



**bürkert**  
FLUID CONTROL SYSTEMS



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## Hygienic Processing Pharmaceutical

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# Alliance

## Combined Competence in the Pharmaceutical Sector

Welcome to our Hygienic Processing Pharmaceutical brochure. Inside you will find an overview of our strategic approach to serving your business needs, an insight into some unique products which provide the chance to enhance overall plant performance, make the very best of your space envelope, reduce and even eliminate dead space to optimize cleaning and ultimately achieve a higher product yield.

In 2008 Christian Bürkert GmbH & Co. KG and BBS-Systems AG teamed up to bring pharmaceutical and biotechnology customers more opportunity to access some of the most exciting and unique system solutions and products available in today's market.

BBS-Systems AG has a comprehensive manufacturing facility in Wil (ZH) in Switzerland and over 20 years of hygienic processing experience. In the beginning, the main focus had been on developing, producing and selling components for bio and pharma plant engineering. BBS-Systems means selected special knowledge, agility, flexibility and outstanding know-how in the sphere of hygienic processing. It was a natural step to join with Bürkert and proves a winning combination for everyone by offering mechanical and instrumentation systems and products previously unattainable from one source.

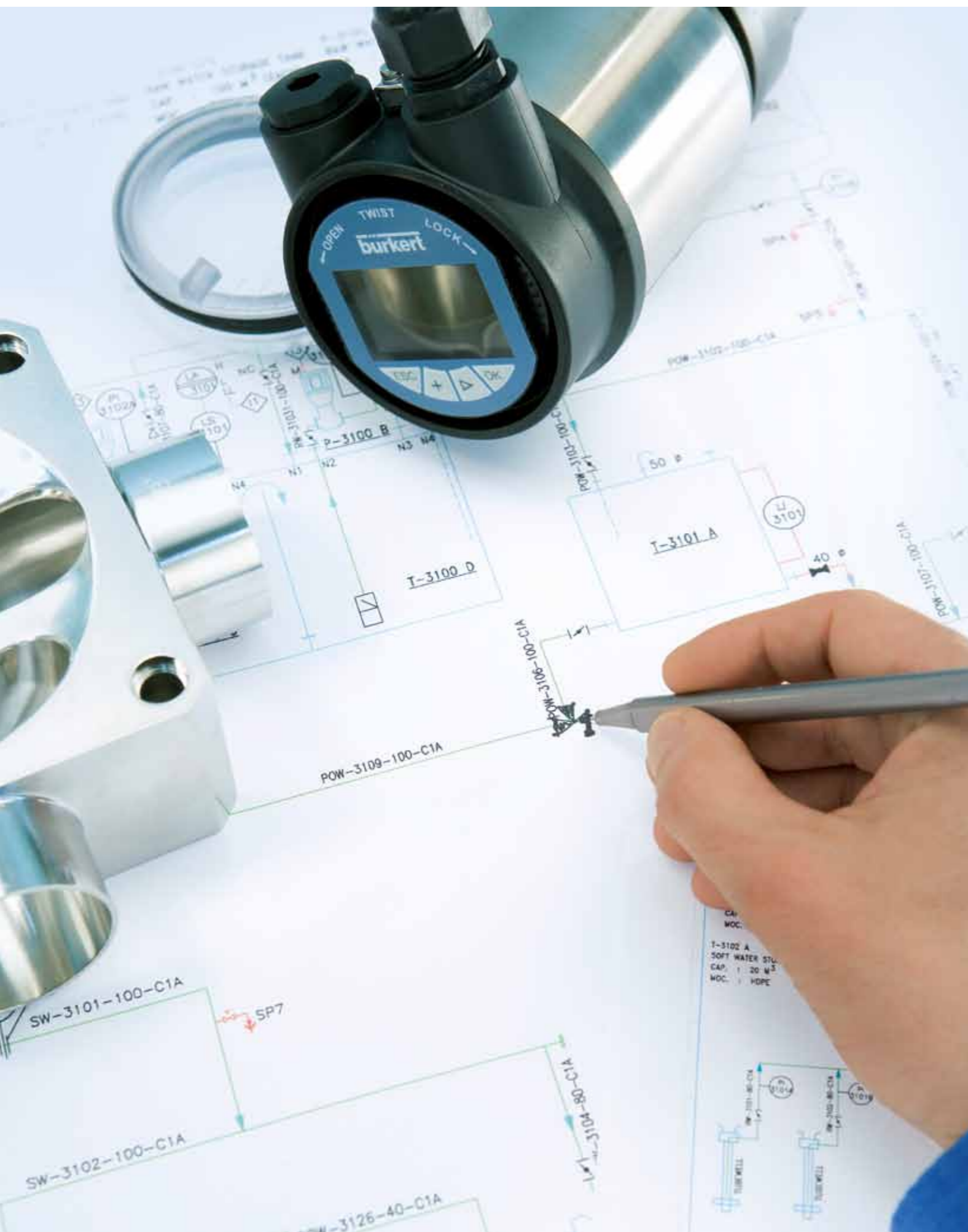
Through Bürkert's customer oriented segment approach we have combined our knowledge and brought together an extended portfolio allowing us to offer our customers a more comprehensive and attuned range of customized products and system solutions.

Now through Bürkert's 35 international subsidiary offices and global distribution network you are even closer to these services and products. Our two strong brands joined forces to combine energies in all business areas – research and development, production capacity, knowledge transfer and especially customer service and support.

We look forward to being your partner of choice for hygienic processing systems and solutions and look forward to serving your needs in the future! Your insistence on our partnership will be highly appreciated and valued and we are confident it will be a successful and rewarding long term relationship.

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## With You from the Start

Our alliance offers you the opportunity of a competent and knowledgeable partner from the very beginning. Whether you are undertaking a routine maintenance program through or a major project we want to be with you from the very start to share our knowledge and engineer the very best possible systems and product solutions for your facilities.

Our fully trained sales force operates globally and together with our multiple manufacturing facilities and unique Systemhaus operations you are always close to a willing partner.

Our service around the world is unparalleled. We are totally committed to provide support for all of our products and the networks and applications where they are used. Satisfying your needs and requirements are our primary concern and supporting in all areas such as installation, commissioning and certification as well as general engineering and design work.

We base our partnership approach on continuous consultation. Our pharmaceutical experience lies in common applications such as fermentor control, mixing and batching, water production and distribution, clean steam generation, and transmission, separation, filtration and chromatography, lyophilisation equipment, vacuum systems, high speed liquid packaging machinery, coating equipment, solvent handling to name some of the many we work with on a regular basis.

## Combined Competence

In hygienic processing, the measuring and controlling of liquids and gases demands superior instrument performance and networkability; the equipment used has to interface seamlessly. The overall mechanical process connectivity is equally as important for maintaining sterile and pure conditions as well as optimisation of plant performance and process security.

Standard connectivity with modular, decentralized monitoring, intelligence and diagnostics are the platform for flow control networks which provide reliable productivity data from your plant level network.

Fluids like ultra-pure water through to those with extreme viscosities, high solid concentrations and low conductivity, and clean or sterile manufacturing application environments present a wide range of challenges that we understand. All our mechanical components are designed according to global norms and standards.

The combination of Bürkert and BBS gives you proven reliability, superior accuracy and virtually maintenance free service ensuring that we deliver unsurpassed total performance in the form of complete flow control loop systems.

## Welcome to the Fascinating World of Fluid Control Systems

Measurement and control: When it comes to working with liquids and gases, we are at your side – as a manufacturer of sophisticated products, as a problem-solver with an eye for the big picture, and as a partner offering you reliable advice. Since we started in 1946, we have developed into one of the world's leading suppliers of Fluid Control Systems. At the same time we have kept our status as a family-owned business with a foundation of strong basic values to highlight the way we think and act.

### EXPERIENCE

There are things which are not inherently yours. You have to gather them bit by bit. You receive them from others. And you constantly have to acquire them anew. That is what makes them so valuable. Experience is one of those things. For instance, because of our many years of experience in hygienic processing, we can provide our extensive services to you – from consulting, development, and 3D CAD simulating to testing and after-sales service. Whether individual product solutions or a pioneering new system for the entire control process: Benefit from our experience!

### COURAGE

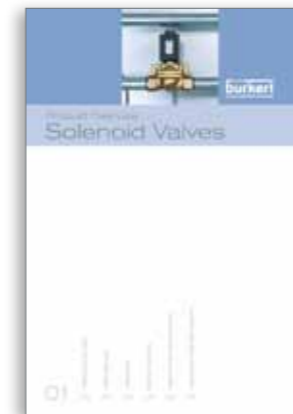
Those who only work toward optimizing things that already exist will eventually reach the limits – technically, financially, or personally. In order to overcome these limits, courage is needed: The courage to be different and trust one's own ideas; the courage to venture into the unknown, searching for new ways to develop products that have never existed before. We have this courage. By pooling and utilizing our competencies across all sectors, you benefit from our cumulative knowledge of hygienic processing systems, whether it is in the pharmaceutical or the biotechnology sector.

### CLOSENESS

There are things we simply take for granted. Only when they are gone, do we realize how important these things really were. This applies in particular to closeness. Without closeness, it is very difficult to build relationships and a good understanding of one another. As an established medium-sized company, we know that. And that is why we are always there for you. Working with you, we develop the best possible solutions for your projects in the area of hygienic processing. Our global presence in 35 locations enables us to press ahead with technical innovations for our customers around the world.

## Bürkert Product Program

We are one of the few suppliers on the market to cover the complete control loop. Our current product range extends from solenoid valves through process and analytical valves to pneumatic actuators and sensors.



*Bürkert offers a remarkable range of servo assisted and direct acting solenoid valves. Read more about them in this brochure.*



*Bürkert offers unlimited modularity for process control with angle-seat, globe and diaphragm valves in the widest range of configurations.*



*Here you can find our product range of pneumatic valves, valve units and automation systems as well as information on our control cabinet building.*



*Here you can find our sensors, transmitters and controllers for measuring and controlling flow, temperature, pressure, level, pH/ORP and conductivity.*



*The brochure contains an overview of Bürkert miniature valves and micro pumps, which allow for precise and safe handling of small volumes of liquids.*



*This brochure provides technical background information as well as a detailed product overview for the mass flow controller and meter product range.*

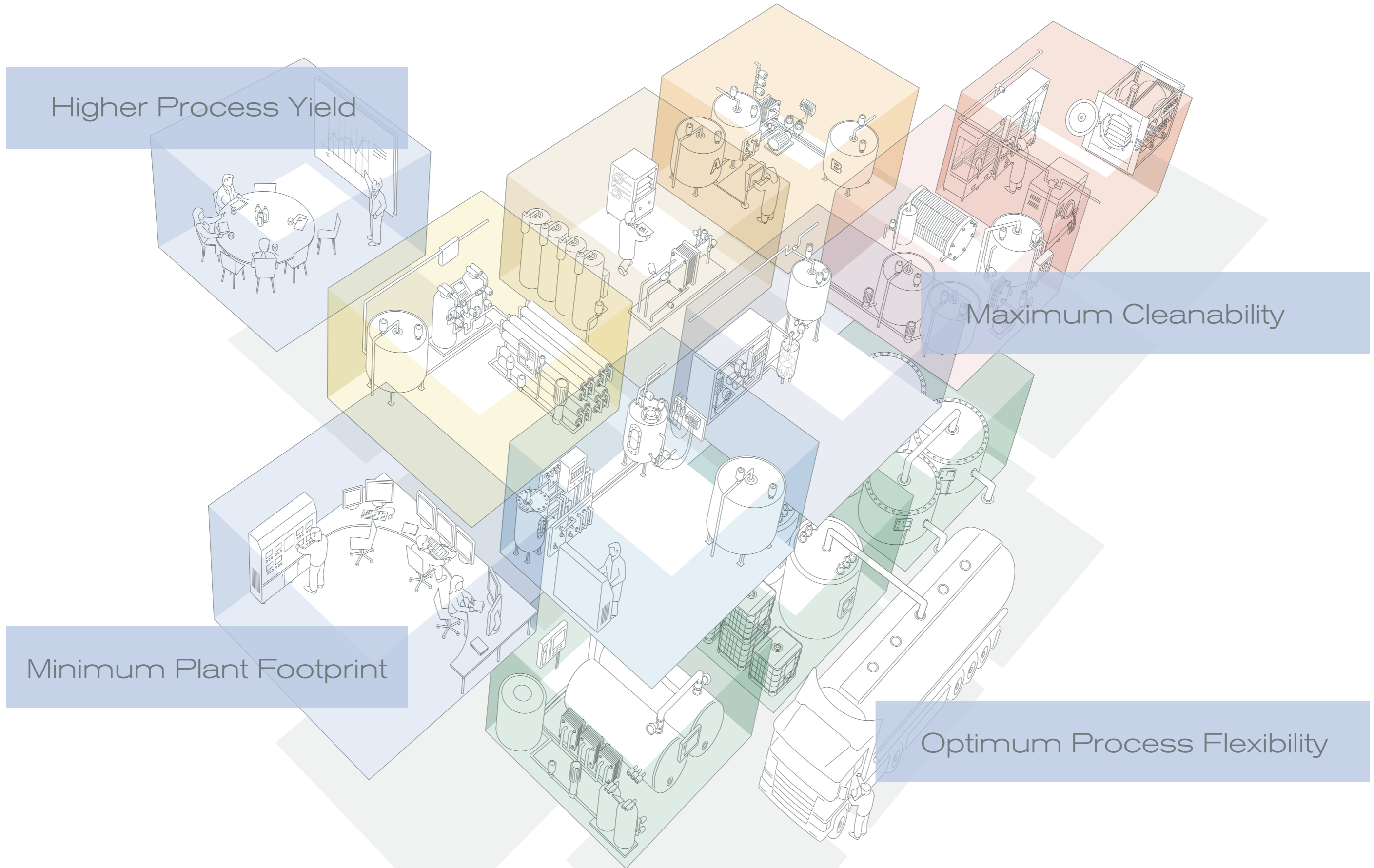


*This brochure presents our solenoid control valves including their respective features, functions and typical applications.*



# Hygienic Processing

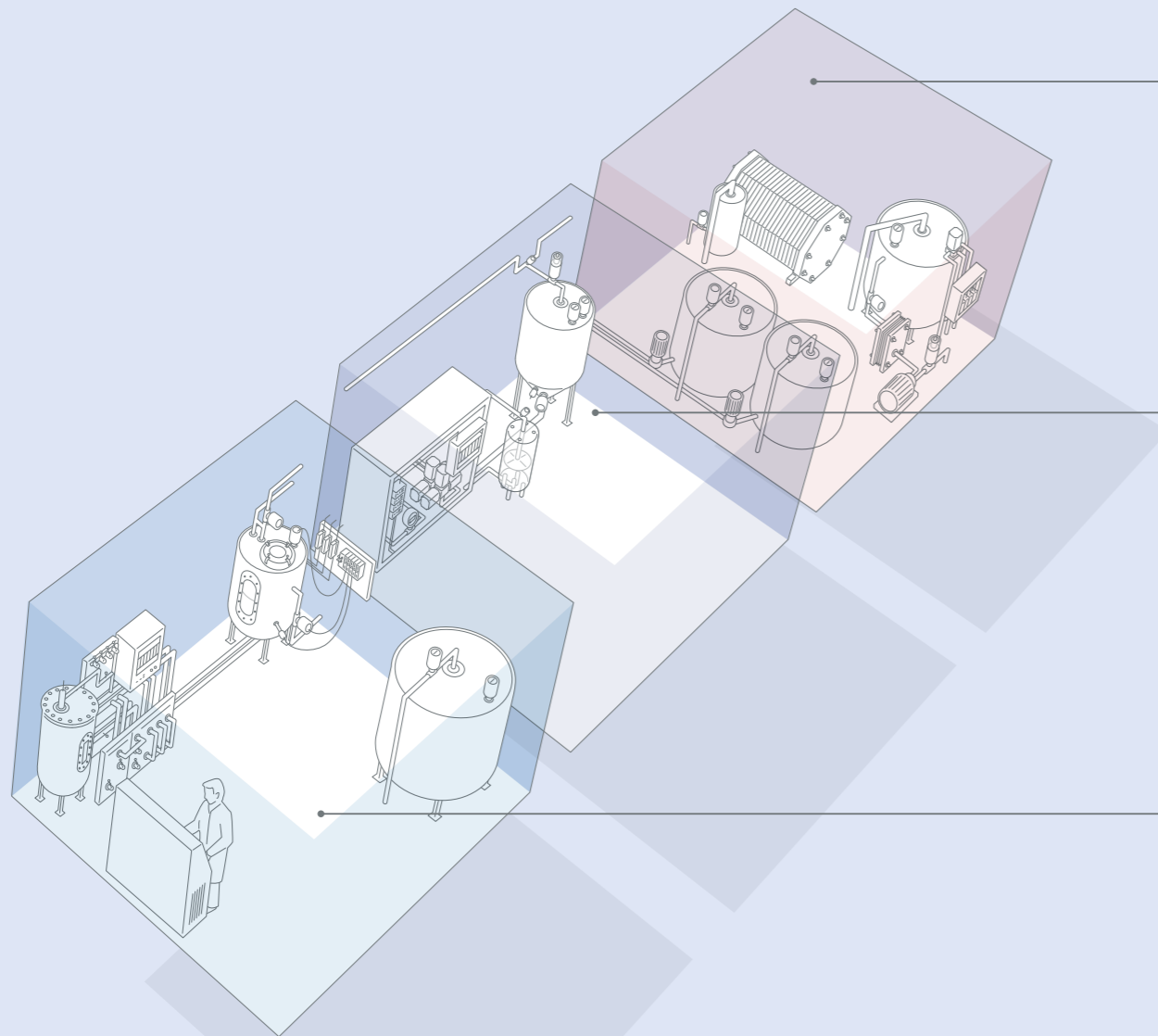
## Virtual Plant



## In the Process

In the world of hygiene, where compactness, smart communications, plant footprints, cleaning and sterilization, dead legs, cross-contamination, and validation are everyday concerns, Bürkert and BBS provide process efficiency and higher yields by offering unlimited process modularity. End-users profit from the combined experience of both companies. And in addition to convincing functionality and cleanability, all instruments and components are not only good looking, they are

also flexible, and can be used in many different processes – for even easier operation, internal processing, and preventative maintenance. Through the sterile process area the scope of systems and components from the alliance cover all the different application environments – effective and efficient in each application whilst working harmoniously together to provide a reliable total plant solution.



### Separation and Filtration

Filtration and separation of identifiable and specific active drug ingredients require our unlimited modularity to save you valuable plant space and offer you peace of mind from dead legs and cross-contamination.

### Chromatography

Obtain as much product yield as possible in the right place with the least amount of waste. This is the area where the combined engineering competence and process/application understanding is fully utilised to deliver fast flow shifts, minimum dead space and reduced footprint.

Downstream is the home of the Robolux multiway/multiport diaphragm valve solution, extending the principle that a highest possible return on investment is generated from this area of the plant.

### Fermentation

Significant time and money is already invested in preparing the ingredients for the fermentation process. On the reactor our sterile flanges, ingolds and access ports are of the highest quality materials and engineering as well as being precision machined. The result is completely reliable environment control for the culture creation; we combine that with exceptional components for fermenter gas control, pH and pressure monitoring, and field bus solutions, which are used to join up separate reactors within coordinated processing lines.



## In the Background

Pharmaceutical manufacturing relies on utilities liquids and gasses being readily available and of the desired quality. This means controlled conditions, accurate pressures and temperatures and variations of other measurements according to specific duty. These applications are critical in upstream integrity as well as overall plant performance. Each

area demands strict control and yet flexibility is often a key desire – Bürkert and BBS make certain that both mechanical and instrumentation equipment are system designed to realise these goals offering enhanced plant lifecycle with high integrity and satisfaction.

### Clean-in-Place, Sterilize-in-Place

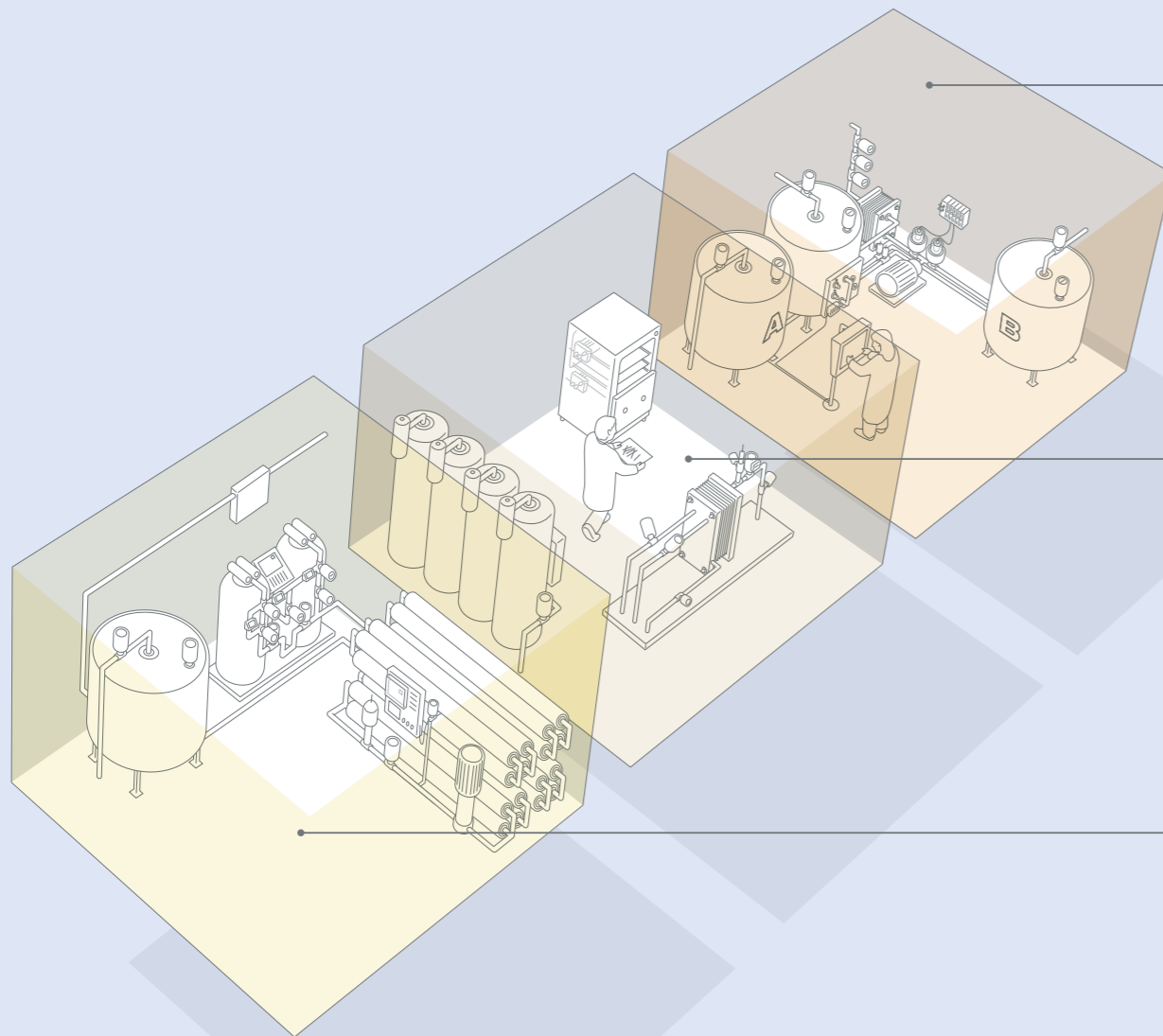
Patients trust your product and safety is related to your brand. Each stage of your CIP/SIP regime can be controlled and safely documented. Our stable and rugged components are designed for the harsh shifts from acid to base. Our components and system solutions bring peace of mind. Reliability in switching from water to clean steam and from chemical to surfactant is standard in a range of valves which are designed for this purpose. All of the CIP parameters are safe in Bürkert hands allowing you to make your product with confidence.

### Utility and Clean Steam

Bürkert provides cutting edge solutions for heat transfer applications in your world. Your use of steam as a heat transfer media, a cleaning agent or as a crucial sterile ingredient can be regulated precisely with Bürkert systems and solutions. Through constant innovation our technology is designed to work with your steam in your hygienic environment.

### Water Quality and Availability

In the pharma sector water is known as the most important ingredient. Water quality is therefore often essential to the success of the product. It affects the sterility of an injectable saline solution, traceability and certification of water quality is standard procedure. Bürkert is involved in the complete water supply chain from groundwater treatment and incoming water supply, processing to your most stringent requirements, inline verification and final decontamination, treatment and/or neutralization. In the production of de-mineralised water, purified water and water for injection(s) Bürkert's technology and expertise are employed with confidence.

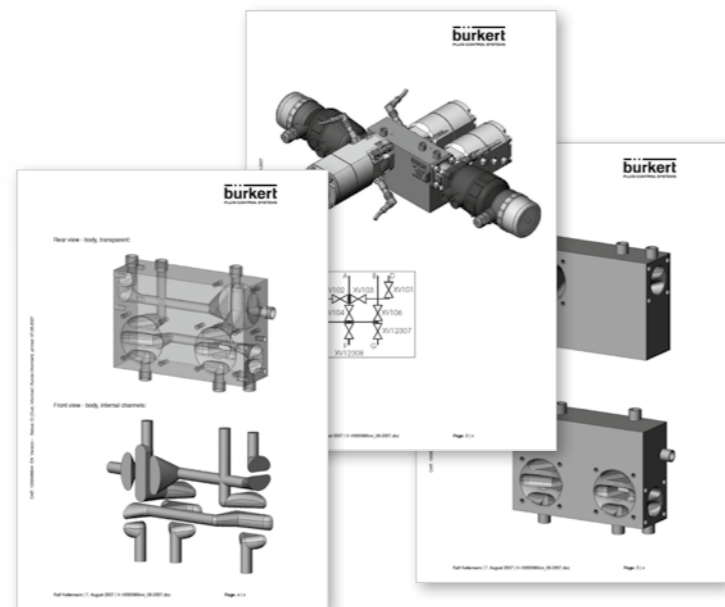


# Documentation and Validation

Supporting the validation requirements of our clients and customers every time, we have extended our quality culture to certification and documentation for pharmaceutical specific requirements. Optimized traceability, the elimination of waste from handling procedures and innovative supply chain/transformation processes raise our level of capability. We are ready to react and deliver to new market requirements by supplying a full range of supporting paperwork with each of our fantastic products.

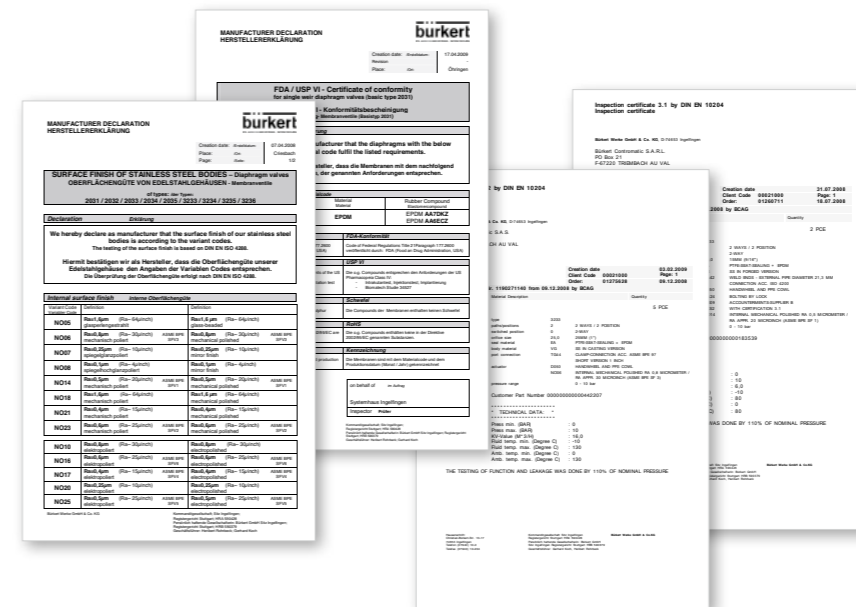


3D-Visualization tools for process efficiency



# Global Certifications

- Level 2.2 Conformance Certification
- Level 3.1 Material Certification
- FDA compliance statement
- USP VI compliance statement
- General Arrangement Drawing in all formats
- Instruction, Maintenance and Operation Manual
- CE Statement
- ATEX Certification
- Positive Material Identification (PMI)
- Re-stamping & traceability
- Ferrite Content Confirmation
- Surface Finish Profilometer Report
- EP Certificate
- Welding Certification and Boroscope Media
- CE Declarations
- 3A Certification



Quality documentation to simplify your validation process





## Materials Specifications

### Metallurgy

The use of stainless steel is widely endorsed in the pharmaceutical segment; but the exact grade and finish of the material will determine the most important contribution to process efficiency and security against contamination or resistance to corrosion. A steel alloy has a minimum content of 10% chromium which defines it as stainless steel; this content is sufficient that chromium oxide forms a passive film across the surface and protects against surface corrosion as well as inhibiting internal material structure corrosion.

Ensuring low ferrite content raw material and optimised manufacturing processes are standard practice and together with appropriate validation certification mean that you are assured of quality every time.

Welding components inline for optimum tightness and process integrity demands high quality materials. Metallurgical knowledge is extensive throughout our alliance and covers a wide range of exotic materials like Hastelloy and tantalum for extreme applications.

### Elastomers

Elastomers are materials that can be stretched or compressed repeatedly but upon release of stress return to almost their original size and state. Their resistance to different process media, cleaning media and temperature cycles are critical success factors in a pharmaceutical installation.

The use of EPDM, PTFE, FPM, silicone and many other elastomer materials is controlled through regulatory bodies such as FDA (Food & Drug Administration) and USP (United States Pharmacopeia). Our qualified and experienced engineers have vigorously tested each of the grades of elastomer in our laboratory facilities to gain satisfactory approval for use.

Whether used for sealing gaskets, o-rings or diaphragms or used in the construction of special process interfaces, all such materials used by the alliance meet the necessary grade and ensure your peace of mind.



Metallurgy	
AISI	A182, A479, 316L
ASTM	ASME BPE
DIN 17440	1.4435 BN2 2 CrNiMo 18 12
British Standard	970 316 S12
AFNOR:	Z 2CND 17-13
Ferrite	< 0.5%

Elastomers	
EPDM	FDA CFR #21 177.2600 USP Class VI
PTFE/EPDM	FDA CFR 177.1550
Teflon PFA lined EPDM	FDA CFR #21
Silicone	FDA CFR #21
Full FDA compliant certification and traceability is provided.	



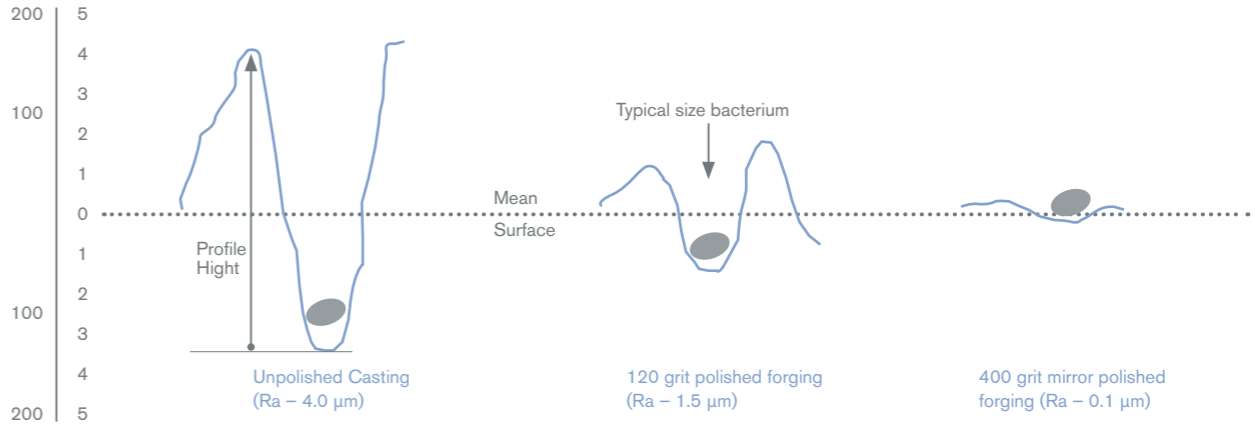
## Perfect Surface for Process Efficiency

All Bürkert valve bodies are machined and finished in house using the latest computer controlled CNC machines and measurement equipment. A high surface quality by precision machining followed by to grinding or polishing, the surface is free of shrink-holes, scoring and other roughness phenomena and free of impurities.

Virtually ferrite-free alloys prevent contamination which may occur due to the use of cast pipe sections.

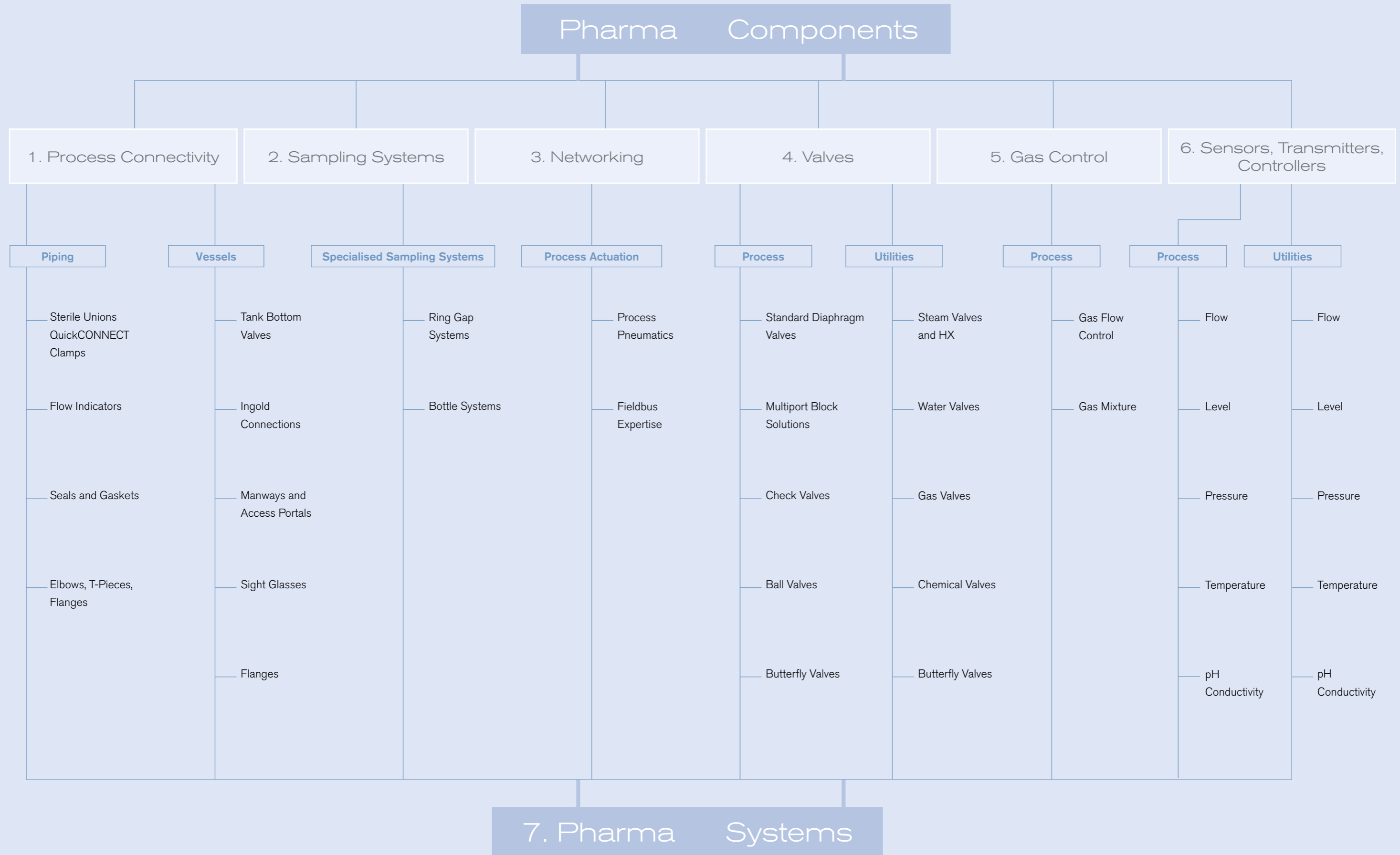
One key to hygiene is the high quality of stainless steel.

A high surface quality is demanded, particularly in the pharmaceutical and biotechnology industries. The high-quality surfaces meet the stringent requirements concerning purity in the processes.



Electropolishing offers a 50 % reduction of roughness by smoothing the surface. The operation also reduces the surface tension and increases corrosion resistance by creating a high-chromium oxide barrier. Electropolishing optimizes cleanability and sterilizability and removes any chance of contamination by lubricants or grain particles. It also gives the beautiful appearance expected in the industry.

Surface finish											
Ra μm	6.3	3.2	2.7	1.6	0.89	0.75	0.625	0.51	0.375	0.28	0.25
Ra μInch	250	128	108	64	35	30	25	20	15	11	10
Grit					150		180	240	280	320	330



# 1. Process Connectivity

## Perfect Solutions

Bürkert's experience lies in accurate and efficient process instrumentation which is communicating important process data via different protocols and signals within the plant. BBS experience of mechanical connectivity means that the process can run continuously and smoothly with the security of safe and sterile connections throughout the plant.

This gives customers a combined process performance including:

- High product yield
- Flexible process lines
- Constant process efficiency
- Fast and flawless cleaning cycles
- Minimum maintenance

Our range of sterile weld unions, quick connectors, flanges, fittings, hoses, and pipes are designed and manufactured with all of these criteria in mind and they also bring you the benefit of virtually unlimited modularity.

The unique BBS Sterile QuickCONNECT System employs standard dimension norm o-rings which fit neatly into precision machined grooves and minimizes potential bacterial traps; the sealing between components is the same whether it is for unions, flow indicators, check valves or specialty components.

Whether the connection is clamped, threaded or flanged each product is designed to ensure that your process will flow without obstruction.

And by using this benefit of modularity the opportunity of extra process needs or enhancements can be made simply and quickly; for example - inserting an inline filter or orifice plate. All materials are fully traceable and meet current regulatory standards; certification and compliance statements are readily available.



Type BBS-10  
Ball Check Valve



Type BBS-05  
Sterile QuickCONNECT



Type BBS-06  
Sterile Flange

# Process Piping Solutions

Unlimited modularity is derived from a complete range of high quality and flexible piping components. Latest manufacturing techniques are employed to ensure precision machined components match exactly with your needs. All made to enhance your success.



**Type BBS-02 – Seals Gaskets and O-Rings**

Wide range of materials with the right certification and a unique level of traceability.



**Type BBS-03 – Sterile Unions**

Sterile unions that provide aseptic connectivity and enhanced process flexibility. Available for all standards and optional material like Hastelloy. ASME BPE, DIN, ISO and BSOD. All sizes.



**Type BBS-3F – Inline Flow Indicators**

Flow indicators – full view, partial view or flange mounted vessel sight glasses. Pressure and temperature resistant. The borosilicate glass used is suitable for CIP and SIP applications and can be provided with protective mesh upon request. Process connections according to your plant requirement.



**Type BBS-4S – Re-Useable Hose Unions**

Hose unions that can be used time and time again. Can be assembled on site with standard tools giving high flexibility and cost efficiency.



**Type BBS-04 – Pharmaceutical Critical Application Hose**

Platinum cured silicone hose. Suitable for steam sterilization and available with glass based silk, polyamide or stainless steel reinforcement. Hoses are made from platinum cured silicone and have different reinforcements to suit your application including aramide and stainless steel. They are suitable for SIP.



**Type BBS-06 – Sterile Flanges**

For increased process security and integrity these sterile flanges are available to suit your exact fine chemical (API) or pharmaceutical process plant requirements.



**Type BBS-12 – Elbows, Tees, Reducers**

A complete range of high quality pharmaceutical level components manufactured in our Swiss facility.



**Type BBS-25 – Clamps**

Expansive selection of high quality clamp connections, ferrules and unions can be supplied as individual components or as pre-validated sub-systems.



**Type BBS-10 – Ball Check Valves**

Ball check valves designed for sanitary applications where clean ability and safety are critical factors. Selection of materials available on request. Diaphragm check valves are also available.

## Process Piping Highlight – Unique Sterility



### Type BBS-25 – QuickCONNECT Clamp System

In the biopharmaceutical and purification plant you will find many different stainless steel connections. Many applications put high demands on the cleanliness, cleaning, sterilization and the overall construction has to cope with these demands. BBS Systems, as a manufacturer of various sterile connections attaches great importance to the fact that these requirements are met. In collaboration with reputable customers and users of such equipment we have developed a sterile connection system which is quick to assemble and simple to use.

Concerned with total dead space, cleanliness and sterilization for stainless steel components in biotechnology and pharmaceutical plants this is the smart specification.

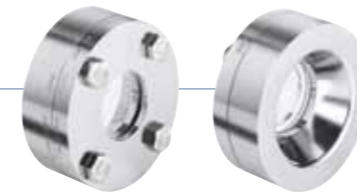
Form A DIN 11864 - Large crevice!	BBS QuickCONNECT - No crevice!
Larger risk of media contamination	No contamination of the medium
Longer rinse time	Short rinse time
More water consumption	Lower water consumption
Large quantity of wastewater meaning higher wastewater treatment expenses	Less wastewater meaning effluent treatment costs
Longer periods of sterilization is higher energy	Short sterilization times / low energy requirements
Less product yield and lower return	Large product yield and larger return
Larger seal	Small seal
Higher particle adhesion/trapping giving higher risk	Minimum particle adhesion/trapping Short rinse time all risk
Higher material duress	No extra material duress
More material needed	Lower overall material need
Longer cooling and heat up	Shorter cool and heat up times
Less production time	Optimized production cycle
Less yield	Large yield

## Process Vessel Solutions

We offer a wide range of vessel components as well as complete vessel solutions for bespoke applications. Materials of construction are according to your process needs and where required exotic materials and special construction provide safe and reliable solutions. All vessels and components are designed for maximum sealing integrity and ease of use.

Vessel components include:

- Sterile access ports
- Man-way covers
- Side wall instrument ports
- Tank sight glasses
- Tank flanges
- Tank mounted valves
- Stroke bottom drain valves



### Type BBS-07 – Tank Flanges

Tank Flanges and Tank Sight Glasses – have a low profile design and enhanced drain ability. They are all provided with unique o-ring seal design and are stress/crack/shatter resistant. All are designed to withstand cleaning cycles and temperatures and high pressure versions are available.



### Tank Bottom Valves

The tank bottom valve is always made from a single block of 316L stainless steel. It provides precision contours with no welding distortion. The shape has no areas for entrapment of dirt or CIP fluids. The valves can be fitted with manual or pneumatic actuators up to DN80.

## 2. Sampling Systems

### Quality at Every Point

Sampling can be for the purpose of analysis and testing, inspection or investigation or maybe even for trial use. It can be random, regular or even continuous. Whatever the requirement and whatever the process you can be assured that the sampling systems and solutions available from Bürkert and BBS Systems will deliver the right specimen in accordance with your needs.

Solutions can be provided for individual operation by qualified persons or can be automated according to overall system design and functionality.

A wide variety of process connectivity is offered which maintains a modular approach; for example our ring gap sample valves make use of standard elastomers and operators whilst our systems for use in vessel ingold connections can be easily adapted according to the media involved.

If required we can integrate cleaning or sterilisation connections that mean we are able to ensure the consistent quality of the samples taken as well as maintain process integrity at all times.



**Type BBS-16 – Ring Gap System**

Special ring gap sample valves with optional sterilization connections are suitable for vessel or pipe mounting and use standard valve components; available in standard design or can be customized quickly to suit specific process sampling requirements.



**Type BBS-17 – In-line Sample System**

Armoured borosilicate bottle sampling systems in every connection and size can be quickly and safely filled and transported. They are the perfect interface between the process and the laboratory. These systems are sterilizable and autoclavable and make use of stainless steel or PVDF materials according to your wishes.



## 3. Networking

### Pneumatic Process Interface

The heart of Bürkert's pharmaceutical expertise. With clients around the world at pharmaceutical plants, builders of fermentors, filtration skids and WFI production equipment we have exceeded market expectations for modularity, performance and ease of use.

Our innovation continues into the hazardous location which is often present in pharmaceutical and cosmetic production plants with systems built for Zone 1 and 2 or Class 1 Div 1 FM as required.

AirLINE consists of a gateway or mini-PLC, modular I/O slices and rugged pneumatic valves on one address.

The gateways connect with all of the normal bus systems and TCP/IP networks for ultimate flexibility in your design. Mini-PLCs can be incorporated easily into the island and in many instances can be programmed for your application by Bürkert engineers. The I/O slices allow 4-20 mA inputs, high frequency counters, thermocouple inputs, relays, RTDs and AS-I bus controllers.



DeviceNet  
CONFORMANCE TESTED



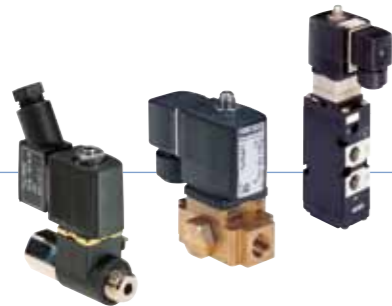
PROFI  
BUS





## Pneumatic Process Interface Centres

Bürkert offers the widest range of equipment to actuate, monitor, network, position and decentralize process control into the field. Each component is the product of cross functional mechanical and electrical engineering innovation and exacting laboratory testing. Each of building blocks is ready to be included in your complete automation strategy.



### Types 6519 / 6014m / 6012 Pilot Valves

Its your choice. From the simplest banjo valve to a fieldbus enabled off road multichannel miracle. We fit within your flexible plant or latest blockbuster machine seamlessly.



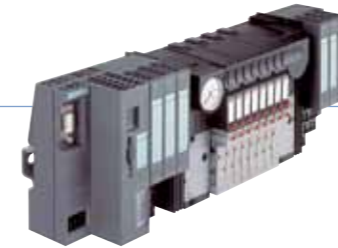
### Type 8640 – Valve Island

The 8640 valve unit system is designed to solve diverse and complex control problems due to its systematic modular construction and combination of pneumatic and electrical interfaces. By putting together a row of pneumatic modules with different numbers of valves, 2 to 24 valve functionalities may be realized on one valve unit. Protection class up to IP 54. Communication with conventional wiring or fieldbus technique.



### Type 8643 – IO Box

Power I/O Box for FOUNDATION Fieldbus H1 or Profi bus PA. Efficient connection of binary signals to a central automation system. Connection of up to 4 pilot valves and 8 NAMUR proximity switches. Integrated diagnostic and monitoring functions



### Type 8644 AirLINE Siemens ET 200S

Remote process actuation control system AirLINE, fully compatible with Siemens ET 200S. It integrates high performance solenoid pilot valves, remote electronic I/O and fieldbus communication into a process actuation and control system that is both compact and extremely flexible.



### Type 8644 AirLINE – Rockwell Point IO

Groundbreaking modular system in protection class IP 20 with multiple communication possibilities including ControlNet, DeviceNet, Ethernet and Profibus DP. Fully compatible with Rockwell Point I/O.



### Type 8644 AirLINE – WAGO 750

Remote process actuation control system AirLINE, fully compatible with WAGO I/O System 750. It integrates high performance solenoid pilot valves, remote electronic I/O and fieldbus communication into a process actuation and control system that is both compact and extremely flexible.



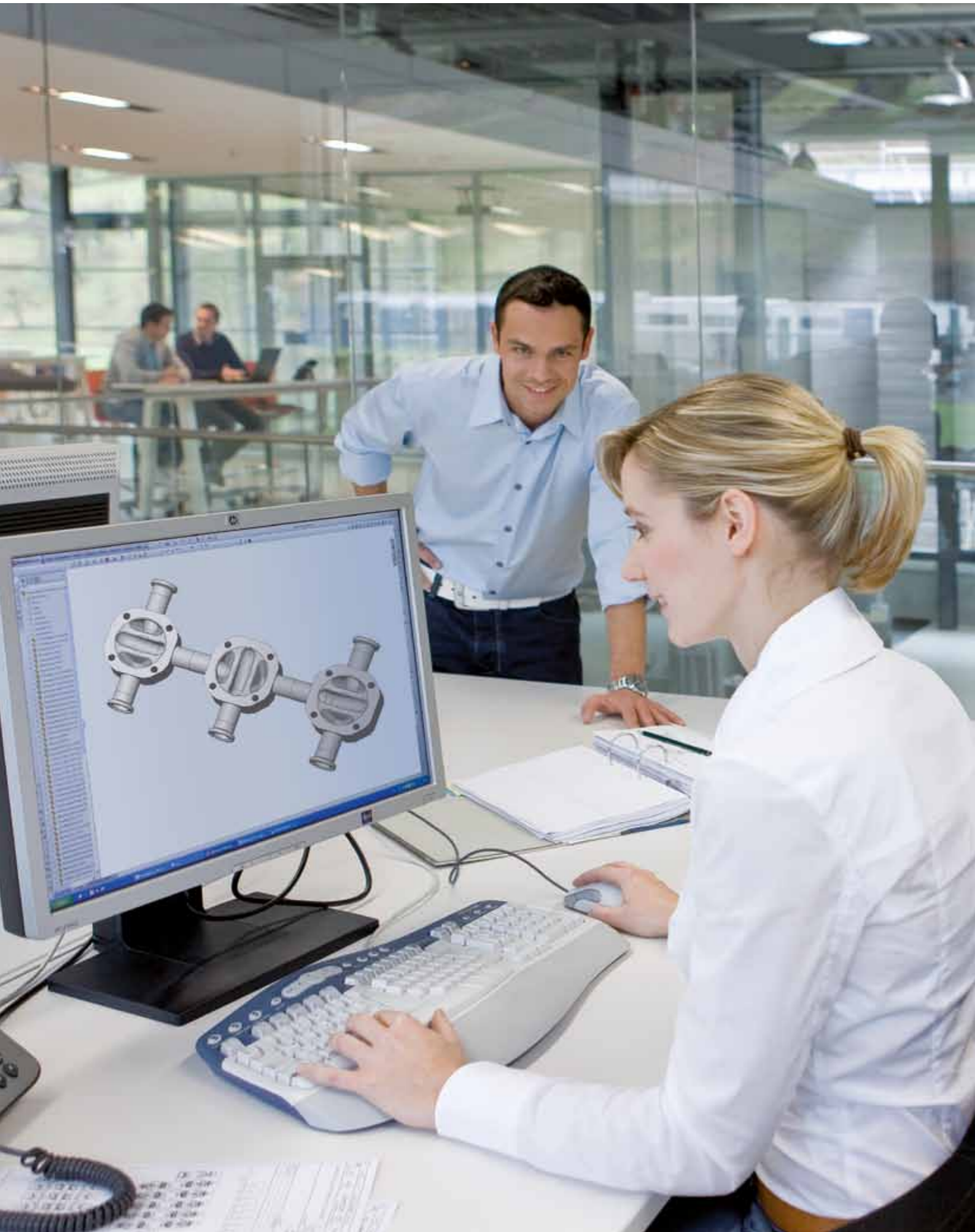
### Type 8644 – AirLINE Phoenix Inline

Remote process actuation control system AirLINE, fully compatible with Phoenix Inline System. It integrates high performance solenoid pilot valves, remote electronic I/O and fieldbus communication into a process actuation and control system that is both compact and extremely flexible.



### Type 8650 – AirLINE Ex

AirLINE Ex is a modular electrical and pneumatic automation system for use in hazardous areas (Zone 1/21). Electrical connection via PROFIBUS® DP-is, electrical I/O functions via Siemens SIMATIC ET 200 iSP-modules. Compact design. Protection rating IP30.



# 4. Valves

## Process Yield Magic

Pharmaceutical and biotechnology customers need to be certain about their process. Often reducing dead legs and optimising system volume are key factors when engineering for maximum process efficiency and highest possible yield.

In recent years the development of complex block and multi port diaphragm valve solutions has proven advantageous for achieving smaller footprints through compact design; this has led to solutions that are extremely cleanable and provide sterile conditions when designed accordingly.

The use of manual and pneumatic actuators with different options for stroke limitation, feedback of position or even full PID control can be combined with any conventional solution or can be implemented in such multi port solutions, meaning even higher levels of performance can be ascertained.

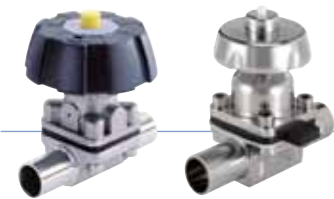
The unique Robolux valve, which makes use of a double weir-single diaphragm-single actuator design, is the ultimate solution for achieving all of these criteria.

Exceptional solutions can be provided by combining all the available technologies, and we have some of the most experienced design engineers who can bring your ideas to life in a virtual 3D model so that you can visualise the process enhancements as they are developed for you.

Weld			
Block			

# Valves | Process

This overview represents only a few of the diaphragm valve configurations we are able to offer you.



### Types 3233 / 3233SS – 2/2-way Diaphragm Valves

Manually operated these valves consist of a flow-optimised stainless steel body with various surface finishes, a diaphragm and a hand wheel style actuator. The valves have no dead volume and can be mounted to be self-draining, enabling high flow capacities. The valves can be autoclaved.



### Types 2031 / 2103 / 2031SS – 2/2-way Diaphragm Valves

Hermetical separation of fluids from the operating mechanism by diaphragm. With its favourable flow characteristics and zero dead volume, the valve housing enables high flow capacities and a variety of applications to be realized. Available with classic, ELEMENT and full stainless steel pneumatic actuators suitable for use with all control heads.



### Types 3233 / 3235 – Tank Bottom Valves

Designed for control of ultra pure, sterile, aggressive or abrasive fluids. Enables optimal filling and emptying of vessels with less dead leg. The high quality diaphragms hermetically separate critical fluids from the actuator. The valve body consists of a single block with no weld seam, machined out of high quality stainless steel. Valves are available with classic, ELEMENT and stainless steel actuators.



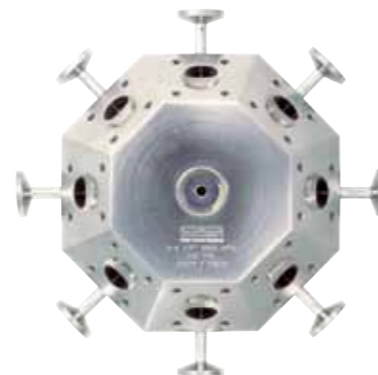
### Types 3234 / 2034 – Zero Dead Leg T Valves

The zero dead leg T Valve system is designed for control of ultra pure, sterile, aggressive or abrasive fluids. It enables optimal sampling, draining or diverting of process fluids. The valve body consists of a single block with no weld seam, machined out of high quality stainless steel. Valves are available with classic, ELEMENT and stainless steel actuators.



### Types 3236 / 2035 – Robolux Multi Port Diaphragm Valves

Manually or pneumatically operated these valves are especially designed for use in the downstream processing area. The patented Robolux technology, where two seats are placed under one diaphragm, eliminates dead legs and will minimize the flow system volume. The valve body is machined from a single piece of bar stock stainless steel or for special applications from PP or PVDF.



## Valves | Utility

Making your life simpler, our groundbreaking innovation has created a remarkable range of attractive and hardworking valve elements which can be combined to give the user the best possible fit for purpose. With unlimited modularity, Bürkert saves you time by offering valves for media from slurries to clean steam and from de-ionized water to hydrochloric acid to save you time and offer peace of mind with the sure knowledge you have chosen experience and quality.



**Type 2000 – 2/2-way Angle-Seat Valve**

Reliable and maintenance-free pneumatically operated angle seat valve. Available within both brass and SS ranging from 1/2" - 2 1/2" (DN 13 - 65). High flow rates and cycle life are extended due to its frictionless seat design.



**Type 2100 – 2/2-way Angle-Seat Valve, ELEMENT design**

Stainless steel and clean design for optimal use in the most testing process environment, coupled with unrivalled cycle life and sealing integrity. The design enables the easy integration of automation modules whether they are electrical/optical position feedback, pneumatic control units, an integrated fieldbus interface or even an explosion proof feedback.



**Type 2012 – 2/2-way Globe Valve**

The externally piloted globe valve consists of a pneumatically operated piston actuator and a 2/2-way valve body. The actuator is made of PA or, for special operating conditions, PPS. The reliable self-adjusting packing gland provides high sealing integrity. These maintenance free and robust valves can be retro-fitted with a comprehensive range of accessories for position indication, stroke limitation or manual override.



**Type 2101 – 2/2-way Globe Valve, ELEMENT design**

A tough globe on/off valve for demanding duties, for media up to +180°C. Unrivalled cycle life by virtue of a proven self adjusting packing gland and impressive sealing integrity. The fully integrated system has a compact, smooth design, integrated pneumatic lines, IP65/67/NEMA4X protection class and superior chemical resistance. Combinable as On/Off System Type 8801-GC.



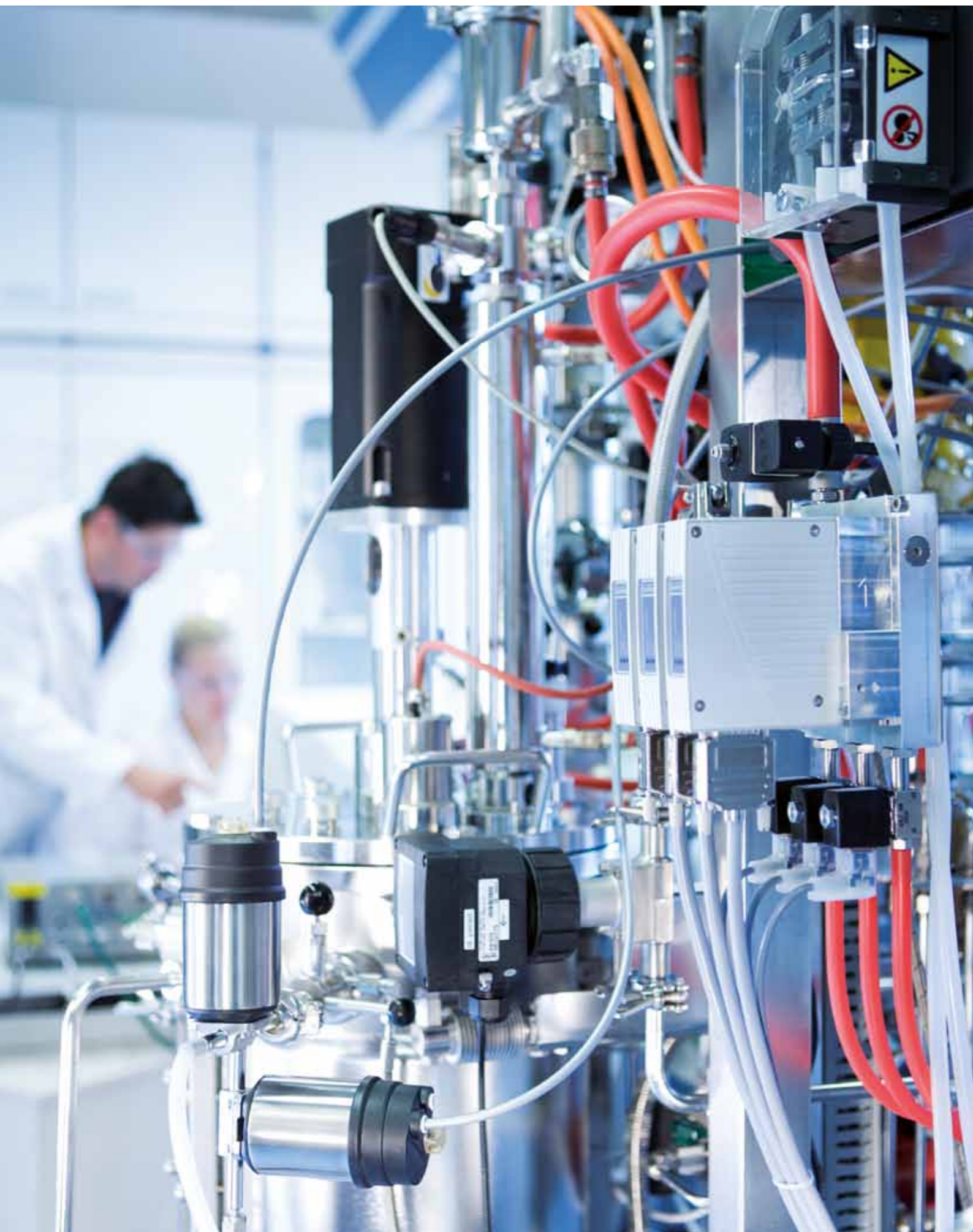
**Types 2301 + 8692 – Globe Control Valve with Positioner, ELEMENT design**

All stainless steel continuous control valve, robust and maintenance free for challenging control applications. With a comprehensive range of reduced trims, you can fit line size bodies with duty specific removable trims, giving the huge benefit of reduced installation time and cost. It can also be combined with the sleek 8692 compact stainless steel controller featuring an integrated graphic display, easy to use PID controller, internal air channels, PC interface and contactless positioner feedback.



**Quarter-turn Ball Valves**

Pharmaceutical grade forged body ball valve for high pressure, high temperature, high purity liquids. It can be equipped with a manual handle or with pneumatic or electric actuators linking it to our full range of controllers and accessories like limit switches, pilot, positioners and manual override devices. Live-loaded pyramidal stem seal design.



## 5. Gas Control

### Mass Flow Measure and Control

Working hand-in-hand with a host of international clients we have developed some of the most advanced gas blending equipment in the world.

We control protective or reactive mixtures by combining various in-house technologies including thermal mass or differential pressure flow and precision solenoid control valves to form perfect loops. Each of these loops or subsystems offers documented ratio control with millisecond reaction times and, importantly, fewer sealing points. The system operator benefits from high levels of repeatability and flexibility without the cost of expensive, less stable pre-mixed gases.

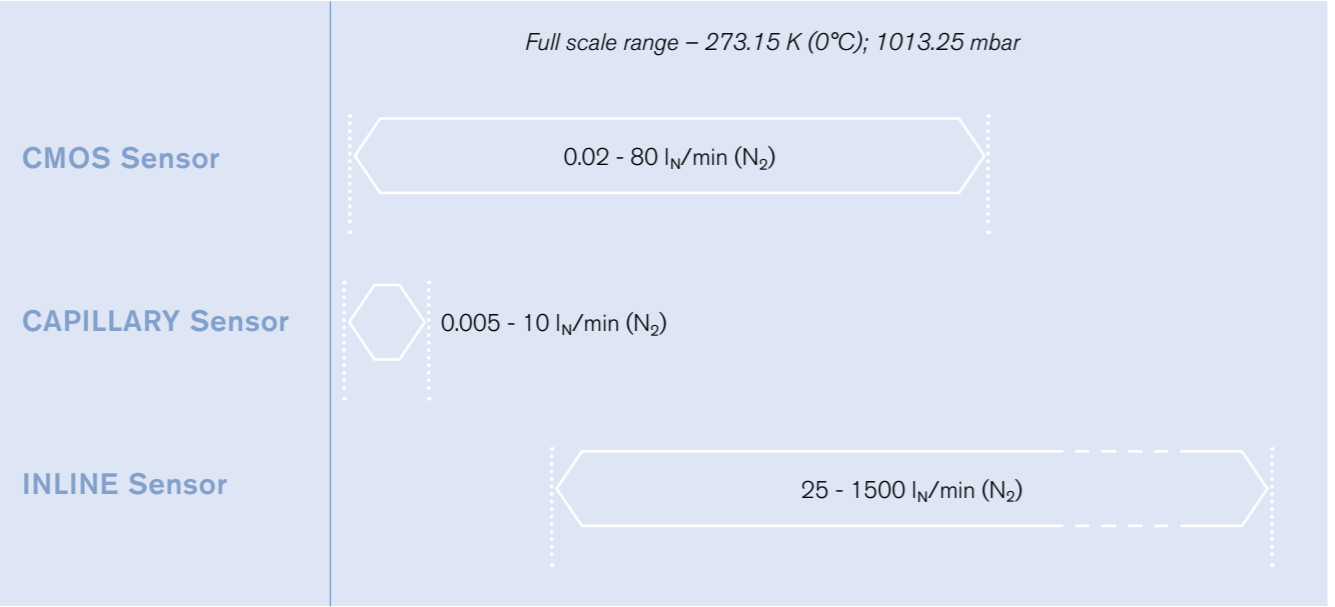
Process gases are indispensable in pharmaceutical manufacturing, from the fermentation right through to the packaging processes. Inert gases are used for example to protect packaged drugs against the effect of atmospheric oxygen. The combination of inert gases and reactive gases such as  $N_2$ ,  $CO_2$ ,  $O_2$  are used in the fermentation process to give the microorganisms a precise atmosphere to achieve a high yield. Whatever the application, it is all down to precise regulation, constant control and accurate metering of the gas media, ensuring a consistent and reproducible result, whilst maintaining process security and limiting costs.

Bürkert's Mass Flow Meters (MFM) and Mass Flow Controllers (MFC) rank among the most sought after components in the business. With a well established position in various processes all over the world, they set the standard in the measurement and control of mass flow rates.

# Mass Flow Measure and Control

The Mass Flow Controller are compact devices that control the mass flow of gases. They control a preset flow rate reference value – regardless of disturbance variables or temporary occurring flow resistances. The mechatronic devices consists of the following components: flow sensor (CMOS, Capillary or Inline sensor), digital electronics and a solenoid control valve as an actuator.

With its easy installation, the compact structure of the Mass Flow Controller ensures the convenient operation of a complete (closed) control loop. Additional work and costs e.g. wiring and harmonising individual components, incorporating pipe lengths, are ruled out.



### Types 8712 / 8702 CMOS Sensors

The CMOS sensor determines the flow rate directly in a secondary channel in parallel to the main channel. This enables the measurement and control of gas flow with millisecond reaction times and it maintains its high sensitivity, even with the smallest flow rates. The MFC/MFM using this type of sensor, displays a high level of repeatability.



### Types 8710 / 8700 Capillary Sensors

The capillary sensor work also with a parallel running secondary channel to the main channel. The sensor has no direct contact with the medium and the measuring range shows a linear dependency between the measuring signal and the mass flow rate. This enables the use of gases the sensor is not calibrated for by working with a conversion factor. This predestinate MFC/MFMs with this type of sensor for the use with aggressive gases.



### Types 8626 / 8006 Inline Sensors

In contrast to the CMOS and capillary sensor, the Inline sensor measures the mass flow of the gas in the main channel. The appropriate flow conditioning and the arrangement of the sensor ensures that the mass flow can be very fast (few hundred milliseconds) and precisely derived.

## 6. Sensors, Controllers and Transmitters

### Process Vision

For more than a decade, Bürkert has been providing well-rounded system solutions from one source with its own range of sensors. In view of the wide variety of specific components linked to specific manufacturers, the availability of a standard concept completing the control loop of actuators and controllers with suitable sensors proves to be the most consistent and logical step. The market proximate, practically oriented alignment of our sensor concept has always offered clear advantages characterized by extremely easy operation and efficient standardization of layout, electrical interfaces and process connections. And the Bürkert brand stands for yet another benefit: optimum economy and efficiency and design geared to the future.

Wherever it is necessary to display process values, perform control functions and monitor alarms, the concept is clear: simple menu prompting and easy integration and commissioning of actuators in an individual, tailor-made system.

Whether they are required to control flow rates, monitor for leaks or control pH values in cooling water conditioning systems or monitoring temperature, conductivity and filling level: our sensors act precisely, systematically and economically. The rugged design and long service life even in extreme continuous operation are "design features" which apply to all products manufactured by Bürkert. The trend in sensor systems pursues two directions. High-end technology with field bus interfaces and multi-channel designs is one of them. On the other hand, there is an increasing demand for "simple" monitoring with switching output and optional ASI bus interworking. Bürkert leads the way on both levels. Integrating intelligent technology using field buses from the start and providing those who only wish to control or measure a simple problem with individually adapted products and services.

Our strength is shown in the functional details of a comprehensive range of sensor systems and its modularity. We offer individually configurable, systematic solutions for any application problem. The dialogue between our researchers and developers and on-site specialists has brought about groundbreaking components. For example, in flow measuring technology, the paddle wheel measuring method plays an outstanding role owing to its broad range of application, and measurement with Finger MID opens up new, interesting potentials. Bürkert already provides suitable, fully-developed products for both areas, and new, innovative solutions will be added, making your life simpler.



## Flow Sensors

According to the various requests and requirements from the pharmaceutical market, Bürkert provides flow sensors and transmitters with measuring principles suitable for both utilities and process duties. With measuring principles from magnetic inductive and paddlewheel and a range of materials and connections to suit different applications your needs are well covered.



**Type 8056 – Magflowmeter**

The 8056 hygienic magnetic flowmeter has high accuracy, a wide range of outputs and integrated data logger and batch controller. Manufactured from 316L stainless steel with a Teflon lining, it is available from DN3 to DN100 with clamp and other sanitary connections. It is designed for applications with conductivities as low as 5  $\mu\text{S}/\text{cm}$ . Type 8056 can control high-precision dosing operations and continuous flow measurement, with a measuring range up to 280  $\text{m}^3/\text{h}$ .



**Type 8045 – INSERTION Magmeter**

INSERTION magmeter for continuous flow measurement. Designed for pipes with diameters ranging from DN 06 to DN 400 and  $> 20 \mu\text{S}/\text{cm}$ . FDA approved. The version with a stainless steel sensor has been designed for applications with high pressures (PN16) and high temperatures (up to 110°C). The version with Alloy C22 electrodes allows applications with high corrosive fluids.



**Type 8030 – Paddlewheel Flow Sensor**

The 8030 paddlewheel flowmeter is ideal for non conductive fluids like R/O systems and DI water production skids. All wetted parts are produced from FDA approved materials. The Bürkert designed fitting system ensures simple installation of the sensors into all pipes from DN 06 to 65.



## Level Sensors

The Bürkert series of level sensors now includes radar, guided microwave, ultrasonic transmitters and tuning fork switches to meet the demanding tasks of the pharmaceutical industry. They fulfill the stringent requirements regarding design, appearance and ease of cleaning in the hygienic sector. Whether aggressive or neutral media: high-tech solutions from Bürkert quickly and efficiently solve your problems.



### Type 8185 – Guided Microwave Level Transmitter

Level transmitter with cable or rod probe, designed for continuous level measurement in all areas of process technology. With a measuring range of up to 32 m, the transmitter is best suited for tall vessels. Even process conditions such as strong steam generation, density fluctuations or changes of the dielectric constant do not influence the accuracy of the measurement.



### Types 8176 / 8177 – Ultrasonic Level Transmitters

Non-contact, highly precise, ultrasonic level transmitters are easily set up for level control of utility fluids such as CIP bulk chemicals where a simple menu allows output of level or volume in minutes. In combination with our intelligent sanitary process valves, continuous level control loops can be established in processing equipment such as flakers.



### Type 8110 – Vibrating Level Switch

The small tuning fork (40 mm of length) allows the use in vessels, tanks and pipes. Typical applications are overflow or dry run protection. Due to the simple and rugged measuring system, the 8110 is virtually unaffected by the chemical and physical features of the liquid. It works even under unfavourable conditions such as turbulences, air bubbles, foam generation, build up or varying products. The 8110 is available with threaded or clamp process connection.



### Type 8138 – Sanitary Radar Level Transmitter

Non-contact radar level transmitter for continuous level measurement up to 20 m. It is particularly suitable for use in small vessels that contain beverage liquids under sanitary process conditions.



### Type 8137 – High Pressure Radar Level Transmitter

General purpose high pressure radar level transmitter, level measurement up to 30 m. Available in two versions: with thread and horn antenna particularly suitable for use in small tanks or with flange and horn antenna particularly suitable for use in storage tanks and process vessels for measurement of products under extremely difficult process conditions.



### Type 8136 – Radar Level Transmitter

Non-contact radar level transmitter for continuous level measurement up to 20 m. The unit is available in two versions: with encapsulated horn antenna particularly suitable for level measurement of aggressive liquids in small vessels or with plastic horn antenna particularly suitable for flow measurement in open flumes or gauge measurement in waters.

## Temperature Sensors

Temperature sensing and control is often critical in both process and cleaning cycles within all hygienic processing environments. With its compact size and smart functionality, the Bürkert 8400 series offers you precisely what you need. However, if it is simple blind sensing with thermo well pockets and standard Pt100 sensors, please don't hesitate to talk to our team who will be pleased to discuss your exact needs and requirements. Each instrument offered is available for connection to the wide range of controllers that we offer.



**Type 8400 – PT100 Temperature Transmitter**

This intelligent sensor/switch with an extra large display is specifically designed to switch a valve and to establish a monitoring system or an On/Off control loop. Compact and wall versions are available. The wall-mounted version must be inserted into a holder previously mounted on a wall, and it needs to be associated with a remote temperature sensor.

## Pressure Sensors

Accurate and reliable, our range of pressure sensors provides exceptional performance. In standard form they come with threaded connections, but each of them features zero and span adjustment, which means they can be combined effortlessly with diaphragm seals to adapt to virtually any pressure, temperature or media in an impressive range of connections. Whether hygienic connections for process or rugged connections for utilities, you will benefit from using these sensors throughout your plant. The flagship of our range is model 8326 featuring bright display and turndown functionality.



**Type 8326 – Pressure Transmitter, 0-40 bar**

Designed for use in pharmaceutical process fluids and utilities. Flexibility is guaranteed through the modular addition of HART and Profibus and the availability of high quality sanitary seals or EHEDG flush diaphragms. Ranges can deal with the low pressures seen in fermenters to high pressure viscous media delivery systems.



**Type 8311 – Pressure Transmitter, 0-50 bar**

This intelligent mini transmitter/switch with an extra-large display is specially designed to switch alarms and to establish a monitoring system or an On/Off control loop. The switching points can be programmed with the three-key keypad under the display. In addition, the process value can be transmitted to the PLC (4-20 mA). Measuring range up to 50 bar.



**Type 8323 – Pressure Transmitter/Monitor, 0-25 bar**

High accuracy, compact design, robust construction and flexibility make this instrument universal and suitable for different measurement functions. The sensor is available with flush diaphragm or according to EHEDG standards. For technical reasons, a piezoresistive sensor element is used for measuring ranges up to 16 bar and a thin film sensor element for the measuring range of 25 bar. Wetted parts are made of stainless steel and completely welded. Internal seal elements, which could restrict the choice of measuring materials, are excluded.

## Analytical Sensors

In combination with our process valves, Bürkert's analytical sensors and controllers for pH and conductivity measurement are the ideal solution for pharmaceutical CIP and SIP applications. Inductive transmitters are employed in the CIP makeup loop whereas the return CIP must be able to measure the very low conductivity of the final rinse water which is commonly WFI quality.



### pH (Process)

#### Type 8201 – pH Transmitter

The pH measuring system is suitable for measuring absolute pH values in liquids between pH 0 and pH 12 at medium temperatures of up to 140°C and process pressures of a maximum 6 bar. Due to its hygienic design and the robust glass-free layout, this model is particularly suitable for use in hygienic processes, for example the production of foods and active ingredients. The pH electrode's extremely smooth enamel surface prevents the medium from sticking and is very easy to clean. For this, the electrode stays in the process even during a CIP purification.



### pH (Utility)

#### Type 8202 – pH/ORP Transmitter, ELEMENT Design

The transmitter Type 8202 is a compact, but modular device, specially designed for measuring the pH or O.R.P. value of fluids with low transducer and dual analog output for temperature and pH/O.R.P. The transmitter consists of a replaceable standard 120 mm pH or O.R.P. probe, screwed in a sensor holder with integrated Pt1000 temperature sensor. This ensemble is plugged-in and screwed with a nut to an IP67 enclosure containing the electronic module with cover and a removable display.



### Conductivity (Process)

#### Type 8221 – Four-Pole Conductivity Transmitter

Due to their hygienic design and the robust layout, these conductivity sensors are suitable for use under demanding conditions in pharmaceutical, biotechnology and the general chemical industry. The sensors are based on the 4-electrode principle which excludes polarization phenomena normally observed with 2-electrode sensors.



### Conductivity (Utility)

#### Type 8222 – Resistive Conductivity Transmitter, ELEMENT Design

DUAL-compact field transmitter for conductivity and temperature. Direct inline or bypass pipe mounted via a standard True Union fitting. The 8222 utilizes 3 different electrodes which are determined by liquid conductivity covering a broad range from ultra pure water (.05  $\mu\text{S}/\text{cm}$ ) to industrial sewage water (10  $\text{mS}/\text{cm}$ ). Integrated switches are optional for diagnostics, high/low alarm purposes or for simple on/off controller functions. The programmer unit with backlit display can be left in the unit for local display or removed, leaving the transmitter blind.

## Controllers and Transmitters

Functionality is the word that best describes this range of transmitters and controllers. Modularity is a close second with plenty of options available as standard to allow you to select the ultimate controller for your process. From standard DIN panel mounting, wall mounting and skid mounting you can be sure you can fit your choice into your chosen application for optimum handling. With a wide range of materials of construction and many features built in for convenience and performance, you will find each one a natural choice to enhance your process or use as a stand alone system controller to integrate into your existing systems.



### Type 8619 – MultiCELL

Bürkert's 8619 transmitter/controller is the latest addition to Bürkert's process control program. The 1/4DIN panel mounted controller incorporates a large backlit LCD display for viewing up to 6 possible process variables including up to two analytical instruments, two temperatures and up to 3 hall flow sensors. Additional input and output modules can be added to further enhance the controller's capabilities with additional 4-20mA and binary inputs and outputs. An SD card is standard for data logging and up/down loading of parameterization files.



### Type 8285 – Analysis Transmitter

The 8285 modular process analysis system is designed to measure and process liquid analysis parameters. The base unit contains the power supply, signal outputs, binary inputs and the front with graphic display with backlighting. Three slots are available, which, depending on the applications, can be occupied with modules for pH, conductivity or also with a module with additional outputs. The hygienic, polished stainless steel enclosure version allows application in the field of biotechnology and in the pharmaceutical and chemical industries.



### Type 8620 – mxCONTROL

Multi-parameter controller designed to automate the control of process variables within a water treatment system (e.g. boiler, cooling tower or reverse osmosis system). Sophisticated electronics and state of the art control algorithms ensure that optimum process control is maintained at all times, with minimal operator intervention. It saves time and space by allowing parameterization and data logging of a wide number of control variants via an SD card slot, USB connection or via an Ethernet interface. Up to eight functions can be performed simultaneously by utilizing up to 23 I/O points.



### Type 8611 – eCONTROL

Thanks to its compact design, the universal 8611 controller is especially designed for compact control system applications. It is compatible with a wide range of proportional control valves and connects with an electropneumatic servo-system for pneumatically actuated process control valves. The PI process controller is equipped with many additional functions. The actual process value can be supplied as one of three inputs; a standard current (4-20 mA), frequency or Pt100 signal directly to the universal controller. The process switching points can be set via a 4-20 mA signal or with the keypad.

# System Competence

## Perfect Solutions

Bürkert and BBS have a unique perspective in the process control and instrumentation industry as we are the only single brand which combines a complete range of valves, instruments, pneumatic actuation, networking and controllers from a single source.

With our dedicated world-class engineers and our superlative manufacturing facilities we can deliver systems which meet your exact requirements.

Your reliable Bürkert and BBS sales consultant and our system engineers work in concert to ask the right questions and provide the right hardware. Transparent operations, up to date situation, review procedure, engineering change notices, portals through SAP and secure intranet are normal in our projects.

For a world class system experience, insist on Bürkert and BBS people to be part of your next project.



01

### Connect

As a globally flexible, lean, focused and innovative company we are the partner of choice for fluid control systems in more than 35 countries. Whether you are in Stuttgart, Singapore, Chicago or Sydney, everywhere in the world we are close to you and therefore know first-hand about your specific tasks and problems.

Following our principle of "one face to the customer", you have a competent, reliable consultant by your side at all times, who listens to your needs and presents a solution in your daily application language ... crossing conventional boundaries and creating synergies between industries in pursuit of your ideal solution.

Systemhaus crews in Charlotte (USA), Suzhou (China), Dresden, Ingelfingen and Dortmund are continuously in innovation mode. They creatively engineer cost effective solutions to meet difficult process challenges for our customers.



02

### Conceive & Innovate

Your project team starts working for you: from your reliable sales consultant, qualified industry specialists to dedicated system engineers – Bürkert puts the necessary experts together.

For the entire duration of the project they work together, combining their experience and clarifying all the requirements in close cooperation with you to come up with a feasible draft of your solution within the shortest timeframe.

CAD-created animations or simulations, combined with extended manufacturing, materials, tool design, construction and assembly knowledge enable us to provide a rough but firm production concept for your system at an early stage.



03

### Plan & Specify

In Phase 3 the project is planned in detail. A specification sheet and refined solution concept are developed. This defines exactly what you expect from the system and what it must provide to ensure that all components meet your requirements.

At the end of this phase you are presented with a detailed product definition, a production specification and precise commercial conditions and agreements.

Structured project management based on open communication, effective coordination and thorough documentation ensures fast and reliable results.



04

### Do & Check

Good communication, coordination and documentation at all project phases make sure that we are on the right track, developing the right solution, to allow us to quickly move on to prototyping.

Thanks to the latest technology, we are able to build a prototype made of metal or plastic or a functional model, to test flow for example, within 24 hours.

We provide you with samples; we perform tests and, of course, obtain all the necessary local and global approvals to make sure the system can go to production.

From here we work in concert with one of our production facilities in Ingelfingen, Gerabronn, Criesbach, Öhringen or Triembach according to their individual core manufacturing competencies.



05

### Complete

Our work does not end with the perfect delivery of components and systems. We offer a comprehensive program to our global clients interlinking services ranging from maintenance and service contracts operator training and integrated logistics.

Our customer service is available around the clock, offering support through internet, telephone or our qualified, experienced people at your site.

We aim to provide only the utmost in customer experience. Something you will tell your friends about.

## Systems

Bürkert and BBS will provide you with total system solutions which are completely compliant. Our Quality Management Systems, Quality Assurance, Risk Assessment and Validation and Training all meet latest practices and combine with our manufacturing and engineering design teams to give you an optimum experience.

Our practical experience of qualitative and productive tools and techniques is put to use every day and is transferred into your ideal system solution.

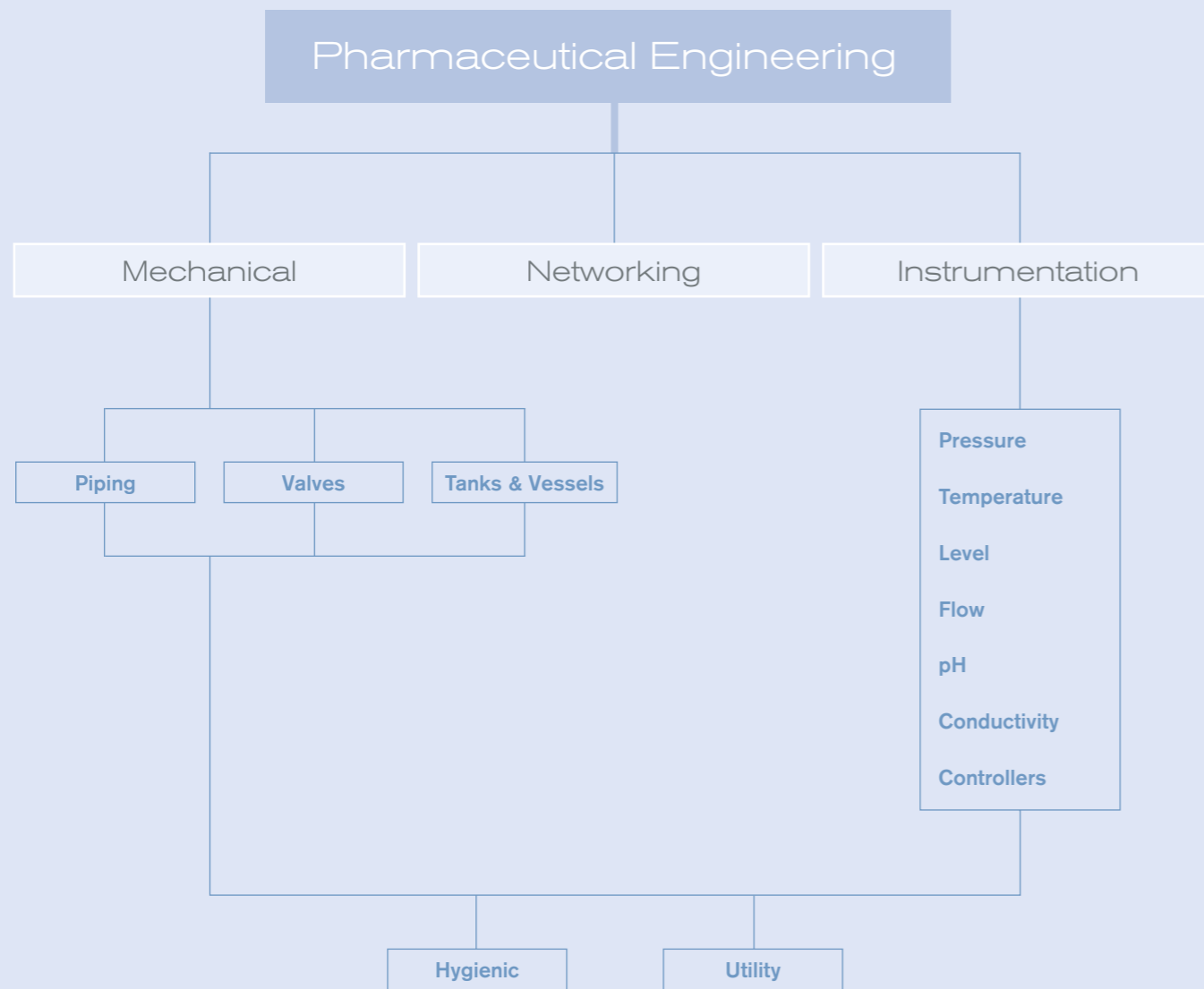
When the consulting approach begins we are searching for the knowledge you possess that will allow us to apply these techniques and put our engineering skills and experience into practice. As we continue to consult, our closeness develops and a mutual trust and understanding brings us closer to realising exceptional system solutions which are tailor made to your process demands. Finally we have realised together a system solution which delivers results time and time again and proves to have a rewarding payback. And so we find the courage to continue as partners in the future and push the boundaries of engineering to enhance process performance and product yield for a successful future.

With 6 manufacturing locations, multiple Systemhaus facilities globally, more than 2000 employees and an own scope of supply which is unrivalled, our alliance is almost certainly a partnership that you will want to insist upon supporting your business development plans.

**We make ideas flow.**



# Your Project – Where can we help?



# Project Requirements

Type of Networking: .....

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Application: .....

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Material Specification: .....

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Documentation: .....

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## Bürkert – Close to You

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