

## QUAD CLUSTER SOURCE QCS

- Four independent effusion cells on a single flange
- Various crucible types for evaporation of metals and organic materials
- Integrated cooling block and multi-position shutter
- Negligible temperature crosstalk
- Reload option in combination with valve and z-shift



QCS 40-4x1-12-S on DN40CF (O.D. 2.75") flange

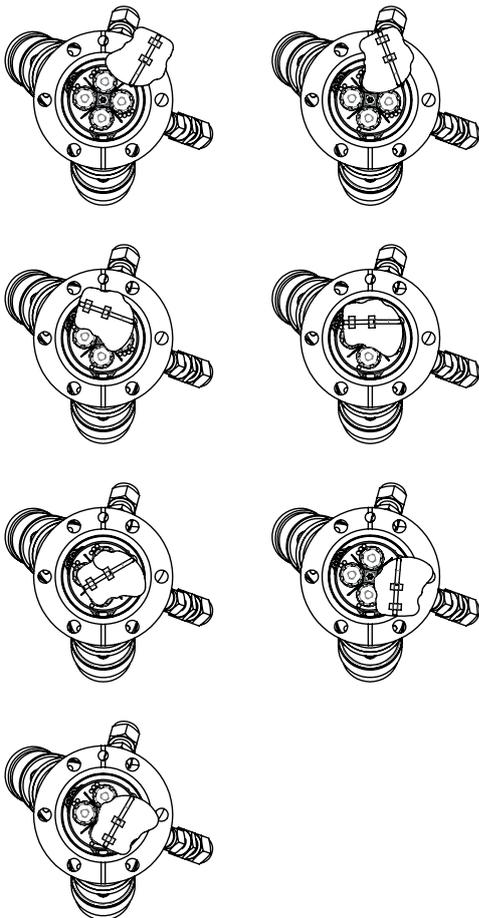
The Quad Cluster Source QCS is a cluster of four independent effusion cells on a single DN40CF (O.D. 2.75") flange. Each effusion cell is heated by a Ta wire heater with integral thermocouple for precise temperature control of the crucible. The heaters are adequately thermally separated by means of a water-cooled cooling block and can be operated one by one or simultaneously, in groups of two, three or four.

Operating temperatures up to 1100°C allow the evaporation of a variety of materials. An optimization of the heaters for the deposition of organic materials and other low temperature applications is possible as well. The integrated water cooling ensures a reliable and precise temperature control of each crucible with a variation of +/- 0.1 K, which is essential for stable flux rates.

Only UHV compatible materials are used to ensure best possible vacuum conditions at operating temperature.

The QCS includes crucibles with a nominal capacity of 0.2 cm<sup>3</sup>. PBN is the standard crucible material, but crucibles from quartz, Al<sub>2</sub>O<sub>3</sub> or pyrolytic graphite are also available. By default, the cells are arranged with a focal point for best possible uniformity. An optional straight alignment with parallel beams is available on request.

The rotary multi-position shutter of the QCS can be operated manually or by remote control, using the Multi-position Shutter Control Unit MSCU-4. This unit allows choosing between predefined shutter positions, which you can select by either pressing the front buttons or using digital input signals.



Possible QCS shutter positions: turning the special shaped shutter plate, each specified angle covers a different pattern of crucibles. In this way both single material or co-deposition applications are possible. A center cell divider shields the crucible orifices from each other, thus minimizing cross-contamination between different materials.

### Applications

The Quad Cluster Source QCS increases the capacity of any thin film deposition system by using only a single port for four independent effusion cells.

Its compact size and the integrated water cooling allow the installation directly into STM, LEED or other surface analysis chambers. Versatility and reproducibility make the QCS superior to widely used rod electron beam evaporation sources in many applications.

The QCS effusion cell operation principle is ideal for evaporants like Ga, In, Ag or Sn that are liquid at their typical operation temperatures.

A precise and fast temperature control enables a temperature stability that is better than 0.1 K at

low temperature operation conditions. That makes the QCS an ideal source for the deposition of organic materials onto small samples as well.

Due to the insignificant thermal crosstalk between the different heaters, the QCS allows a simultaneous evaporation of organic materials and metal evaporants from the same source.

The shutter design enables single material deposition and co-evaporation applications.

On request, the QCS can be combined with a reloading option that uses a suitable UHV gate valve and z-shift for full retraction of the source from the growth chamber without breaking the vacuum of the main system.

### Technical Data

Mounting Flange	DN40CF (O.D. 2.75")
Dimensions in Vacuum	L depends on design, D=36 mm
Filament type	Ta wire heater
Thermocouple	Chromel/Alumel (type K)
Bakeout temperature	max. 250°C
Outgassing temperature	1100°C
Operating temperature	25°C - 1000°C (depending on cluster design)
Power consumption	typical values for 500°C: 8 W, 4 A / for 1000°C: 50 W, 7 A
Cooling	water cooled cooling block, low temperature crosstalk
Crucibles	material: PBN, Quartz, Al <sub>2</sub> O <sub>3</sub> , etc.; nominal charge 0.2 cm <sup>3</sup>
Option	multi-position rotary shutter (S)

