Liquid handling
with modular dosing system
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.

Making laboratory processes more effective together – with joint engineering processes from Festo
When you develop solutions that enable laboratories to be even more productive, reliable and cost effective in the future, it pays to use the engineering competency from Festo in the earliest planning phase. We transform individual and validated process steps into automated process sequences which can be perfectly integrated into your overall systems. Together we can create efficient automation solutions which offer you and your customers maximum added value.

High-precision dosing and transportation tasks with ready-to-install systems from a single source
Reliability, precision and compact dimensions are key when handling liquids in laboratories. Festo offers all that – and much more. Our modular dosing system can be adapted perfectly to your specific requirements. Combining this with our handling system creates a ready-to-install solution which simplifies planning and increases productivity. As an innovative and reliable partner, we develop, test and deliver all system modules for you.
Increase your advantage in laboratory automation with our compact, precise and seamlessly integrated function units which combine the best of pneumatic and electric components.

Liquid handling – with integrated technology from Festo

More information at:
www.festo.com/liquidhandling
Dosing with up to 12 dispense heads, different fluids and aliquot volumes – the modular Festo dosing system gives you lots of options. Festo components as well as third-party components by renowned manufacturers ensure maximum quality.

Compact, flexible and highly precise dispense head

The advantages of the dispense heads at a glance:
- Compact 9 mm grid, individual stacking dimensions > 9 mm available on request
- Maximum dosing precision with typical CV < 1% in the range from 10 to 1000 µl
- Maximum flexibility
- Ideal for dosing applications
- Small internal volume makes it easy to rinse

Typical applications:
- Producing dilutions
- Adding nutrient solutions
- Dosing reagents

Different materials for a range of applications
The dispense head VTOE comes in two different variants, with a manifold made from polycarbonate (PC) and with a manifold made from PEEK. Both variants offer three different nozzles with three different internal diameters as standard. Both use 24 V. PEEK and PC can be mounted in the same grid.

High-quality: PEEK
- Ideal for applications involving aggressive media
- Parts that come into contact with fluids are made from PEEK, stainless steel and FFPM

Transparent: polycarbonate
- The transparent version permits visual inspection of the channels
- Parts that come into contact with fluids are made from PEEK, stainless steel, PC, FPM and PPS

Technical data

<table>
<thead>
<tr>
<th>Tubing connector</th>
<th>Outside diameter [mm]</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzles (made of stainless steel)</td>
<td>Length [mm]</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Internal diameter [mm]</td>
<td>0.32, 0.6 or 1.0</td>
</tr>
<tr>
<td>Valve</td>
<td>Nominal size [mm]</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>Switching time H₂O on/off [ms]</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Inlet pressure [bar]</td>
<td>0 – 0.5</td>
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<tr>
<td></td>
<td>Coil</td>
<td>24 V DC</td>
</tr>
<tr>
<td></td>
<td>Body material</td>
<td>PPS or PEEK</td>
</tr>
<tr>
<td></td>
<td>Seal</td>
<td>FPM or FFPM</td>
</tr>
<tr>
<td>Channel plate</td>
<td>Material</td>
<td>PC or PEEK</td>
</tr>
</tbody>
</table>
Flexible combinations for a multitude of applications

The single dispense head can be individually combined by either mounting it on a rail or a retaining plate – even with a stacking dimension of up to 9 mm for VTOE. Customised solutions for larger stacking dimensions as well as individual combinations of the six different variants of the VTOE are all possible.

Possible combinations
The dispense heads can be modularly mounted on a rail. This enables different fluids and aliquot volumes to be dosed in parallel.

Typical applications:
- Flexible stacking dimension
- Independent dosing of different fluids

8-channel dispense head with cover VTOE-8
The system is optimally suited for microplates and enables a very high throughput as well as dosing of various aliquot volumes and fluids. Individual control of the valves permits the channels to be coordinated for maximum precision. Easy connections thanks to sub-D plug.

Typical applications:
- Preparing samples
- Adding fluids to microplates

<table>
<thead>
<tr>
<th>Part numbers</th>
<th>Polycarbonate</th>
<th>0.32 mm</th>
<th>8063634</th>
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<tbody>
<tr>
<td>VTOE-8</td>
<td>Polycarbonate</td>
<td>0.32 mm</td>
<td>8063634</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.60 mm</td>
<td>8063635</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.00 mm</td>
<td>8063636</td>
</tr>
<tr>
<td>PEEK</td>
<td>0.32 mm</td>
<td>8063372</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.60 mm</td>
<td>8063373</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00 mm</td>
<td>8063374</td>
<td></td>
</tr>
</tbody>
</table>

Note: Please specify the part number if you have any queries about the dispense heads.
The dispense head VTOE offers excellent precision and enables a multitude of specific dosing volumes as a function of pressure and opening time for maximum flexibility.

**High linearity**
The precision of the dispense heads is indicated by a typical variation coefficient of < 1% in the range from 10 to 1000 µl and a very high linearity.

**Measurement conditions:**
- 250 mbar
- Room temperature 23 °C
- Aqueous solution
- 24 V without reduction of holding current

**Results of the gravimetric test**
The dosed volume is the result of the combination of pressure and pulse time, i.e. how long 24 V was applied to the valve. The lines show the gradient, e.g. at a pressure of 150 mbar and appropriately set opening times. If you increase the pressure, the dosed volume increases. The dots correspond to the average of multiple measurements.

**Wide variety – realistically calculated**
These characteristic values show what the typical behaviour might look like under laboratory conditions. The values between the individual points can also be calculated in this way. The VTOE can thus be entirely configured to meet your needs.

**Measurement conditions:**
- VTOE with nozzle internal diameter 0.6 mm
- 24 V
- 150, 200, 300, 400 mbar
- Aqueous solution
The electrically controlled planar surface gantry allows loads of up to several hundred grams to be moved precisely and reliably. It covers a maximum working space of 360 by 700 millimetres. An electric axis EGSK or EGSC with strokes of up to 100 mm is used for the Z movement. The dispense head is mounted on the axis. The system is rounded off by stepper motors, motor controllers and a multi-axis controller.

Two different solutions, one goal: maximum productivity

Fluids with different viscosities are dispensed with a single-channel dispense head by moving the microplate. The planar surface gantry EXCM moves the microplate in the X-Y direction. The single-channel dispense head is fixed and mounted on an electric axis EGSK for the Z movement.

Even different fluids with different viscosities can be dispensed in parallel with an 8-channel dispense head by moving the dispense head. The planar surface gantry EXCM moves the 8-channel dispense head, mounted on an electric axis EGSK, from column to column. The microplate is positioned underneath.
The right handling system paves the way for a complete function unit

Festo offers ready-to-install handling systems for your dosing solution, for handling and transporting vials and sample carrier systems. Our complex, pre-mounted assemblies simplify your tasks. We make your development work easier by selecting suitable components and pre-mounted assemblies for handling and liquid systems.

Handling and controlling

**Mini-slides EGSC**
- Size 25, 32
- Stroke lengths 25, 50, 75, 100 mm
- Spindle axis with ball screw guide

**Stepper motor EMMS-ST**
- Size 28, 42, 57
- Holding torque 0.09 ... 1.4 Nm
- Voltage 24 ... 72 V DC

**Controller CECC**
- Compact controller with 400 MHz processor
- CODESYS provided by Festo
- 12 digital inputs
- 8 digital outputs
- Interfaces: USB, CANopen, Ethernet, etc.

**Planar surface gantries EXCM-30**
- Electrically controlled by stepper motors
- X-stroke: max. 700 mm
- Y-stroke: max. 360 mm
- Perfectly matched drive and controller packages
- Max. payload 3 kg

**Motor controller CMMO-ST**
- Voltage 24 V DC
- Nominal current 5 A
- Closed-loop servo controller for stepper motors

Fluid control

**Pressure and vacuum sensors SDES**
- Different pressure ranges –1 ... 10 bar
- Switching status indication
- Freely programmable
- Adjustable switching point

**Proportional pressure regulating valve VPPM**
- With IO-Link and I-Port technology
- Short and standardised cycle times
- Different pressure ranges 0.02 – 10 bar
- Flow rate 380 – 7000 l/min

**Proportional pressure regulating valve VEAB**
- Pressure regulation range –1 to 6 in different gradations
- Noiseless
- Long service life > 200 million setpoint changes
- Flow rate up to 20 l/min

**Proportional pressure regulating valve VEMA**
- Eight independently controlled precision pressure channels
- Very small installation space
- Central vacuum and pressure supply
- Easy actuation via CAN bus

Available on request:
Third-party components by renowned manufacturers seamlessly integrated in your function unit.

www.festo.com