

Beam Defining Slits



For a variety of applications involving the control of ion beam size and current, NEC manufactures three basic models of slit systems, and a number of variations, with different beam power capabilities and geometries. Most NEC slits are equipped with insulated elements for current read. Most models are available in manual or motorized versions.

APPLICATIONS

NEC slits are ideal for applications requiring accurate control of beam size, determination of beam divergence, or limiting beam current. The NEC line of slits is designed for use on injection and high energy beamlines of medium to high current or high energy electrostatic accelerators. NEC slits are also commonly used for ion beam energy control in conjunction with NEC's Terminal Potential Stabilization systems.

With a power rating of 50W to 1000W, the NEC line of slits is suitable for a wide variety of applications for control of ion beam energy, current, or size.

DESIGN

All NEC slit assemblies incorporate proven NEC technology with all-metal and ceramic construction for ultra-high vacuum compatibility.

The slit element assemblies utilize all-metal seals to the slit housing and motion is transmitted to the elements through stainless steel welded bellows. The beam aperture material and the slit elements are either molybdenum or tantalum. This greatly limits neutron production from light ion beams while providing high temperature tolerance.

Listed below are the standard model slit assemblies manufactured by NEC and their beam power ratings and aperture diameters. The beam power ratings are conservative and based on tests at NEC. Power rating is based on a beam of uniform power density with a minimum diameter of 3mm fully incident on a single slit element. In normal operation, much of the beam will pass between the slit elements.

Model	Power Rating	Maximum Aperture	Cooling Method
BDS6	1000W	1.5"	De-ionized water
BDS8	50W*	1.2"	Radiation only
BDS18	50W*	2.0"	Tap water/radiation

*100W version available upon request

OPTIONS

Manual and Motorized

All models are available in manual or motorized versions. Motorized BDS6 and BDS8 slits are electric motor driven with a 10 turn potentiometer to monitor slit element position. Though 24VDC motors are standard, 115VAC motors are also available. The motorized BDS18 is operated via stepper motors.

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Single and Double

All models are available in single (2-jaw) and double (4-jaw) versions. The double slits (4-jaw) consist of two pairs of slit elements to provide beam definition in the X and Y directions. Single slits (2-jaw) are available for applications requiring beam definition in only one dimension.

Element Type

The standard BDS8 utilizes slit elements with a beveled edge design. The bevel is designed to minimize slit edge scattering of the ion beam and is the best element configuration for beam energy control. However, other available element designs for the BDS8 include a folded design for applications requiring complete closure, square edge element which provides the most resistance to sputter erosion, and a furrowed element designed to handle power up to 100W. Please contact NEC for further information on these element types or on element options for the BDS6 and BDS18.

Travel

The manual BDS6 and some versions of the manual BDS8 allow some over-center travel, permitting an off-center aperture. Motorized slits do not allow over-center motion.

Customization

Standard flanges used are 6.0" OD NEC or ConFlat flanges. Other flange size and type may be available upon request. In addition, custom slit systems designed into common housings with other NEC components, such as Beam Profile Monitors and Faraday Cups, are also available. Other customization to meet customer specific needs may be available upon request.

ACCESSORIES

For manual slits, a slit current monitor is available with four meters for simultaneous display of individual element currents and is switchable to monitor up to three different slit assemblies on the front panel.

For motorized BDS6 and BDS8 slits, two types of controllers - local and remote - are available. These controllers provide independent slit element position controls, slit position readout, and connectors for monitoring the current on each slit element.

The local controller has a separate 3-position (in/off/out) switch for actuation and a meter to display relative position of each of the slit elements. The computer-controllable controller is designed to interface with computer controls via data acquisition systems such as CAMAC, NEC ACT or compatible systems.

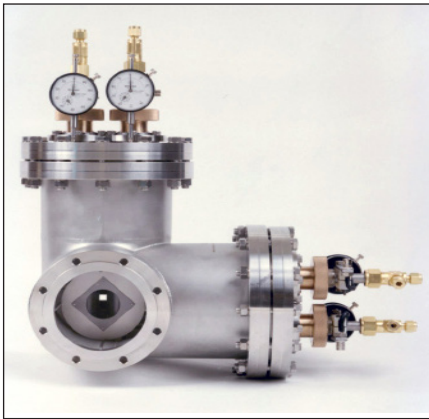
Please contact NEC for information regarding control of the BDS18.

For a complete motorized slit system, a slit, controller, and logarithmic amplifiers (one per element pair) are needed. NEC offers a complete line of dual channel log amps for use with the controllers and current monitors.



The local slit controller has switchable analog meters which display the slit position and current read.

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BDS6

Power Rating: 1000W

The model BDS6 is designed for use on the high energy beamlines of high current or high energy electrostatic accelerators. Conservatively rated at 1000W of continuous beam power with de-ionized water for cooling, this slit can safely dissipate the heat generated by a 3mm or larger ion beam directly incident on any of the molybdenum slit elements (tantalum elements optional). The slit elements are bolted to water cooled copper blocks for rapid heat dissipation. Electrical isolation (greater than 1000M Ohms) is maintained by the use of de-ionized cooling water and ceramic fluid feedthroughs. The elements of the BDS6 are cylindrical in cross section to provide maximum cooling for this high powered unit.



BDS8

Power Rating: 50W (100W optional)

The model BDS8 is designed for use on the high energy beamlines of medium current electrostatic accelerators and on injector beamlines of large electrostatic accelerators. Conservatively rated at 50W of continuous beam power without requiring air or water cooling, this slit can safely radiate the heat generated by a 3mm or larger ion beam directly incident on any of the tantalum slit elements. The elements have a beveled edge designed to minimize slit edge scattering of the ion beam. Folded and square edge elements available upon request. Furrowed elements, rated at 100W, are also available.



BDS18

Power Rating: 50W (100W optional)

The model BDS18 is similar to the BDS8, including the same beam power rating. However, the BDS18 has a larger range of adjustment. The standard range is 0-1.0" per element (2.0" max. beam opening) however larger ranges are available upon request. The standard BDS18 is a remote version utilizing stepper motors, though a manual version is also available.

All three models are available as manual or motorized and single (2-jaw) or double (4-jaw).

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SPECIFICATIONS

	BDS6	BDS8	BDS18
Power Rating:	1000 Watts/element	50 Watts/element 100 Watts/element optional	50 Watts/element 100 Watts/element optional
Leakage Resistance	>1000M Ohms at 500V	>1000M Ohms at 500V	>1000M Ohms at 500V
Adjustment Resolution:	0.001" (0.025mm)	0.01mm (0.025mm)	0.001" (0.025mm)
Adjustment Sensitivity:	0.0625" per turn of adjustment knob	1.0mm per turn of adjustment knob	0.025" per turn of adjustment knob
Range of Adjustment:	-0.25" to +0.75" per element (1.5" max. beam opening)	0 to +0.6" per element (1.2" max. beam opening)	0-1" per element (2.0 max. beam opening)
Position Readback: (remote models only)	2K Ohms per 10 turns (10K Ohms optional)	2K Ohms per 10 turns (10K Ohms optional)	
Separation of Element Pairs:	1.5" (4 jaw model)	1.25" (4 jaw model)	1.25" (4 jaw model)
Cooling:	Deionized water (0.5 l/min. for 1000W rating)	Radiation	Radiation
Element Material:	Molybdenum (Tantalum optional)	Tantalum	Tantalum
Housing:	Stainless steel	Stainless steel	Stainless steel
Length Along Beamline*:	8.0" for 2 jaw assembly, 9.5" for 4 jaw assembly	5.88" for 2 jaw assembly 7.13" for 4 jaw assembly	5.875" for 2 jaw assembly 7.125" for 4 jaw assembly
Electrical Connections**:	One BNC/element	One MHV/element	One MHV/element
Standard Flanges***:	6.0" O.D. NEC or CF (blind tapped)	6.0" O.D. NEC or CF	6.0" O.D. NEC or CF

*Length based on CF flanges: May vary with NEC or other style flanges.

** Other connection types may be available upon request

***Other flange size and type may be available upon request.



[Slits v1]

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