

The Experts in Non-Invasive Liquid Flow Measurement Via the Ultrasound Transit Time Method

Germany-based em-tec GmbH has been developing and manufacturing products and components for the medical and bioprocessing industry for decades. With many years of experience, em-tec has become known as a strong partner for consulting, development, and production focusing on non-invasive flow measurement systems using the ultrasound transit time principle. The long-established and medically certified bidirectional Clamp-On flow measurement system for liquids has been adapted for the special needs of the good manufacturing practice (GMP)–oriented bioprocessing industry.

THE FLOW MEASUREMENT SYSTEM FOR BIOPROCESSING AND PHARMACEUTICAL PROCESSES

The BioProTT™ flow measurement system consists of a disinfectable Clamp-On transducer and a FlowTrack flowmeter with the measuring electronics. Flexible tubing can be easily inserted into the Clamp-On transducer. After the lid is closed, the measurement can start without splicing the tubing lines. There is never contact between the sensor and the measured medium. The sterility of the process is inherently ensured by the system design, making it ideal for processes with high hygienic requirements and single-use applications. That also ensures that users are not exposed to toxic or similarly dangerous substances when incorporating flow measurement into a bioreactor set-up.

A large range of flexible tubing (typically also fulfilling special requirements of the pharmaceutical and food industries) can be supported with sensor sizes starting from 1/32-inch (0.8 mm, internal diameter) to 1-inch (25.4 mm) and flows from a few mL/min up to 100 L/min. Depending on customer's accuracy requirements, the sensors can be calibrated for up to seven different calibration parameter sets — with alternative tubing materials, different temperatures, or media, for example. Media may be pure in the form of an emulsion or contain (for example) salts, carbohydrates, alcohols, proteins, or cellular components. A number of flow meter variants with standard interfaces (4-20 mA/RS-232) are available to allow an optimal and easy integration into process automation. The bench-top version also can be used as a stand-alone measuring device by including a display and user interface (e.g., for laboratory setups).

SYSTEM ACCURACY

The high accuracy of the system has been proven in different customer application. Non-invasive transit-time ultrasonic flow



measurement with Clamp-On technology can achieve overall performance accuracy that is required for typical process control applications. As part of a poster presentation for an international show, three different single-use system set-ups (filtration system, isocratic chromatography system, and gradient chromatography system) were compared with the em-tec BioProTT™ flow measurement system. Flow rates ranging from 2 to 16 L/min were measured and evaluated against a NIST-calibrated Coriolis meter. Results indicated that with proper material calibration and unit setup, flow rate measurement accuracies of better than $\pm 2\%$ of reading can be achieved over the complete linear range (for details go to www.em-tec.com).

CUSTOMIZED SOLUTIONS AND FLEXIBILITY

One of em-tec's strengths is to support customized solutions and product developments with an individual and very flexible approach based on the following features.

Flow measurement components are designed for integration into customer specific projects (OEM integration) with flexibility to adapt to customer needs — e.g., different housing materials for sensors (such as for stainless steel equipment) or with different branding options.

Customizable multichannel platform approach allow monitoring of up to eight flow channels simultaneously. Various protocols and interfaces for individual process control integration can be provided and adapted to specific project needs.

PROCESS-ORIENTED QUALITY ASSURANCE

em-tec's quality management system, certified to ISO 13485, provides for a correct and complete technical documentation of a project and ensures that all strict standards that apply to medical device manufacturers are obeyed throughout a development process. em-tec also possesses key experience in all classes of medical CE and FDA approvals. 🌐

Hubert Jakob is product manager at em-tec GmbH, Lerchenberg 20, 86923 Finning, Germany, 49-8806-92-36-34; Hubert.jakob@em-tec.de, www.em-tec.com.