Operational Recommendations for Reducing F/T Sensor Output Drift

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Sensor Output Drift

Output drift refers to raw gage values that do not stabilize but continue to increase or decrease after a load is applied or removed from a F/T sensor. This effect may be easier to observe when viewing resolved F/T data. Output drift can be caused by temperature changes, inappropriate mechanical coupling, or internal failure. As is typical of strain-gaged instruments, output drift is normal over extended periods of time and should be expected. If the sensor experiences significant temperature changes the drift cannot be easily accounted for.

To reduce output drift, keep the sensor temperature as stable as possible – we recommend that the sensor be allowed to warm up for 30 to 45 minutes prior to use and also strongly encourage biasing the sensor before taking a measurement. Customers should ideally bias the sensor before each task or measurement period. For example, if a customer is performing a periodic operation every 30-60 seconds, the sensor should be biased before each of these cycles/operations. Frequent biasing will remove the effects of output drift that would otherwise influence measurements taken over extended periods of time.

Biasing the Sensor

When a Bias command is issued the current load level will be set as the new zero point. The Bias command does not stop drift – it removes the cumulative drift effect and brings the output back to zero to perform a measurement again. If the surrounding temperature gradients or conditions are causing the sensor to change temperature, drift will occur as a result. Bias the sensor as often as needed to reduce the effects of thermal drift.

We recommend that customers do not operate the F/T sensor in an application for extended periods of time between issuing Bias commands. The ideal time intervals between issuing Bias commands will be unique to each customer's application and environment; therefore the frequency of bias commands should be adjusted as necessary to provide satisfactory results for each unique implementation.

How to reduce drift during a benchtop accuracy check

If testing the accuracy of a F/T sensor on a benchtop work area, do not apply a load directly to the Tool Adaptor Plate. Instead, an insulator such as cardboard, foam or the tooling itself should be placed between the sensor and the load. If a weight is applied directly to the sensor's Tool Adaptor Plate, temperature gradients may cause sensor drift to occur. Thermal output drift can be significantly reduced by using an insulator such as those seen in the examples below.

Cardboard

Foam

Tooling

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Mounting Recommendations for F/T Sensors

Mounting a sensor to a robot or structure via an interface plate will increase the thermal mass of the system. Once the sensor is given time to normalize to the system's temperature, the additional thermal mass provided by the adapter plates and tooling will help reduce the rate of temperature change across the sensor, thereby reducing the output drift experienced when thermal loads are applied. Thermal gradients can still cause the sensor to experience output drift, and precautions should be taken to reduce these gradients where possible.

Axia80 Thermal Sensitivity

Please note, the Axia80 F/T series is more susceptable to temperature drift than ATI's standard F/T product line. As such, it is important to consider adding additional thermal mass and/or thermally-resistive interface plates to the sensor when it will be experiencing relative temperature changes during operation. If significant thermal gradients are expected, please consult an ATI F/T Applications Engineer to confirm that the Axia80 is suitable for the application.