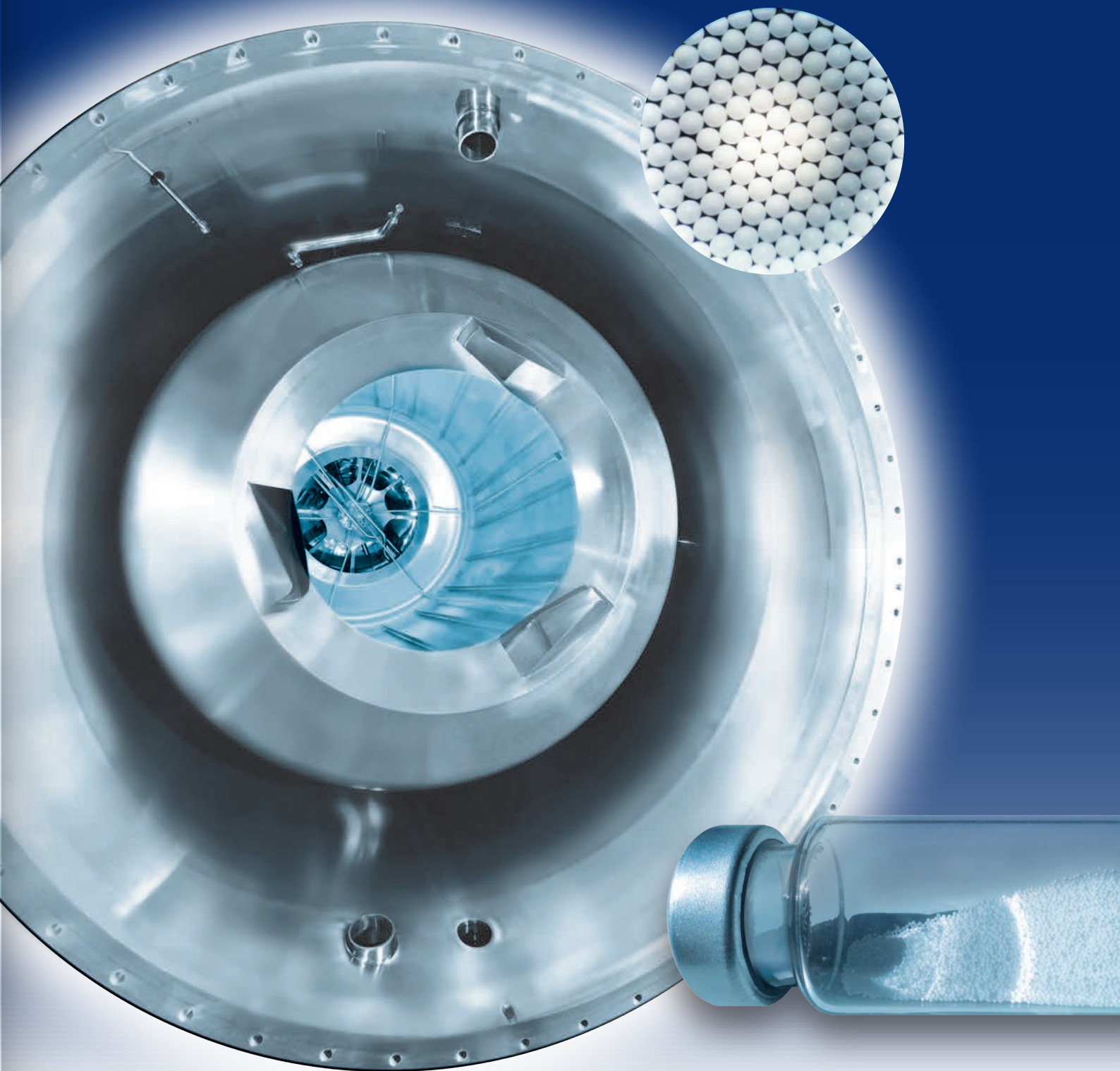


BREAKTHROUGH INNOVATION
IN FREEZE DRYING



MERIDION

TECHNOLOGIES

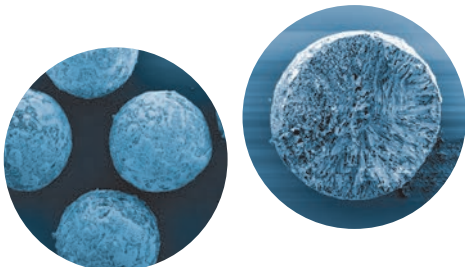
Lyophilized Microspheres and Bulk Freeze Drying: Breakthrough Technology, Breakthrough Advantages.

MERIDION develops and manufactures highly innovative freeze drying technologies, allowing for significant product innovation and offering further benefits in the areas of production logistics, process technology and costs. Forget about yesterday's typical limitations of conventionally freeze dried products, like poor flowability and poor dosing properties, inhomogeneities and dust emission during handling – and learn about the future of freeze drying!

MERIDION Technologies offer you new opportunities:

- **Product Innovation**
- **Manufacturing Flexibility**
- **Process Robustness**
- **Total Containmentment**
- **Significant Cost Reductions**

The results of MERIDION technologies are worth a closer look



MERIDION Technology

- **Manufacturing flexibility and cost savings**
 - Filling of lyophilized product on demand
 - Filling quantities as required
 - Contained product handling by gravity: no need for loading and unloading systems as with shelf freeze dryers
 - Vial/final recipient flexibility: no specific freeze drying requirements for primary packaging
- **Innovation & formulation flexibility**
 - Multicomponent formulations achieved by combining different lyophilized products in the final recipient (vial), e.g. to overcome incompatibilities
 - Further modifications of product properties esp. in the area of Solid Dosage Forms like ODTs, Fast Dispersible Formulations, by applying known technologies so far not applicable to lyophilized compounds

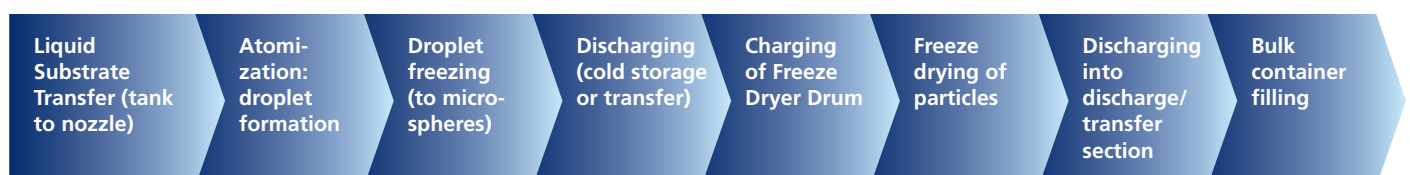
MERIDION *SprayCon*: Spray Freezing of Microspheres

Frozen microspheres are generated by dispersing the substrate liquid using high precision nozzles into single droplets, which by gravity pass through a cooling zone, congealing to frozen spheres.

MERIDION *SprayCon* Microspheres: Your Advantages

- **Narrow particle size distribution**
- **Size selectable** from 200 µm – 800 µm
- After freeze drying, the product
 - is **homogeneous**
 - has excellent **flow** properties
 - is **dust free**
- **Product innovation:** after freeze drying, further processing, e.g. coating or combination products, possible
- Highly **cost effective** utilization of cooling energy – no direct contact with primary cooling agent

The MERIDION process – step by step





MERIDION *LyoMotion*: Dynamic Bulk Freeze Drying

In the dynamic freeze drying process, flowable bulkware is lyophilized in a rotational freeze dryer under constant gentle mixing. Sublimation energy is transferred by radiation and temperature controlled surfaces.

MERIDION *LyoMotion*: Your Advantages

- Up to 50% **reduced drying times** by
 - maximized heat exchange (entire particle surface available)
 - heat transfer directly to the product
 - maximized flow of vapor – no limitation by stoppers
 - vapor diffusion facilitated by reduction of dry product layer

● Process robustness

- Direct monitoring of product relevant parameters
- OOS results reduced
- PAT tools directly accessible

● Product quality

- Homogeneous, dust free product due to constant and gentle mixing – no caking, no variations in product density
- Direct monitoring of product temperature

MERIDION offers application lab facilities for product development and/or process verification (up to 20 kg pilot scale) and provides projects realization covering Engineering, Project Management, Equipment Design, Manufacture and Installation as well as Start-up and After-Sales-Service.

**Start your future now – with
breakthrough technologies by
MERIDION!**



Innovative MERIDION technology in lab scale:
LyoMotion LAB and SprayCon LAB



Left: MERIDION *LyoMotion* bulk freeze dryer with IR radiators and double wall drum

Right: line operation control unit



MERIDION Technologies. The Freeze Drying Innovators.

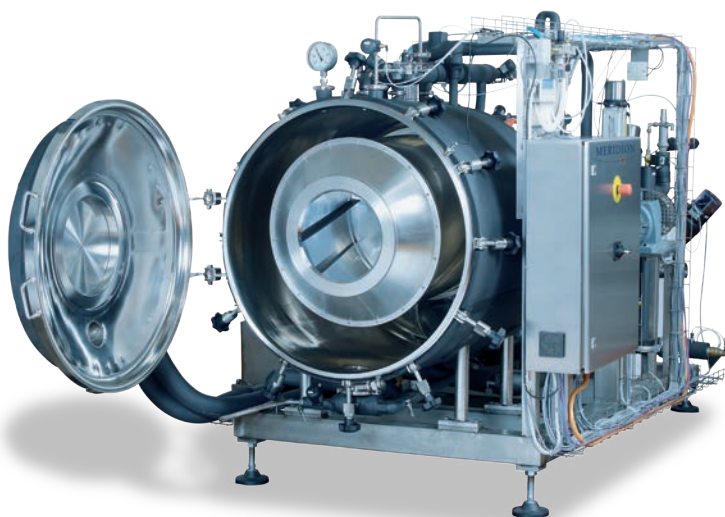
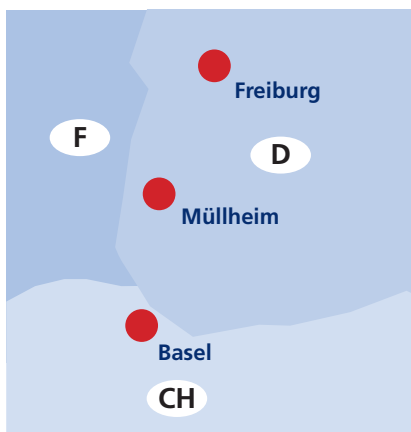
Situated in south-western Germany, in the vicinity of Basel (CH), MERIDION is dedicated to the application of dynamic bulk freeze drying and lyophilized microspheres generation. Our specific know-how includes Freeze Drying Processes at both atmospheric pressure and under vacuum.

We are a highly motivated team of pharmacists, engineers, process technologists and mechanics as well as control experts – with decades of experience in the areas of Pharma Processing Equipment and Pharmaceutical Technology.

**Learn more about what
MERIDION can do for you –
get in touch with us!**



A center of innovation in the heart of Europe – that's MERIDION



MERIDION LyoMotion dynamic bulk freeze dryer in pilot scale

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MERIDION LyoMotion
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MERIDION

T E C H N O L O G I E S