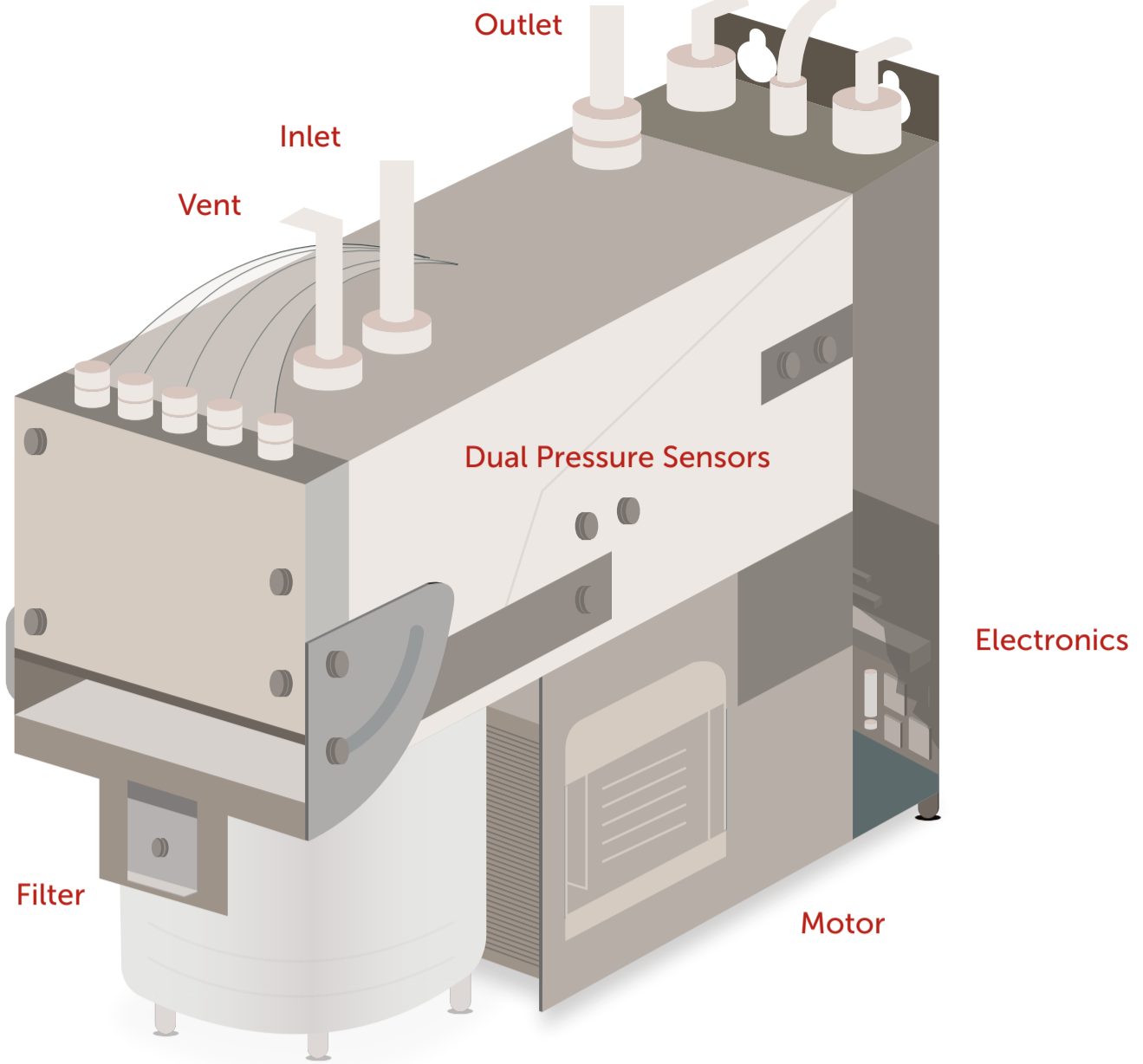


Choosing the Right Pump to Ensure Clean Chemical Delivery in Advanced Lithography

Wafer fabrication of modern semiconductor designs, including interconnected packaged chipsets used in smartphones, requires advanced lithography at astonishingly small scales. Advanced lithography processes require precision from each part of the supply chain. Dispense systems are the final gate before photochemicals are deposited onto the wafer, and ultimately control accuracy and purity. Entegris photochemical dispense systems enable superior filtration and dispense, ensuring repeatable, precise dispenses every time.

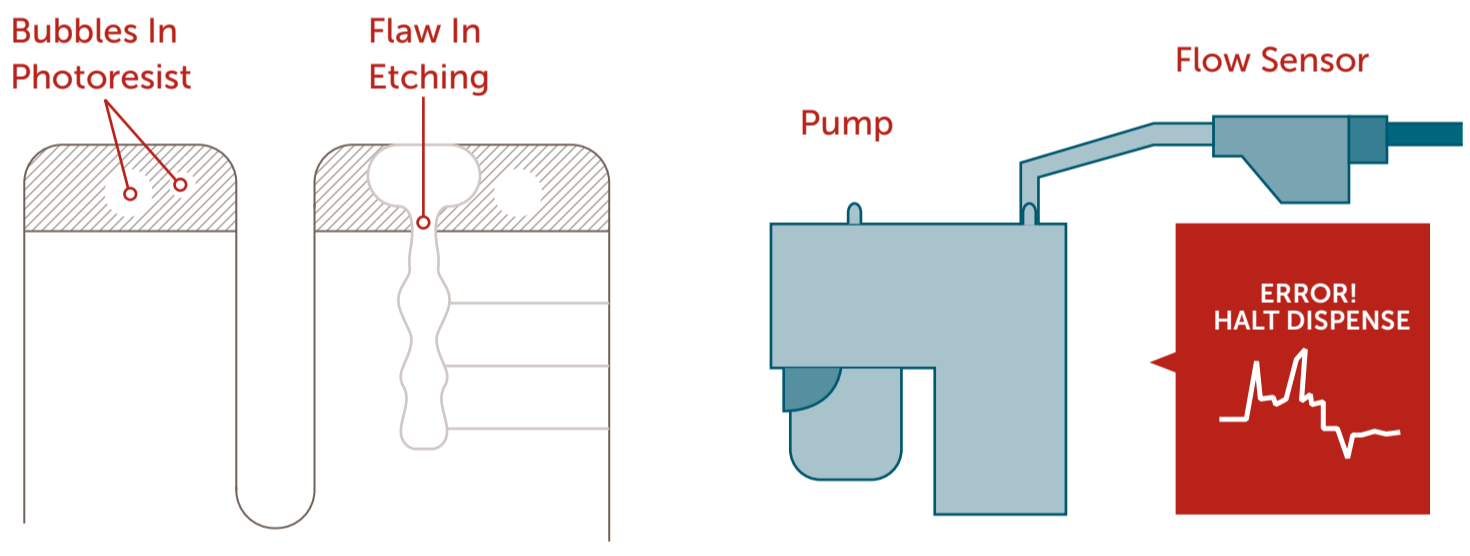


CRITICAL ISSUE: HANDLING CHANGING VISCOSITY

Photolithography requires photochemicals be dispensed precisely to 1) not waste costly photochemicals, and 2) provide the right thickness for imaging and etch resistance. Unfortunately, photochemical viscosity can vary from batch to batch, or when introduced to a change in ambient temperature.

HIGHER THAN EXPECTED VISCOSITY	STANDARD VISCOSITY	LOWER THAN EXPECTED VISCOSITY
<p>Photoresist Layers To Etch</p>		<p>Intended Etch Profile</p>
<p>Too thick photoresist prevents effective etch later in the process, leading to scum defects, bridge defects, or oversized patterns.</p>	<p>Proper layer thickness provides a desired photochemical resistance to etching.</p>	<p>Too thin photoresist does not resist the etch, leading to areas of over-etched patterns.</p>

CRITICAL ISSUE: AIR BUBBLE DETECTION AND PREVENTION



Air introduced into the photochemical during dispense can create bubbles that lead to pattern defects after etching. Bubbles are particularly challenging in high-viscosity materials where the bubbles will not dissolve into the photochemical, and in surfactinated materials that generate bubbles.

To prevent bubbles from being dispensed onto the wafer, they can be detected by the dispense system, using several air confirmation tools as well as o-line flow sensors.

CRITICAL ISSUE: PARTICLE FILTRATION AND PERFORMANCE

Filtration is critically important to reduce and eliminate contamination from the fluid path. The right pump design can have a significant impact on filtration efficacy and dispense performance.

SINGLE-STAGE PUMP	TWO-STAGE PUMP
<p>Integrates filtration along the fluid path. The filtration rate is determined by the dispense rate.</p>	<p>Filtration rate is controlled independently of dispense rate, increasing dispense repeatability and precision without sacrificing filtration quality.</p>

ENTEGRIS CAN HELP

To ensure repeatable photochemical dispense that meets the highest purity requirements of the semiconductor industry, look to Entegris' advanced two-stage IntelliGen® dispense systems. We can help you reduce variation and ensure dispense repeatability, improved throughput, and optimized return on investment.

Learn More

www.entegris.com/ccd-pumps