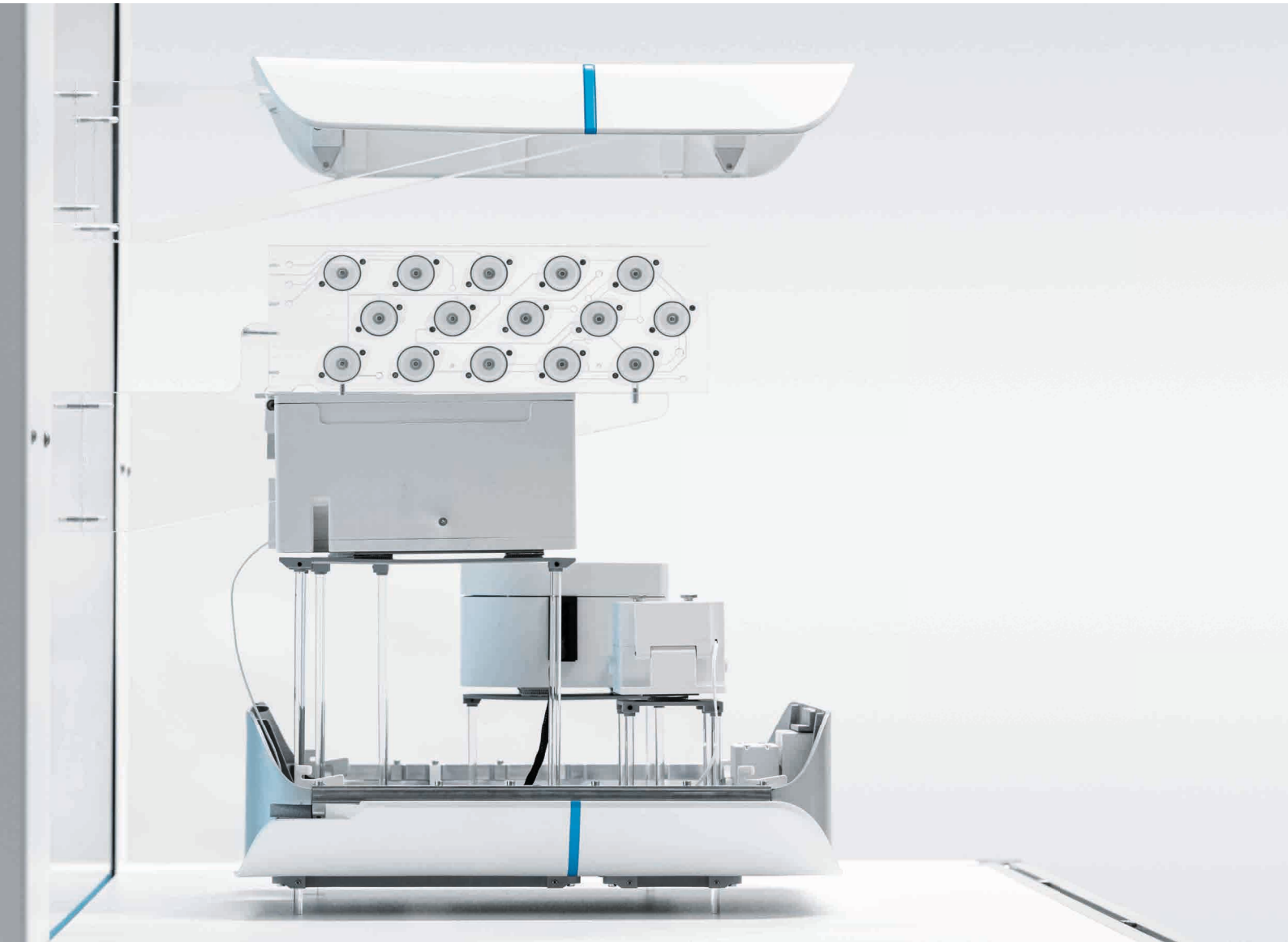


Next-Gen Life Science Automation

Personalized Cell Therapy for Cancer Treatment

FESTO



Automation for a world in motion.

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Personalized Cell Therapy for Cancer Treatment

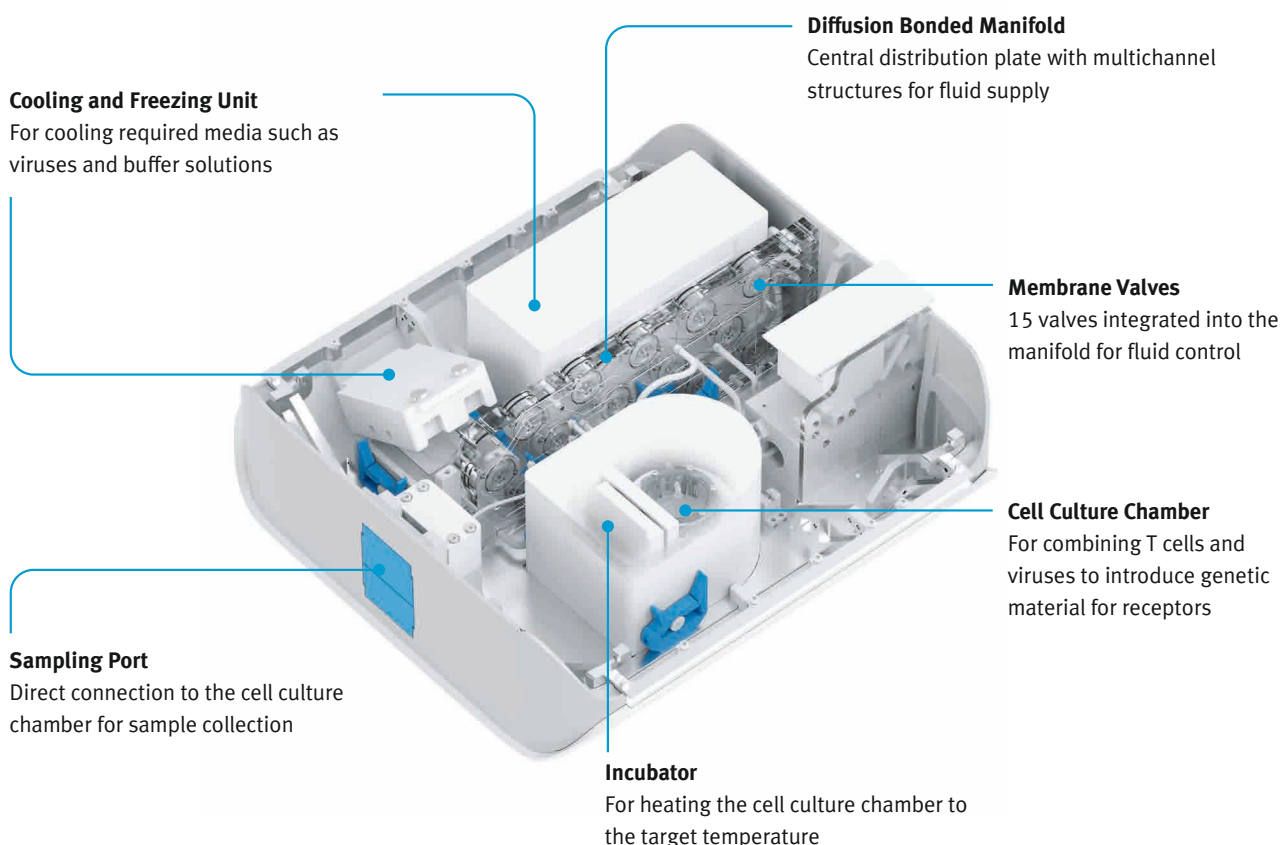
As part of its Next-Gen Life Science Automation, Festo is researching new solutions for medical technology and laboratory automation. The exhibit shows the structure of a cassette for the cell modification step in the CAR-T cell therapy process, which uses Festo automation components.

Cancer remains one of the biggest challenges in medicine. Tumors vary biologically, so standardized treatments are not always effective. A medicine that helps one patient might not have much of an effect for another.

An alternative approach is CAR-T cell therapy. “CAR” stands for chimeric antigen receptors, and the therapies have a personalized approach: The patient’s own immune cells – “T cells” – are taken, modified, expanded, and returned so that the immune system can fight the cancer cells itself. This individualized approach to treatment offers higher effectiveness and fewer side effects. What’s more, the therapy is only needed once.

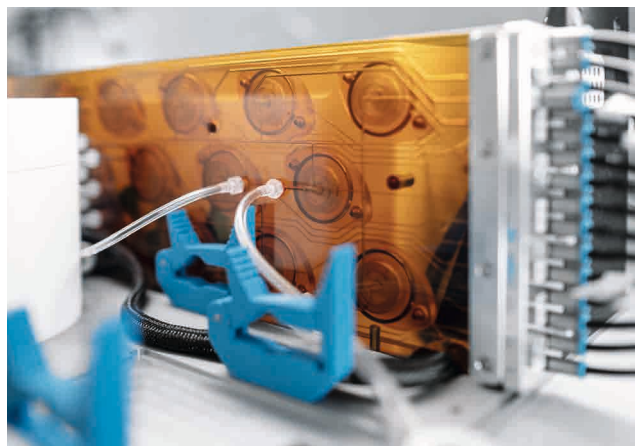
However, it only has limited availability due to its complexity and manual production. For this reason, the Fraunhofer Institute for Manufacturing Engineering and Automation IPA, with the help of Festo technology, has developed an automation concept for small, decentralized production systems for processing immune cells.

These modular mini-factories could, for example, be deployed at university hospitals, operate largely autonomously, and require minimal specialist staff. Thanks to automation, the production times and costs are significantly reduced, making CAR-T cell therapies faster, cheaper, and available for more patients.





Fraunhofer IPA, using Festo technology, has developed an automation concept for the cassette used for cell modification.



The Diffusion Bonded Manifold from Festo with integrated valves ensures precise fluid transport in a highly compact space.

The mini-factories consist of various modules through which the cassettes pass step by step. A cassette is required for each patient at every step of the therapy, with the T cells undergoing the necessary processing in each cassette. In the cassette used for the cell modification step, automation components from Festo ensure precise fluid transport in an extremely compact space.

The cassette holds a self-contained and sterile fluid system with all the elements necessary for modifying the cells. The elements themselves are passive and are operated externally when the cassette is inserted into one of the mini-factory modules.

In the cell culture chamber, the T cells are brought into contact with viruses which introduce genetic material containing the blueprint for the CAR receptors. Through this, the T cells produce special CAR receptors and become CAR-T cells.

For that to happen, the various media must be dosed into the cell culture chamber with precision, mixed in it, and brought to the required temperature. The fluid transport is performed by a Diffusion Bonded Manifold from Festo. The distribution block contains a channel system and connects all sections of the cassette through it. There are valves integrated into the manifold, and these valves are operated externally through control air to establish a connection between the individual elements.

Fluid is moved by pushing and pulling with compressed air or vacuum. Thanks to intelligently controlled compressed air, even the smallest volumes can be dosed with precision and transported inside the cassette – all in an extremely compact space. To use the cassette for other patients afterward, only the elements that were in contact with cells and viruses need to be exchanged. The system is designed so that this can be done in just a few steps without the need for a clean room.



Festo – Your Automation Partner for Life Sciences

With its flexible automation solutions, Festo supports the translation of innovative therapies into clinical practice and provides cutting-edge biotechnology right where it is needed. We offer an extensive catalog portfolio and also develop customer-specific solutions for laboratories, diagnostic applications, and bioprocess applications, ranging from precise fluid and gas dosing to scalable, modular systems. With our portfolio of pneumatic, electrical, software, and AI products, we work together with customers to achieve the perfect, seamless automation solution.

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Diffusion Bonded Manifolds

Diffusion Bonded Manifolds combine precise channel structures, a contamination-free connection of the individual layers, and a compact design. This is made possible by HADB (High Accuracy Diffusion Bonding) technology, which is used to manufacture acrylic and Ultem manifold duct plates with the highest precision.



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