

## VALVED SELENIUM CRACKING SOURCE VSCS

- Provides cracked or uncracked selenium flux
- Flux modulation and on/off control by motorized valve
- Source capacity 300 cm<sup>3</sup> and 500 cm<sup>3</sup>
- Water-cooled assembly
- Excellent flux uniformity due to beam shaping nozzle
- Precise run-to-run reproducibility



Valved Selenium Cracking Source VSCS-300 with 300 cm<sup>3</sup> crucible and DN63CF (O.D. 4.5") mounting flange



Production scale valved selenium source PVSS-9600

The VSCS is a valved selenium cracker, employed in high efficiency CIGS solar cell growth and other II-VI semiconductor material deposition applications.

Selenium beam pressure is generated in a heated large capacity crucible. The flow rate of Se is controlled and switched on/off by a specially designed Se-resistant valve whose outlet opens into an injection tube that includes an independently heated cracking zone. The temperature within the cracking zone can be adjusted to generate either uncracked or cracked selenium. The use of a beam shaping nozzle at the end of the injection tube provides excellent flux uniformity on the substrate.

The valve design features a large cross-section orifice which allows very good pumping properties of the reservoir. Its robust wide angle valve design effectively eliminates the risk of locking, which is a frequently observed problem with needle valves.

Technical details of the construction have been optimized to meet the specific requirements of research deposition applications and MBE systems. Simple system integration and excellent long-term run-to-run stability have been demonstrated. Different crucible sizes of 300 cm<sup>3</sup> or 500 cm<sup>3</sup> are offered on DN63CF (O.D. 4.5").

The figure on the left side shows an industrial version, applied in sulfurization processes that are part of solar cell manufacturing and other industrial thin film applications.

### Applications

The VSCS Valved Selenium Cracking Source has been designed for the controlled evaporation of Se. It can be used for II-VI semiconductor thin film research and solar cell manufacturing. Other possible applications are, for example, post-growth selenization processes. MBE-Komponenten provides support in the design of customer-specific research or production systems in order to achieve a customized source geometry, optimized for specified layer uniformity and most efficient deposition material consumption. Co-deposition processes can be simulated on request. The simulations are based on geometric and Monte Carlo Method calculations. Typical results include the lateral layer thickness distribution and material composition for multiple material co-deposition processes on semiconductor wafers as well as on large area substrates. Please contact us for more information.

## Technical Data

Type	VSCS-300	VSCS-500
Crucible capacity	300 cm <sup>3</sup>	500 cm <sup>3</sup>
Mounting flange	DN63CF (O.D. 4.5")	DN63CF (O.D. 4.5")
Length of injector tube	250 to 400 mm	250 to 400 mm
In-vacuum diameter (w/o cooling shroud)	38 mm	38 mm
External dimensions	see drawing below	contact us
Operating temperatures		
-crucible zone	250 - 370°C	250 - 370°C
-cracker (no cracking)	350 - 500°C	350 - 500°C
-cracker (cracking)	700 - 1100°C	900 - 1100°C
Max. bakeout temperature (crucible/cracker)	500 / 1200°C	500 / 1200°C
water cooling	main body injector tube (option)	main body injector tube (option)
Valve opening time	1 sec	1 sec
Heater circuits	crucible + valve cracker	crucible + valve cracker
Thermocouples	W5%Re/W26%Re 2 thermocouples crucible-valve / cracker	W5%Re/W26%Re 2 thermocouples crucible-valve / cracker
Valve control	manual or motor drive MVCU	manual or motor drive MVCU

Details to larger versions on request

