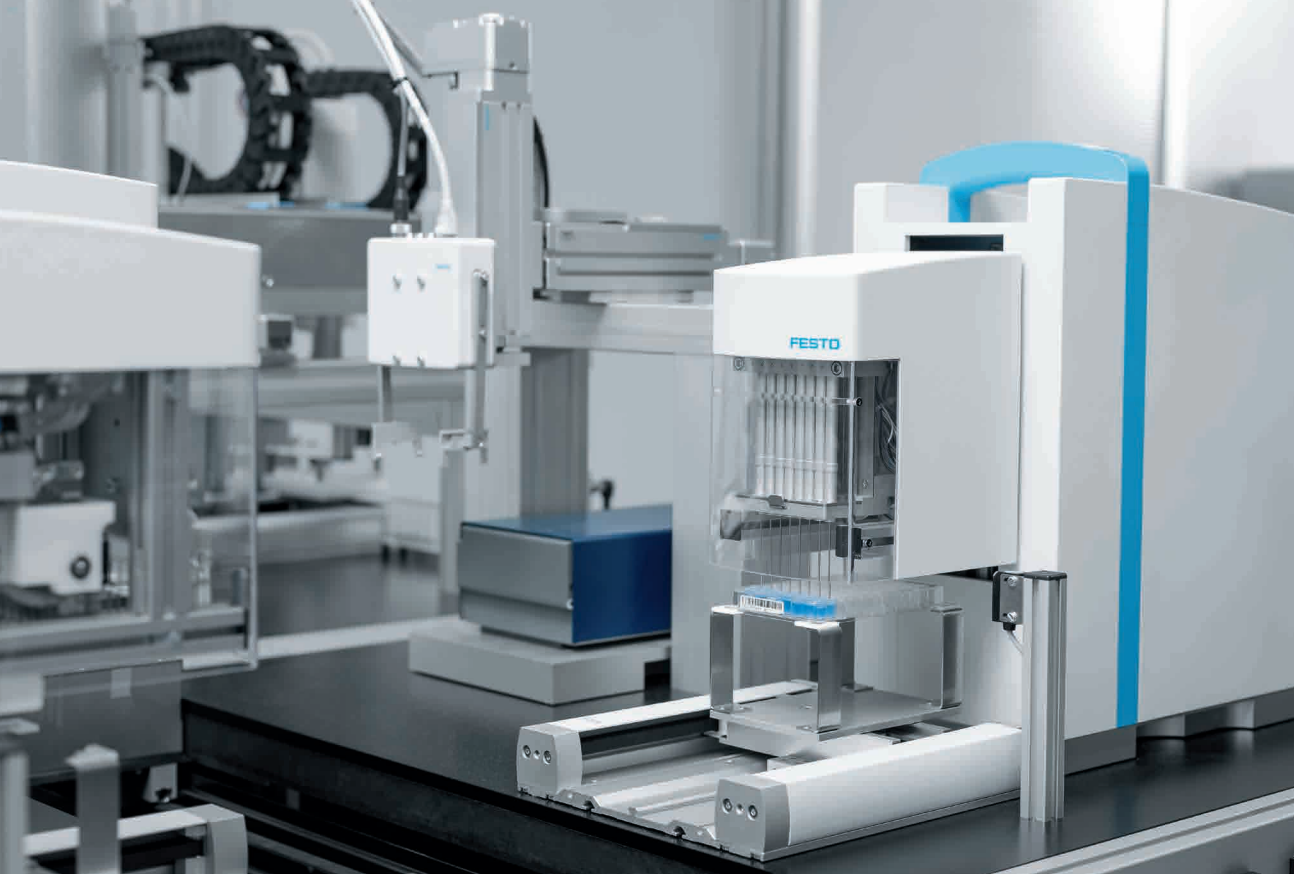


# Automation of laboratory processes

**FESTO**





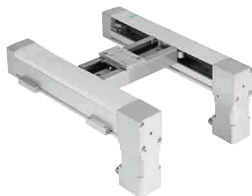
You need random access and batch analyses.  
You want reliable error-free processes.  
We make your laboratory processes faster and more precise.

→ WE ARE THE ENGINEERS  
OF PRODUCTIVITY.

Our  
variety

Your  
choice

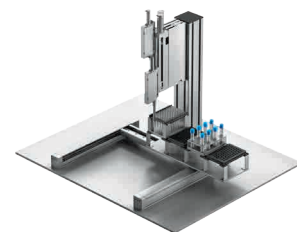
## Components



### Combine products into ready-to-install solutions

Customer-specific, ready-to-install solutions for liquid handling applications can be implemented simply and reliably with the planar surface gantry EXCM and the modular dosing system VTOA.

## Modules



### Automating individual workflows

Automation maximises throughput and minimises sources of error especially for manual processes that must be performed every day, such as opening or closing sample vials.

### Advantages in sample processing: automated solutions for every function

Transporting samples, identifying and qualifying, pipetting and dispensing fluids or equipping centrifuges, with customised automation concepts from Festo you can significantly boost your productivity and safety in each step of the analysis process. That enables laboratories to process far more samples in the same time. We offer you solutions in all areas of sample analysis, from pre-analysis with sample preparation to the actual analysis process with applications like dispensing, extraction, washing, incubating, right up to storing the sample carriers for post-analysis. For the best possible results, we also integrate third-party components and devices.

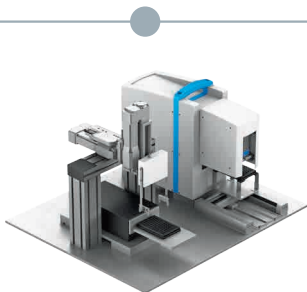
### You determine the level of automation

Your customers have different requirements and budgets reaching different levels of automation in their laboratories. Festo's concepts enable you to adapt your solutions flexibly and gradually to the requirements of the laboratory operator – from automating an individual process step to linking complex individual processes. Standardization, tracability, reproducibility and high process quality are always guaranteed.

#### The benefits at a glance:

- The level of automation can be adapted flexibly
- Clear interfaces for rapid integration
- Pre-assembled, tested modules via a single order number
- Perfectly matched components

## Module chains



#### Link steps automatically

Linking steps within a process reduces the workload of laboratory staff as the samples are transported automatically from module to module.

## Platform

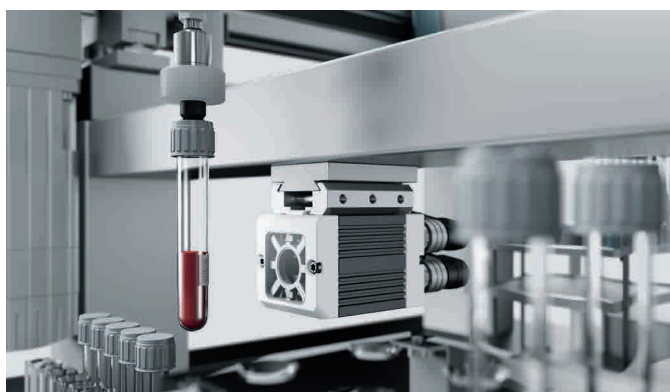
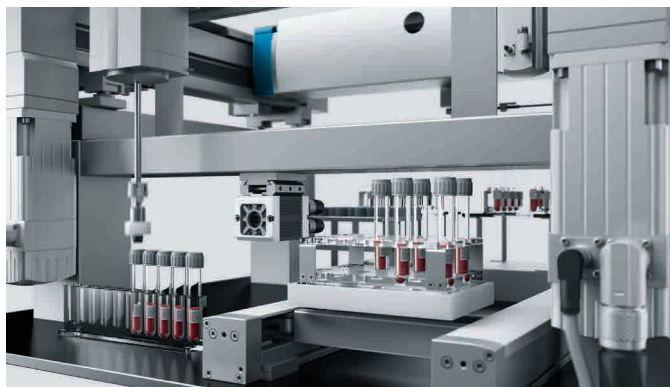


#### Automate subprocesses precisely

The platform integrates module chains in one housing, optionally with sub-controller and interface software. This is the basic concept design for "sample to result" approach. In addition, it makes processes verifiable and simplifies tracing.

# Automation solutions for all areas of sample analysis

## Pre-analysis

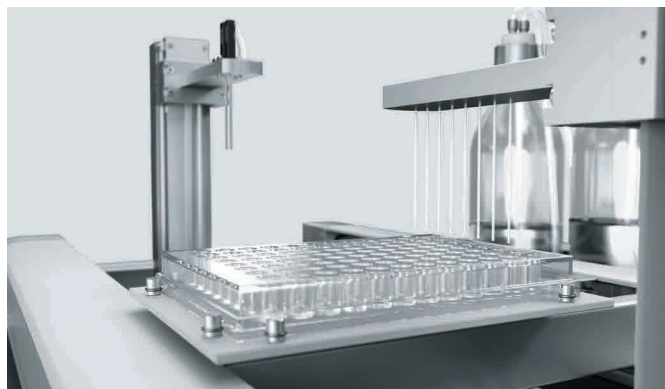


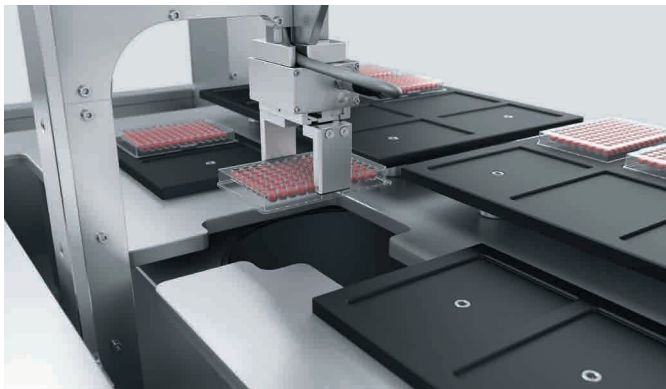
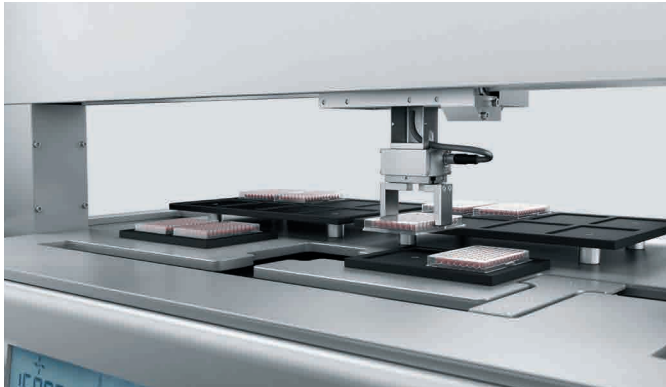
### Identification and evaluation

The reliable identification and assessment of the samples are the starting points of every analysis (positive ID). This can be carried out by using a simple barcode reader or a vision system qualifying the condition of the samples. Depending on the different vials and tubes 1D or 2D barcodes need to be identified. A gripping system can take individual tubes in front of the barcode scanner or a specific 2D barcode reader is installed able to read the 2D barcodes on the bottom of the vials. Motion and positioning of vials and racks are performed with absolute precision and reliability.

### Dispensing and pipetting

Reliability and precision are key when handling liquids in laboratories to ensure the results of the analysis are correct. If you combine a modular dosing system with a matching handling system, it can be perfectly adapted to the specific requirements. It is ideal for high-precision dispensing and pipetting, individually or in series, with various fluids and fill levels. The ability to dispense and move tools in parallel saves times as two process steps are carried out simultaneously.





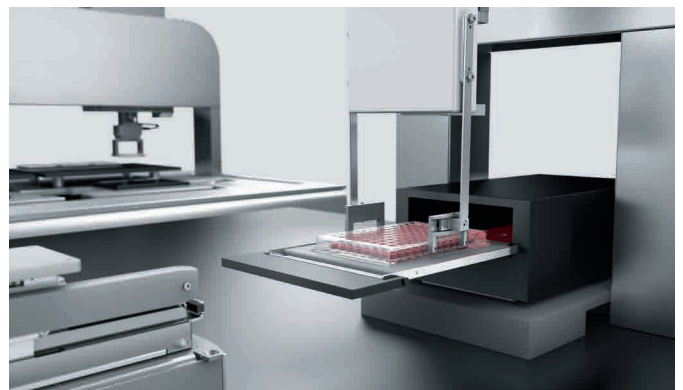
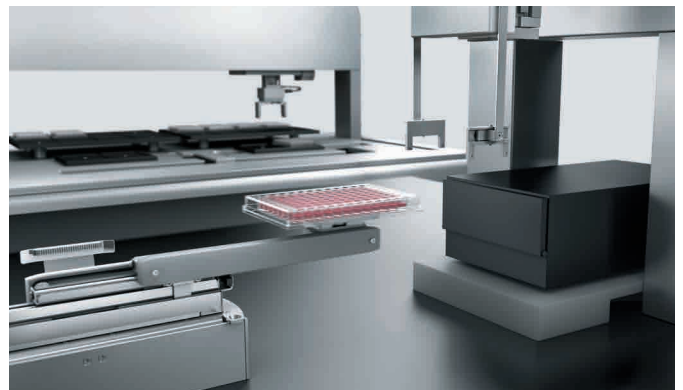
### Centrifuging

For a variety of samples centrifugation is necessary as a special sample preparation including even loading and unloading of centrifuge hangers and well plates into laboratory centrifuges. An automatic loading system guarantees precise positioning and safe handling for accurate centrifugation. Third-party components are easy to integrate.

## Analysis

### Incubation and shaking

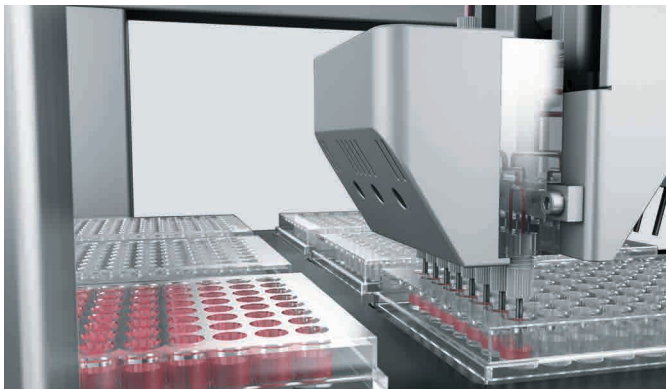
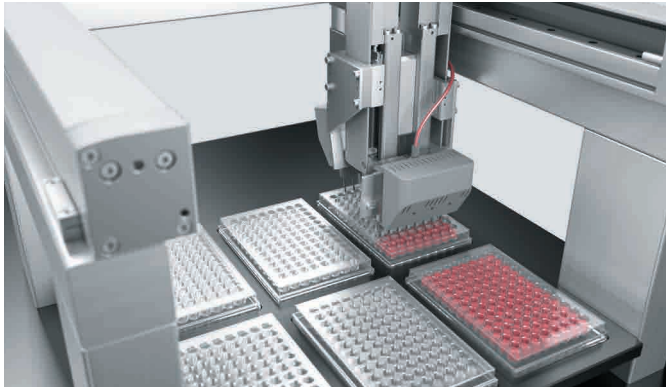
Incubation, with or without shaking, at a prescribed, constantly maintained temperature in an incubator is a key step in many analytical processes. These processes are fully automated by linking individual modules.



## Post-analysis

### Storage

Smart and well designed automated processes need optimized solutions for transporting and storing sample racks and other carriers like well plates or petridishes. This is carried out by a cross-module transport system, while a gripper unit places the carriers in the designated positions of the storage systems. Depending on the storage unit, different quantities can be stored. This application also makes it easy to integrate third-party devices (devices and solutions from different providers).



### Aspirating and dispensing

In various applications, i.e. cell cultivation, different cell growth media need to be supplied for the optimal cultivation. Depending on the cell type, the media is added and dosed at different pressures. When the medium is changed, the residual volume in the individual wells in the cell culture plates is aspirated. This requires precise control of both the vacuum and the position of the aspiration needles to prevent damage to the cell layer and avoid the cells being sucked away too. This is taken care of by single- or multi-channel dispensing heads which can dose different media. The pressure and vacuum of the dispensing and aspiration units is controlled using variable pressure and vacuum control units based on Festo's piezo technology.

## Making laboratory processes more effective together: collaborative engineering projects with Festo

Developing solutions which enable laboratories to work even more productively, reliably and cost-effectively in the future. To achieve this, use the engineering competency from Festo right from the planning phase. We transform individual and validated process steps into automated process sequences which can be perfectly integrated in your overall systems. Together we can create efficient automation solutions which offer you and your customers maximum added value.

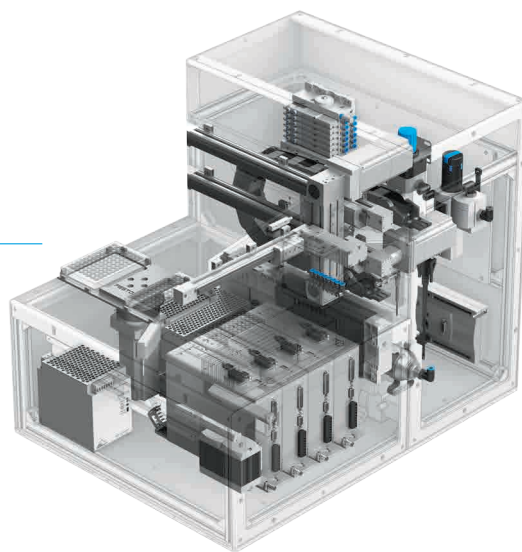
# Simple and complete: everything for laboratory automation from a single source

Rely on automation concepts where everything matches perfectly – with hardware, software and services from a single source. Our support ranges from design to collaborative engineering projects, right up to hardware consultation. That allows you to implement pioneering laboratory solutions for your customers much faster and much more cost effectively. We are happy to provide our partners with after sales services or training.



## Kinematics

The highly dynamic mechanical systems with integrated energy chains are available in numerous sizes and stroke ranges – as pneumatic, electric or hybrid systems.



## Front unit

Gripping or dispensing – you can choose the right component in line with the requirements and the process steps.



## Vision systems

Intelligent compact vision systems facilitate optimum quality inspection and identification.



## Control

Control your systems centrally from one location or decentrally with or without a control cabinet.



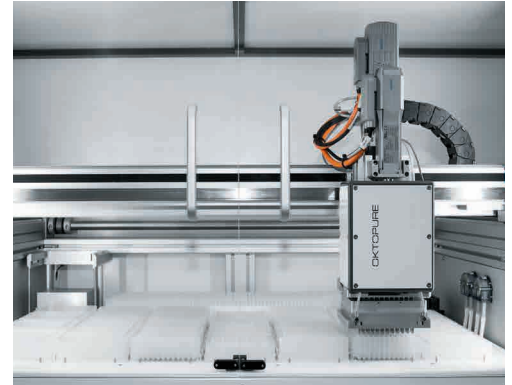
## Service

Our experts support you as equipment manufacturers with your handling systems – from the design to collaborative engineering, all the way to consultation about hardware and the interfaces.

## Platform solutions in practice

"The fact that Festo was able to offer us a complete package of hardware, software, consultation and services was the key to our decision."

Dr. Dietrich Köster, Product Manager, LGC



### **oKtopure – fully automated DNA extraction**

The oKtopure DNA extraction robot from LGC Genomics in England is one example of successful laboratory automation. This high-tech platform accelerates cultivation programmes and many other molecular biology processes thanks to standardised DNA extraction from plant leaf and seed tissue, animal tissue, hair and blood. 8 x 96 deepwell plates can be purified simultaneously. This means that up to 5000 samples can be processed every day. For such a high level of automation, Festo developed a new handling system in close cooperation with LGC. The three-dimensional gantry for liquid handling from Festo is supplied as a complete system; the drive and controller package is pre-parameterised. [www.lgcgroup.com](http://www.lgcgroup.com)



"Festo supplied us with a complete system solution including controllers. That was what actually enabled us to develop the system so quickly."

Project manager Dipl.-Ing. Markus Schöllauf,  
Automation and Robotics Division at  
Anton Paar GmbH

### **Modular sample processor – automated sample preparation**

Anton Paar GmbH's Modular Sample Processor is a system for preparing samples, such as for chromatographic analysis with high-pressure throughput. The compact "benchtop platform", which can be used as a table-top device or integrated in the plant, prepares samples from a few to 100 millilitres, making it ideal for petrochemicals, foodstuffs or fragrances. It makes complex manual work prior to analysis, such as pipetting, sampling, dosing and weighing over a great volume range and many different sample types, a thing of the past. The samples are then tested, for example for their water content, density, viscosity, suspended particles or pH value.

Compact handling gantries with electric axes from Festo ensure precise pipetting processes. Integrated vision systems as barcode readers record the data matrix code, so that the samples can be attributed. Cylinders dispose of the pipette used. Engineers from Festo's Medical Technology and Laboratory Automation division were also responsible for developing the dispensing head.

To find out more, go to: → [www.festo.com/lab](http://www.festo.com/lab)