# ANALYTICAL EQUIPMENT

MICROPUMP®

# SUCCESS STORIES

**Dynamic Imaging Particle Size & Shape Analysis -**
Dynamic imaging systems specifically for processing fluids require a recirculation pump. Fluid samples with suspended particles are added into the particle sizing system. The system pump provides the flow loop that allows the samples to be transferred through a sample cell and across their diffraction tri-lasers, LED light source and a high-speed imaging camera. The pumped samples are typically suspended in an organic or nonorganic chemistry, determined by the end-user.

The Micropump GJ Series pumps provide a high-quality solution that can handle the diverse applications that particle sizer machines can encounter. Where other pumps may experience permeation & swelling issues, our materials and design allow a solution to ensure long term performance and quality. Micropump pumps provide the accurate, durable and customizable answer for the required recirculation loop with suspended particles for imaging of particle size and shape.

**Tissue Diagnostic Waste Transfer -**
In tissue diagnostics, staining cancer cells assists in determining if they are malignant or benign. The staining is done with a series of different chemistries that vary in composition and chemical make-up, and many of them are very aggressive and corrosive. In order to collect these waste fluids, systems are designed with a reservoir in the unit to catch all of the various reagents, as well as deionized water.

Micropump pumps provide the best solution for the waste transfer system. Our GJ Series delivers a high-quality pump to handle the diverse chemistries that vary in composition. Micropump pumps move the fluid waste from the collection zone and transfers it to a removable container for disposal. The proven reliability of our pumps, along with the superior chemical resistance, compact size, and low noise during operation allow analytical equipment OEMs to provide a superior system.

### Chemistry Analysis Probe Wash-

Manufacturers of analytical equipment traditionally utilize a large, pressurized recirculation circuit to provide wash water flow at nearly constant pressure regardless of how many probe circuits are open at any time. This method requires the pump to be three to five times larger than necessary and depending upon their accuracy requirements, requires three to five times the necessary power and generates heat inside the instrument.

An alternative method utilizing a Micropump pump reduces size and complexity of the system while consuming less power and generating less heat. In conjunction with a pressure sensor and a microcontroller, this system allows delivery of exactly the correct flow and pressure as needed. The on-demand design drastically reduces the size and complexity of the system. With Micropump pumps providing wash fluid at commanded flow and pressure for reliable probe wash functions, the constant pressure requirements and heat generation are eliminated.

### Sample Dilution -

Often it is necessary to dilute sample material prior to analysis. In automated sample dilution systems, samples can be more quickly processed and controlled for excellent sample quality.

In automated sequential mode, the sample vials are placed on a carousel or moving platform and a Micropump GA Series delivers finite volumes of solvent to each vial base on timed movement of the vials. Typically, the volume of solvent would be determined by the desired concentration for analysis. The flow rate of the pump and the vial fill time equals the volume for each vial. The simultaneous dilution configuration permits all sample vials to be filled to exactly the same volume. The total volume of delivered solvent is calculated by multiplying the number of vials times the flow rate and the delivery time.

Micropump gear pumps allow accurate, variable amounts of solvent to be programmed to deliver discrete amounts of solvent for different levels of dilution. Our pumps are capable of dispensing low and slow with accurate and precise flow performance. Even more, our pumps are composed of materials that provide chemical resistance to a wide array of solvents.

### Flash Chromatography -

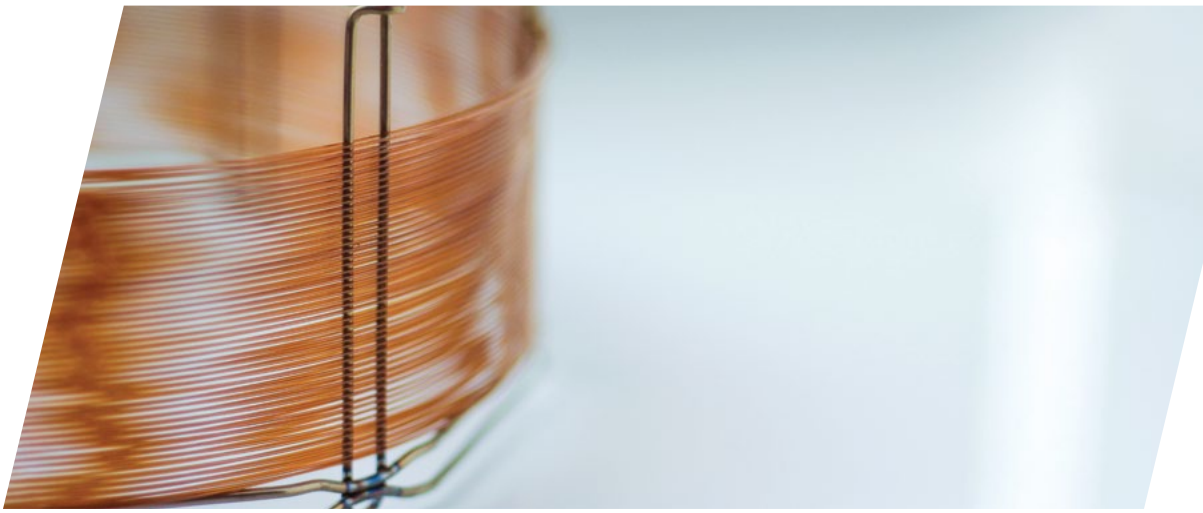
Traditionally a flash chromatography apparatus utilizes solvent flow in disposable plastic cartridges generated by air pressure in stainless steel tank. However, the use of stainless-steel tanks presents several drawbacks. Micropump pumps can act as a complete replacement of the stainless-steel tank.

By utilizing pumps, flash chromatography systems no longer need to solve issues of unknown solvent volumes, filling and emptying solvent, limited volume capacity, and the need for air or nitrogen for pressure. Micropump positive displacement gear pumps enable OEMs to eliminate and streamline their chromatography systems. Additionally, the pumps allow for step-gradient and continuous gradient capability. System improvements include elimination of air or nitrogen supply, unlimited volume of solvent delivery, easy solvent transition with no unused solvent waste, trace enrichment, and parallel, multi cartridge systems.

### HPLC Post Column Derivatization -

HPLC is a technique that separates mixtures into their respective component substances using adsorption, ion exchange or partitioning effects to move the substances through a packed column (stationary phase) at different rates of speed. The separation relies on the relative polarity or strength of a solvent (mobile phase) competing with the strength of the packing to attract sample molecules. The molecules that are most strongly attracted to the mobile phase elute early while those molecules strongly attracted to the packing elute later. Slight differences in the molecular structure of sample molecules can result in separation due to chemical forces that occur in the column. When separation must be performed before UV absorbing derivatives are formed, post column derivatization is a viable option.

Micropump pumps have been chosen for reagent pumps for post-column derivatization in HPLC. To perform post column derivatization, the HPLC must be modified with the addition of a secondary fluid delivery system to deliver derivatizing agent between the HPLC column and UV detector. Micropump positive displacement GA Series pumps allow flow rates to be achieved with standard actuators for continuous or regulated flow, and discrete amounts up to a few ul can be applied to the heated reaction coil with position actuated regulators. Additionally, our pump material construction allows for chemical inertness to a wide array of post-column reagents.



### Dissolution Testing Systems –

Dissolution testing is a method to determine the drug release over time of a formulation product in an in vitro environment. The USP requirements include both automated and manual techniques with corresponding instrumentation configurations for programmed emptying, washing and refilling dissolution vessels, sample delivery and dispensing. Fractions are taken via a sampling probe at timed intervals and delivered to fraction vials or on line flow cells before being analyzed by a spectro-photometer or HPLC. Pumps can be used to dispense sample material to its respective vial.

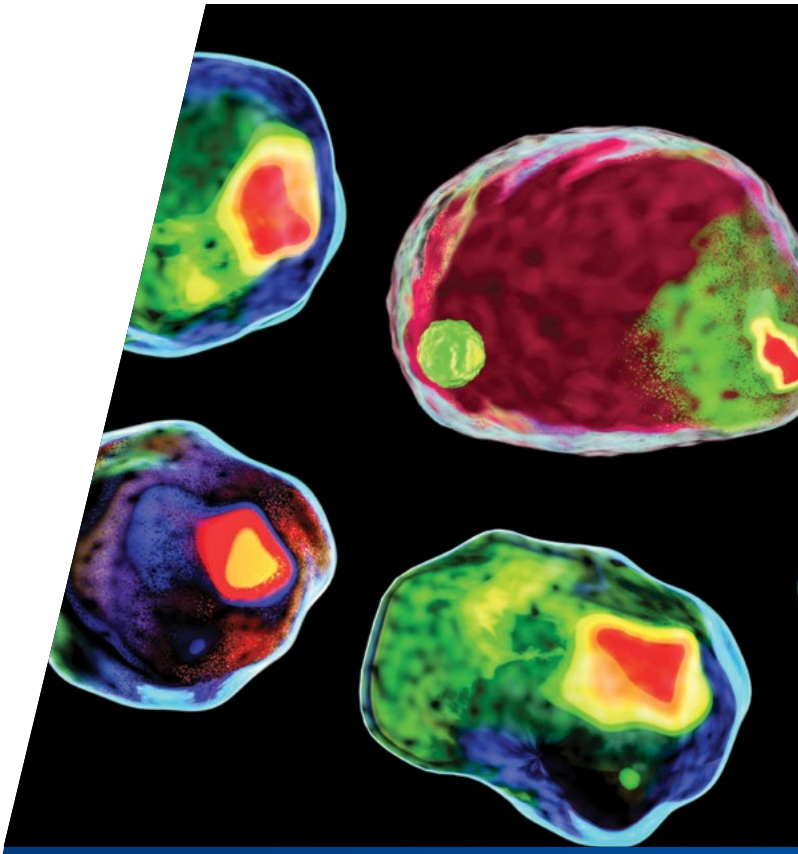
Micropump pumps deliver volume accuracy and precision for dissolution testing systems. Our GA and GJ Series pumps can perform programmed emptying, washing and refilling dissolution vessels and provide sample delivery and dispensing. Micropump pumps provide continuous pulse-free flow, low vibration, precise delivery of sample volumes, small package size, and multi-channel programmable capability.

### Degassing Systems –

Gases dissolved in liquids often cause troubles in fluidic systems. The gas molecules can form bubbles when pressure or temperature changes, and this will affect the accuracy, precision and performance of the equipment. Online degassing efficiently removes dissolved gases from the fluid stream and thereby prevents bubble formation, reduces noise, improves baseline stability, reduces startup times and ensures more consistent results. This is very important in laboratory analysis equipment and other machines that benefit from more consistent results with a degasser included in the fluid path.

Micropump GJ Series provide a highly reliable and durable pump in the demanding system featuring vacuum and restricted inlets for efficient and continuous gas removal.

GA Series

**Flow Cytometry –**

Flow cytometry is a technology that rapidly analyzes single cells or particles as they flow past single or multiple lasers while suspended in a buffered salt-based solution. Each particle is analyzed for visible light scatter and one or multiple fluorescence parameters. Traditional flow cytometers consist of three systems: fluidics, optics and electronics. The fluidics system consists of sheath fluid (usually a buffered saline solution) that is pressurized to deliver and focus the sample to the laser intercept or interrogation point where the sample is analyzed.

Micropump GA Series, specifically our X21 gear set, delivers the industry-leading pump to ensure the best consistent and smooth fluid movement. Our pump design enables a steady flow velocity to ensure the lowest flow ripple possible for improved sample analysis.

MICROPUMP®



www.micropump.com