AHRS-8/GE DC-6E/M1/M2 -- Application Note 1012E
Helium Exposure and MEMS Gyroscopes

Introduction

Helium is a small, rare molecule that can penetrate through the smallest of gaps. For these reasons, it is commonly used as a tracer gas in leak testing. However, helium is so small that it can also penetrate through solid materials and interfere with the function of MEMS devices such as accelerometers and gyroscopes. Sparton compasses are sealed to water and air, but not to helium.

MEMS gyroscopes are small vibrating structures that are especially vulnerable to helium. Damage from helium may be apparent many hours after initial exposure, as it is absorbed by, and then slowly diffuses through the potting material and chip carrier. Low levels of exposure can be visible as a small shift in the bias of the raw gyroscope measurements. At higher levels, the gyroscope calibration will be thrown off, the compass may appear to “spin”, or the gyroscopes may stop vibrating entirely, and will only read “0”. In the last case, it may take months for the gyroscopes to return to some level of usability and the gyroscope calibration will no longer be valid.

Sparton, therefore, recommends that compass exposure to helium be avoided whenever possible, and leak testing be performed with nitrogen.

Want to know more?
• Questions or support issues can be directed to productsupport@sparton.com

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