

# CYTOMATION

Better Tools. Good Science.



**SortMaster determines the initial droplet delay for each sort, and then controls the droplet break-off during the run, ready to interrupt the sort and correct the droplet delay if it changes.**

## SIMPLE SORT SETUP

SortMaster is an innovative system that automates the precise measurement of the droplet break-off point and controls it during the sort. The accurate determination of this measurement, which up until now has had to be manually measured, is essential to high sort recovery and purity results. Only with SortMaster can outstanding sort performance be achieved every time.

## CONTINUOUS SORT MONITORING

Many factors can change the droplet break-off, including room temperature, sheath fluid temperature and pressure. Until now, the operator was required to continuously monitor the droplet break-off and adjust the instrument to compensate for changes in the break-off point. With SortMaster, no monitoring is necessary because SortMaster *controls* the droplet break-off. Every 30 milliseconds, a continuous closed loop feedback system monitors an image of the stream at the position of the last attached drop and compares the new image to the previous image. If SortMaster detects stream instability during a sort of less than  $\pm 0.25$  drop, it applies the Rayleigh Control Function<sup>1</sup> and adjusts the Drop Drive Amplitude. If SortMaster detects stream instability greater than  $\pm 0.25$  drop, it momentarily halts

the sort, modifies the Cytomation Sort Unit (CSU) parameters to return the stream to the correct drop delay, and resumes the sort, all without operator intervention. If SortMaster cannot regain a stable droplet break-off point, it halts the sort, turns off the stream deflection and alerts the operator by audible alarm, page or E-mail.

## INNOVATIVE DESIGN

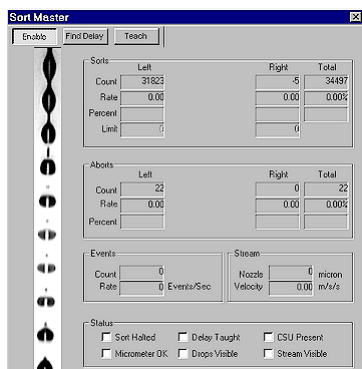
The SortMaster Embedded Processor uses sophisticated image acquisition via a frame grabber and sort control electronics to provide adaptive stabilizing control for sorting. Using a high quality CCD camera, special optics and newly developed imaging algorithms, SortMaster finds a stable droplet break-off and communicates its value to the control electronics.

## OPERATOR PRODUCTIVITY

Using SortMaster, the operator can initiate a sort quickly and walk away, secure in the knowledge that SortMaster is controlling the droplet break-off point. Because sorts for rare events can take hours, this new-found freedom for the operator can translate into far greater productivity than ever before possible. With SortMaster, operators are in total

<sup>1</sup> Rayleigh Control Function: The hydrodynamic properties of droplet break-off, first described by Rayleigh (and later Weber), were used to construct a control function that monitors stream velocity, stream diameter and wavelength. This information is used to alter drop drive amplitude so that a constant drop delay is maintained.

control of their sorts no matter where they are located. In fact, if the MoFlo is connected to a network, the sort-stream image and sort status (Figure 1) can be viewed from any computer on that network.



**FIGURE 1.** View the status of your sort with SortMaster.

## FUTURE AUTOMATION

The SortMaster is another module in Cytomation's continuing plan to automate MoFlo's sort process. Cytomation is unique in employing microprocessor-control for these modules. These modules are programmable and will be able to communicate with each other to coordinate the sort process, reducing operator exposure to hazardous samples. Cytomation is designing in the power and flexibility necessary for a fully integrated, automated and safe sort.

## SORTMASTER TECHNICAL SPECIFICATIONS

<b>SortMaster includes:</b>	SortMaster Electronics Unit User Guide
<b>Minimum Reaction Time for Correction of Changes:</b>	30 msec
<b>Minimum Reaction Time to Shut Down:</b>	<10 msec
<b>Maximum Correction Allowed:</b>	3 corrections/minute of > 0.25 $\mu$ m
<b>Maximum Break-off Deviation Permitted:</b>	0.25 drop
<b>Range of Nozzle Sizes Supported:</b>	50, 70, 100, 150 $\mu$ m
<b>Range of Operating Frequencies:</b>	0 - 200 Kh
<b>Frame Grabber Specs:</b>	512 x 512 pixels
<b>Camera Resolution:</b>	40 frames/second NTSC
<b>Indicator Accuracy:</b>	1.0 $\mu$ m (accuracy of vertical movement of camera)

Cytomation, Inc. is a privately held bio-technical instrumentation corporation specializing in high-performance, high-speed flow cytometer analyzers, sorters and upgrades. Our mission is to design, produce, and service the finest flow cytometers and cell sorters in the world — unparalleled in performance, accuracy, versatility, reliability and speed. MoFlo, our premier flow cytometer, is a modular system that is easily upgraded whenever requirements change or new modules become available.

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