



Technical Data

GAGE SERIES

All Micro-Measurements strain gages incorporate precision foil grids mounted on organic backing materials. The strain-sensing alloys and backing materials cannot be arbitrarily combined in specifying a gage type. Instead, a selection must be made from among the available gage systems, or series, where each series generally incorporates special design or construction features, as well as a specific combination of alloy and backing material.

Descriptions of all standard gage series are given on the following pages, along with performance specifications and application notes. The information includes, in each case, the alloy and backing combination employed, as well as the principal construction features common to the series. The allowable strain range is specified, and operating temperature ranges are recommended for different types of applications.

The plots of cyclic strain level versus number of cycles shown for each series represent general guidelines for the nominal fatigue characteristics. This data is a function of gage size with the upper curve indicative of larger gage patterns, and the lower curve of smaller gage patterns. Since the fatigue life of a strain gage is subject to special interpretation, reference should be made to Micro-Measurements Tech Note TN-508, Fatigue Characteristics of Micro-Measurements Strain Gages, for a full understanding of the plotted data.

The fatigue curves on the following pages correspond to fully reversed strain levels. They can also be applied, approximately, to unidirectional strains and to combinations of mean and variable strains by derating the peak-to-peak amplitude by 10%. As an example, a fully reversed strain range of $\pm 1500\mu\epsilon$ is approximately equivalent in gage fatigue damage to strain levels of:

- 0 to $+2700\mu\epsilon$
- 0 to $-2700\mu\epsilon$
- -200 to $+2500\mu\epsilon$

However, a mean strain which increases in the tensile direction during cycling will lead to much earlier failure.

It must be noted that all performance specifications for strain gages are nominal, since the behavior of a particular gage may be modified by installation or application circumstances. Moreover, the specifications apply primarily to gages of 0.125 in [3 mm] gage length and larger, and without optional features, unless otherwise indicated.

CEA	Universal general-purpose strain gages. Constantan grid completely encapsulated in polyimide, with large, rugged copper-coated tabs. Primarily used for general-purpose static and dynamic stress analysis.	Normal: -100° to +350°F [-75° to +175°C] Stacked rosettes limited to +150°F [+65°C]	±3% for gage lengths under 1/8 in [3.2 mm] ±5% for 1/8 in and over	±1500	10 ⁵
				±1500	10 ⁶ *
				*Fatigue life improved using low-modulus solder.	

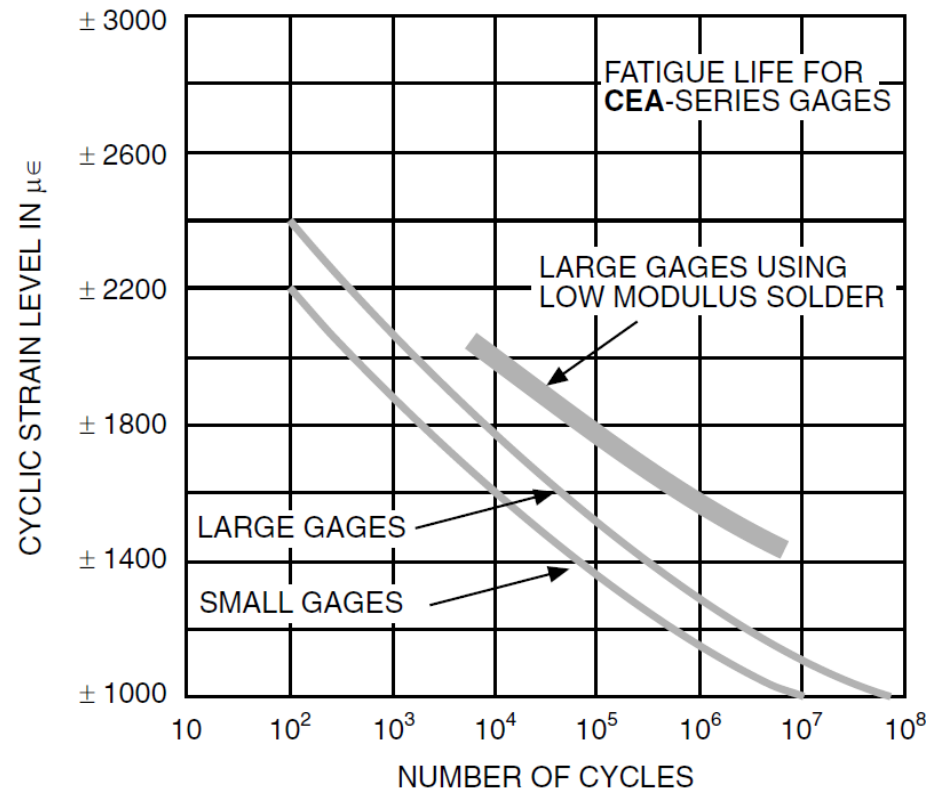
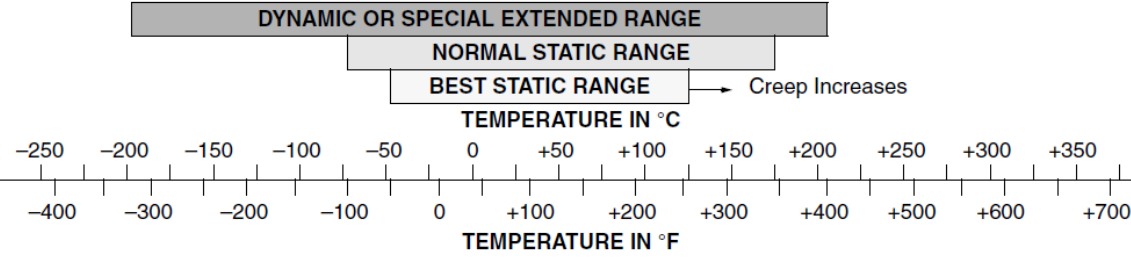
CEA Series

CEA-Series gages are the most widely accepted for use in general-purpose experimental stress analysis applications in the world today. These polyimide encapsulated constantan gages feature large, rugged, copper-coated tabs. This construction provides optimum capability for attaching leadwires directly to the tabs, eliminating the need for separate terminals. In most applications, the CEA Series is preferred over the EA Series with options such as E, L, LE and W. Nominal single-plane gage thickness is 0.0027 in [0.069 mm]; stacked rosettes, 0.0039 in [0.099 mm]. The extremely tough but flexible cast polyimide carrier can be contoured to almost any radius. Strain limits are approximately $\pm 5\%$ [50 000 $\mu\epsilon$] for gage lengths 1/8 in [3 mm] or greater, and $\pm 3\%$ for smaller sizes.

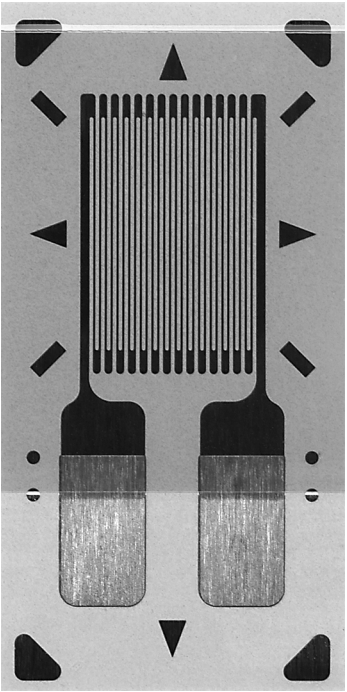
OPERATING TEMPERATURES FOR CEA-SERIES GAGES

The thermal output of constantan increases rapidly below -50°F [-45°C]. Static measurements become difficult if temperatures are varying.

Positive zero drift of constantan alloy increases significantly above $+150^{\circ}\text{F}$ [$+65^{\circ}\text{C}$] for single active gages in static measurements. Use half-bridge or full-bridge circuits when possible. Stacked rosettes are limited to a maximum operating temperature of $+150^{\circ}\text{F}$ [$+65^{\circ}\text{C}$].



General Purpose Strain Gages - Linear Pattern

GAGE PATTERN DATA					
 <p>actual size</p>			GAGE DESIGNATION	RESISTANCE (OHMS)	OPTIONS AVAILABLE
			See Note 1		See Note 2
			CEA-XX-125UN-120 CEA-XX-125UN-350	120 ± 0.3% 350 ± 0.3%	P2 P2
DESCRIPTION General-purpose gage with narrow geometry. Exposed solder tab area 0.06 x 0.05 in [1.5 x 1.1 mm]. See also 125UW pattern.					
GAGE DIMENSIONS			Legend: ES = Each Section S = Section (S1 = Sec 1)		<div>inch</div> <div>millimeter</div>
Gage Length	Overall Length	Grid Width	Overall Width	Matrix Length	Matrix Width
0.125	0.275	0.100	0.120	0.38	0.19
3.18	6.99	2.54	3.05	9.7	4.8

GAGE SERIES DATA			
See Gage Series data sheet for complete specifications.			
Series	Description	Strain Range	Temperature Range
CEA	Universal general-purpose strain gages.	±5%	−100° to +350°F [−75° to +175°C]

Note 1: Insert desired S-T-C number in spaces marked XX.

Note 2: Products with designations and options shown in bold are not RoHS compliant.

CALCULATION OF THERMAL OUTPUT FOR STRAIN GAGES

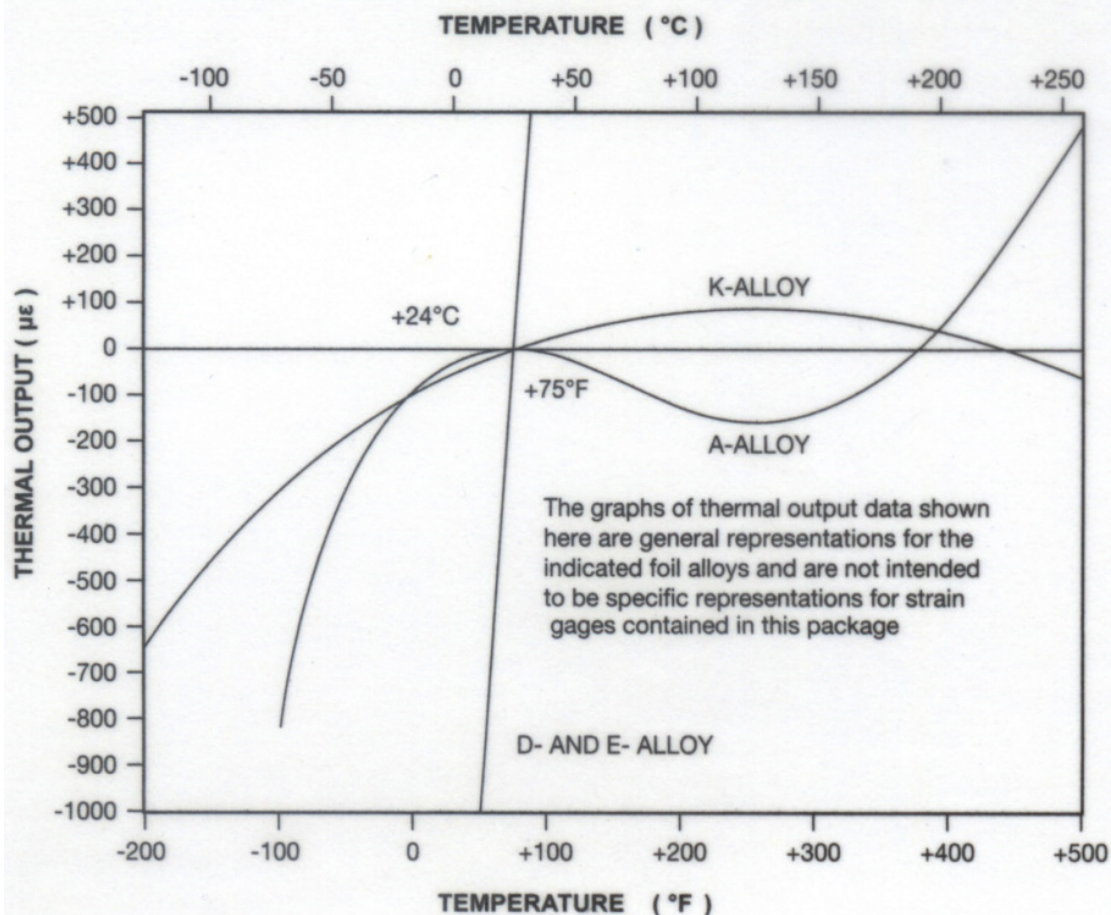
The thermal output of the gages contained in this package can be calculated from the following polynomial expression

$$a_0 + a_1 \cdot T + a_2 \cdot T^2 + a_3 \cdot T^3 + a_4 \cdot T^4$$

where a_N are the coefficients and T^N is temperature to the Nth power.

The coefficients for both Celsius and Fahrenheit temperature scales are provided on the data label affixed to this package for strain gages.

A-Alloy, D-Alloy, and E-Alloy will generally use all five coefficients (a_0 to a_4) but K-Alloy will generally use only the first four coefficients (a_0 to a_3) with the fifth (a_4) being zero.



Los coeficientes de respuesta térmica para algún material de ejemplo dependen del lote y están impresos en la parte trasera de cada caja. Si las galgas compradas son las últimas de su caja se la enviaremos, de lo contrario si necesita los coeficientes precisos del lote, solicítelos a nuestro email con su referencia de pedido y se los enviaremos.

Como referencia se presenta la información de alguno de los lotes:

CEA-06-125UN-350



MICRO-MEASUREMENTS
General Purpose
STRAIN GAGES

GRID RESISTANCE IN OHMS		TC OF GAGE FACTOR, %/100°C
350.0±0.3%		(+1.3±0.2)
GRID	GAGE FACTOR @ 24°C	TRANSVERSE SENSITIVITY
1	2.110±0.5%	(+0.3 ±0.2)%
2		
3		
NOM		
THERMAL OUTPUT COEFFICIENTS FOR 1018 Steel @ A G.F. OF 2.00		
ORDER	FAHRENHEIT	CELSIUS
0	-2.76E+2	-1.12E+2
1	+6.39E+0	+7.11E+0
2	-4.24E-2	-1.10E-1
3	+9.02E-5	+4.87E-4
4	-5.31E-8	-5.58E-7

CEA-13-125UN-350

MEME [®] MICRO-MEASUREMENTS		
FOR COMPLETE TECHNICAL DATA, VISIT WWW.VISHAYPG.COM		
GRID RESISTANCE IN OHMS		TC OF GAGE FACTOR, %/100°C
350.0±0.3%		(+1.3±0.2)
GRID	GAGE FACTOR @ 24°C	TRANSVERSE SENSITIVITY
1	2.125±0.5%	(+0.3±0.2)%
2		
3		
NOM		
THERMAL OUTPUT COEFFICIENTS FOR 2024-T4 ALUMINUM @ G.F. OF 2.00		
ORDER	FAHRENHEIT	CELSIUS
0	-1.05E+2	-3.27E+1
1	+3.06E+0	+2.75E+0
2	-2.71E-2	-6.72E-2
3	+6.93E-5	+3.74E-4
4	-4.08E-8	-4.28E-7
5		