DATASHEET GAS FLOW CONTROLLERS IN BIOREACTORS A050

APPLICATION NOTE

Gas flow controllers for bacterial growth in bioreactors

Flow controllers play an important role in Bioreactor applications, in benchtop bioreactors, but also in large industrial systems. In a search for better gas flow control a manufacturer of bioreactors contacted us for our mass flow instruments. A few years ago they developed a new, small type of bioreactor with a volume of 500 ml, for which they needed matching gas dosing equipment. Important in bioreactor applications are the *reproducibility* and *reliability*, as gas dosing of Air, Nitrogen, Oxygen and Carbon Dioxide into cell cultivation is critical. In the controlled environment of a bioreactor, bacteria can grow before they are used for preparation of fermented foods and drinks, like yoghurt and wine.

Application requirements

Accurately and *reproducibly* dosing of gases, as oxygen or carbon dioxide, to bioreactors is essential to control the bacterial growth rate. Moreover, for easy scaling-up, a full range of gas flow controllers for different flow rates should be available and be mutually interchangeable.

Important topics

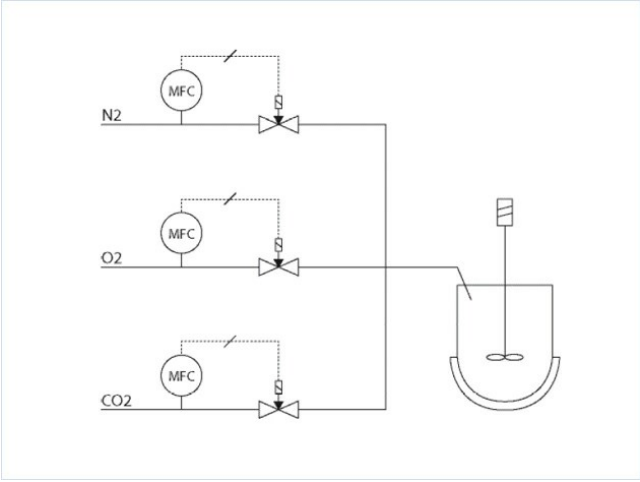
- Reproducibility and reliability
- Full range of flow rates
- Mutually interchangeable, for easy scaling-up

Process solution

A benchtop bioreactor has the size of a desktop computer housing, with a reactor vessel of 500 ml and all kinds of sensors. For this system, the customer needed very compact gas flow regulators for low flows. To this end we supplied the IQ+FLOW gas flow controller for one channel, or a package called IQM3 for three channels, to dose the gases (oxygen, nitrogen, carbon monoxide or carbon dioxide) into the reactor. With IQM3 three gases can be dosed simultaneously, each in the range between 10 and 1500 ml per minute.

For this benchtop bioreactor application, a dosing accuracy of max. ±3% is required, which is no problem for the IQ+FLOW flow controllers. These ultra-compact flow controllers have an accuracy of ±1.5%RD plus ±0.5%FS.

In addition to that: if the bioreactor is used for a fixed recipe of gases for bacteria to grow, the composition of the recipe should remain the same over time. Therefore, a good reproducibility is even more important.



Flow scheme

Bronkhorst is able to serve the entire biotechnology production range: from lab scale (1 l/min) with the compact IQ+/IQM3 flow meters series, via intermediate scale (20 l/min) with the EL-FLOW Select flow controllers, to full production scale (200 l/min). Upscaling to another instrument with larger flow is easy, as all these devices are available with the ModBus communication protocol.

Nowadays, we not only supply the gas flow controllers for the lab scale bioreactors but also the ones for the intermediate and full production scale equipment.

Recommended Products

IQ+FLOW IQF-100C MFM

Min. flow 0...10 mln/min
Max. flow 0...5 ln/min

Pressure rating 10 bar

Ultra compact

MEMS technology

EL-FLOW SELECT F-201CV

Min. flow 0,16…8 mln/min
Max. flow 0,5…25 ln/min

Pressure rating 64 bar

Compact design

High accuracy and repeatability

IN-FLOW F-111AI

Min. flow 0,4…20 ln/min
Max. flow 0,6…100 ln/min

Pressure rating 100 bar

Compact IP65 design

High accuracy

MASS-STREAM D-6321 MFC

Min. flow 0,05…1 ln/min
Max. flow 0,35…7 ln/min

Pressure rating up to 20 bar

Rugged sensor and housing (IP65)

Optional integrated TFT display

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