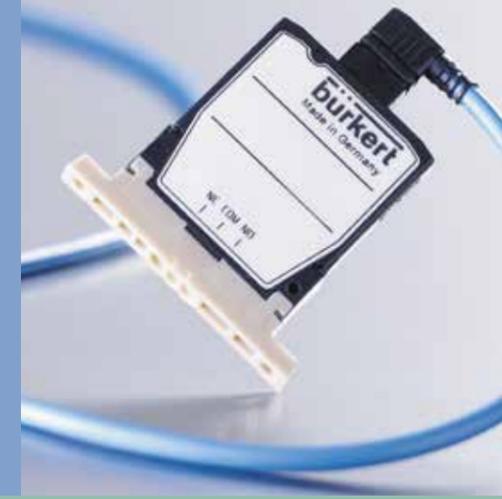


**bürkert**  
FLUID CONTROL SYSTEMS



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# Product Overview MicroFluidics

**Bürkert Fluid Control Systems**  
Christian-Bürkert-Straße 13-17  
74653 Ingelfingen  
Germany  
Tel. +49 (0) 7940/10-0  
Fax +49 (0) 7940/10-91 204  
info@burkert.com  
www.burkert.com

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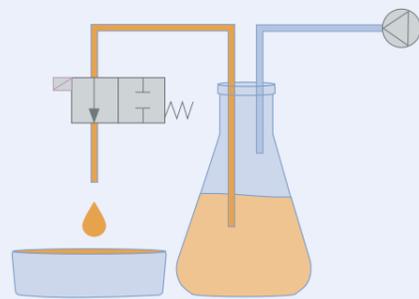
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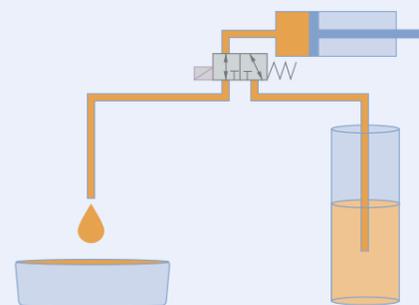
## Accuracy, Precision and Timing

These are the criteria for reliable dosing. But how is accuracy, precision and timing achieved? There are several dosing principles in microfluidics, each with its own strengths and advantages. Knowing these strengths and the differences between each dosing principle is crucial in finding the correct one for your application. Follow our overview – we answer all your questions on dosing in microfluidics.

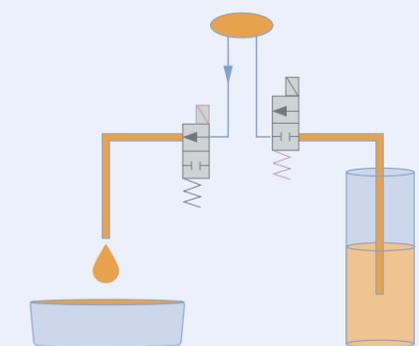
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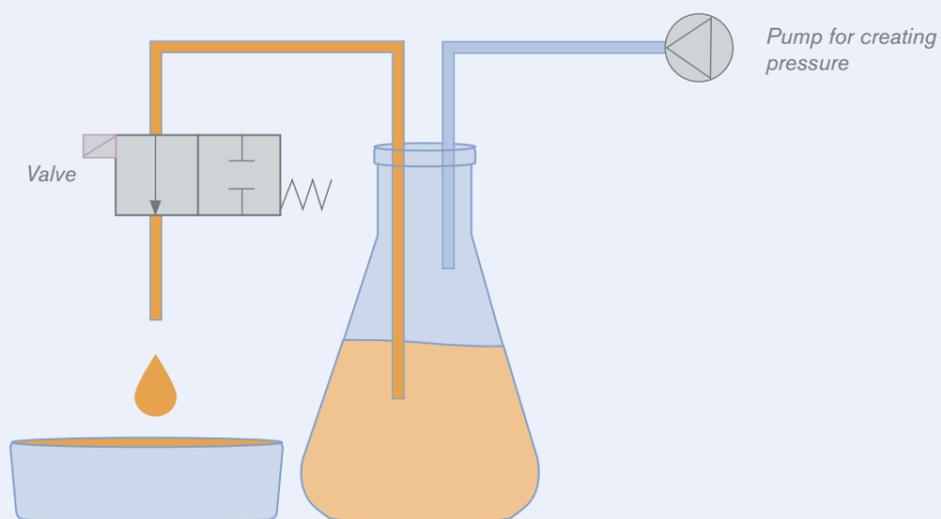


## Time-Pressure Dosing

In time-pressure dosing the medium is stored in a pressurised tank and is carried through a valve to the dosing needle. Parameters such as tank pressure, flow resistance, product viscosity, and temperature of the medium are carefully controlled. The valve controls the flow of the medium by either opening or closing the stream of flow for a defined amount of time per switching cycle. Since the medium is driven by air pressure instead of a pumping mechanism, the process does not contain any mechanical moving parts in the stream of the medium.

High dosing velocity is combined with high dosing accuracy while also maintaining a high repeatability and reproducibility (low CV - coefficient of variation). Time-pressure dosing provides a degree of freedom as dosing amounts are individually adjustable. This is a great process for continuous dosing as required in applications such as process filling or vending.

Bürkert provides a wide range of products perfect for time-pressure dosing. With fast switching, low internal volume, excellent flushability, extremely high life cycle, and compact size, Bürkert valves are essential to any dosing application. Besides individual products, Bürkert has the know-how and experience in system solutions custom to any unique process. Let us support you in developing a customised system solution that completes your entire time-pressure dosing process.



## Applications using Time-Pressure Dosing

### Process Filling

Whether it's the production of pills, filling of contact lens solution or dosing of jelly on cookies, time-pressure dosing provides the value that counts in process filling.

- Accuracy for reliable production
- High repeatability for the exact same dose, each time
- Fast dosing for a high speed production process
- Dosing volume is adjustable with the time parameter, providing flexibility for an easy, fast and cost-effective retooling process.



### Vending

When it comes to your favourite drink, the exact combination of flavours is imperative.

- Precise mixing of flavour syrups in each drink
- High reproducibility so that each of your drinks tastes just as delicious as the first one
- Fast dosing so you can quench your thirst in seconds



### Lab Analysis

Fast and reliable results are essential for correct doctor treatment and patient safety.

- Precise and accurate dosing of reagents and samples even of microliter volumes
- High reproducibility for reliable and comparable results
- High speed dosing for fast analysis especially in emergency situations



## Products for Time-Pressure Dosing



### Type 6650 – Flipper valve

With a width of just 4.5 mm, Type 6650 sets new industry standards. Along with its compact design, the 6650's extremely fast and high-precision switching makes it ideal for dosing tasks in the microliter range (3 µl with CV of < 3 %). Further advantages of the valve are its capability to handle pressures up to 7 bar (101 psi) for more flexibility of use in various applications. With a service life of up to 200 million cycles at 4.5 bar, it gives you more reliability.



### Type 6712 – WhisperValve – plunger type with diaphragm

With its compact size (7mm width and 26 mm height), the media separated diaphragm valve Type 6712, WhisperValve, is ideal for integration in small, portable machines or on pipetting arms. Its low switching noise of <36 dB, allows for maximum concentration in the work place and optimal conditions for point-of-care applications. Fast switching guarantees precision dosing in any application. The low internal volume of only 5µl and excellent flushability, eliminates chance of cross contamination and guarantees reliable results.



### Type 6144 – Flipper valve

The medium separated Type 6144 has been designed for general purpose use and is especially suitable in pneumatic applications. Its compact form leaves you more room for your innovations. The valve boasts a particularly long service life of more than 500 million cycles for greater reliability. It can be applied in many different applications thanks to its ability to handle pressures of up to 10 bar (145 psi). It offers more options with an available latching version or with explosion protection type Ex-ia.

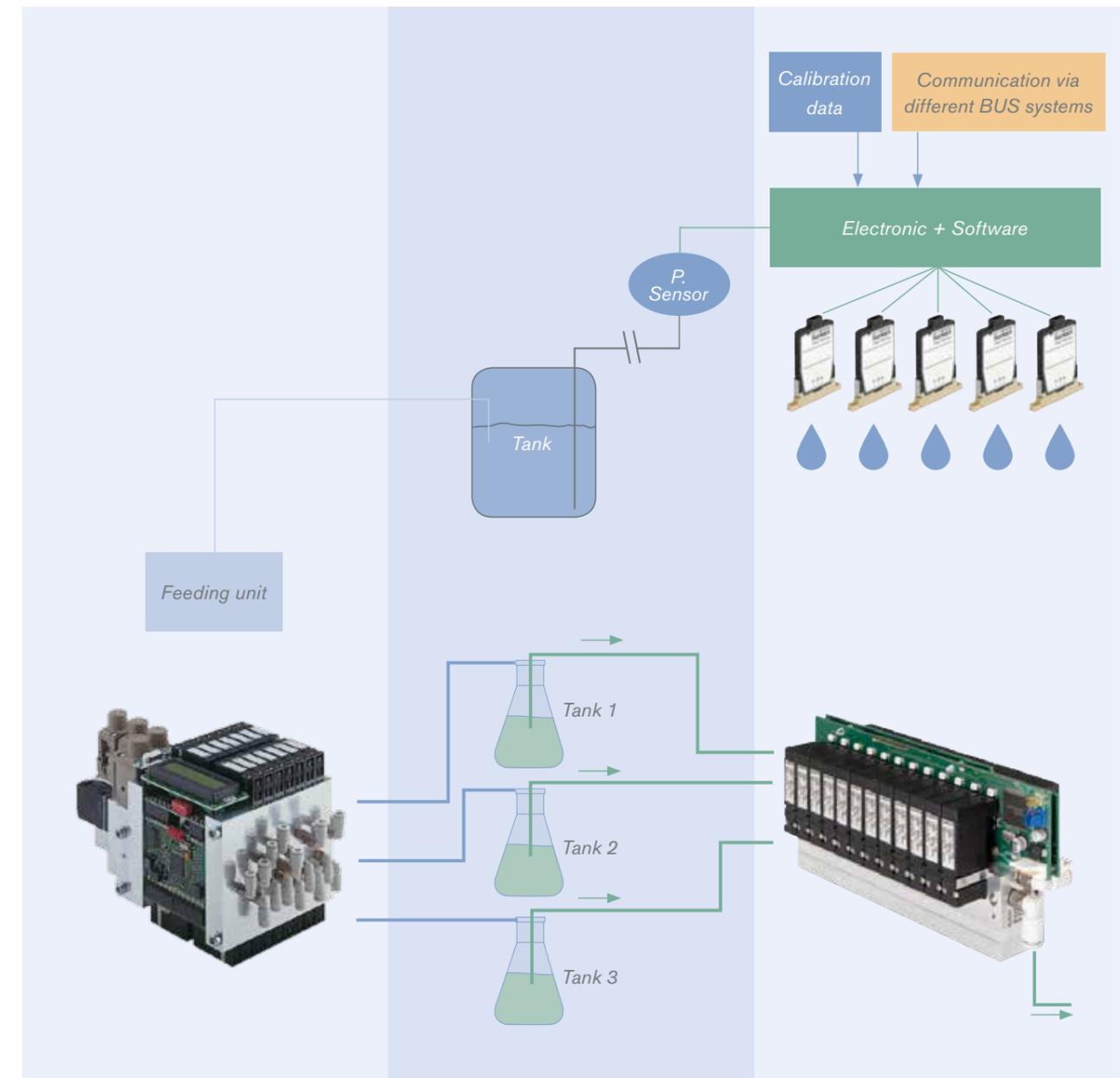


### Type 0331 – Pivoted armature valve

Type 0331 is especially suitable for the control of aggressive or waste media, which require a separation of medium and actuator. Depending on the orifice, the valve is suitable for pressures up to 16 bar (232 psi), and an orifice of up to 5 mm allows for high flow rates.

## Complete System Solutions for Time-Pressure Dosing

Beyond standard products, we design an entire process including components such as pressure control, calibration, and system communication. Bürkert's competence and knowledge in customised system solutions allow us to provide you with the complete dosing process from the feed to the dispensing systems. Let us develop your dosing process together with you and we will provide you with an entirely developed, manufactured, assembled and tested system customised to your unique application.

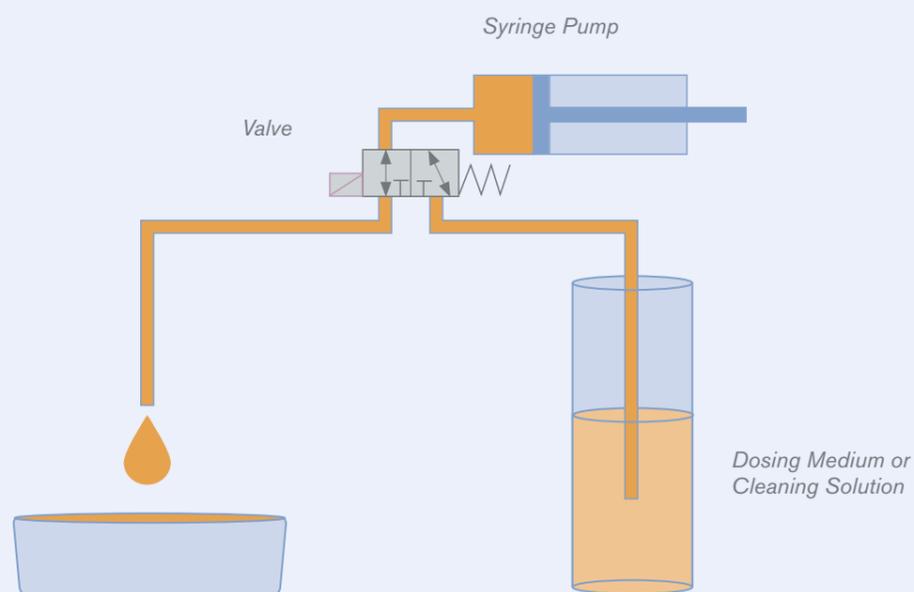


## Syringe Pump Dosing

Syringe pumps make the exact dosing of small, specific fluid volumes possible. With the motion of a piston inside of the pump cylinder, medium is taken in through suction and dispensed back again. This principle works discontinuously. The pump takes a certain amount of liquid in through suction and dispenses it through the same channel to a needle again.

If medium is to be dosed from a container to a cuvette, a 3/2-way valve, which opens both inlet and outlet, must be positioned before the pump. In this set-up, the medium flows through both the valve and the pump. The cleaning is done analogous to the dosing of the medium.

Bürkert's expertise in precision dosing with ultra-short response times, low internal volumes, chemically inert materials for unaltered test results as well as cross contamination free components and manifolds all aid in effective design of your lab automation devices. A wide range of micro valves with different valve principles, with or without media separation, is available and perfectly suitable for syringe pump dosing. The valves all have excellent flushing ability, which is very important since the medium flows through both the valve and the pump; any residue would impair the excellence of the dosing process.

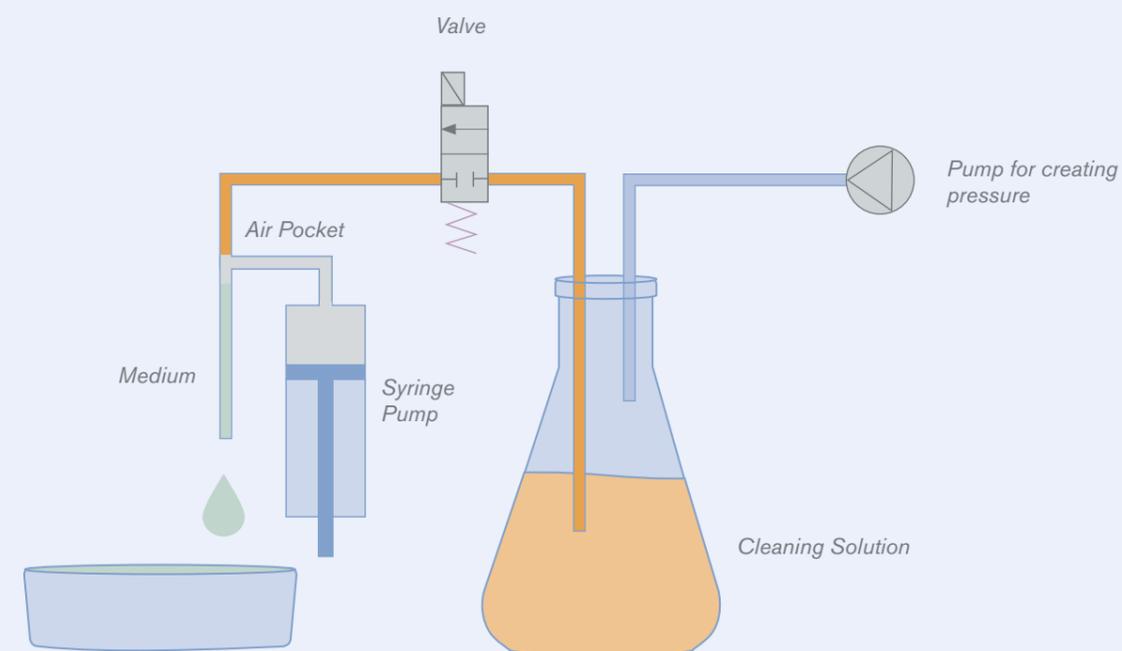


## Air Isolated Syringe Pump Dosing

This dosing principle also uses a syringe pump. However, the medium is not sucked into the pump, just into a dosing needle. This method is used above all in applications with very low dosing amounts. An isolating air pocket acting as a barrier is both in the syringe pump as well as in the inlet channel. The medium only comes into contact with the dosing tip, due to the isolating air pocket. This way, the risk of contamination is minimised. This principle makes an integrated cleaning of the dosing tip possible. After the medium is dosed, a valve opens the cleaning channel. The cleaning solution, which is stored under pressure, flows only through the dosing tip and the syringe pump remains free of liquids, even during the cleaning process, thanks to the isolating air pocket.

Blood, serum and urine analysis require expertise in sample and reagent handling, flushing and waste treatment. As your established partner, we can optimise integration of specific system solutions for mixing, distribution or dosing.

Bürkert customised system solutions and products have proven to be excellent process components in Air Isolated Syringe Pump Dosing. The cleaning process is perfected with both custom systems as well as media separated valves, supported by a range of chemically resistant materials.



## Applications using Syringe Pump Dosing



### In-Vitro Diagnostic

In-Vitro Diagnostic involves the testing of different parts of the blood and is the basis of physicians' therapies for patients like you and me. Syringe Pump Dosing:

- Fits the high automation of the analysis machines.
- Makes precise dosing of microliter fluid amounts possible.
- Fits the goal to reduce human interaction with the system to a minimum.
- Minimises the chance of contamination thanks to the air pocket in Air Isolated Syringe Pump Dosing, which requires only flushing of the dosing needle.



### Molecular Diagnostics

Patient therapy can also be determined and designed based on the results of molecular diagnostics. Molecular Diagnostics is the analysis of the human genetic code, used in areas such as prenatal testing, infectious disease detection and disease risk management. Syringe Pump Dosing:

- Guarantees precise control of reactants, testing samples, and cleaning solution to ensure accurate results.
- Is a dependable process for reliable testing and diagnosis with minimal chance of contamination.



## Products for Syringe Pump Dosing



### Type 6724 – Rocker WhisperValve

Type 6724 is the larger version of the WhisperValve Type 6712 (9 mm width, 43 mm height, and 1,2 mm orifice). A membrane separates the fluid chamber from the actuator and allows the use of aggressive media. With the nearly silent switching, it is perfect for the laboratory and medical applications providing a quiet environment at the patient's side. The low internal volume of 29 µl, excellent flushability and precision dosing guarantee reliable testing results.



### Type 0127 – Rocker valve

The pioneer of media-separated valves sets the standard in the field of laboratory, medical and analytical devices since 1993. This valve combines low internal volume for less unused fluid medium, with less chance of contamination thanks to its minimal dead volume. You have more flexibility with a large variety of port connections and materials.



### Type 6624 – TwinPower Rocker valve

The new TwinPower actuator enables a radical reduction in size and footprint, for more flexibility in positioning while saving space for your innovations, without compromise in performance. With only 10 mm pitch, our media-separated rocker valve comes along with 1.6 mm orifice and 2 bar (29 psi) pressure resistance – the same performance data as the traditional, larger 16 mm rocker valve.



### Type 6626 – TwinPower Rocker valve

The Type 6626 is the bigger counterpart of Type 6624, using the TwinPower actuator as well. With pressures ranging from vacuum to 2 bar (29 psi) and an orifice of 3 mm, this technology allows for a valve with only 16 mm in width increasing the size-to-performance ratio leaving you with more power and more space for your own innovations. An additional LED enables the status monitoring of the valve giving you more control and reliability.



### Type 6628 – Rocker valve

The 22 mm valve complements the TwinPower family by using the same fluidic design as the proven and reliable Type 0127. The established rocker technology is characterised through its reliable sealing of the valve seat with full back pressure tightness. Cross contamination is eliminated with its good rinsing capability, and the low internal volume maximises the use of medium. Type 6628 is available with different port connections, sealing and housing materials for adaptation to various applications.

## Complete System Solutions for Syringe Pump Dosing

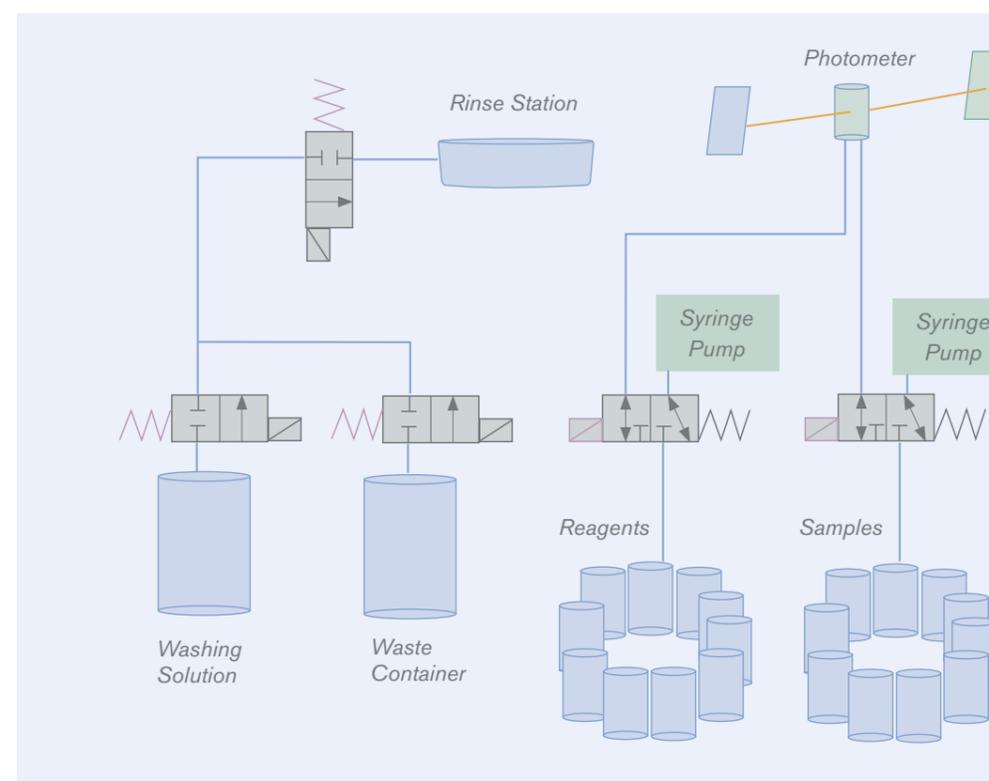
Bürkert's willingness to listen carefully and to respond by developing a solution in accordance with the exact requirements enables you to concentrate on your tasks.

For precise and reliable measurement, regulation and control of the flow rates in an analytical instrument, Bürkert developed a unique modular system. The used valves feature our rocker technology, which ensures not only a complete back pressure tightness, good flushability and a low internal volume, but also precise switching of micro volumes with minimal temperature rise through the coil.

An essential function in blood analysis is the detection and prevention of air bubbles, which can substantially corrupt the results of the analysis. Bürkert therefore avoided rough surfaces, dead zones and sharp edges in the design of the dosing unit. A special challenge was the customer's requirement for a transparent window for visual inspection, to be placed in front of the dosing unit and beneath the structure with the valves and pressure sensor. Bürkert developed an injection moulded part with a very high surface quality and no sharp edges in the area of the dosing unit.



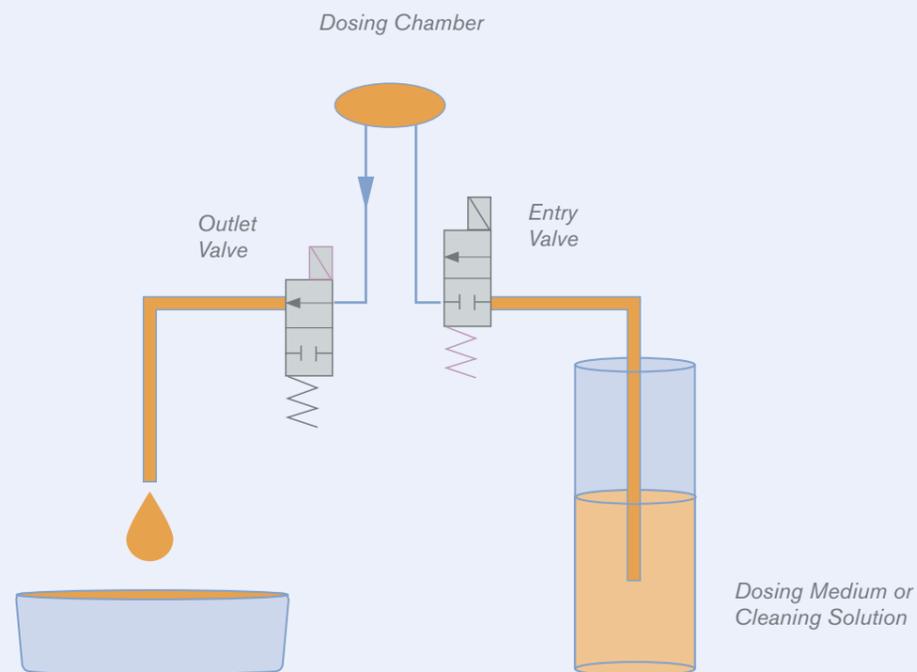
The new one-for-all dosing unit can now be used in more than one analysis device.



## Volumetric Dosing

In volumetric dosing, an accurately defined dosing amount is dispensed with each stroke of the pump. This individual stroke volume cannot be adjusted, however the number of strokes can vary the dosing amount. The principle is excellent for continuous dosing. A high dosing velocity makes volumetric dosing valuable in many applications such as Vending and Pharmaceutical Dosing.

Bürkert not only supplies valves perfectly suitable for volumetric dosing, but we also apply this dosing principle to several of our products, the micro pumps. Whether operated with pressure and vacuum or by integrated solenoid valves, Bürkert micro pumps integrate the entire volumetric dosing principle in a single compact product. Used for precision dosing in many applications, Bürkert products support your process with accuracy and reliability.



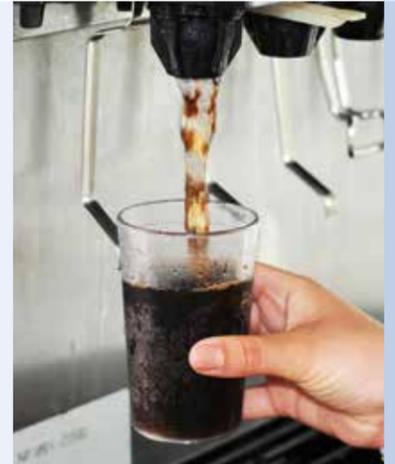
## Applications using Volumetric Dosing

### Vending

To achieve the perfect drink, even the smallest dose of flavour syrup can affect the taste. The accurate dosing and mixing of flavours is essential in vending.

Volumetric dosing:

- Enables the dosing of even the smallest fluid amount.
- Guarantees accurate dosing independent of the viscosity of the flavour syrup.
- Makes immediate dispensing possible with high speed dosing.



### Dosing of Adhesives & Lubricants

The dosing of adhesives and lubricants means dosing under a wide range of conditions such as different viscosities and temperatures of the medium.

Volumetric Dosing:

- Provides accuracy independent of medium viscosity and temperature.
- Guarantees reproducibility and repeatability of precise dosing amounts even in the microliter range thanks to the calibrated dosing chamber.



### Pharmaceutical Dosing

In pharma, precision and accuracy are imperative because the processes are always connected to a life.

Volumetric Dosing:

- Provides accurate dosing with each stroke of the pump thanks to the exactly calibrated dosing volume.
- Guarantees high repeatability and reproducibility for a reliable pharma process.
- Can be realised with disposable dosing chamber to reduce chance of contamination.



## Products for Volumetric Dosing



### Type 7604 – One directional pump

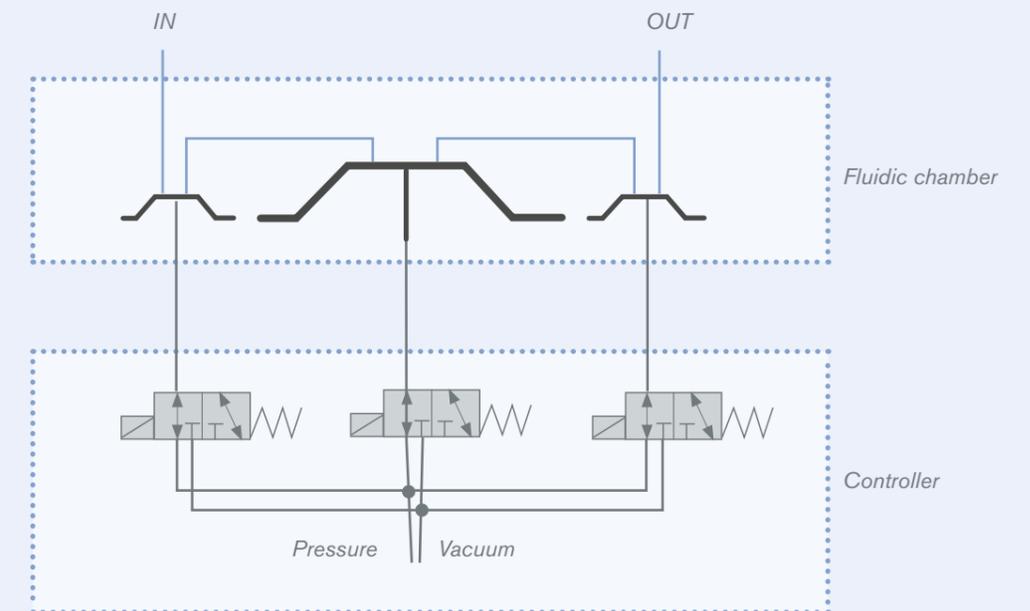
The self-priming diaphragm pump is ideal for continuous low flow liquid applications and provides a plug-and-play solution without cumbersome start-ups. Since only the high-class materials PEEK and FFKM get in contact with the fluid, the pump can also be used for aggressive chemicals. The mounting pitch of 11 mm allows for an extremely compact design and ease of mounting, with standard bodies designed for surface mount (manifold) or tube connections. The low power consumption of just 1.5 watt means the pump can be easily incorporated into battery-powered mobile devices. The flow rate can be adjusted by varying the frequency input to fit your specific performance requirements. Due to the high maximum frequency of 40 Hz, the pulsation is reduced to a minimum, maximising accuracy.



### Type 7615 – Bidirectional pump

The Micro Dosing Unit 7615 consists of a diaphragm pump and active inlet and outlet valves. The components are assembled on a manifold in order to keep the internal volume to a minimum. The delivered volume can be adjusted via the cycle rate for more flexibility. Thanks to its high reproducibility ( $< \pm 2\%$ ), the unit is ideal for precise dosing of the smallest quantities of liquids and guarantees high quality test results. PEEK and FFKM are the only materials that come into contact with the medium. This facilitates the use of aggressive media. The Micro Dosing Unit can be easily connected via a 4-pole plug. It has an integrated electronics for an immediate use.

## Complete System Solutions for Volumetric Dosing



## Pneumatic Dosing System

With the combination of a compact fluid chamber and an integrated control unit for pressure and vacuum, Bürkert designed a truly unique dosing system customisable to your application. It's installed in the blink of an eye thanks to easy plug-and-play capabilities.

- Precisely defined and calibrated dosing volume per stroke of the system
- High dosing velocity adjustable to the application
- Highly chemically resistant material for dosing of aggressive media
- Compact size for excellent system integration
- Easy combination for multiple dosing stations in the process



## Flipper Valves

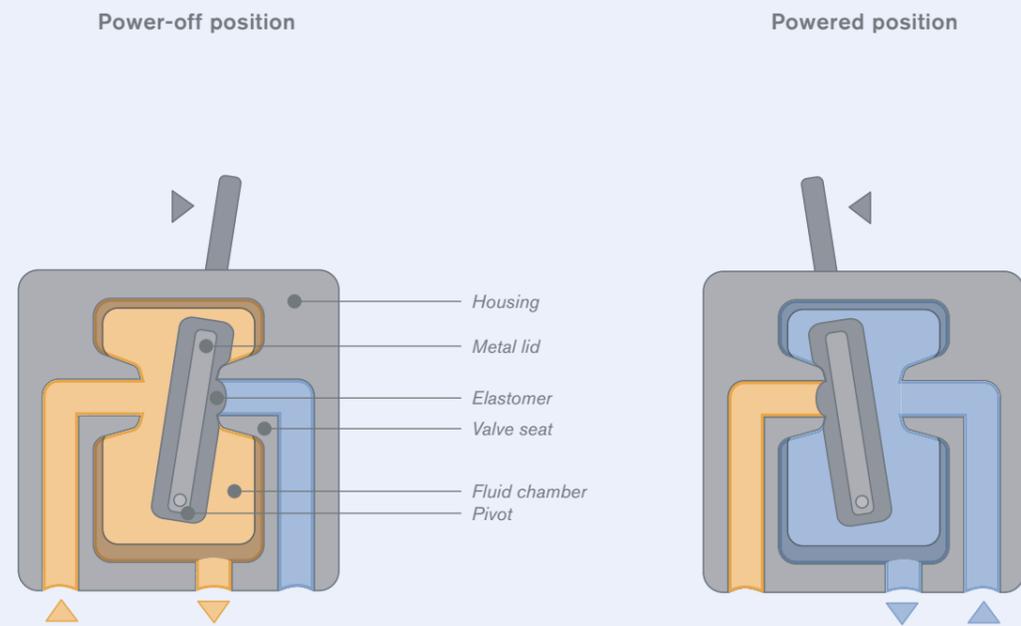
The core component in flipper valves is a metal lid vulcanized with elastomer. This pivoting "flipper" is housed in the fluid chamber and alternately closes one of the two valve seats.

As in valves with diaphragms, flipper valves provide a complete separation of medium and actuator. However, the switching action of the flipper creates no pump effect. In addition, the flipper valve technology allows for especially short and reproducible response times and an extended service life due to the lack of diaphragm flexing. This makes

this technology particularly suitable for precise dosing applications. Since the medium does not act on large areas of a diaphragm, flipper valves remain tight even at back pressures above the nominal pressure.

Characteristics:

- short and reproducible response times
- no pulsation
- low power consumption
- enclosed fluid chamber



3/2-way valve flipper technology

## Rocker Valves

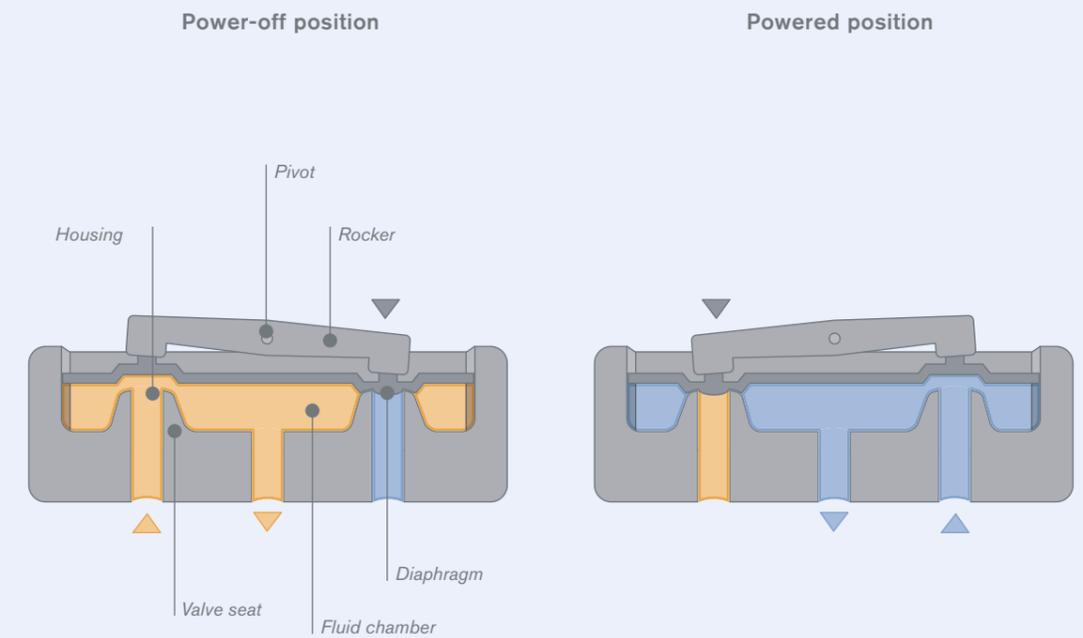
The valve seats in rocker valves are in one plane and opened and closed by a switching rocker. Due to the extremely small amount of moving mass involved, the distinguishing feature of rocker valves is their particularly long service life.

Alongside the non-media-separated valves for pneumatic applications, the principle behind rocker valves also allows for the reliable separation of medium and actuator by way of a diaphragm. In contrast to plunger type valves with a diaphragm, the construction principle of rocker valves provides a secure

seal of the valve seats even if a high back pressure is applied. Due to the lack of gaps in the inner contour and the very good cleanability of the fluid chamber, the media-separated rocker valves are particularly well suited for use with biological media.

Characteristics:

- excellent cleanability
- minimal internal volume
- high back pressure tightness
- media separated from actuator



3/2-way valve rocker technology

# Plunger Valves

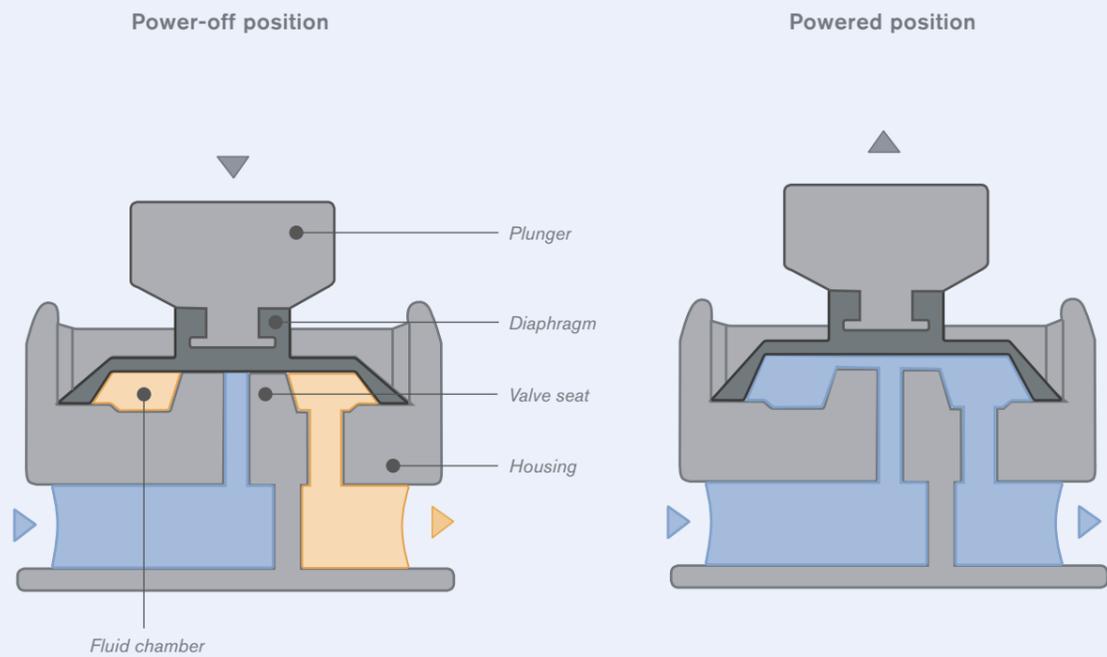
The main components of this valve type are a coil, a closing spring, a valve body cover and the valve body with the seat. Without current the path to the outlet is blocked (normally closed), since the closing spring, supported by the pressure of the medium, presses the plunger onto the valve seat. If current flows through the coil, the latter generates a starting force, which pulls the plunger and the seal against the spring force and draws the medium upward. The channel is opened for the medium.

With a media separating membrane, the valves are used for the control of gases and fluids in analytical applications.

They are ideal for switching aggressive and high purity media, since the separating diaphragm ensures a hermetically sealed coil and only high-quality plastics are used as the sealing and body material.

**Characteristics:**

- Long service life
- High pressure and temperature ranges
- Increased switching cycles



2/2-way valve plunger technology

# Product Selection Chart

Width	Orifice	Vac	Max. pressure in bar											
			1	1.5	2	3	4	5	6	7	8	9	10	11
4.5 mm	0.4 mm	6650	[Bar chart showing pressure range up to ~7.5 bar]											
	0.8 mm	6650	[Bar chart showing pressure range up to ~3.5 bar]											
7 mm	0.8 mm	6712	[Bar chart showing pressure range up to ~3.5 bar]											
9 mm	1.2 mm	6724	[Bar chart showing pressure range up to ~2.5 bar]											
10 mm	0.6 mm	6144	[Bar chart showing pressure range up to ~10 bar]											
	0.8 mm	6624*	[Bar chart showing pressure range up to ~5 bar]											
	1.6 mm	6624*	[Bar chart showing pressure range up to ~2.5 bar]											
16 mm	0.9 mm	6106	[Bar chart showing pressure range up to ~10 bar]											
	1.0 mm	0127*	[Bar chart showing pressure range up to ~2.5 bar]											
	1.2 mm	6106	[Bar chart showing pressure range up to ~10 bar]											
		0127*	[Bar chart showing pressure range up to ~2.5 bar]											
	1.6 mm	6106	[Bar chart showing pressure range up to ~5 bar]											
		0127*	[Bar chart showing pressure range up to ~2.5 bar]											
	2.0 mm	6626*	[Bar chart showing pressure range up to ~3.5 bar]											
20 mm	1.2 mm	0117	[Bar chart showing pressure range up to ~2.5 bar]											
	1.6 mm	0117	[Bar chart showing pressure range up to ~2.5 bar]											
	2.4 mm	0117	[Bar chart showing pressure range up to ~2.5 bar]											
22 mm	2.0 mm	6628	[Bar chart showing pressure range up to ~5 bar]											
	3.0 mm	6628	[Bar chart showing pressure range up to ~3.5 bar]											
32 mm	2.0 mm	0330	[Bar chart showing pressure range up to ~12 bar]											
		0121	[Bar chart showing pressure range up to ~8 bar]											
	3.0 mm	0330	[Bar chart showing pressure range up to ~10 bar]											
		0121	[Bar chart showing pressure range up to ~8 bar]											
	4.0 mm	0330	[Bar chart showing pressure range up to ~5 bar]											
		0121	[Bar chart showing pressure range up to ~5 bar]											
	6.0 mm	0121	[Bar chart showing pressure range up to ~3.5 bar]											
	8.0 mm	0121	[Bar chart showing pressure range up to ~2.5 bar]											

\* Maximum total pressure difference: 2 bar

Pressure ranges depend on circuit function, power supply and material.