

Diffusion Bonded Manifolds: Precise Fluidic Solutions for Laboratory and Medical Technology

Thermoplastic plates with multichannel structures for customized applications with limited installation space

Compact, custom distribution plates for precise fluid control: Diffusion bonded manifolds enable tailored, contamination-free fluidic solutions through an adhesive-free joining process. The technology complements existing standard components and is aimed especially at applications in medical technology, diagnostics, laboratory automation and food analysis.

Since acquiring the technology from the UK company Carville in 2024, Festo's product portfolio has included diffusion bonded manifolds. Manifolds produced by this method are particularly suitable for custom solutions where space is limited, and gases or liquids must be distributed without contamination. They provide a technical alternative to conventionally hoseconnected or machined fluidic assemblies.

Advantages and key features of the technology:

- High integration density: Multichannel structures in a small footprint with minimal dead volume enable compact and efficient system designs.
- Compatibility with other components: Bonded manifolds can be combined with mediaseparated Festo valves such as VYKA, VYKB and VYKC and with other standard components to create functionally integrated fluidic modules. This reduces assembly effort and the number of external hose connections.
- Process reliability: Precisely manufactured channels and fewer sealing interfaces increase reliability and improve cleanability.
- Customizability: Individual, complex channel and 3D geometries as well as interfaces can be developed projectspecifically, enabling easy integration into customer systems.
- Manufacturing method: Diffusion bonding is an adhesivefree joining process that fuses multiple plastic layers into a dense, multilayer channel block with high precision. The process reduces potential leak points and enables reproducible, compact channel geometries.
- Materials: Typical materials include highly transparent or highperformance engineering plastics such as PMMA (acrylic) and PEI (Utem).

Relevant industries and typical applications

- Medical technology and laboratory automation: Pointofcare devices, sample preparation, dialysis systems, reagent management, distribution and switching functions in analytical instruments.

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- Diagnostics and life sciences: Labonachip, assay and liquidhandling automation, sample distribution in analytical systems.
- Semiconductor, food and chemical industries: Applications that require compact, sealed fluid interfaces and reproducible flow control.
- In addition to transporting liquids and gases, there are application possibilities for compressed air when lightweight, compact solutions are required—for example in endofarm tooling.

Customer application: drug testing

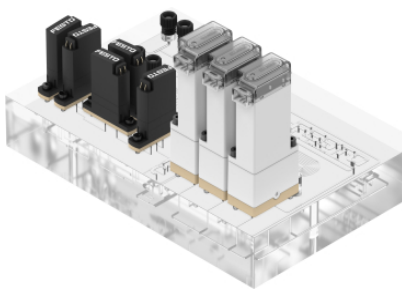
Cellbox Labs from Latvia uses Festo's bonded manifolds for developing technology to enable automated, more human-like compound screening to test drugs for their efficiency and toxicity. In combination with single-use cell cartridges, the distribution blocks enable precise control of fluid supply. "Festo's manifolds provide us with seamless, contamination-free fluid handling that is crucial to the accuracy and efficiency of our instrumentation," says Roberts Rimša, CTO of Cellbox Labs.

Festo as a partner for custom life science solutions

In addition to a comprehensive catalog portfolio, Festo develops a wide range of custom automation solutions precisely tailored to the requirements of laboratories, diagnostics and bioprocess applications: from precise liquid and gas dosing to scalable, modular systems. Using its product portfolio in pneumatics, electrics, software and AI, Festo experts work together with customers to develop the ideal Seamless Automation solution.

Customers benefit from deep application knowhow, coengineering and validated subsystems that shorten timetomarket and improve the quality of customer applications.

Festo provides reliable global supply chains, industry expertise and certified quality to meet requirements such as precision, cleanroom compatibility and compliance. Further information: [Customized solutions for life science | Festo DE](#)



Diffusion Bonded Manifold

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