

Superconductor technology: Contactless working in the laboratory of the future

Automated filling and weighing of freeze-dry containers in the cleanroom with SupraMotion from Festo

Superconductor technology enables the contactless movement and handling of objects – ideal for high-tech industries such as laboratory automation or biotechnology. At the Hannover Messe, Festo presents a concept for the fully automated filling and weighing of freeze-dry containers in cleanrooms. Thanks to SupraMotion levitation modules and products from the Festo automation portfolio for laboratory applications, the highest standards of cleaning and cleanliness can be met.

"Keeping processes in the laboratory free of contamination is not easy," says Michael Schöttner, Head of SupraMotion Projects at Festo. "The equipment used, for example test tubes or measuring devices such as scales, are particularly problematic. Taken from the dirty outside, they are prone to carry contaminations to the clean inside. We can largely rule this out with our SupraMotion modules, as they allow to transport and weigh without contact." In the exhibit, special disposable freeze-dry containers are filled automatically and the added mass is checked using a contactless scale. Products from Festo's LifeTech portfolio are used in combination with a levitation module from the "SupraMotion" range. Altogether, this results in a reliable overall solution that makes cleaning simple and effective to meet the highest cleanliness requirements.

The magnetic forces between the superconductor and the carrier on which the containers are transported allow levitation heights of 10 millimeters and more. Permeating through many materials, the levitation leaves plenty of space for separating walls enclosing sterile working environments. Movement of the carrier is possible from the exterior, as is weight control using a standard laboratory scale. This keeps most of the technology outside the cleanroom; contamination of all kinds is reduced to an absolute minimum. "With our concept, we show how to combine our innovative superconductor technology with our automation solutions for the life science sector and thus manage some of the most demanding challenges in laboratory automation," says Michael Schöttner.

Opening, closing, filling and weighing in the cleanroom

The contactless levitation module of SupraMotion moves the freeze-dry container into a symbolized clean room. A universally applicable, compact EHMD rotary gripper module, which was specially developed for laboratory automation, opens the screw cap of the container regardless of its thread pitch. It is then transported to the next station, where two VTOE dosing heads fill the container with liquid. These dosing heads work very precisely with a typical variation coefficient of 1% in the range of 10 to 1000 µl. The contactless scales integrated into the transport system allow the filling volume to be checked precisely at all times during the process.

"With the SupraMotion modules and our products for laboratory automation, we are able to design innovative complete solutions for customers in the life science sector – precise, reliable

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and largely contamination-free thanks to contactless handling. Only Festo offers these solutions!" says Marcus Kroll, Head of LifeTech Business Development at Festo. Upon request, interested potential users will receive a customized application according to their needs.

About superconductor-based magnetic levitation

Superconductors are materials with unique magnetic features. The superconductor used in SupraMotion applications can anchor the magnetic field of a permanent magnet to its bulk, creating a strong but invisible coupling keeping the magnet and superconductor at a fixed distance from each other – even through walls, in liquids or in a vacuum. Levitation gaps of 10 mm and more are possible. As long as it remains below its transition temperature, the magnetic memory of the superconductor stores the fingerprint of the magnet and thus its position, even if the two are separated.

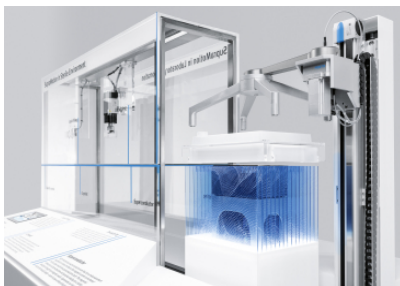
The technology is characterized by a low energy requirement independent of the levitation height and payload – the power requirement with the current coolers is between 15 and 80 watts, depending on the application. The levitation effect is maintained for up to 15 minutes in case of a power failure, does not require separate control technology and does not heat up surfaces or levitation modules.

Press Images



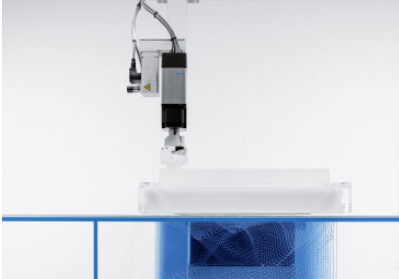
Festo SupraMotion 2024

SupraMotion 2024: Opening, closing, filling and weighing in the cleanroom.



Festo SupraMotion 2024: Entering Clean Room

The contactless levitation module of SupraMotion moves the freeze-dry container into a symbolized clean room.



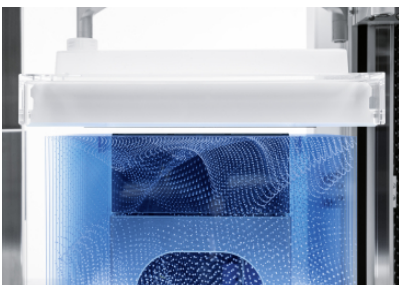
Festo SupraMotion 2024: Decapping

A compact EHMD rotary gripper module opens the screw cap of the container.



Festo SupraMotion 2024: Filling

Two VTOE dosing heads fill the container with liquid.



Festo SupraMotion 2024: Levitation Gap

The magnetic forces between the superconductor and the carrier on which the containers are transported allow levitation heights of 10 millimeters and more.