

Solenoids in a Pristine System Liquid Environment

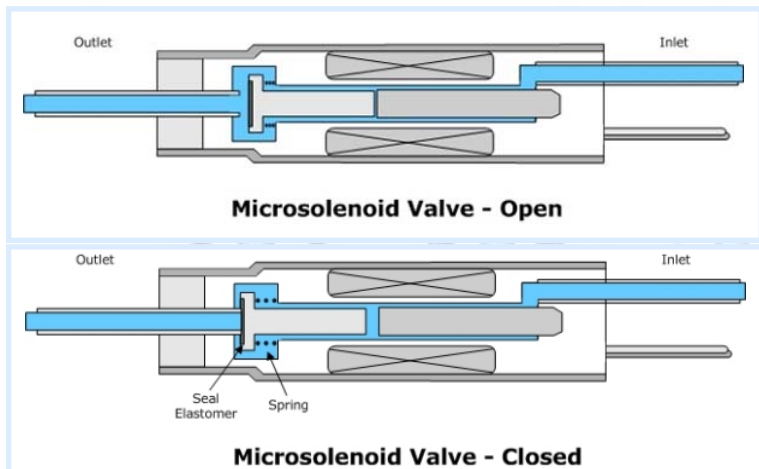


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leading the way in high-precision dispensing

When they are designed properly, systems that incorporate *ink-jet* or *microsolenoid* valves offer exceptional capabilities for low-volume liquid dispensing. In the right configuration, such systems can dispense volumes as low as 5 nL with excellent accuracy and precision. Their non-contact, streaming-dispense capability also minimizes washing between dispenses, greatly favoring increased throughput.

For microsolenoid valves to perform effectively, however, the solenoid actuator must reside in a system liquid that does not cause a change to the actuator over time.

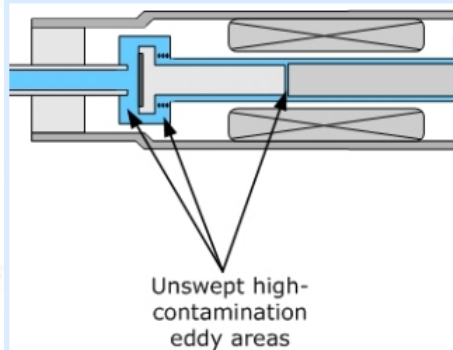
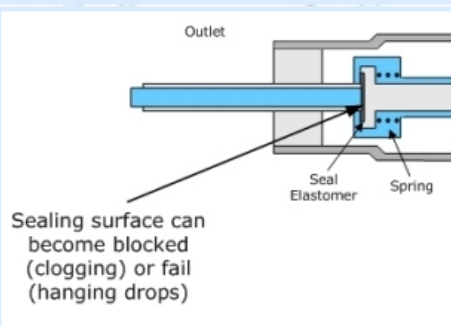
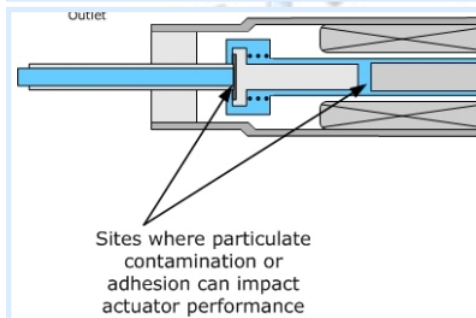


The physical movement of the solenoid actuator can be readily compromised by viscosity, particulates, and adhesion. This can occur, for example, when protein solutions form hydrophobic interactions with plastics, or if salts leave residue within the actuator body. Trouble areas inside the solenoid fall into three different regions:

- Unswept area where particulates can impede actuator motion or accumulate with subsequent flow restrictions (clogging)

- Seal areas where adhesion can cause valve closure failures (hanging drops)

- Eddy areas that are difficult to clean and tend toward carryover



All of the conditions that are noted above can occur singly or system-wide. One approach is to use feedback sensors that indicate the condition of the valve, supported by algorithms to adjust each valve independently. This is costly and introduces many possibilities for error conditions.

Innovadyne's approach is simple. Keep each solenoid in a pristine environment of degassed, pressurized deionized water. This approach not only provides for long life but also guarantees reproducible performance run after run. Another benefit of using a pristine environment is the ability to control bubble formation within the system. Bubbles in a nano-dispense system destroy reproducibility of the dispense performance. Innovadyne has proprietary routines that initially purge our systems and maintain them free of bubbles, ensuring consistent, robust performance.

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