

Understanding Warmup Drift

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Overview

Measurement drift is a phenomenon common to all extensometers, as well as other types of sensors and electronics generally. There are several common sources of drift that affect strain measurement. *Warmup drift* generally affects electronics that have just been powered up or connected.



In brief: allow all electronics to stabilize after powering on before use or calibration (about 30 minutes typically).

Root Cause

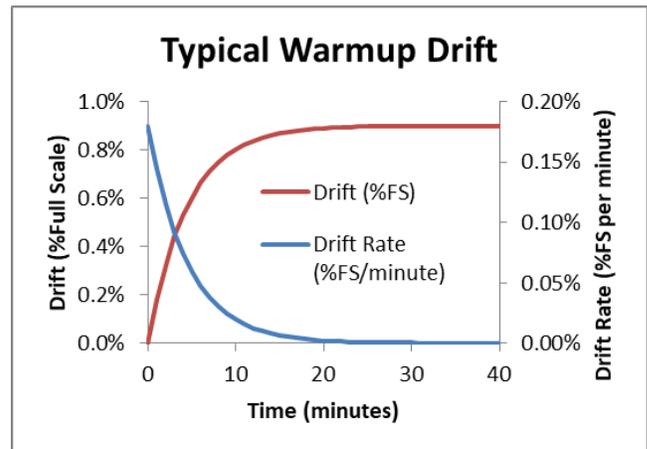
When electronics are powered on, the flow of electricity generates heat. In the case of extensometers, load cells etc., this heat typically produces a small drift in the reading over time. As the sensor temperature stabilizes, so does the reading; warmup drift typically stabilizes sufficiently after a few minutes.

Warmup Drift is distinguished from other sources of drift by the fact that it occurs immediately when a sensor is plugged in and stabilizes after a short time. It is not related to room temperature and will occur even with an extensometer mounted onto a stable unloaded specimen.

Assessing Significance

When performing typical tests of short duration, drift is usually negligible. For tests lasting minutes or hours, account for warmup by allowing the entire system to stabilize before beginning a test. The example below shows a typical warmup profile, although this varies and may be larger or smaller.

Example 1: A 6-second tensile test is performed after allowing the system to warm up for 10 minutes. The drift rate is 0.02% FS/min and test elongation is 10% of sensor full scale. The measurement error is negligible: $0.02\%FS/min \times 0.1 \text{ min} / 10\%FS = 0.02\% \text{ of reading}$.



Example 2: A creep test lasting 10 minutes is performed after allowing the system to warm up for 10 minutes. The test elongation is 1.0% of sensor full scale, and drift during the test is 0.1% of sensor full scale. The measurement error is: $0.1\%FS / 1\%FS = 10\% \text{ of reading}$.



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