How to Calculate Slope and Offset for Calibrated NRG 110S Temperature Sensors

Introduction

The calibration data given for the NRG 110S temperature sensor is in Imperial units. This application note explains how to calculate the scale factor and offset used for scaling in SI units in Symphonie Data Retriever (SDR).

Calculations

To simplify the calculations, do them in three steps:

1) The calibrated slope value is given in volts per degree F. Convert the calibrated slope to volts per degree C by multiplying the calibrated slope by 1.800 (precise conversion). We will refer to this new value as S.
2) Calculate the required scale factor as 1 / (S x 409.2). This is the scale factor to use in SDR.
3) The calibrated offset value is given as the output voltage at 0 degrees F. Calculate the SDR offset value as

   −17.78 − ((calibrated offset) / S)

Using these values in SDR will result in values in SI units.

Example

A NRG 110S is calibrated, yielding a calibrated slope of 0.0099 volts/degree F, and a calibrated offset of 1.262 volts at 0 degrees F.

1) Convert the slope: S = 0.0099 x 1.800 = 0.01782.
2) Scale Factor = 1/ (S x 409.2) = 1 / (0.01782 x 409.2) = 0.1371, so the scale factor for SDR is 0.1371
3) Offset = -17.78 − (1.262 / S) = -17.78 − (1.262 / 0.1782) = -88.60, so the offset for SDR is −88.60.