

Application Note



Angst+Pfister Sensors and Power is a company with a long track record in life science, serving medical device manufacturers across the globe for many decades.

A **Bioreactor** is used to cultivate microorganisms or live cells in a controlled environment for the purpose of manufacturing biological substances (antibodies, enzymes...)

"Thanks to Angst+Pfister Sensors and Power, we were able to massively improve our process stability and repeatability"



Example Bioreactor (source: Eppendorf)

How can Bioreactors be improved with the high-precision mass flow controller PFLOWC5001/2?

- Measurement of the flow medium's calorimetry to improve linearity
- Optimization of the calibrated measuring span
- Mass flow detection of multiple gases, without recalibration
- High precision
- High IP-protection class



What are the advantages of APSP pressure sensors for Bioreactors?

- High accuracy miniature pressure sensor AG2/ AG4
- Backward gage - sensor resistant towards temporary humidity exposure (e.g. condensation when changing to fresh, cold gas bottle)
- Manifold-mountable for easy integration in pneumatic block
- Individual range calibration for optimization of usable span



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How can the digital and factory-calibrated SMT172 improve monitoring of gas temperature in Bioreactors?

- Digital temperature sensor with PWM output for error-free transmission over long distances
- Extremely high accuracy of $\pm 0.04^{\circ}\text{C}$
- Very high Signal-to-noise ratio
- Fast response time of $t_{63\%}=0.6\text{s}$, to quickly detect temperature changes
- High repeatability of 0.01°C to increase process stability
- Extremely high efficiency to eliminate self-heating



What advantages do paramagnetic oxygen sensors from APSP offer to enhance the efficiency and sustainability of Bioreactors?

- Extremely stable measurement up to 100 vol.-% O_2
- Linear analog output signal so that no post-processing is required
- No cross-sensitivity to other emitting gases (highly selective)
- Little maintenance because of no wearing parts
- Long life-time
- Suitable for continuous (24/7) measurement



How can you benefit from APSP medical power supplies/ DC-DC converters while increasing user safety?

- Compact form factor for reduced space demand
- High efficiency and low no-load energy consumption
- Extremely low leakage current
- High EMC- class
- BF (body floating) and even CF (cardiac floating) insulation
- Specific safety approval
- Design-in engineering and certification support
- Flexible customization even for smaller quantities



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What are the advantages of A+P elastomer components for Bioreactors?

- With our A+P specialists we realize the most suitable and efficient solutions for demanding Life Science applications in terms of sealing, fluid handling and antivibration
- Comprehensive know-how in high-performance elastomers from choice of raw materials to final testing and serial production
- Solutions designated for vacuum systems/ pumps
- Extremely high chemical resistance against most liquids and chemicals
- Great range of possible operating temperatures from -60°C up to +250°C
- High resistance to pressure, compression and deformation
- Low steam permeability and minimum water absorption combined with low cold flow compared to PTFE
- High durability and reliable service
- Non-adhesive smooth surface
- Fully customizable molded specials (e.g. inflatable door sealing AIRMATIC® for pressurized/ vacuumized chambers)
- Multiple approvals and conformities



Everything from a single source!

Very fast and flexible engineering prototypes for customized solutions.

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