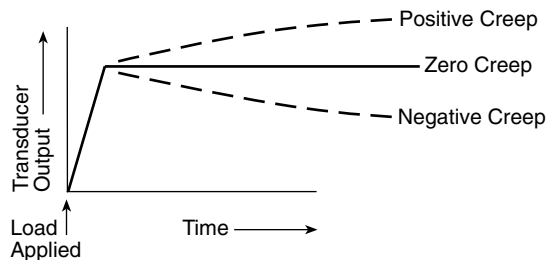


Advanced Sensors

CREEP COMPENSATION

Commercial transducers regularly achieve a creep specification of less than $\pm 0.02\%$ of full scale (FS) for a 20-minute test. To attain this level on a high production basis, it is usually necessary to match the strain gage's creep characteristic to the spring element creep.

Most *Transducer-Class* gages can be adjusted in design to exhibit either a positive or negative creep under load. Spring element materials exhibit only positive creep under load. (See figure below.)



Since transducer creep depends on several variables such as spring element material, heat treatment, strain field, adhesive type and test temperature, it is not possible to predict the proper gage compensation necessary to achieve the best creep result.

Most of the gages in this catalog list one available creep compensation code. Since it is not possible to predetermine the creep characteristics of a particular transducer, it is suggested that the standard creep code be ordered in quantities sufficient to evaluate three or four transducers. Where creep levels are high enough to warrant correction, a different creep compensation, either more negative or more positive, depending on test results, can often be recommended.

A complicating factor in creep code selection is that while different gage patterns may list the same creep code, they do not necessarily exhibit the same creep behavior. This is because the gage backing selection, gridline width and gage length also influence creep characteristics.

It should also be noted that this type of creep correction is generally limited to transducers exhibiting less than $\pm 0.1\%$ FS creep. Higher creep levels in the positive direction are often the result of poor spring element material selection. Negative creep values in excess of 0.1% FS generally are the result of a faulty gage installation.

MODULUS COMPENSATION (EMC) OPTION

Many of the K-alloy gages in this catalog are available in a special form which permits the gage factor change with temperature to be adjusted over a wide range during gage manufacture.

Properly matched to the transducer spring element, these EMC (Effective Modulus Compensation) gages can provide very good self-correction of changes in transducer span versus temperature. A compensation better than $\pm 0.0008\%/^{\circ}\text{F}$ ($\pm 0.0014\%/^{\circ}\text{C}$) can readily be achieved in many cases.

While this may at first appear to be the "ideal" strain gage for transducers, there are certain factors that should be considered prior to selecting EMC gages for a given application:

1. EMC gages cost more than other gages. In most cases the difference is great enough to offset the additional cost of span/temperature resistors.
2. EMC gages must be "matched" to the transducer spring material. Depending on the degree of compensation accuracy desired, the standard EMC options may not yield the "best fit" compensation on the spring material in use. In these cases, a special foil lot which possesses the desired compensation would be required. There is normally a minimum order requirement and set-up charge for special foil lots.
3. Transducer spring materials may not have batch-to-batch repeatability sufficient to maintain specifications when using the same EMC gages. New material lot testing is therefore necessary for high precision units.

Despite these limitations, EMC gages can often be advantageous for transducer manufacturers.

The following standard EMC options are available:

OPTION M1

Gage factor slope is -1.50% per 100°F (-2.70% per 100°C). Provides span-versus-temperature compensation for many stainless steels.

OPTION M2

Gage factor slope is -2.35% per 100°F (-4.23% per 100°C). Provides span-versus-temperature compensation for most aluminum alloys.

OPTION M3

Gage factor slope is -1.25% per 100°F (-2.25% per 100°C). Provides span-versus-temperature compensation for many tool steels.

OPTION M4

Gage factor slope is -1.35% per 100°F (-2.43% per 100°C). Provides "mid-range" compensation between M1 and M3.

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