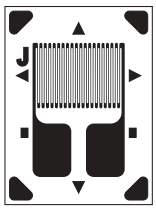
Transducer-Class® Strain Gages

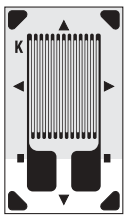
N2A SERIES

N2A gages are open-faced constantan-alloy patterns constructed on a thin, laminated, polyimide-film backing. This series is capable of low and repeatable creep performance. Construction is very rugged, which will help prevent gage handling damage.



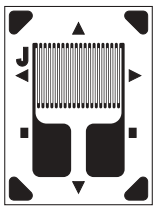
J2A SERIES

J2A gages are encapsulated constantan-alloy patterns. Both the encapsulation and backing are thin, laminated polyimide film. Gage soldering tabs are exposed for simplified lead connections. Creep performance is equal to the N2A Series, although the presence of an encapsulating layer will require a change in creep code selection to maintain the same performance.



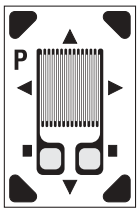
EA SERIES

EA gages are open-faced constantan-alloy patterns with a flexible cast-polyimide backing. Creep scatter is somewhat more pronounced than with all other series. Consequently, EA gages are normally available with only one creep code per pattern.



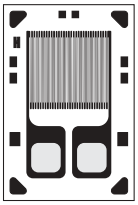
N2K SERIES

N2K gages are open-faced modified-Karma-alloy patterns constructed on a thin, laminated, polyimide-film backing. More rugged and flexible than the TK or SK Series, N2K gages are popular for transducer applications where lower cost K-alloy gages are desired. All N2K gages are supplied with copper soldering pads (DP) for ease of leadwire attachment. Most gages in the N2K Series can also be modulus compensated.



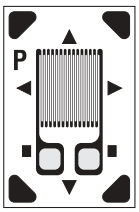
N3K SERIES

N3K gages are special, open-faced, modified-Karma-alloy patterns constructed on an ultrathin, laminated polyimide-film backing. Their small size and high resistance (5000 ohms) makes them ideally suited for 4 to 20mA process control transmitters and battery-operated systems. All N3K gages are supplied with a copper soldering pad (DP) on each gage tab.



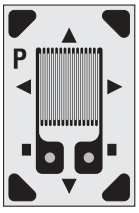
TK SERIES

TK gages are open-faced modified-Karma-alloy patterns with a thin, reinforced, laminate backing. These gages have a higher operating temperature range and greater fatigue life than N2A, J2A, EA, N2K, or N3K gages. However, they are generally more costly. Most gages in the TK Series can also be modulus compensated. All TK gages are supplied with a copper soldering pad (DP) on each gage tab.



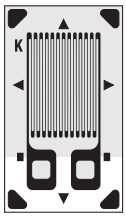
SK SERIES

SK gages are fully encapsulated, modified-Karma-alloy patterns with a preformed solder dot on each gage tab. Both backing and encapsulation are thin, reinforced, laminated material. Due to the relatively stiff backing and encapsulation, SK-Series gages are less flexible than all other series and care must be exercised in handling and bonding. Some SK patterns can be supplied with modulus compensation (EMC) options.



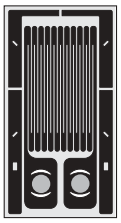
Transducer-Class® Strain Gages

J5K SERIES



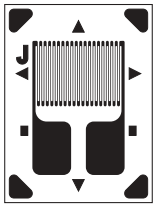
J5K gages are encapsulated, modified-Karma-alloy patterns specially constructed to improve gage performance at elevated temperatures. Because of the laminated polyimide-film backing and encapsulation, all J5K patterns are fully flexible without being brittle. Copper soldering pads (DP) are exposed for simplified lead connections. Some J5K gages can be supplied with modulus-compensation (EMC) options. For best high-temperature performance, J5K-Series gages should be installed with M-Bond 450 high-temperature adhesive.

J5E SERIES



J5E gages are a family of platinum-tungsten-alloy patterns constructed with a thin, flexible polyimide backing. Sensing grids are fully encapsulated by a polyimide film overlay and include a preformed solder dot on each gage tab. With a gage factor more than double that of conventional strain gages, platinum-tungsten-alloy patterns provide standard transducer output levels at less than half the normal spring-element stress values. This allows for higher overload safety, increased fatigue life, and improved linearity in many transducer designs. A negative gage-factor-versus-temperature slope also provides modulus compensation in many types of steel transducer spring elements. A relatively high thermal output of platinum-tungsten alloy makes precision static measurements difficult.

RE SERIES



RE gages are platinum-tungsten alloy patterns constructed with a thin, flexible, glass-fiber-reinforced polyimide film backing. Sensing grids are unencapsulated and solder tabs are fully exposed. Platinum-tungsten alloy is quite easy to solder using conventional rosin type fluxes. RE Series gages have the same beneficial high gage factor of J5E Series, and are useful in the same applications.

GAGE SERIES	TEMPERATURE RANGE		GAGE FACTOR (See Note)	FATIGUE LIFE	
	STATIC	DYNAMIC		STRAIN LEVEL IN e	NUMBER OF CYCLE
N2A	–100° to +200°F (–75° to +95°C)	Same as static	2.05 nom.	±1500 1500	10^7 10^8†
J2A	–100° to +200°F (–75° to +95°C)	Same as static	2.05 nom.	±1700 1700	10^6 10^7†
EA	–100° to +200°F (–75° to +95°C)	–320° to +350°F (–195° to +175°C)	2.05 nom.	±1500 1500	10^6 10^7†
N2K	–100° to +200°F (–75° to +95°C)	Same as static	2.1 nom.*	±1800	10^7
N3K	–100° to +200°F (–75° to +95°C)	Same as static	2.1 nom.*	±1800	10^7
TK	–100° to +300°F (–75° to +150°C)	–320° to +400°F (–195° to +205°C)	2.1 nom.*	±2000 2000	10^7 10^8†
SK	–100° to +350°F (–75° to +175°C)	–320° to +450°F (–195° to +230°C)	2.1 nom.*	±2000 2000	10^7 10^8†
J5K	–100° to +400°F (–75° to +205°C)	–320° to +500°F (–195° to +260°C)	2.1 nom.*	±2000 1800	10^7 10^8
J5E	–100° to +400°F (–75° to +205°C)	Same as static	4.5 nom.	±1500	10^8
RE	–100° to +400°F (–75° to +205°C)	Same as static	4.5 nom.	±1500	10^8

NOTE: Transducer-Class® gages are supplied with nominal gage factor values that will vary slightly with pattern. They are not suitable for strain measurement in stress analysis applications. Request Catalog 500, or contact our Applications Engineering Department, for a complete listing of gages for precision strain measurement applications.

*Nominal gage factor is 2.3 for EMC options.

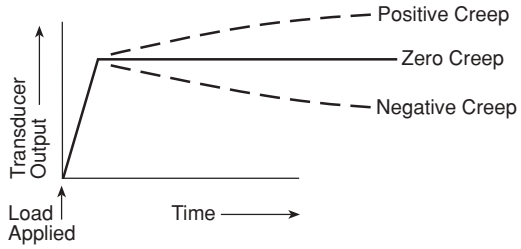
†Unidirectional strain.

Transducer-Class® Strain Gages

CREEP COMPENSATION

Commercial transducers regularly achieve a creep specification of less than ± 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 behaviour. 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 ± 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 ± 0.0008%/°F (± 0.0014%/°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.