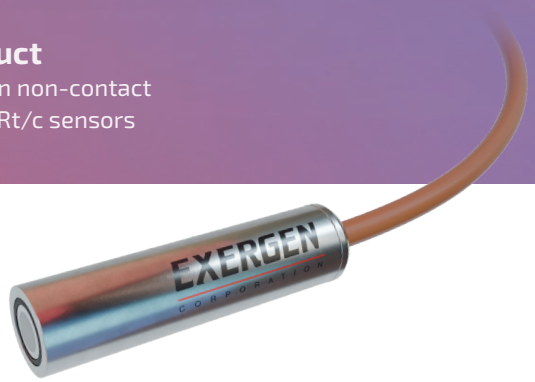
Application note

Extending flywheel lifetime through precise bearing temperature monitoring

Sector
Flywheel energy storage systems

Application
Bearing temperature sensing

Product
Exergen non-contact Micro IRt/c sensors



Flywheel energy storage systems offer long-lasting, low-maintenance alternatives to batteries in uninterruptible power supply applications. Their performance relies on minimizing friction through high-performance bearings. When bearings wear, efficiency drops, and system longevity suffers. Continuous temperature monitoring provides early detection of bearing stress, enabling operators to prevent overheating and premature failure.

Challenges

Measuring bearing temperature presents several challenges. The critical components rotate constantly, ruling out contact sensors. Space constraints demand compact solutions that fit within the bearing cavity. The sensor must also function effectively in the vacuum environment surrounding the flywheel without disrupting it. Rapid response times are essential to track sudden shifts in energy supply and demand.

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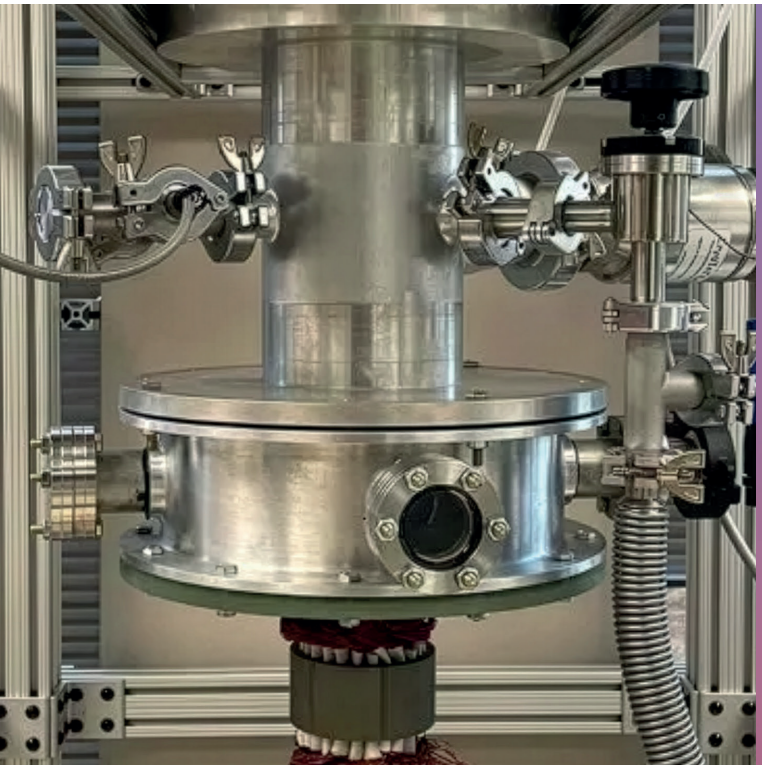
CLEVER IR

Solutions

Self-powered Exergen Micro IRt/c sensors from CleverIR are the smallest available, making them ideal for measuring rotating components in confined spaces. Hermetically sealed to NEMA 4X and IP67 standards, they operate reliably in harsh environments including vacuum applications. With response times between 50 and 100 milliseconds and exceptional accuracy, IRt/c sensors meet the demanding requirements of flywheel energy systems.

Benefits

Exergen sensors deliver highly reliable monitoring that improves flywheel performance. Their fast response ensures accurate measurements under demanding conditions and supports maintenance planning that reduces downtime. Self-powered and intrinsically safe, they require no service or calibration over their operational life. With a repeatability error of 0.01 °C (0.02 °F) and interchangeability of ±1%, they provide stable, accurate output even in dynamic ambient environments. Combined with strong price-performance, these capabilities help extend flywheel life beyond 20 years.



By reliably monitoring bearing temperature changes, Exergen Micro IRt/c sensors help extend flywheel lifetime beyond 20 years.

Results

Integrating Exergen Micro IRt/c sensors in flywheel systems transforms maintenance and performance. Continuous monitoring detects bearing stress before failure, reducing unplanned downtime and preventing costly repairs. Fast response ensures reliable operation during rapid load changes, while the robust sealed design delivers long-term durability. Good thermal management enables better service planning, reducing downtime and protecting flywheel energy storage's reputation as a sustainable, long-lasting battery alternative.

Conclusion

Flywheel energy storage depends on efficient, reliable bearings. Monitoring their condition with Exergen Micro IRt/c infrared sensors provides the accuracy, speed, and durability needed to prevent overheating and extend system life. Compact design, vacuum compatibility, and maintenance-free operation make them optimal for confined, demanding environments.

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