



PRECISION SOLUTIONS BY SMC

# Enhancing bioprocess efficiency

Expertise  
Passion  
Automation



# SMC solutions for bioreactors

In the evolving landscape of bioprocessing, efficiency, precision, and scalability are crucial for bioreactor manufacturers. At SMC, we specialise in providing high-performance fluid control and automation solutions, ensuring reliable gas, liquid, and temperature control in bioreactor systems. Whether for **seed train development or large-scale production**, our solutions enhance process stability and operational flexibility.

With our expertise in **batch and perfusion systems** as well as **stainless steel (SUS) and glass bioreactor tanks**, we help biopharmaceutical manufacturers meet regulatory demands while optimising performance.

## Pinch valves

- For single use line

## Thermo control unit (TCU)

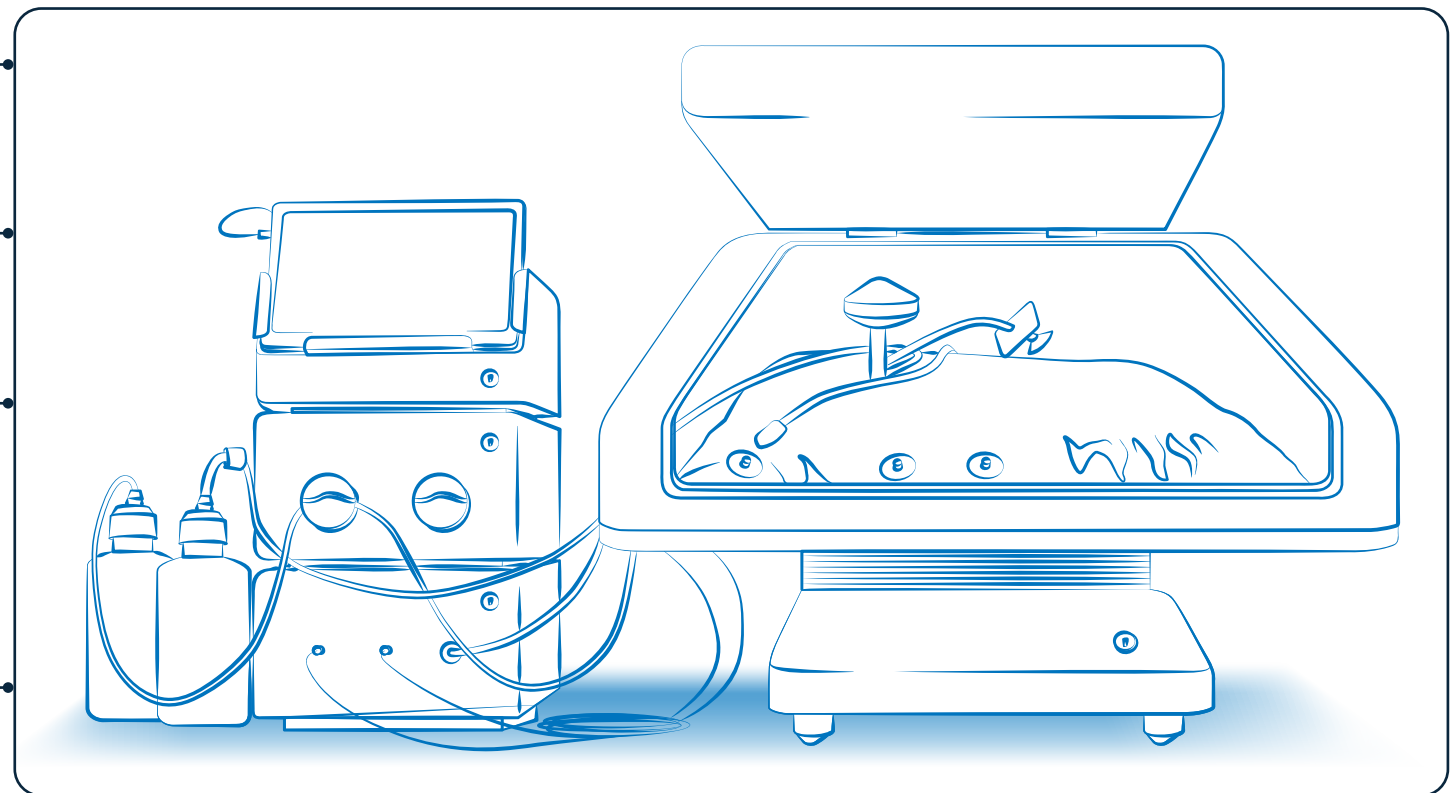
- Water temperature control

## Digital flow switch

- Monitor the flow of air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>

## Flow controller

- Flow control for air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>



## Clean regulator

- Pressure regulation for air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>

## Sintered metal element

- For sparger bubbling applications

## Directional control valve

- Space saving and improved operability



# Bioreactors

## Upstream/Seed train

The seed train process, the initial phase of cell culture, is critical for establishing a robust and scalable bioprocess. Bioreactor manufacturers recognise the importance of precise control and reliable components within seed train systems to ensure optimal cell growth and viability. Leveraging its extensive experience in the bioprocessing industry, SMC offers a comprehensive portfolio of solutions designed to meet these demanding requirements



# Bio process – Cell culture

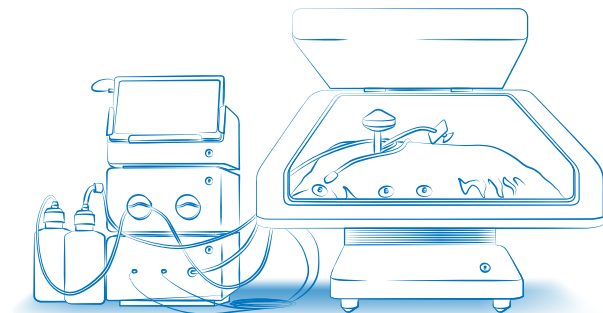
## Batch/Perfusion bag

SMC offers advanced control solutions for **single-use bioreactors (SUBs)**, ensuring seamless **batch and perfusion processing**. Our solutions improve process reliability while maintaining sterility, making them ideal for **cell culture, fermentation, and biologics production**.

### Key benefits:

- **Optimised gas & liquid control** – Precision regulation of **oxygen (O<sub>2</sub>), nitrogen (N<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), and air** for enhanced cell growth
- **Hydrogen technology** – Single-use line compatibility with easy tube replacement for contamination-free operation
- **Temperature stability** – Advanced **thermo-control units (TCUs)** provide precise **cooling and heating** for process consistency
- **Scalability** – Suitable for **R&D, pilot-scale, and large-scale biomanufacturing**.

Our innovative automation solutions ensure that your batch and perfusion processes meet the highest industry standards for both performance and efficiency.



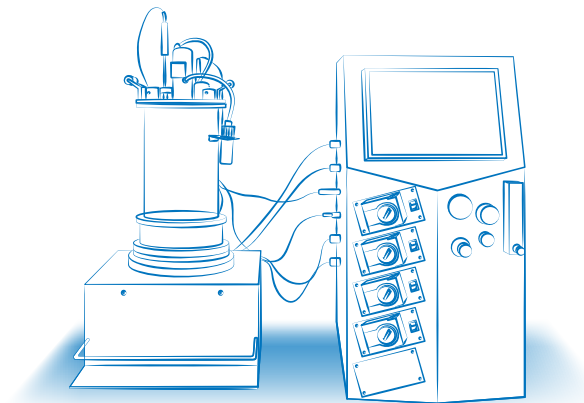
## Small & medium size tanks

For bioreactor manufacturers requiring **durable, multi-use or single-use systems**, SMC offers a range of products for stainless steel (SUS), glass and single-use tanks designed for **cell culture, fermentation, and microbial applications**. Our solutions provide precise control over critical bioprocessing parameters, ensuring consistent and repeatable results.

### Key benefits:

- **High-purity gas control** – Clean regulators and flow controllers ensure contamination-free sparging of process gases (**O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, air**)
- **Advanced temperature management** – Thermo-control systems with  $\pm 0.1$  °C stability for precise culture conditions
- **Reliable valve solutions** – Low-particle generation **angle seat valves** for seamless integration into stainless steel bioreactor lines
- **Flexible scalability** – Suitable for **pilot-scale to full production-scale applications**, ensuring smooth scale-up.

With SMC's fluid control and automation expertise, bioreactor manufacturers can achieve consistent product quality, process efficiency, and regulatory compliance.





# Temperature control

Precise temperature control is essential for maintaining optimal conditions in bioreactors, ensuring cell viability and process efficiency. At SMC, we offer advanced solutions such as high-stability thermal control units, Peltier-based systems, and high-capacity cooling options. Our products provide reliable and precise temperature regulation, meeting the stringent standards of the biopharmaceutical industry. For applications requiring environmental compliance, we offer selected models that are compliant with F-GAS regulations.



**HRS Series** +

## Thermo-control unit

- Up to 38 kw cooling capacity
- Worldwide service location
- Specials available as required.



**HRS Series** +

## Low temp thermo control unit

- Set temperature range and stability  
HRS-X158/X164: -10 to 40 °C with  $\pm 0.1$  °C.



**HEF Series** +

## Peltier type thermo-control unit

- Low-noise design (37 dB)
- Set temperature range: 10 to 60 °C
- Temperature stability:  $\pm 0.1$  °C.



**HRSC Series** +

## Non-F-gas (CO<sub>2</sub> refrigerant) refrigerated thermo-chiller

- Up to 11.5 Kw cooling capacity
- Uses natural refrigerant (CO<sub>2</sub>) with GWP=1
- Temperature stability:  $\pm 0.1$  °C.

# Liquid control

Efficient liquid handling in a bioreactor is key for media feed, collection, and mixing processes. SMC provides a wide range of pinch valves for single-use systems and flow control valves designed for the biotechnology industry. Our solutions ensure precise, contamination-free flow control, adaptable to various applications.



**JSX/JSXD/JSXZ/JSXU Series +**

## 2-port valve

- Space-saving and light-weight
- Power consumption: 14 % reduction
- Stainless body and coil.



**LVM Series +**

## Isolated structure valve

- Low particle generation, oil-free, metal-free
- Available with EPDM, FKM, Kalrez®
- Fluid area is separated from solenoid.



**JSB Series +**

## Angle seat valve

- High flow with angle seat design
- Air, water, steam
- Suitable for stainless line with multi-use bioreactor.



#### LPV Series +

#### Pinch valve solenoid type

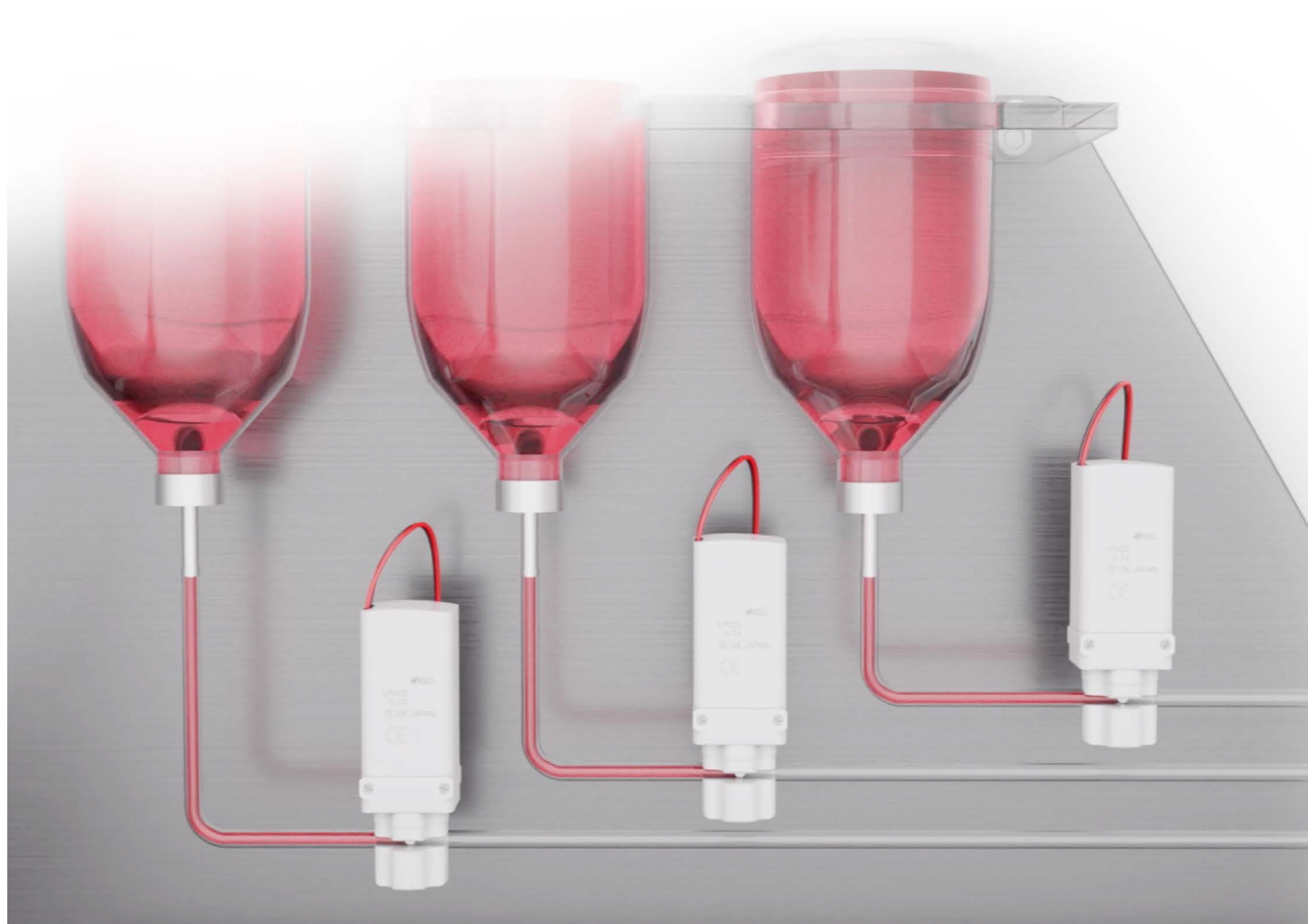
- 2-port and 3-port type
- Easy tube replacement for single-use tube.



#### KQG2 Series + KFG2 Series +

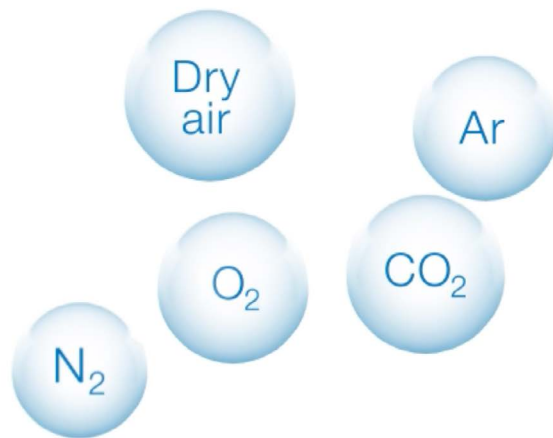
#### Stainless fitting

- SUS316 material
- KQG2 one touch type: -5 to 150 °C
- KFG2 Insert type: -65 to 260 °C.



# Gas control

Gas supply and control in a bioreactor directly impact oxygenation and cellular metabolic reactions. With our advanced valve technology, pressure regulators, and sintered metal filters, SMC enables precise control of gases such as air, CO<sub>2</sub>, O<sub>2</sub>, and N<sub>2</sub>, optimising oxygen transfer and the efficiency of fermentation and cell culture processes.



**PFC7 Series +**

## Flow controller

- Flow control for air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>
- Time to flow set: 0.5 seconds or less
- Repeatability:  $\pm 1$  % F.S.



**PF2M Series +**

## Digital flow switch

- 2 to 200 l/min range
- Air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>
- Grease-free.



**SR Series +**

## Clean regulator

- Pressure regulation for air, Ar, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>
- Contamination-controlled SUS steel
- Oil-free.



**ES Series +**

## Sintered metal filter element

- Space-saving and light weight
- Stainless material
- For sparger bubbling applications.



# Device communication

The seamless integration and automation of bioreactor systems require reliable communication solutions. SMC offers serial interfaces with protocols such as Ethernet/IP™, PROFINET, and IO-Link, ensuring real-time monitoring and connectivity. Our solutions enable smooth integration with automation systems, enhancing process control and traceability.



EXW1/EX600-W Series +

## Serial interface

- Wireless system option
- Various protocols available (Ethernet/IP™, PROFINET, IO-Link, etc).

IO-Link

EtherNet/IP™

EtherCAT®

PROFINET®  
BUS

PROFINET®

DeviceNet™

CC-Link V2



# Air line components

The quality of compressed air is a critical factor in bioreactor systems, directly affecting sterility and process performance. SMC provides high-performance pneumatic regulators, air treatment units, and control valves designed to maintain a clean and stable air supply. Our solutions ensure operational reliability and energy efficiency in critical applications.



AC-D Series +

## Air combination units for air supply

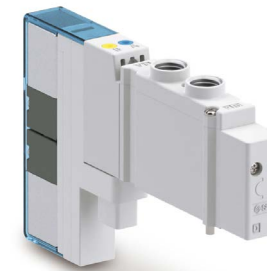
- Urban white, a clean look for your equipment
- Modular design
- Element and bowl form one piece.



SY Series +

## Directional control valve

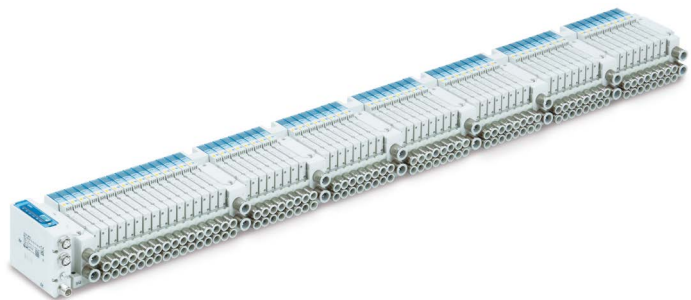
- Space-saving and improved operability
- Power consumption of 0.1 W.



JSY Series +

## Directional individual valve

- Flow size reduction
- Dual 3-port valves available for supplying pilot air
- Low power consumption (0.1 W).



### JSY3000-L Series +

#### 64-station compatible manifold

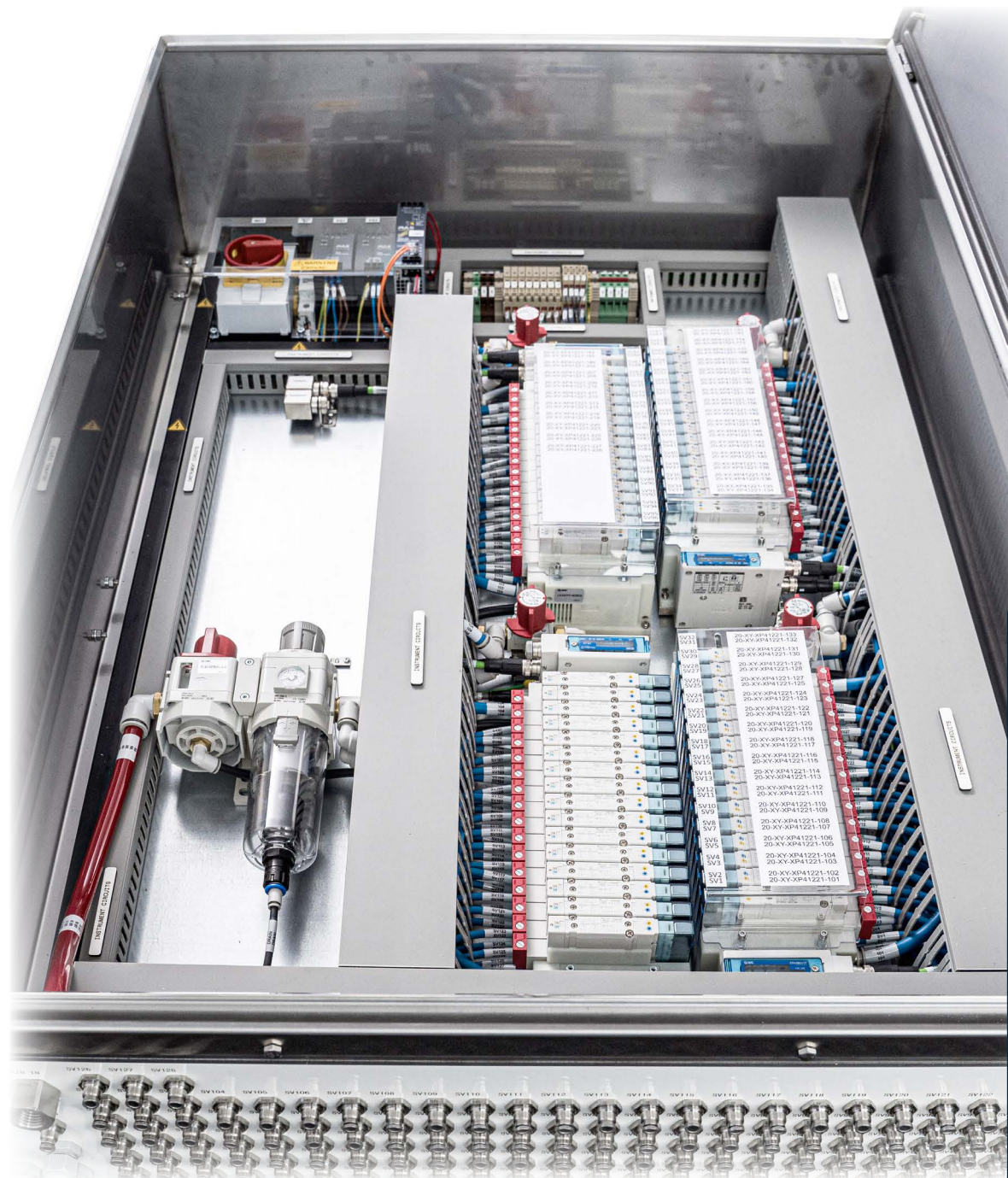
- Valve stations: from 4 to 64
- Reduced number of SI units
- Reduced wiring and wiring work.



### ITV Series +

#### Electro-pneumatic regulator

- Stepless air pressure control
- Linearity:  $\pm 1$  % or less (F.S.)
- Hysteresis: 0.5 % or less (F.S.).



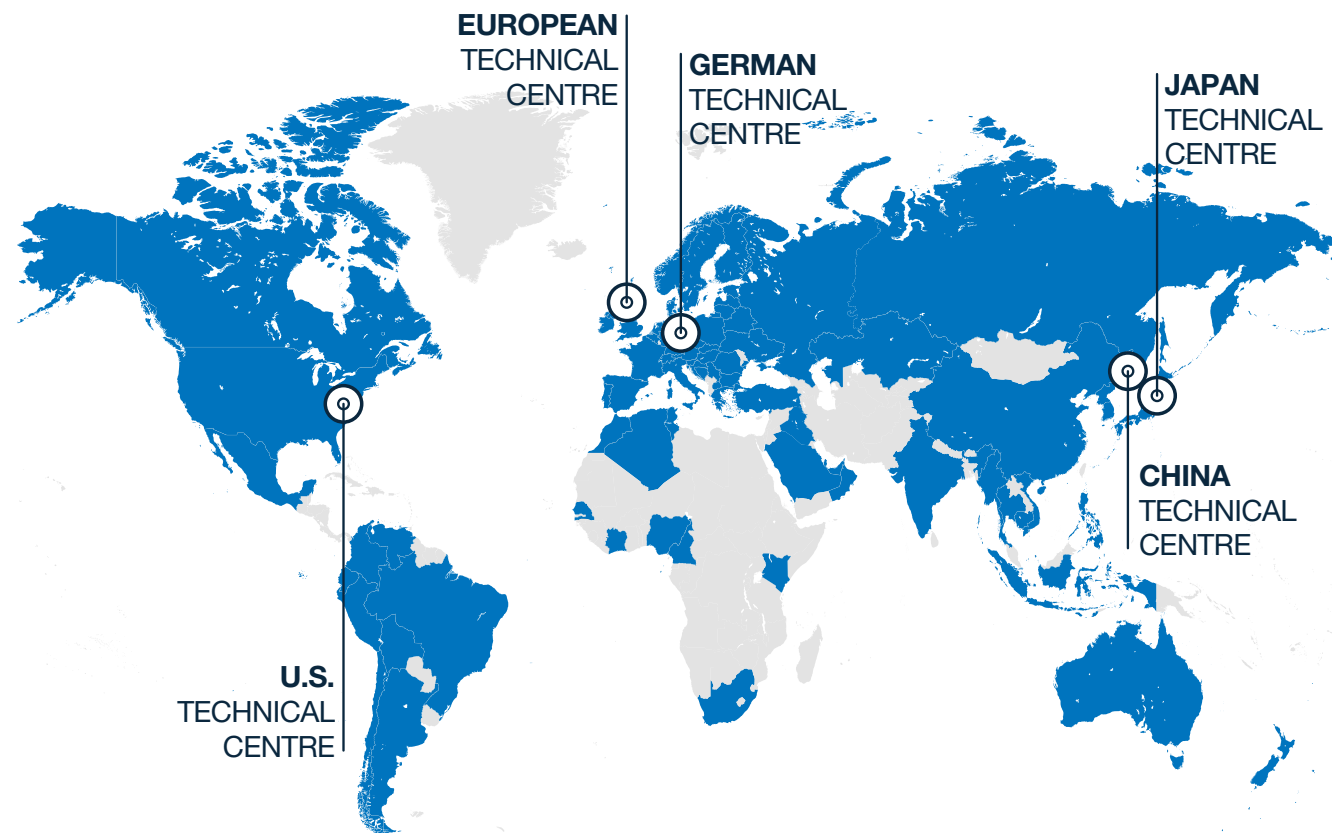


# Our support network

## SMC's worldwide commitment

One of the things we do best at SMC is **being close to our customers**. Local support, on a global scale.

With **support** in over **500 locations** across **80 countries** and regions **worldwide**, our sales force of **7000 experts** maintains **close communication with customers**.



# SMC Business Continuity Plan

## Sustainable growth also means ensuring uninterrupted operations

We are committed to ensuring that SMC is prepared for any emergency and that our business activities will not stop in the event of such circumstances. SMC aims to fulfil our product supply responsibilities and maintain our customers' trust by contributing to both sustainable growth and the expansion of technological innovations.

SMC, as a comprehensive manufacturer of automatic control equipment that supports automation, is able to promptly provide products that meet our customers' needs anywhere in the world.

## Production BCP

### Ensure customer order fulfilment

Reliable delivery for you thanks to our 9 global logistic centres and 38 production sites worldwide, 10 of which are located in Europe. Moreover, flexibility to rapidly respond to any sudden change in the manufacturing environment.

## Finance BCP

### Safe & Solid financial base

In the event of an emergency, SMC can provide a safe and solid financial base (with cash, deposits, and equity capital) that will sufficiently cover the working capital and funds needed to rebuild buildings and the equipment required for business continuity. This is done to provide peace of mind to our customers and workers alike.

## Information security BCP

### Vital data kept safe

Strengthen information security for protection against computer viruses and cyberattacks, plus the installation of data centres to establish a disaster recovery system. Your information is safe with us.

## Engineering BCP

### Consistent technical support

2,100 engineers at our 5 technical centres around the globe (2 in Europe – Germany and UK).

## Sales BCP

### Consistent sales support

7,000 sales engineers worldwide ready to recommend the best solution for you. Over 80 global locations to make sure that wherever you are, we are there too.



Discover more



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Release DW  
BIOREACTOR-A-EN

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