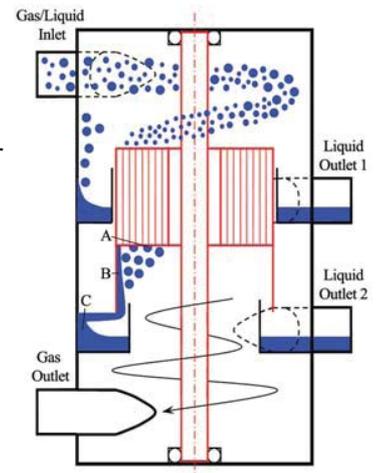


The RPS as mist eliminator

The **rotational phase separator** (RPS) is a cyclonic device wherein a rotating element is placed. The rotating element is a simple consisting of a very large number of axial channels or pipes of a few millimeters in diameter.

The cylinder is driven by the cyclonic swirl and rotates at speeds comparable to a pump with tangential speeds in the order of 30 to 40 ms⁻¹. The reliable technical solutions devised for (cryogenic) pumps can also be used for the RPS design.

The micron-sized droplets are centrifuged to form a liquid film at the channel-wall, which is ripped of at the exit of the channel in the form of droplets; typically 50 micrometer or larger. These droplets are separated according the working principles of ordinary axial cyclones.



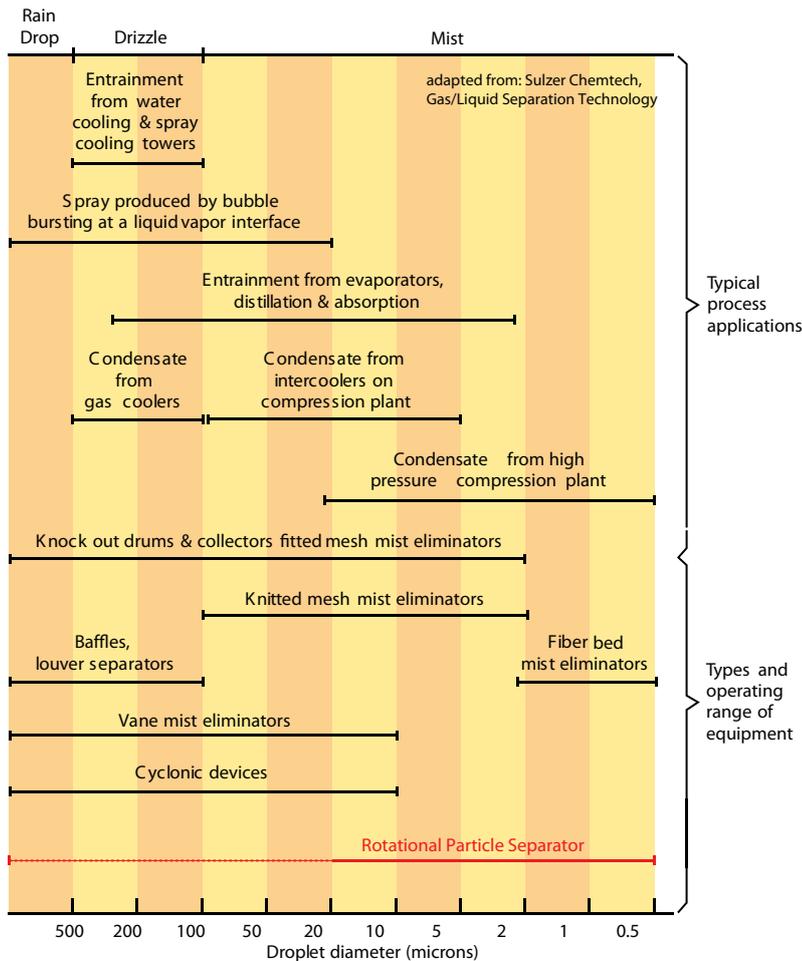
The RPS offers the separation performance of a **fiber-bed mist eliminator** (0.5 micrometer) in the same volume and with the same pressure loss as a single cyclonic device. **Knitted mesh, vane and cyclonic demisters** can not do this.

Gas-gas separation by centrifugation (**ultra centrifuge**) is simply not an option: 1 million centrifuges would be needed to treat a gas stream of 100 kg/s.

A **disc stack centrifuge** also uses a rotating element but as the flow is not parallel to the rotation axis throughflow is limited due to the flow dynamics and Coriolis forces. Also an external drive is necessary.

High speed swirl systems like the Ranque – Hilsch vortex tube and Twister supersonic separator have a very high energy consumption as the pressure drop increases with the square of the circumferential speed. In condensation systems cooling and separation are coupled and can not be optimized in the phase diagram.

The rotational particle separator is the only viable technology to economically separate the small droplets generated by condensation processes.



Compared to a fiber-bed mist eliminator the RPS is at least a factor 20 smaller in volume.

Compared to cyclones the RPS is an order of magnitude smaller in size at equal separation performance. At equal size the RPS separates droplets ten times smaller

Selection Guide - Mist Elimination Equipment					
	Knitted Mesh	Vane	Fiberbed	Cyclone	RPS
Cost	1	2-3	10	3-5	5-10
Gas Capacity	5	6-15	1	15-20	20-50
Liquid Capacity	5	10	1	10	20
Particle Size (micron)	3-10	10-40	< 0.1	7-10	0.5
Pressure Drop, WC	< 25 mm (1")	<10-90 mm (0.4" - 3.5")	50-500 mm (2" - 20")	200-240 mm (8" - 14")	200-240 mm (8" - 14")
Solid Handling	3	10	1	8	8
Relative scale based on 1 as the lowest. Others are scaled.					

adapted from: Koch-Glitsch "Mist Elimination"