Automating Flow Cytometry with the ZE5 Cell Analyzer and S-RUN Software

Improving accuracy, reproducibility, and throughput are key considerations in cell analysis workflows. The integration of robotic solutions for sample handling can have a significant and positive effect on all these aspects. Bio-Rad Laboratories, Inc., one of the world's leading manufacturers of advanced flow cytometry instrumentation, and Peak Analysis & Automation Ltd. (PAA), a leading robot manufacturer, have combined their expertise to provide high-throughput flow cytometry solutions that meet the dynamic needs of the research community.

How Does Automation Improve Flow Cytometry Workflows?

Automation offers a range of benefits including:

Increased Efficiency and Throughput: Automation allows researchers to process and analyze a large number of samples in a shorter amount of time. This is particularly useful in high-throughput experiments or in high-workload environments.

Consistency of Results: Automated analysis reduces the risk of human error. Consistency of data collection is crucial for generating reliable and reproducible results.

Reduced Labor and Hands-On Time: Automation minimizes the need for manual intervention, freeing up researchers' time for more complex tasks and reducing the workload associated with cell analysis.

Standardization: Automation allows you to establish and adhere to standardized protocols, ensuring that all samples are treated and analyzed in the same way. This is important for maintaining the integrity of your data.

Data Integrity: Automated instruments such as the Bio-Rad ZE5 Cell Analyzer provide data in a digital format. Experimental data can also be integrated into sample data by using the custom FCS keyword import function, reducing the risk of transcription errors.

Remote Monitoring and Accessibility: When required, you can remotely monitor and control the ZE5 Cell Analyzer, which can be especially valuable for managing long or overnight experiments without being physically present in the lab.

Data Archiving: Automated systems facilitate data storage and organization, allowing for easier historical data retrieval for future reference and publications.

Cost Efficiency: While the initial investment in an automated system may be significant, it can lead to long-term cost savings by reducing the need for manual labor and reagents, improving the reliability of results, and improving time to results.

Visit bio-rad.com/ZE5 for more information.

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What Makes the ZE5 Cell Analyzer Ideal for Automated Flow Cytometry?

Although recognized as a powerful technology, flow cytometry has historically been limited in terms of throughput, with many systems relying on manual loading of individual tubes, or cumbersome, unreliable, and difficult-to-automate plate loaders. The ZE5 Cell Analyzer addresses these issues with an integrated, universal plate loader, which is ideal for automation. Its fast acquisition rate and superior fluidics allow 96-well plates to be analyzed in less than 15 minutes, while still collecting tens of thousands of events per well. Automated error detection and recovery, as well as automated cleaning and shutdown functions, also make it an ideal choice when considering automated flow cytometry.

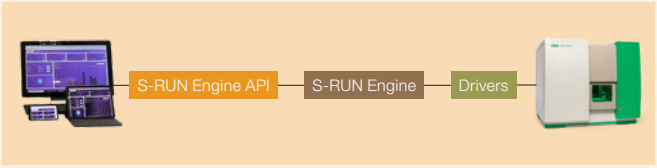
ZE5 Cell Analyzer

Key benefits:

- Powerful five-laser, 30-parameter optics
- Versatile universal plate loader capable of handling tubes, and 96- and 384-well plates with integrated cooling and agitation
- Automated fault recovery, cleaning, and maintenance
- Open-platform, vendor-agnostic application programming interface (API)
- Fast data acquisition of up to 100,000 events per second, and fast plate handling
- Reliable clog-resistant fluidics

Why Automate with S-RUN Software?

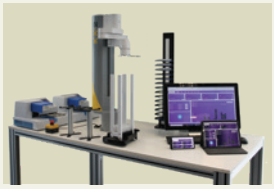
S-RUN software provides all-instrument control and the scheduling required to run an automation workcell. It is completely scalable and can be used on simple systems, such as a single instrument and robot, as well as complex systems with several dozen instruments and multiple robots.

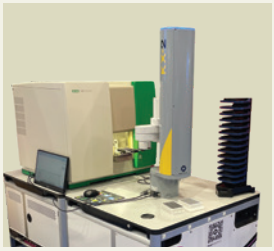


System Architecture with S-RUN Software

In line with most control models, the communications from user computer to instrument action are relayed through a number of software layers. The user selects an S-RUN instrument procedure as part of a complete process. This procedure is passed to the S-RUN API, which in turn interprets that procedure into individual actions. Each of those actions is sent in turn to the appropriate instrument driver, which relays the low-level command to the instrument for action.

S-RUN software is the first laboratory automation scheduler and control software that contains both event- and time-driven static scheduling on one platform. The simple and dynamic tiles interface enables complex routines to be rapidly and easily developed, providing an elegant, easy-to-use software solution for scheduling and control of your automation platform.





The ZE5 Cell Analyzer, KX-2 collaborative robot, and S-RUN software.

S-RUN software provides all-instrument control and the scheduling capabilities to run an automation workcell.

Key benefits:

- Platform-independent; use iOS, Android, or Windows on a desktop, tablet, or smartphone to control your automated system
- Easy setup of new processes without code development
- Control a huge variety of instruments with a driver library of more than 300 instruments, including robots, incubators, liquid handlers, plate readers, heaters, and shakers
- Precise time control, which is ideal when process timing is critical
- Scalable for large automation systems as well as simple, single-instrument systems

The Peak Robotics Inc. (PRI) KX-2 collaborative robot, PAA S-RUN software, and the innovative Bio-Rad ZE5 Cell Analyzer work seamlessly together to deliver high-quality data with speed and reliability. Achieve ultimate flexibility with high-parameter optics, fast, clog-resistant acquisition, and the ZE5 Cell Analyzer's universal plate loader. Combined with the customizable automation of the KX-2 robot, the system offers 360° continuous rotation, drag-to-teach technology, and fully collaborative, open-bench operation.

Visit bio-rad.com/HTflow or PAA-Automation.com/S-Run for more information.

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