dia. (0.12 cm)	3/64" dia. (0.12 cm)	3/8" dia. (0.95 cm)	3/8" dia. (0.95 cm)
Magnetic Field:	1200 Gauss (fixed)	1500 Gauss (fixed)	2300 Gauss (fixed)	3300 Gauss (fixed)
Magnet Type:	Ceramic Permanent Magnets	Ceramic Permanent Magnets	2 x 2.1 x 3.75 Samarium Cobalt	2 x 2.1 x 0.5 Samarium Cobalt
Plate Voltage Feedthrough Rating:	±5 kV max.	±5 kV max.	±15 kV max.	±5 kV max.
Plate Voltage Power: (+ and - supplies)	0 to 2.5 kV, 1 mA	0 to 2.5 kV, 1 mA	0 to 10 kV, 7.5 mA	0 to 2.5 kV, 1 mA
Vacuum Chamber: (OAL) (housing dia.) (CF flanges)	4" (10.2 cm) 6" (15.2 cm) OD 8" (20.3 cm) OD	8" (20.3 cm) 6" (15.2 cm) OD 8" (20.3 cm) OD	5-1/2" (14 cm) 6" (15.2 cm) OD 8" (20.3 cm) OD	3-3/16" (8.1 cm) 6" (15.2 cm) OD 8" (20.3 cm) OD
Weight:	11 lbs. (5 kg)	17 lbs. (7.7 kg)	17 lbs. (7.7 kg)	11 lbs. (5 kg)

\*Other aperture sizes available to meet buyer's specific needs.

All models are available with or without power supplies and local controls.

## Contact NEC

 [www.pelletron.com](http://www.pelletron.com)

 +1 (608) 831-7600

 [nec@pelletron.com](mailto:nec@pelletron.com)

 7540 Graber Rd, Middleton, WI 53562-0310 USA