



Blue-White®

Overcoming the Challenges of Environmental and Chemical Exposure on Chemical Dosing Pumps

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Chemical Metering Pumps are often exposed to harsh environmental conditions, such as extreme heat and UV light, cold, rain, wind, dirt and sand. When exposing these pumps to such harsh weather conditions, temperature fluctuations, volatile elements and then adding viscous and/or corrosive chemical to the mix, how can we expect them to continue delivering accurate and reliable chemical dosing?

Meeting the Challenge of Chemical and Thermal Exposure

For a chemical metering pump to perform successfully materials used for components such as pump head tubes, O-ring seals, and diaphragms must be rated appropriately for the temperatures and chemicals they will encounter. For example, some elastomers may become brittle and eventually fail in the cold, which can lead to chemical leaks, unplanned downtime, and may potentially create a chemical hazard for employees.

Chemical compatibility is critical and when spec'ing pump tubes or diaphragms, those constructed of polyvinylidene fluoride (PVDF) are often preferred over polyvinyl chloride (PVC), and other fluoropolymers, due to PVDF's superior resistance to high temperatures, pressure, and corrosive agents. Although it may initially be more costly, PVDF eliminates many concerns regarding chemical compatibility and temperature range.

Some manufacturers may also offer optional, specialized pump tubes designed for specific chemical challenges.

Combating Volatility and Viscosity

Extreme temperatures don't just impact the pump and its components. Volatile chemicals, such as chlorine, can evaporate or off-gas when exposed to heat, which may lead to operational problems such as vapor locking. This is not a concern with Peristaltic pumps which are not subject to vapor lock. With regard to Diaphragm pumps, which do experience vapor locking, the good news is there have been advances in "smart" diaphragm pump technology to help avoid this problem.

An example is, Dual diaphragm pumps outfitted with cutting-edge Hyperdrive Technology. These pumps operate so that when one diaphragm is in the suction phase, the other is in

the discharge phase, resulting in a near-continuous, smooth chemical feed profile and mitigating issues of vapor lock. It may also be possible to help prevent vapor lock by using specialized external valves that allow gases to escape.

Another issue that often impacts pumping action is cold environments which can affect viscosity, causing fluids to thicken or form slurries. This makes them far more difficult to pump. When pumping viscous fluids, chemical metering pumps experience increased hydraulic resistance, which requires higher motor torque. As a result, the motor draws additional current, and the drive and power supply must be properly sized to support this demand. If the pump, motor, or power supply is undersized, the pump is at increased risk of underperforming, stalling, faulting, or shutting down due to overcurrent or torque limit conditions.

Designing for Protection from Environmental Elements

When selecting a Chemical Metering Pump, operating temperature isn't the only environmental condition to be considered. It's important to check the pump's performance ratings as well. High-performance pumps often carry ratings such as National Electrical Manufacturers Association (NEMA) 4X and International Electrotechnical Commission's IP 66, which certify that the pumps have been tested to confirm a high degree of protection against the ingress of water, rain, dust, and sand. These standards verify that motors and electronics are shielded from these elements, which can cause damage over time. This also ensures protection against chemical vapors or liquids getting into the pump housing and possibly leading to pump failure.

In addition to protection from elemental hazards, the pump design must also account for thermal and light management.

For example, pumps should be engineered with internal cooling mechanisms to prevent overheating and to trigger automatic shutdown in overheating situations. Another consideration is, when operated in direct sunlight, components like touchscreens can become vulnerable to UV damage, and the pumps' design elements should prevent this. Smart controls should be shielded from UV light in order to maintain screen functionality and prevent material degradation.

Reliability and Certification

Beyond rugged design, manufacturers validate metering pump performance through stringent third-party testing, to prove claims of durability and safety. Engineering firms often look for certifications, including listings from agencies such as, Underwriters Laboratories (UL), Canadian Standards Association (CSA), European Conformity (CE), and National Sanitary Foundation (NSF). These listings verify safety, electrical standards, temperature performance, and chemical compatibility.

Flammability ratings are often overlooked. There are some pump manufacturers whose pumps enclosures are constructed of fire-retardant materials designed to stop fire. Ratings such as UL 94 V-0 ensure that any internal fire is contained within the pump, mitigating the risk of flames spreading throughout the facility.

Evolving Pump Capabilities and ROI

While peristaltic pumps were historically associated with low-pressure applications or laboratory use, the underlying technology has advanced significantly. Many of today's

peristaltic pump designs are engineered specifically to handle demanding industrial and municipal applications, and to operate at the pressures these applications demand.

It stands to reason that, the more robust and durable a chemical metering pump is, the greater the upfront price may be. However, the initial expense is offset by a lower total cost of ownership. Pumps designed to handle the rigors of extreme environments and challenging chemicals require less maintenance, incur less frequent downtime, and meter with much greater accuracy over the unit's lifetime, which can be a decade or more.

Smart chemical metering pumps should not be limited by conditions such as harsh chemicals or extreme environments. Advanced material science, robust design, and rigorous certification allow today's peristaltic and diaphragm pumps to deliver consistent accuracy and long-term reliability. The reduced maintenance, minimized downtime, and extended service life make them a smart investment for industrial and municipal applications that demand dependable performance under the toughest conditions.

In today's marketplace engineers and operators expect more from their equipment, including their Chemical Metering/Dosing Pumps. This includes better design features, longer-lasting materials, intuitive controls, ease of use and low maintenance.

Blue-White® has stepped up to meet these demands with aggressive R&D efforts which have enabled the company to deliver some truly pioneering developments. These include smart controls and new industrial protocols which enhance the connectivity and automation of their smart pumps. The company's groundbreaking multi-diaphragm metering pump technology sets new industry standards, while ensuring smoother operation and reducing maintenance concerns.

The newest enhancements to the company's CHEM-FEED® MD1 Diaphragm Pumps incorporate more robust construction, including unmatched diaphragm

durability. The unibody check valves are mistake proof, You cannot install them wrong. Perhaps most impressive is, MD1 has a remarkable pressure rating of 180 psi.

The core innovation is Blue-White's exclusive dual diaphragm hyper-drive technology. This technology delivers smooth, consistent, and repeatable dosing while effectively mitigating vapor lock issues.

MD1 is Energy Efficient and Built to Endure: The Brushless DC motor reduces energy consumption and provides long-

lasting durability in harsh environments. In addition, operator comfort is always top of mind and MD1's brightly lit touchscreen control is as easy to operate as a smart phone.

Find out more about the Blue-White® family of Smart Pumps, including MD1 at www.blue-white.com

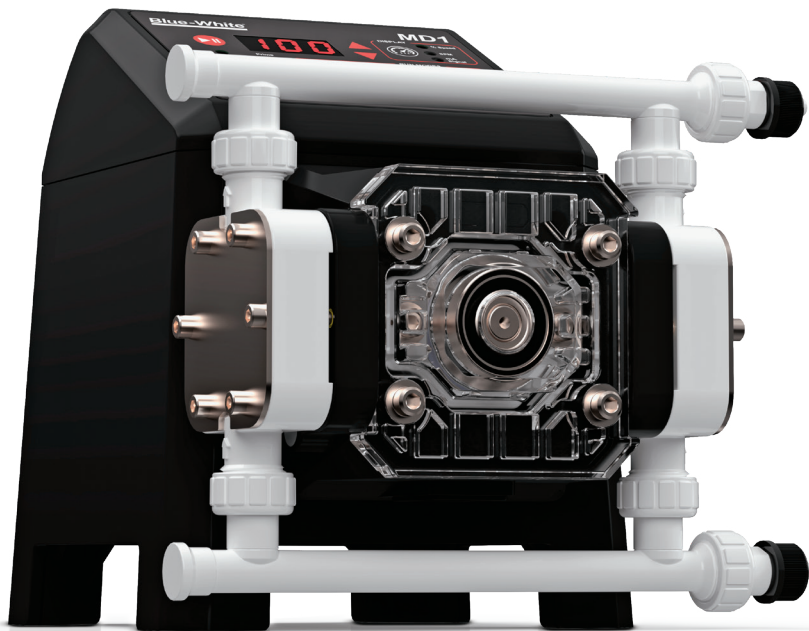


Figure 1. Blue-White's CHEM-FEED® MD1 Chemical Dosing Pump.