

Reliable High-Throughput Flow Cytometry

Five Advantages of Automated Everyday Life in the Lab

1. Less Housekeeping

Device cleaning or the startup and shutdown of a flow cytometer are necessary, but also annoying processes that often cloud the fun of flow cytometry. These procedures take up time that the user could spend much more effectively doing something else. However, there are alternatives to these inconveniences: automated flow cytometers that manage these boring domestic tasks all by themselves.

Equipped with three lasers (405, 488, 640 nm), the MACSQuant X Analyzer of-

fers the user completely automated solutions for a variety of routine functions. These include, among other things, startup and shutdown of the device, as well as all necessary washing steps. The instrument calibration and compensation of the different fluorescence channels are also fully automated. The integrated robotic arm is even capable of automatically mixing 384 samples with up to four different reagents, such as antibodies or dyes for living-dead discrimination, prior to measurement. The user only has to position the microtiter plate containing the sam-

ples, select a pre-programmed assay setup, and the instrument does the rest. This not only gives the user more time to focus on important research questions, but also ensures standardized instrument settings and a reproducible pipetting process that generates accurately measured values. A win-win situation, so to speak.

2. Reliable Results Despite High Sample Throughput

In some areas, less is more. However, when it comes to flow cytometry, higher sample throughput is definitely more. More data to be exact. And to achieve the desired data volume, many high-throughput and screening facilities have to measure as many samples as possible in the shortest time possible. However, as is so often the case, cutting corners to save time can lead to a higher error rate, which is not desirable. Data accuracy is key, which is why the need for fast and reliable high-throughput devices in flow cytometry is essential.

The optimized fluidics design of the MACSQuant X allows users to quickly and safely process their 96- or 384-well microtiter plates. With this high-throughput flow cytometer, the automated process needs only 15 minutes to measure 96-well plates and less than 60 minutes for measuring 384-well plates. And most importantly, even with a small sample volume of 5 μL per sample, the user can rely on consistent results with low coefficients of variation. Sample type, the selected flow rate, and measuring volume of the respective microtiter plate are irrelevant. The industry gold standard of <0.01% carryover between samples is guaranteed in any case with the “extended washing” setting! The advantage for the user? Saving precious samples, while still achieving reproducible and reliable results.

The function of the built-in vibrating needle is unique, enabling individual sample mixing in each well of a plate and thus ensuring an even suspension of cells, even with samples that are difficult to mix. In addition, there is the option to use



the MACSQuant X Orbital Shaker, which enables fast and simultaneous two-dimensional shaking of all samples within a microtiter plate. These different options give the user flexibility in setting up assays and can ensure thorough sample mixing, which in turn delivers reproducible results. What if you need even more flexibility? Then, of course, individual tubes can also be measured quickly and easily.

3. Analyzed Data in Record Time

As is so often the case in the laboratory, the decisive factors that separate a pile of data from an award-winning publication are a statistically accurate evaluation and analysis of the results. Especially in the field of high-throughput flow cytometry, it can be difficult to analyze the desired amount of data efficiently and in a real time-saving manner. It is often not humanly possible to keep up with the fast sample throughput of a flow cytometer. As a result, non-analyzed data is accumulating on laboratory hard disks worldwide. The solution: fast and uncomplicated data processing with standardized analysis templates.

During the measurement, the MACSQuant X stores the data for each sample as a separate file. This means that each sample can either be analyzed directly during the measurement or analytical data can be accessed immediately afterwards. In combination with the integrated MACSQuantify acquisition and analysis software, the heatmap view enables immediate visualization of the results, while the remaining samples continue to be processed. An optional software variant is available that conforms to FDA requirements according to 21 CFR part 11 and thus supports the user in complying with official regulations regarding electronic signatures, audits, and data storage.

4. Uncomplicated Integration of Liquid Handling Systems

However, an automated flow cytometer alone is not enough to create a truly hands-free working process. Before any cell analysis can provide the experimenter with the long-awaited results, there are a few experimental steps that must also

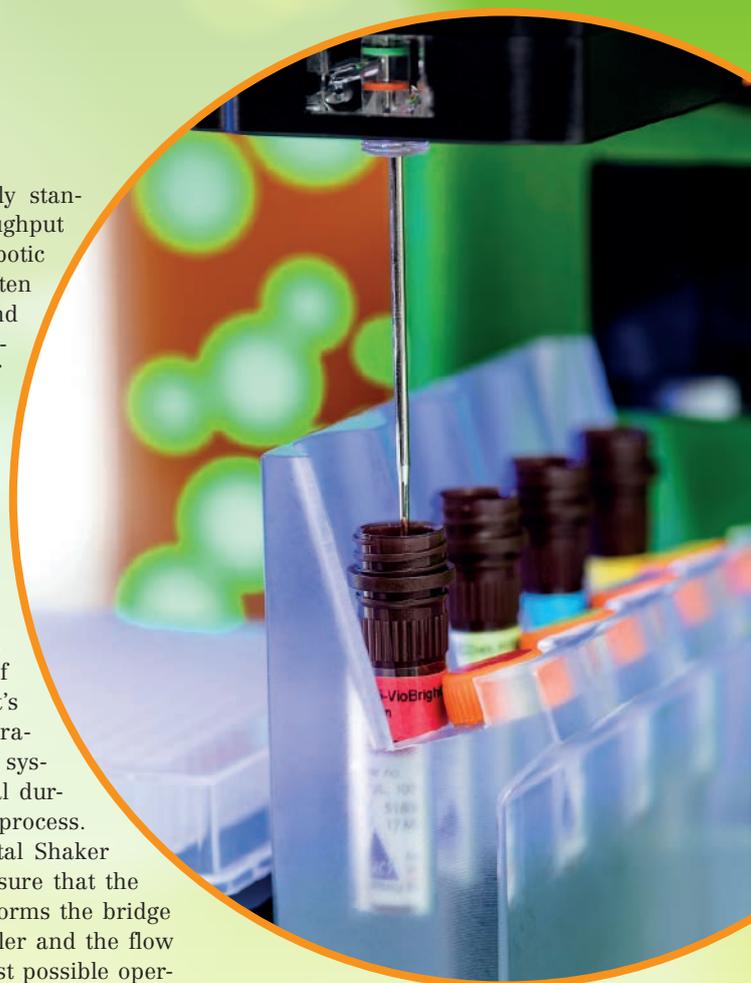
be automated for a truly standardized high-throughput workflow. This is why robotic liquid handlers are often used in drug discovery and screening; they conveniently relieve the user of the routine work steps and pipetting procedures. True to the motto “keep calm and let the robot do the work for you”.

The idea behind the MACSQuant X was to develop a device that could run thousands of samples per day. That’s why the seamless integration into liquid handling systems was a primary goal during the development process. The MACSQuant X Orbital Shaker was also designed to ensure that the connecting arm, which forms the bridge between the liquid handler and the flow cytometer, has the longest possible operational reach. This means that a large number of liquid handling systems can be connected smoothly and access to the microtiter plates is completely barrier-free.

5. Broader Experimental Horizons

In order to widen the scientific horizon, new technologies often have to be created that enable new methods to be developed, which then enable new insights to be gained. As Konrad Adenauer once said: “We all live under the same sky, but we do not all have the same horizon”. And this is also the case for flow cytometry.

With its analytical capabilities that are unique in the field of automated flow cytometry, the MACSQuant X enables a broadening of the experimental horizon for a wide variety of research applications. Drug discovery applications in particular become more versatile and can provide answers to a wide range of questions. With the integrated “FRET Express Mode”, it is now possible to combine a fully automated, user-friendly, fluorescence resonance energy transfer (FRET) assay with high-throughput flow cytometry. This allows protein-protein



interactions to be readily investigated, while the device is performing the cell analysis at the same time. With this standardized method, for example the effects of active ingredients in a substance library could be determined from 4000 samples within 2 days on a single flow cytometer. Technical developments such as these have the potential to revolutionize areas such as drug discovery and phenotypic screening. Flow cytometry just keeps on getting more and more exciting!

Contact

Dr. Anna Guastafierro
Miltenyi Biotec GmbH
Bergisch Gladbach, Germany
annagu@miltenyibiotec.de
www.miltenyibiotec.com