



Bal Seal® spring-energized seals in clinical analyzers

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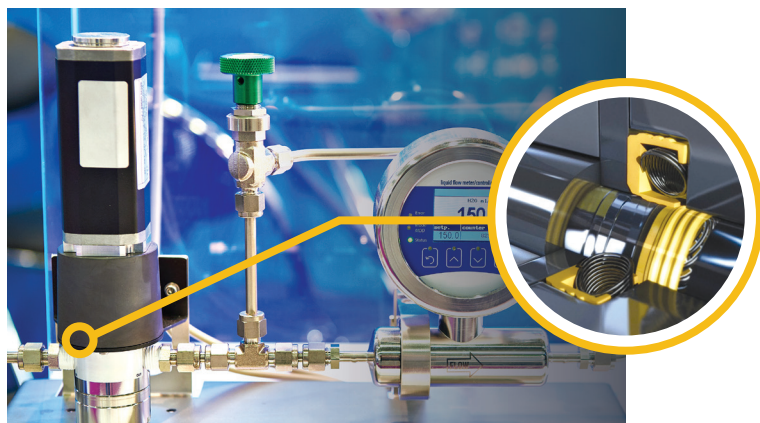
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Overview

Clinical analyzers are used to determine the concentration of certain metabolites, electrolytes, proteins, and/or drugs in samples of serum, plasma, urine, cerebrospinal fluid, and/or other body fluids. During analysis, the sample is diluted with a reagent (usually a saline-based solution) to a prescribed ratio. The ratio depends on the analyzer and the testing parameters. An autosampler is often used when numerous identical samples are prepared. The mixed sample is injected into the analyzer system using a dilutor, an autosampler with a switching valve, test tubes moving along a track, a syringe, or a pipette. It is then analyzed via electrical conductivity or optical techniques to determine the analyte of the assay.

Pumps play a central role in the operation of hematology, urine, and chemistry analyzers. Most pumps have a slow reciprocating plunger and a non-standard seal designed with low friction to accurately distribute reagent consistently over thousands of cycles. The seals control weepage and prevent the saline-rich reagent from forming salt crystals in the equipment. The seal's ability to wear evenly, resist crystallization, provide low friction, and provide reliable service can have a significant impact on the precision of the diagnostic equipment, as well as the accuracy of the results it produces.



In clinical chemistry analyzers and other diagnostic equipment types, Bal Seal® spring-energized seals protect motors and electronics from potential damage caused by leakage of fluids during use.

For more information and technical assistance, contact your nearest Bal Seal Engineering location, or visit www.balseal.com.

Operating Parameters

Bal Seal® spring-energized seals are custom-engineered for hematology, urine, and chemistry analyzer pumps, providing reliable service at pressures from slight vacuum to 9,000 psi (62 MPa) up to 104 °F (40 °C), in saline or reagent. Designs can incorporate flange or lip designs that are precision-engineered to optimize low friction and sealing effectiveness, while providing superior protection against contamination. PEEK backup elements can be integrated to reduce plunger misalignment and enhance seal life.

Advantages

- Seal jackets are available in a variety of materials, including virgin polyethylene, virgin Teflon, filled PTFE, and filled polyethylene, to meet specific chemical compatibility, friction, temperature, and pressure requirements
- Biocompatible or USP Class VI materials for diagnostic systems are also available upon request
- Spring energizer materials are available to meet a broad range of application requirements

Design Insight

Slight weepage may occur under the seal lip with the saline reagent. Incorporating a rinse portion and seal into the pump design can prolong service life and improve performance by preventing salt crystals from forming behind the high-pressure seal, which reduces seal life. The rinse portion will wash away any residual saline reagents crystallizing behind the seal and enhance seal performance.

Technical Description

Media	Saline or reagent	Shaft material	Ceramic, sapphire, or treated stainless steel
Friction	Low	Housing material	Treated stainless steel or machined plastic
Speed	Slow	Surface finish	8 – 16 µin RMS
Cycles	>20,000	Hardness	30Rc
Pressure	Slight vacuum to 9,000 psi (62MPa)		
Temperature	up to 104 °F (40 °C)		

Diagnostic Hematology/Clinical Analyzers

Bal Seal® spring-energized seals improve the performance and reliability of diagnostic equipment, including chemistry analyzers, hematology analyzers, and IVD instrumentation. Our low friction seals permit controlled weepage, reducing salt crystal formation caused by drying of the saline or reagent, and making one year PM intervals possible. Made from virgin PTFE or UHMWPE and energized with stainless steel springs, the seals are compatible with aggressive chemical reagents and prevent contamination.



For more than 30 years, Bal Seal® spring-energized seals have been helping designers of diagnostic analyzers reach performance milestones and gain a competitive edge.

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