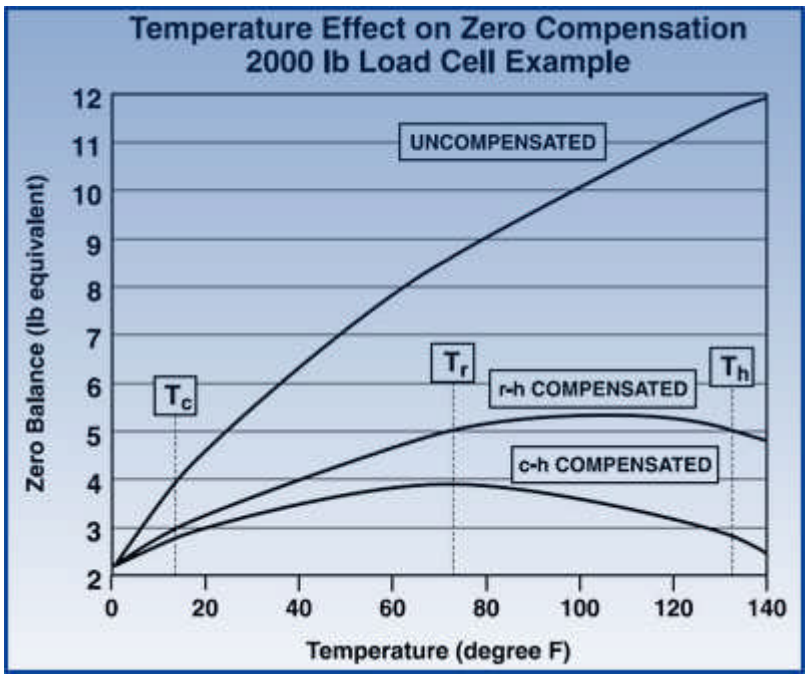
Load Cells - Temperature Compensation of Zero

The Advantages of Full Temperature Range Compensation

Temperature compensation of zero balance of load cells is conventionally performed using the chord-slope method. A partial-range implementation of this method, acting on a chord between room temperature and one extreme temperature is often used. A better implementation is full-range using three test temperatures and acts on a chord between the cold and hot extremes.



The top curve on the plot represents the zero temperature characteristics of an uncompensated load cell. This curve would ideally be a straight line but often has some nonlinearity such as shown here.

The objective of the compensation process is to rotate the curve to a more level position. The middle curve represents a compensation based on room temperature (T_r) and hot temperature (T_h) and is consequently labeled "r-h compensated." The process equalizes the zero balance values at T_r and T_h.

The lower curve represents a compensation based on cold temperature (T_c) and hot temperature (T_h) and is labeled "c-h compensated." This process equalizes the zero balance values at T_c and T_h, producing a relatively full-range solution.

It is now apparent why the full range procedure (lower curve) is superior:

1. The slope of the characteristic near room temperature, the temperature at which most applications are of most interest, is near zero.
2. The total range of zero balance over the temperature range of the plot is minimal, approximately one-half that of the partial-range compensated.