



Blue-White®

The Benefits of Choosing BLDC Motors for Chemical Metering Pumps

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Chemical metering pumps are a critical component in water treatment systems, where precise and reliable dosing is essential. The performance of these metering pumps can be heavily influenced by the kind of motor used in manufacturing.

There are several types of motors that can be employed in chemical metering pumps, such as stepper motors, AC induction motors, brushed DC motors, and more. Over the past decade or so, brushless DC (BLDC) motors have gained traction as the preferred motor choice. BLDC motors offer improved efficiency, durability, and precision over other technologies. This makes them an ideal choice in chemical metering pumps which are being used in critical and highly regulated industries.

BLDC motor technology is particularly well-suited for use in both peristaltic pumps, where smooth and consistent squeezing of the tubing is essential for accurate fluid delivery, and in diaphragm pumps, where BLDC motors contribute to a wide turndown ratio. A wide turndown ratio enables precise control of flow rates, which is crucial when precise dosing of chemical, and/or dosing in variable quantities are critical.

Still, some manufacturers and end-users shy away from BLDC motors due to the upfront cost. For that reason, it is important to understand how this technology works and how the long-term benefits justify the higher price tag.

How BLDC Motors Work

BLDC motors combine permanent magnets on the rotor with a series of electromagnets arranged in the stator. The motor's controller drives the stator windings, generating a rotating magnetic field. This field interacts with the permanent magnets on the rotor, causing it to spin. The absence of

brushes reduces mechanical friction, which not only improves efficiency but also eliminates the maintenance issues typically associated with the wear and tear of brushes.

While BLDC motors offer superior performance, they come with a higher degree of control complexity. A BLDC motor requires a feedback mechanism, such as an encoder or sensor, to continuously monitor the rotor's position. This closed-loop control system ensures the motor operates smoothly and maintains the correct speed. Without proper feedback the motor could stall, reverse, or fail to maintain a steady speed. Thankfully, this challenge is tackled at the manufacturer level, and end-users should expect to receive a system with an easy-to-use interface.



CHEM-FEED® MD3 Dual Diaphragm Pump

FLEXFLO® M3 Peristaltic Pump

Benefits of BLDC Motors

The advantages of this technology far outweigh the additional cost, and include:

Energy Efficiency. Unlike older motor types such as AC shaded-pole motors, which can waste significant energy in the form of heat (with efficiencies as low as 30%), BLDC motors are designed to maximize the conversion of electrical energy into mechanical

work. They typically achieve efficiencies between 90% and 93%, which means only a small percentage of the energy input is lost as heat. This reduces energy consumption, which is especially important for applications where pumps may run continuously or for long periods.

Maintenance and Longevity. BLDC motors have exceptional durability. Unlike brushed DC motors, which rely on mechanical brushes that can wear out over time, BLDC motors have no brushes or other parts that are subject to wear and tear. The lack of brushes also means there is less friction, resulting in less heat generation, lower noise levels, and minimal maintenance requirements. All this means they can operate

for tens of thousands to hundreds of thousands of hours without significant degradation. In practical terms, this results in reduced downtime and maintenance costs for pump systems.

While other components of the pump will still require maintenance, the motor can remain maintenance-free for years.

Precision Control and Smooth Operation. Accurate dosing relies on precise control of motor speed and torque. In a BLDC motor there is a direct relationship between the voltage applied and the rotor's position, which allows for the tightest control over rotational speed. In addition, unlike stepper motors, which operate in discrete steps (resulting in a "stuttering" motion that can compromise smooth flow), BLDC motors provide continuous, non-interruptive rotation. These two factors combined ensure a smooth, steady flow of fluid, enabling consistent chemical delivery throughout the entire dosing cycle.

Reduced Noise and Vibration. An often-overlooked benefit of BLDC motors is their quiet operation. The lack of friction-generating brushes allows these motors to generate less mechanical noise and vibration. The reduction in vibration also contributes to the overall reliability and comfort of the pumps they power.

Strong Return-On-Investment (ROI). Despite the higher upfront cost of BLDC motors as compared to traditional AC or stepper motors, the long-term benefits make them an excellent investment. The combination of energy efficiency, low maintenance, and precise control leads to lower operating costs and increased uptime, resulting in a quick ROI for users.

BLDC motors offer a host of advantages for chemical metering pumps, including exceptional energy efficiency, extended lifespan, low maintenance, and precise control. For end-users seeking a pump solution that balances performance with long-term value, BLDC motors present a compelling option that improves the efficiency of chemical delivery in critical applications.

All Blue-White® Smart CHEM-FEED® Diaphragm Pumps, and Smart FLEXFLO® Peristaltic Pumps are equipped with Top Performance BLDC Motors for Smooth, Quiet and Precise Chemical Dosing and zero motor maintenance.