



Pressure and level instrumentation for biotechnological processes

It's an exciting time for biotechnology. Many chemical and pharmaceutical processes are currently being transformed into biotechnological processes. Right in the middle of this is the Spanish company TECNIC Bioprocess Equipment Manufacturing, who supports its customers through all phases of the implementation of a bioprocess. When it comes to level and pressure instrumentation, the company relies on measuring instruments from VEGA.

The pace being set by the company, which was only founded ten years ago, is fast. With a production area of 5,000 m², TECNIC is known as a specialist in equipment for biotechnological and pharmaceutical applications for laboratories, pilot plants and full-scale production facilities. Its activities encompass the entire manufacturing process, from 3D design to programming and instrumentation of the equipment, right through to plant setup and commissioning. TECNIC also has BSL2 laboratories for cell and microbial cultures that it uses to support its customers. "We support our customers in the planning of equipment used for upstream or downstream processes as well as the scale-up phase. We act as a link between the R&D and production departments, offering scalable solutions to speed up the industrialisation process," explains Manel Estany, operations manager at TECNIC.

While in the first few years the focus was purely on pharmaceutical applications, in 2018 a new department for biotechnology was added. Since then, the company deals with all the main processes in biotechnology. They produce equipment for both upstream (bioreactors and reactors) and downstream processes (tangential flow filtration).

TECNIC has a wide range of equipment for laboratory (eLAB), pilot (ePILOT) and production (ePROD) applications.

Bioreactors are devices that reproduce optimal conditions for the growth of cell or microbial cultures by regulating temperature, pH value and partial pressure of oxygen (pO₂) as well as the concentration of dissolved gases, and optionally also the optical density (TCD), cell density (VCD) or dissolved CO₂. The dissolved oxygen in the culture medium is controlled, for example, by means of a 'cascade control' system, which involves variables such as stirring, ventilation or oxygen-enriched aeration. To ensure the sterility of the biological reactor, sterile influx valves and a fully aseptic sampling system were developed and designed to be connected to the SIP (Sterilisation in Place) system.

A wide range of sensors



A wide variety of VEGA sensors are installed in the processing systems. These deliver their analogue and digital 4 ... 20 mA signals to TECNIC's own eSCADA software. Based on the AVEVA platform, the software manages the control parameters and ensures that the recipes are adhered to in compliance with GAMP5 and CFR21. "We set up and commission all the sensors ourselves. But if we do need help, we can always rely on VEGA's technical support," adds Estany.

VEGABAR 28 is practically the standard sensor for pressure measurement. It is used to regulate the sterilisation processes in the bioreactors. The sensor is crucial in ensuring a pressure of 1.3 bar. **VEGABAR 28** is a universally applicable pressure sensor with ceramic measuring cell for measuring gases, vapours and liquids at temperatures up to 130 °C. The sensor element is the proven CERTEC® measuring cell, which not only features excellent long-term stability but also high overload resistance. The CERTEC® measuring cell is also a dry cell without any oil filling, which minimises any contamination risk.

The **VEGABAR 29** is the standard pressure sensor used for tangential flow filtration systems (TFF), i.e. in the downstream applications of biotechnological processes. The sensor monitors the TMP (Trans Membrane Pressure), a critical process value for efficient filtration. This process parameter is the average pressure of the inflowing material on the permeate side of the diaphragm. TECNIC's tangential filtration system (TFF) is fully automated, so that the TMP can be pre-defined and the process is controlled using retentate valve.

Although the capacitive rod probe **VEGACAL 62** is only used occasionally by the company, it is very much appreciated in the components with CIP (Cleaning in Place) because of its high chemical resistance. It measures the level continuously there. **VEGAFLEX 81**, on the other hand, is used more frequently at various points in the processes, for example to measure the level in the tangential flow filtration tanks. It delivers reliable measured values, which are an absolute must for tank regulation.

The level switches **VEGAPOINT 11** and **VEGAPOINT 23** are used to monitor the level wherever the standards of ASME-BPE, EHEDG or GMP have to be complied with, for example the pump operation. These sensors can also handle the sterilisation processes as well. Thanks to their universal connections for hygienic adapters, they are quick and easy to install. Moreover, the sensors can be deployed without calibration or adjustment.

The compact radar sensor **VEGAPULS 21**, which can also withstand CIP processes up to 80 °C, is used for non-critical volume monitoring that requires no direct contact with the medium. If non-contact level sensing needs to be made with higher accuracy and hygiene compliance, it's time to deploy the **VEGAPULS 64** radar level sensor, which is ideal for measuring various critical volumes in the processes. This 80-GHz radar sensor, which is designed for continuous level measurement of liquids, is perfectly suited for applications with SIP processes.

And, last but not least, the vibrating level switches **VEGASWING 51** and **VEGASWING 61** are also installed in the bioprocessing systems, especially in areas where the ASME-BPE, EHEDG or GMP specifications do not apply.

Viscous and turbulent media conditions



Reliable measured values are crucial for these elaborate, hi-tech processes. Since it started making bioprocessing equipment five years ago, the company has relied almost exclusively on sensors from VEGA for pressure and level measurement. "Due to the sterilisation processes, the temperatures ranges from -10°C to $+140^{\circ}\text{C}$ in most applications. We often have to deal with viscous and turbulent media, but also the steam and CIP spray heads put a strain on the sensors," says Manel Estany, explaining the operating conditions inside the bioreactors manufactured at TECNIC.

Service and support very much appreciated



"We especially appreciate the reliability of VEGA sensors. But the service and above all the worldwide technical support VEGA provides are also very important to us, because we sell our bioprocessing systems on the international market," explains Manel Estany. He and his colleagues are convinced that the Bluetooth connectivity of the sensors is one of the most outstanding features. "The wireless connection for the adjustment and monitoring of devices is extraordinarily useful for commissioning and verification. It also allows us to identify errors and discrepancies much more quickly in our day-to-day work," says Estany, pointing to his own experience in conclusion.

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