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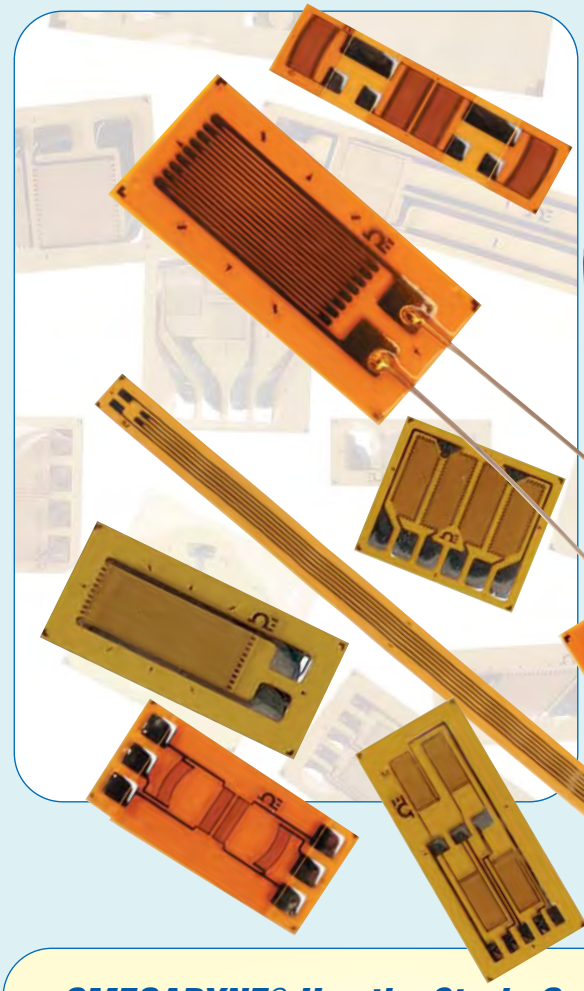
New Horizons® in Strain Gages: Users Guide and Technical Reference



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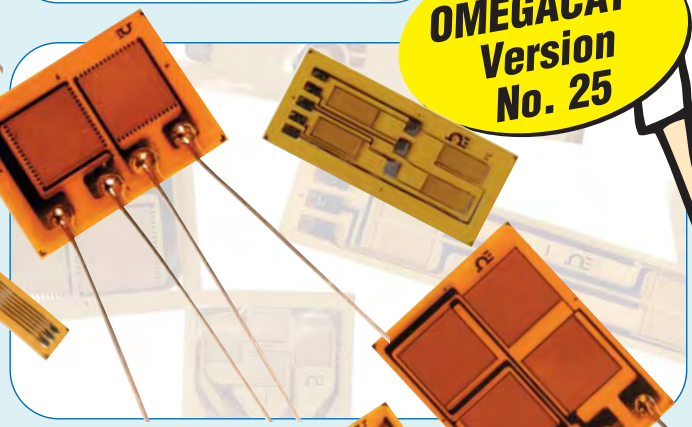

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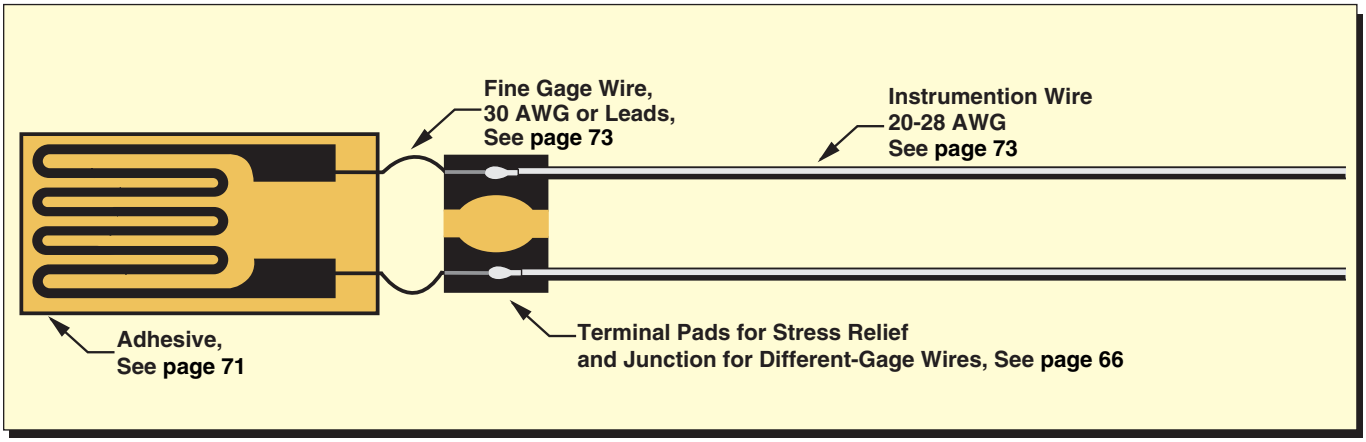
STRAIN GAGE INSTALLATIONS

BASICS

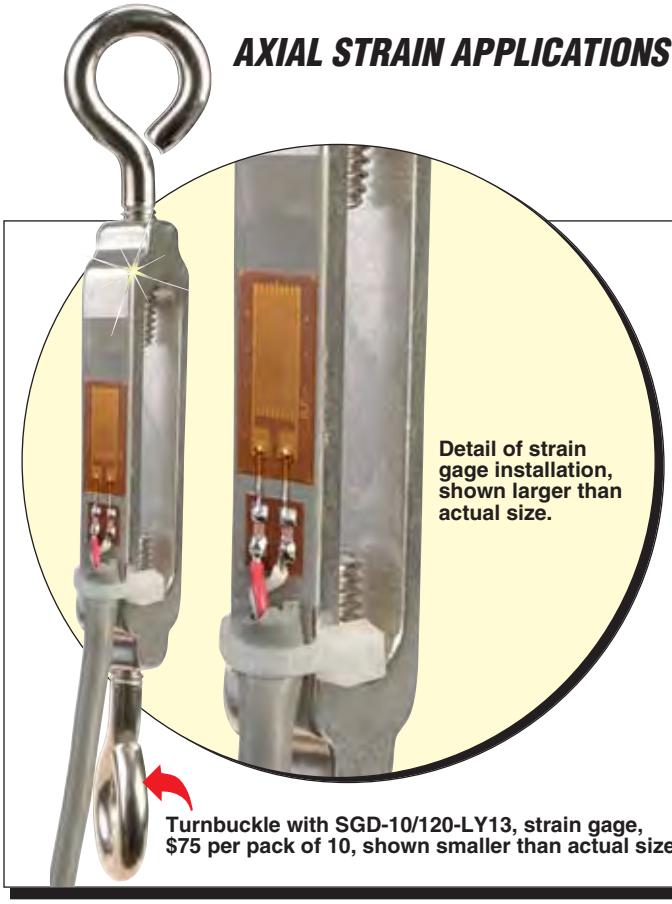


Strain Gage Basics, Axial Strain Application, Material/Steel, Long Term Use

Adhesive: TT300, page 71
30 AWG Wire: TFCP-010-50, page 73
Strain Gage Linear:
1-Axis, SGD-7/350-LY41, page 15
BondableTerminal Pads: BTP-4, page 66
Instrumentation Wire: TX4-100, page 73

Considerations for force sensor design. Look up the modulus of elasticity and the yield strength of the material that has been selected. Determine the estimated load or force that will be applied. Design the spring element so that you are working in the linear portion of the stress strain curve. Modify the dimensions of the component part as required so that there will be enough strain in the component part so that it can be measured. Determine how the component part will be loaded, as in axially, bending, shear, or torsion. Select your strain gages. Correctly position and install your strain gages. Calibrate you new force sensor using a known applied load.

AXIAL STRAIN APPLICATIONS



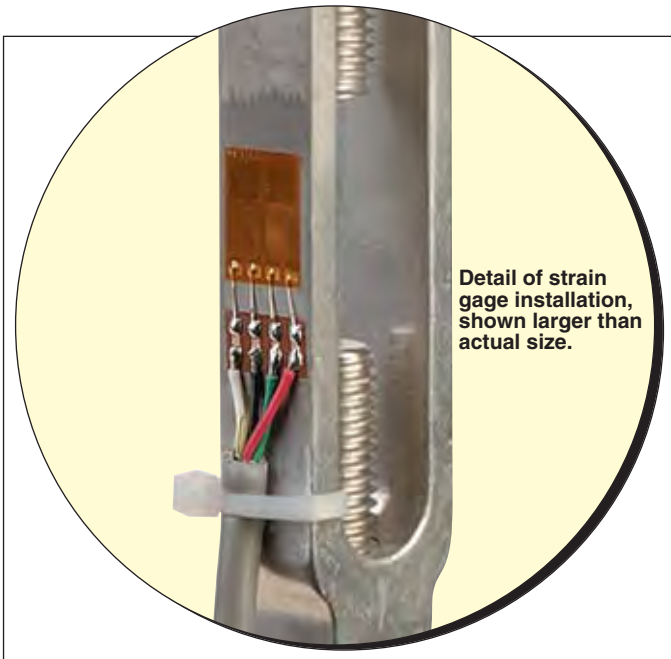
Turnbuckle with SGD-10/120-LY13, strain gage, $75 per pack of 10, shown smaller than actual size.

Axial strain measurement in a small eye-to-eye turnbuckle; size is 6.35 x 133.53 mm (¼ x 5¼"), and the safe working load specified is 68.04 kg (150 lbs). The eye-hooks are stainless steel and the turnbuckle body is aluminum. Application using a linear uniaxial strain gage pattern.

Strain Gage: SGD-10/120-LY13, page 15
Bondable Terminal Pad: BTP-4, page 66
Adhesive: SG496, page 71
Cable: TX4-100, page 73

Installation using standard surface preparation per page 70. One strain gage has been installed in the principal stress direction. The strain gage selected has temperature characteristics matched to aluminum, and has ribbon leads. The bondable terminal pad has been placed close by, and the ribbon leads have been brought over, leaving small flex loops, and soldered in place. Any excess lead has been trimmed away. TX4 cable has been used, and 2-leads have been soldered in place to bring the ¼ bridge strain gage out to instrumentation. The BCM-1, page 74 can be used to complete the Wheatstone bridge.

AXIAL FULL BRIDGE STRAIN APPLICATIONS



Detail of strain gage installation, shown larger than actual size.

Turnbuckle with SGT-4/1000-FB13, strain gage, $106.50 per pack of 5, shown smaller than actual size.

Axial strain measurement in a large hook-to-eye turnbuckle; size is 9.525 x 203.2 mm (⅜ x 8"), and the safe working load specified is 158.75 kg (350 lbs). The eye-hooks are stainless steel and the turnbuckle body is aluminum. Application using a full wheatstone bridge pattern which has 4 strain gages on one carrier piece, with 2 strain gages that are perpendicular to the other two.

Strain Gage: SGT-4/1000-FB13, page 46
Bondable Terminal Pad: BTP-4, page 66
Adhesive: SG496, page 71
Cable: TX4-100, page 73

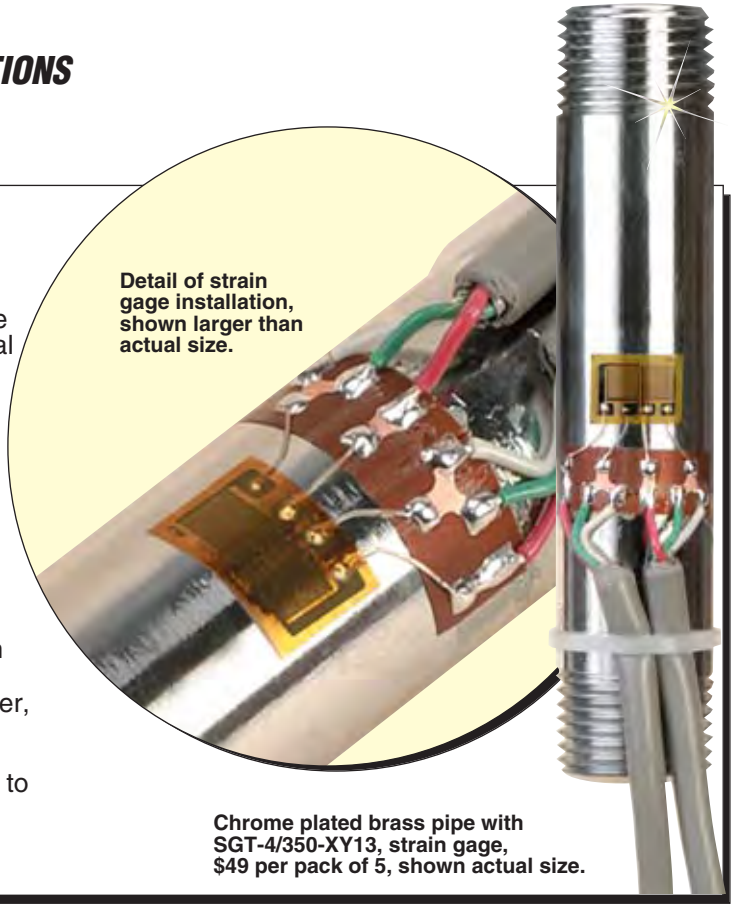
Installation using standard surface preparation per page 70. Installation will be a full Wheatstone bridge with 2 fully active strain gages in the axial direction, and 2 that will see the effect of Poisson's ratio. The strain gage selected has temperature characteristics matched to aluminum, and has ribbon leads. The bondable terminal pad has been placed close by, and the ribbon leads have been brought over, leaving small flex loops, and soldered in place. Any excess lead has been trimmed away. TX4 cable has been used, and 4-leads have been soldered in place to bring the full Wheatstone bridge out to instrumentation.

PIPE PRESSURE APPLICATIONS

Pressure application, using a ½ male NPT by 101.6 mm (4"), chrome plated brass pipe nipple. Application used a tee rosette. One carrier piece has 2 electrically independent strain gages which are perpendicular to each other. The installation will have two separate strain gages, to measure hoop and axial strain, here wired using three-wire method. This method compensates for the effect of temperature on thelead wires.

Strain Gage: SGT-4/350-XY13, page 36
Bondable Terminal Pad: BTPC-4, page 66
Adhesive: SG496, page 71
Cable: TX4-100, page 73

Installation using standard surface preparation per page 70. The strain gage selected has temperature characteristics matched to aluminum, and has ribbon leads. The bondable terminal pad has been placed close by, and the ribbon leads have been brought over, leaving small flex loops, and soldered in place. Any excess lead has been trimmed away. TX4 cable has been used, and 3-leads have been soldered in place to bring the two ¼ bridge strain gages out to instrumentation. The BCM-1 page 74 can be used to complete the Wheatstone bridge.



Detail of strain gage installation, shown larger than actual size.

Chrome plated brass pipe with SGT-4/350-XY13, strain gage, $49 per pack of 5, shown actual size.

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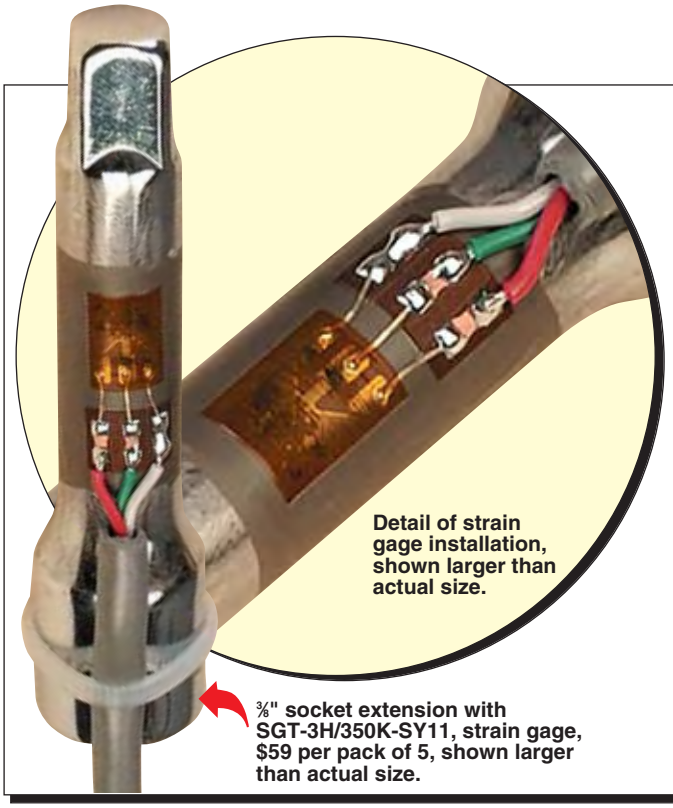
TORQUE APPLICATIONS

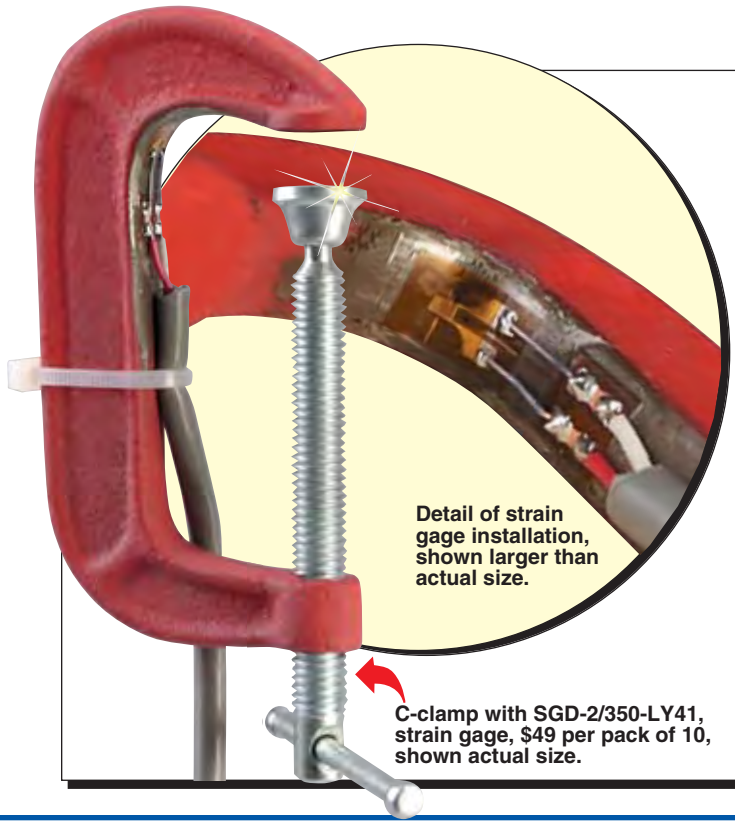


Torque strain measurement in a 9.5 mm (⅜") socket extension, material is carbon steel. Application using a shear ½ bridge pattern with a common lead. The one carrier piece has two reversed grids, at 45° with respect to the center line.

Strain Gage: SGT-3H/350K-SY11, page 44
Bondable Terminal Pad: BTP-4, page 66
Adhesive: SG496, page 71
Cable: TX4-100, page 73

Installation using standard surface preparation per page 70. One carrier piece has been installed, which will have two fully active strain gages. The strain gage selected has temperature characteristics matched to steel and has ribbon leads. The bondable terminal pad has been placed close by, and the ribbon leads have been brought over, leaving small flex loops, and soldered in place. Any excess lead has been trimmed away. TX4 cable has been used, and 3-leads have been soldered in place to bring the ½ bridge strain gage out to instrumentation. The BCM-1 page 74 can be used to complete the Wheatstone bridge.

AXIAL STRESS APPLICATIONS



Experiment using a 50.8 mm (2") C-clamp, material is carbon steel. Application using a linear uniaxial strain gage pattern.

Strain Gage: SGD-2/350-LY41, page 13
Bondable Terminal Pad: BTP-4, page 66
Adhesive: SG496, page 71
Jumper Wire: TFCP-010-50, page 73
Cable: TX4-100, page 73

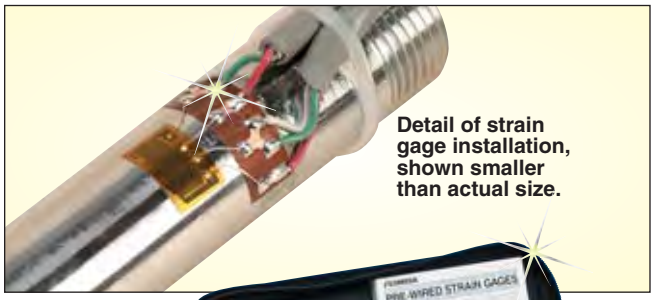
Installation using standard surface preparation per page 70. One strain gage has been installed in the principal stress direction at the fillet. The strain gage selected has temperature characteristics matched to steel, and has solder pads. The bondable terminal pad has been placed close by. Small jumper wires were made using the TFCP-010-50 and were soldered onto the strain gage solder pads. The jumper leads have been brought over, leaving small flex loops, and soldered in place. TX4 cable has been used, and 2-leads have been soldered in place to bring the ¼ bridge strain gage out to instrumentation. The BCM-1 page 74 can be used to complete the Wheatstone bridge.

Application Considerations When Selecting Strain Gages

- Is the strain gage application feasible?
- Will there be enough strain in the component part so that it can be measured?
- What type of material will be strain gaged?
- Do you know where the high stress location will be?
- Do you know what the principal stress direction is?
- Is the stress consistent over a large area?
- Is there a stress concentration?
- Will you be installing a ¼ of a Wheatstone bridge, or a single strain gage?
- How will you complete the Wheatstone bridge?
- Will you use a ½ Wheatstone bridge or a full Wheatstone bridge?
- Have you selected your strain gages?
- Have you selected your adhesive?
- Will this strain gage be used for a short term or long term use?
- Have you selected your bondable terminal pads and your wiring?
- What is the environment like where the strain gage will be used?
- What is the temperature in the environment?
- Is the environment electrically noisy?

Considerations for Load Cell Design

- Look up the Modulus of Elasticity and the Yield strength of the material that has been selected
- Determine the estimated load or force that will be applied
- Design the spring element so that you are working in the linear portion of the stress strain curve
- Modify the dimensions of the component part as required so that there will be enough strain for it to be measured
- Determine how the component part will be loaded as in axially, bending, shear, or torsion
- Select your strain gages
- Correctly position and install your strain gages
- Calibrate your new load cell using a known applied load



Detail of strain gage installation, shown smaller than actual size.

SG1-KIT, $549, shown smaller than actual size, contains all the necessary tools to apply strain gages plus an assortment of popular strain gages. See page 72.

TT300, complete strain gage adhesive kit, $190, shown smaller than actual size. See page 71.

Sensor and transducer wire and cable, convenient pre-spooled lengths. See page 73.

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GENERAL INFORMATION

A wide variety of strain gages for various industrial, scientific or transducer applications have been made available for our customers. OMEGADYNE® strives to keep the entire line in stock so the strain gages are available for immediate delivery.

The OMEGADYNE line of strain gages offer a broad selection of precision strain gages that are grouped into three basic sections shown below. Plus, for OEM users, OMEGADYNE customizes any gage to match your requirements. Special tab placements, resistance, grid shape, grid or backing dimensions plus most gages are available with A to Z creep values for high precision applications.

General Purpose Precision Strain Gages

General purpose precision strain gages are encapsulated constantan foil strain gages offered in a wide variety of patterns for scientific, industrial and experimental stress analysis. These precision strain gages can be used for experimental stress analysis monitoring industrial equipment or various scientific applications. In the General purpose strain gage section you will find the strain gage patterns next to the part numbers so that you will be able to see the geometry of the strain gage. The gage dimensions are also provided in and SI (Metric, mm) and US Customary (English, inches) units. General purpose precision strain gages are offered in linear patterns, dual parallel-grid patterns, Tee rosettes (0/90°), rectangular or delta (45° or 60°), stacked or planar rosettes, and shear patterns.

Transducer Quality Strain Gages

Transducer-quality strain gages are for customers who are manufacturing transducers or similar sensing devices. Transducer-quality strain gages feature a tighter tolerance on the carrier trim dimensions which allows the carrier edge to be used for strain gage alignment if required. They also feature tighter tolerances on nominal resistance values. These gages can be creep adjusted to meet a transducer manufacturer's specifications and they can be customized to the unique requirements of a transducer. They are also excellent gages off-the-shelf for experimental stress analysis and/or strain verification projects.

Karma, Strain Gages

OMEGADYNE offers a full line of Karma Strain Gages. Karma Strain gages can be used for various static and dynamic applications. Karma strain gages are used for transducer applications where long term stability or higher temperature use is required. When used at room temperature, for static strain measurements, the transducer will have very good stability for months or even for years. Karma strain gages are also suggested for static strain measurement over a wide temperature range from -75 to 200°C (-100 to 392°F) due to its good linearity over this wide temperature range. Karma strain gages are often used for fatigue-rated transducer designs. The fatigue life of Karma alloy tends to be much better than constantan, and so transducers using Karma strain gages provide good fatigue life. Karma is a nickel-chromium alloy, and was selected as a strain gage material for it's modulus-compensating capabilities which tends to significantly reduce span shift in transducer design. With Karma alloys, the gage factor tends to decrease with increasing temperature. This effect of decreasing elastic modulus will tend to reduce the span shift. Karma alloys do have drawbacks, for example they are difficult to solder without special fluxes. OMEGADYNE has the solution. We have eliminated this problem by offering our Karma Strain Gages with two termination options; ribbon leads or copper plated solder pads. No special flux or procedures are needed.

Custom Strain Gages for OEM Applications

OMEGADYNE can also make custom strain gages for OEM applications. We understand that our customers may require strain gages that are manufactured to their specifications. Custom strain gages can be designed to simplify strain gage installation or for a specific application or for an environment where space is limited. If you need a modification of a standard strain gage pattern, or a non-standard lead length or material, or you need relocation of a solder pad, or a custom trim dimension, please let us know. If you need the creep modified on a strain gage to match the characteristics of the spring element being used to maximize the transducer performance, call us. OMEGADYNE can provide strain gages with modified creep compensation, higher or lower as required by your transducer test results. OMEGADYNE can also provide ½ or full Wheatstone bridge designs or custom rosettes. Send OMEGADYNE your custom strain gage drawing along with your specifications and the quantity of strain gages required. A quotation for the custom strain gages can be provided. A custom part number can be created for your future needs to make reordering custom strain gages fast and easy. Call us here at OMEGADYNE! We are here to assist you.

Contact OMEGADYNE at:

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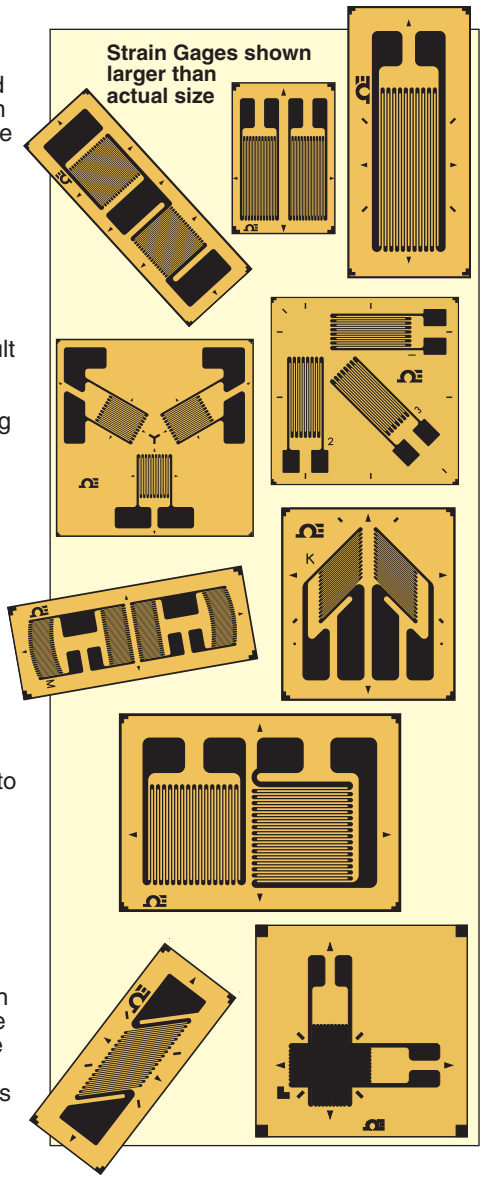
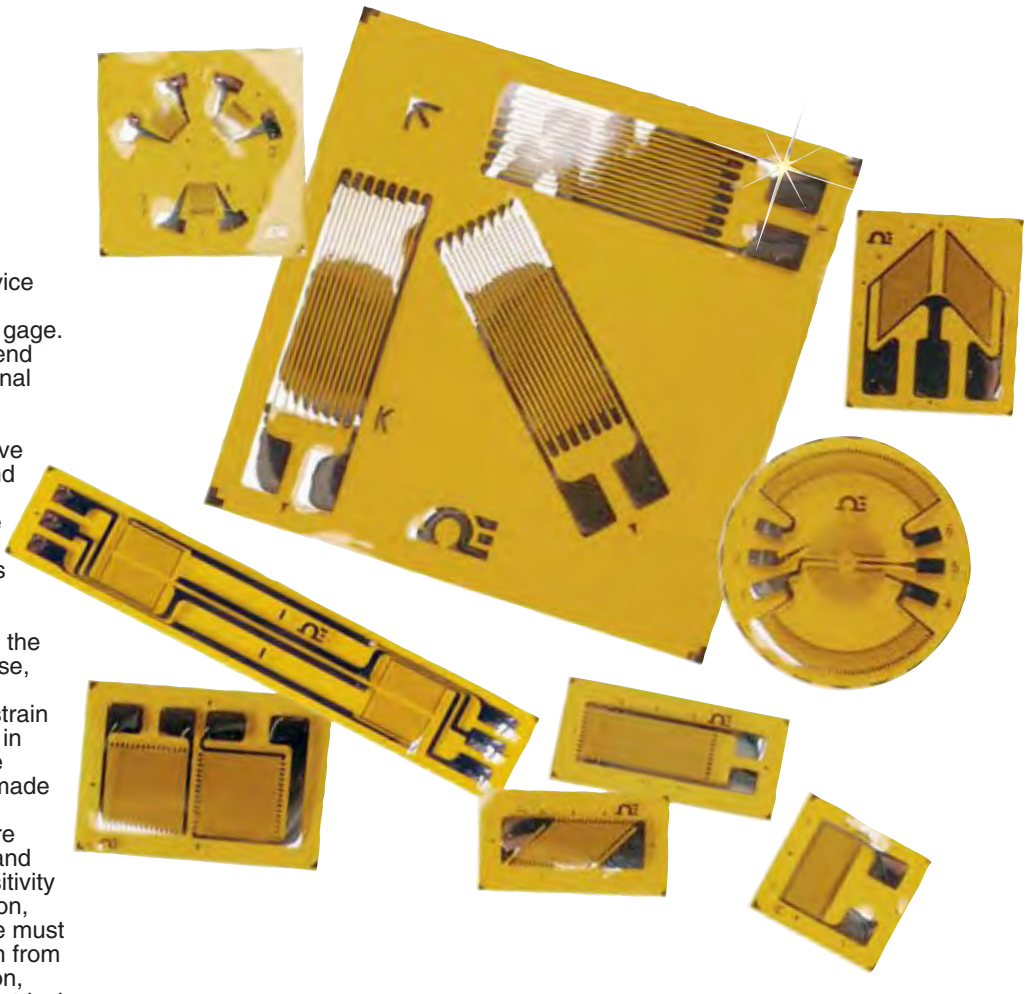


TECHNICAL DATA

STRAIN GAGE MEASUREMENT

The most universal measuring device for the electrical measurement of mechanical quantities is the strain gage. Several types of strain gages depend for their operation on the proportional variance of electrical resistance to strain: the piezoresistive or semi-conductor gage, the carbon resistive gage, the bonded metallic wire, and foil resistance gages. The bonded resistance strain gage is by far the most widely used in experimental stress analysis. This gage consists of a grid of very fine wire or foil bonded to a backing or carrier matrix. The electrical resistance of the grid varies linearly with strain. In use, the carrier matrix is bonded to the surface, force is applied, and the strain is found by measuring the change in resistance. The bonded resistance strain gage is low in cost, can be made with a short gage length, is only moderately affected by temperature changes, has small physical size and low mass, and has fairly high sensitivity to strain. In a strain gage application, the carrier matrix and the adhesive must work together to transmit the strain from the specimen to the grid. In addition, they combine to function as an electrical insulator and heat dissipator. The three primary factors influencing gage selection are: operating temperature, state of strain (gradient, magnitude, and time dependence), and the stability required.

Because of its outstanding sensitivity, the Wheatstone bridge circuit is the most frequently used circuit for static strain measurement. Ideally, the strain gage is the only resistor in the circuit that varies, and then only due to a change in strain on the surface. There are two main methods used to indicate the change in resistance caused by strain on a gage in a Wheatstone bridge. Often, an indicator will rebalance the bridge, displaying the change in resistance required in micro-strain. The second method calls for installation of an indicator, calibrated in micro-strain, that responds to the voltage output of the bridge. This method assumes a linear relationship between voltage out and strain, an initially balanced bridge, and a known VIN. In reality, the VOUT-strain relationship is nonlinear, but for strains up to a few thousand micro-strain, the error is not significant.



POTENTIAL ERROR SOURCES

In a stress analysis application, the entire gage installation cannot be calibrated as can some pressure transducers. Therefore, it is important to examine potential error sources prior to taking data. Some gages may be damaged during installation. It is important therefore to check the resistance of the strain gage prior to applying stress. Electrical noise and interference may alter your readings. Shielded leads and adequately insulating coatings may prevent these problems. A value of less than 500 MΩ (using an ohmmeter) usually indicates surface contamination. Thermally induced voltages are caused by thermocouple effects at the junction of dissimilar metals within the measurement circuit. Magnetically induced voltages can occur when wiring is located in a time-varying magnetic field.

Magnetic induction can be controlled by using twisted lead wires and forming minimum but equal loop areas in each side of the bridge.

Temperature effects on gage resistance and gage factor should be compensated for as well. This may require measurement of temperature at the gage itself, using thermocouples, thermistors, or RTD's. Most metallic gage alloys, however, exhibit a nearly linear gage factor variation with temperature over a broad range, which is less than ±1% within ±100°C/180°F.

PRIME STRAIN GAGE SELECTION CONSIDERATIONS

- Gage Length
- Number of Gages in Gage Pattern
- Arrangement of Gages in Gage Pattern
- Grid Resistance
- Strain-Sensitive Alloy
- Carrier Material
- Gage Width
- Solder Tab Type
- Configuration of Solder Tab
- Availability

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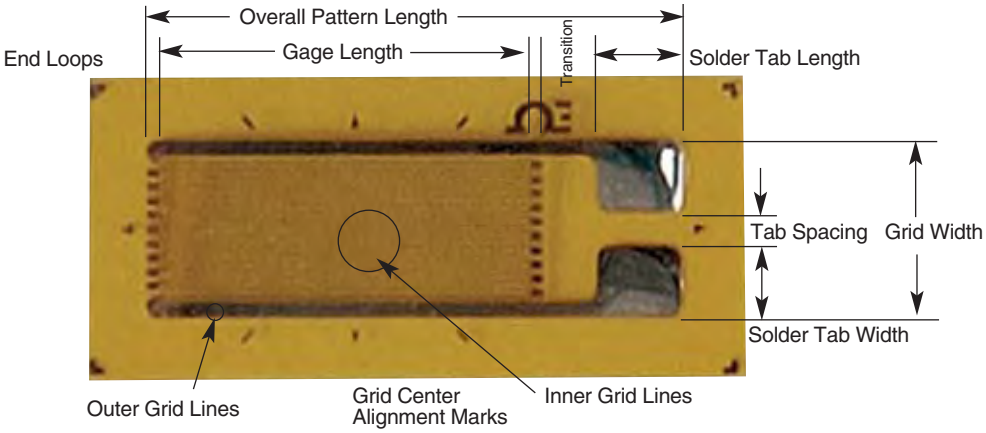
THE STRAIN GAGE IS ONE OF THE MOST IMPORTANT TOOLS

The strain gage is one of the most important tools used to apply electrical measurement techniques to the measurement of mechanical quantities. As their name indicates, they are used for the measurement of strain. As a technical term, “strain” is comprised of tensile and compressive strain, distinguished by a positive or negative sign. Thus, strain gages can be used to detect expansion as well as contraction.

The strain of a body is always caused by an external influence or an internal effect. Strain can be caused by forces, pressures, moments, heat, structural changes of the material and the like. If certain conditions are fulfilled, the amount or the value of the influencing quantity can be derived from the measured strain value. In experimental stress analysis, this feature is widely exploited. Experimental stress analysis uses the strain values measured on the surface of a specimen or structural part to determine the stress in the material and also to predict its safety and endurance. Special transducers can be designed for the measurement of forces or other derived quantities, *e.g.*, moments, pressures, accelerations, displacements, vibrations and others. The transducer generally contains a pressure-sensitive diaphragm with strain gages bonded to it.



STRAIN GAGE DIMENSIONS

The active grid length, in the case of foil gages, is the net grid length without the tabs, and includes the return loops of the wire gages.

Carrier dimensions are designed by OMEGADYNE® for optimum function of the strain gage.

STRAIN GAGE RESISTANCE

The resistance of a strain gage is defined as the electrical resistance measured between the two metal ribbons or contact areas intended for the connection of measurement cables. The range covers strain gages with nominal resistances of 120, 350, 600 and 700 ohms.

GAGE FACTOR (STRAIN SENSITIVITY)

The strain sensitivity k of a strain gage is the proportionality factor between the relative change of the resistance.

Strain sensitivity is a figure without dimension and is generally called gage factor.

The gage factor of each production lot is determined by sample measurement and is given on each package as the nominal value with its tolerance.

REFERENCE TEMPERATURE

The reference temperature is the ambient temperature for which the technical data concerning a strain gage are valid, unless temperature ranges are given.The technical data quoted for strain gages are based on a reference temperature of 23°C (73°F).

TEMPERATURE CHARACTERISTICS

Temperature-dependent changes in specific strain gage grid resistance occur in the applied gage owing to the linear thermal expansion coefficients of the grid and specimen materials. These resistance changes appear to be mechanical strain in the specimen. The representation of apparent strain as a function of temperature is called the temperature characteristic of the strain gage application.

In order to keep apparent strain through temperature changes as small as possible, each strain gage is matched during production to a certain linear thermal expansion coefficient. OMEGADYNE offers strain gages with temperature characteristics matched to ferritic steel and aluminum.

SERVICE TEMPERATURE RANGE

The service temperature range is the range of ambient temperature wherein the use of a strain gage is possible without permanent change in the measurement properties. Service temperature ranges are different, whether static or dynamic values are to be sensed.

MAXIMUM PERMITTED RMS BRIDGE ENERGIZING VOLTAGE

The maximum values quoted are permitted only for appropriate application on materials with good conduction (*e.g.*, steel of sufficient thickness) if room temperature is not exceeded. In other cases, temperature rise in the measuring grid area may lead to measurement error. Measurement on plastics and other materials with bad heat conduction requires reduction of the energizing voltage or of the duty cycle (pulsed operation).

HOW TO POSITION STRAIN GAGES TO MONITOR BENDING, AXIAL, SHEAR, AND TORSIONAL LOADS

In the glossary to the Pressure Reference Section, "strain" is defined as the ratio of the change in length to the initial unstressed reference length. A strain gage is the element that senses this change and converts it into an electrical signal. This can be accomplished because a strain gage changes resistance as it is stretched, or compressed, similar to wire. For example, when wire is stretched, its cross-sectional area decreases; therefore, its resistance increases.

The important factors that must be considered before selecting a strain gage are the direction, type, and resolution of the strain you wish to measure.

To measure minute strains, the user must be able to measure minute resistance changes. The Wheatstone Bridge configuration, shown in Figure B, is capable of measuring these small resistance changes. Note the signs associated with each gage numbered 1 through 4. The total strain is always the sum of the four strains. The total strain is represented by a change in V_{OUT}. If each gage had the same positive strain, the total would be zero and V_{OUT} would remain unchanged. Bending, axial, and shear strain are the most common types of strain measured. The actual arrangement of your strain gages will determine the type of strain you can measure and the output voltage change. See Figures C through F.

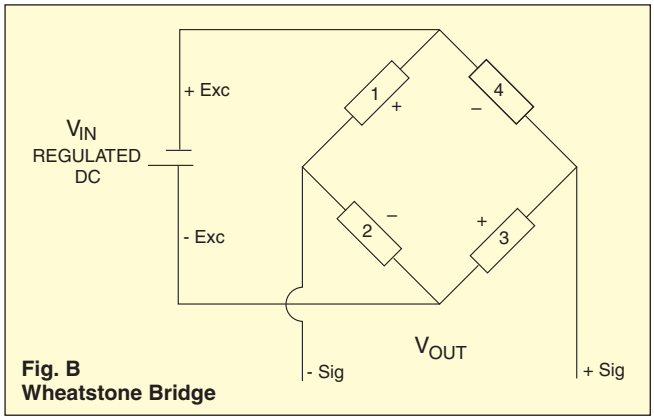


Fig. B
Wheatstone Bridge

For example, if a positive (tensile) strain is applied to gages 1 and 3, and a negative (compressive) strain to gages 2 and 4, the total strain would be 4 times the strain on one gage. See Figure C.

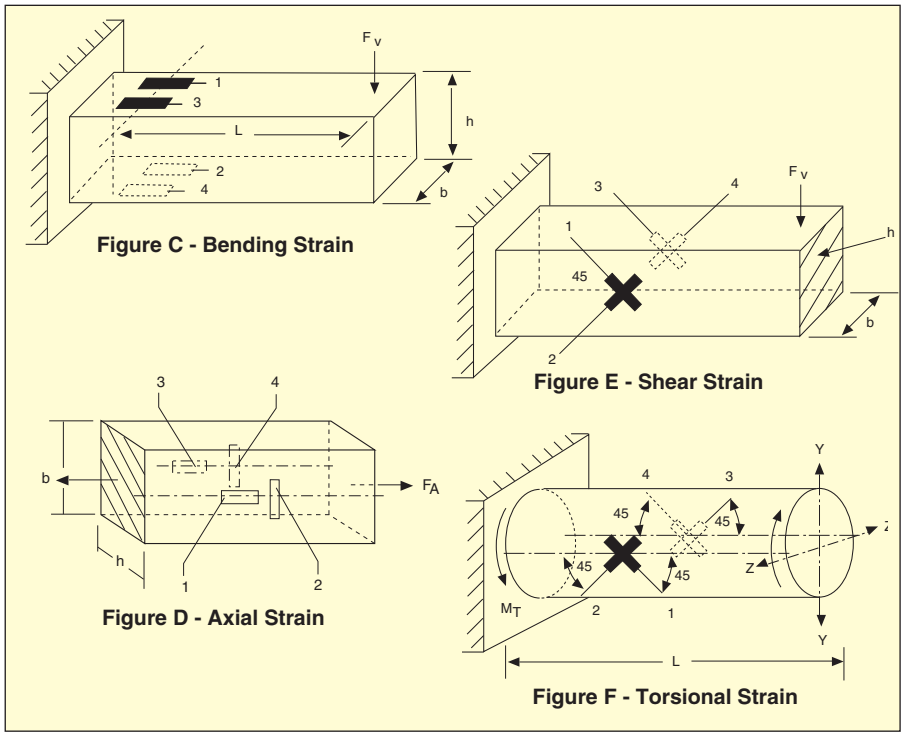


Figure C - Bending Strain

Figure E - Shear Strain

Figure D - Axial Strain

Figure F - Torsional Strain

If total strain is four times the strain on one gage, this means that the output will be four times larger. Therefore, greater sensitivity and resolution are possible when more than one strain gage is used.

The following equations show the relationships among stress, strain, and force for bending, axial, shear, and torsional strain.

1) **BENDING STRAIN** or moment strain is equal to bending stress divided by Young's Modulus of Elasticity.

$$\epsilon_B = o_B/E \qquad o_B = M_B/Z = F_V(\ell)/Z$$

Moment stress (o_B) equals bending moment (F_V x ℓ) divided by sectional modulus. Sectional modulus (Z) is a property of the cross-sectional configuration of the specimen. For rectangles only, the sectional modulus is ($bh^2/6$). Strain gages used in the bending strain configuration can be used to determine vertical load (F_V); this is more commonly referred to as a bending beam load cell.

$$F_V = E\ \epsilon_B(Z)/\ell = E\ \epsilon_B(bh^2/6)/\ell$$

2) **AXIAL STRAIN** equals axial stress divided by Young's Modulus.

$$E_A = o_A/E \qquad o_A = F_A/A$$

Where axial stress (o_A) equals the axial load divided by the cross-sectional area. The cross-sectional area for rectangles equals (b x d). Therefore, strain gages used in axial configurations can be used to determine axial loads (F (axial)).

$$F\ (axial) = E\ \epsilon_A bh$$

3) **SHEAR STRAIN** equals shear stress divided by modulus of shear stress.

$$\gamma = \tau/G \qquad \tau = F_V \times Q/bI$$

Where shear stress (τ) equals (Q), the moment of area about the neutral axis multiplied by the vertical load (F_V) divided by the thickness (b) and the moment of inertia (I). Both the moment of area (Q) and the moment of

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HOW TO POSITION STRAIN GAGES TO MONITOR BENDING, AXIAL, SHEAR, AND TORSIONAL LOADS

inertia (I) are functions of the specimen's cross-sectional geometry.

For rectangles only
$Q = bh^2/8$ and $I = bh^3/12$

The shear strain (γ) is determined by measuring the strain at a 45° angle, as shown in Figure E.

$$\gamma = 2 \times \epsilon @ 45°$$

The modulus of shear strain (G) = E/2 (1 + μ). Therefore, strain gages used in a shear strain configuration can be used to determine vertical loads (F_V); this is more commonly referred to as a shear beam load cell.

$$F_V = G(\gamma)\, bl/Q$$
$$= G(\gamma)\, b\, (bh^3/12)/(bh^2/8)$$
$$= G(\gamma)bh(2/3)$$

4) **TORSIONAL STRAIN** equals torsional stress (τ) divided by torsional modulus of elasticity (G). See Figure F.

$$\gamma = 2 \times \epsilon @ 45° = \tau/G$$
$$\tau = M_t(d/2)/J$$

where torsional stress (τ) equals torque (M_t) multiplied by the distance from the center of the section to the outer fiber (d/2), divided by (J), the polar moment of inertia. The polar moment of inertia is a function of the cross-sectional area. For solid circular shafts only, $J = \pi(d)^4/32$. The modulus of shear strain (G) has been defined in the preceding discussion on shear stress. Strain gages can be used to determine torsional moments as shown in the equation below. This represents the principle behind every torque sensor.

$$M_t = \tau(J)\,(2/d)$$
$$= \gamma G\,(J)\,(2/d)$$
$$= \gamma G\,(\pi d^3/16)$$

$$\varnothing = M_T L/G(J)$$

The following table shows how bridge configuration affects output, temperature compensation, and compensation of superimposed strains. This table was created using a gage factor of 2.0, Poisson's Ratio of 0.3, and it disregards the lead wire resistance.

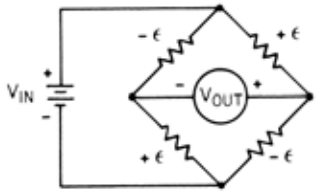
This chart is quite useful in determining the meter sensitivity required to read strain values.

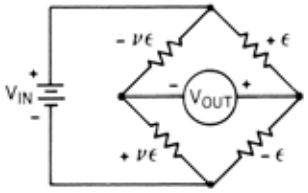
Temperature compensation is achieved in many of the above configurations. Temperature compensation means that the gage's thermal expansion coefficient does not have to match the specimen's thermal expansion coefficient; therefore, any OMEGADYNE® strain gage, regardless of its temperature characteristics, can be used with any specimen material. Quarter bridges can have temperature compensation if a dummy gage is used. A dummy gage is a strain gage used in place of a fixed resistor. Temperature compensation is achieved when this dummy gage is mounted on a piece of material similar to the specimen which undergoes the same temperature changes as does the specimen, but which is not exposed to the same strain. Strain temperature compensation is not the same as load (stress) temperature compensation, because Young's Modulus of Elasticity varies with temperature.

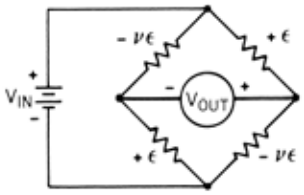
STRAIN	BRIDGE TYPE	POSITION OF GAGES FIG. C-F	SENSITIVITY mV/V @ 1000 $\mu\epsilon$	OUTPUT PER $\mu\epsilon$ @ 10 V EXCITATION	TEMP COMP.	SUPERIMPOSED STRAIN COMPENSATED
BENDING	¼	1	0.5	5 $\mu V/\mu\epsilon$	No	None
	½	1, 2	1.0	10 $\mu V/\mu\epsilon$	Yes	Axial
	Full	All	2.0	20 $\mu V/\mu\epsilon$	Yes	Axial
AXIAL	¼	1	0.5	5 $\mu V/\mu\epsilon$	No	None
	½	1, 2	0.65	6.5 $\mu V/\mu\epsilon$	Yes	None
	½	1, 3	1.0	10 $\mu V/\mu\epsilon$	No	Bending
	Full	All	1.3	13 $\mu V/\mu\epsilon$	Yes	Bending
SHEAR AND TORSIONAL	½	1, 2	1.0	10 $\mu V/\mu\epsilon$ @ 45°F	Yes	Axial and Bending
	Full	All	2.0	20 $\mu V/\mu\epsilon$ @ 45°F	Yes	Axial and Bending

STRAIN BRIDGE DIAGRAMS AND EQUATIONS

Full-Bridge Configurations (BENDING) (AXIAL)







$$\epsilon = \frac{-V_r}{GF} \qquad \epsilon = \frac{-2V_r}{GF(\nu + 1)} \qquad \epsilon = \frac{-2V_r}{GF[(\nu + 1) - V_r(\nu - 1)]}$$

EQUATIONS

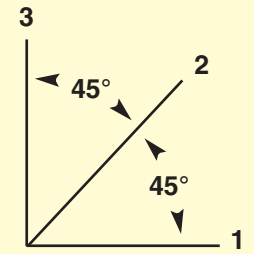
BIAXIAL STRESS STATE EQUATIONS (X-Y)

$$\epsilon_x = \frac{\sigma_x}{E} - \nu\frac{\sigma_y}{E} \qquad \epsilon_z = -\nu\frac{\sigma_x}{E} - \nu\frac{\sigma_y}{E} \qquad \sigma_y = \frac{E}{1 - \nu^2}(\epsilon_x + \nu\,\epsilon_x)$$

$$\epsilon_y = \frac{\sigma_y}{E} - \nu\frac{\sigma_x}{E} \qquad \sigma_x = \frac{E}{1 - \nu^2}(\epsilon_x + \nu\,\epsilon_y) \qquad \sigma_z = 0$$

ROSETTE EQUATIONS

Rectangular Rosette:

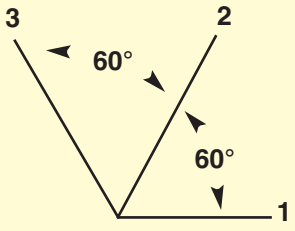


$$\epsilon_{p,q} = \frac{1}{2}\left[\epsilon_1 + \epsilon_3 \pm \sqrt{(\epsilon_1 - \epsilon_3)^2 + (2\epsilon_2 - \epsilon_1 - \epsilon_3)^2}\right]$$

$$\sigma_{p,q} = \frac{E}{2}\left[\frac{\epsilon_1 + \epsilon_3}{1 - \nu} \pm \frac{1}{1 + \nu}\sqrt{(\epsilon_1 - \epsilon_3)^2 + (2\epsilon_2 - \epsilon_1 - \epsilon_3)^2}\right]$$

$$\Theta_{p,q} = \frac{1}{2}\,\text{TAN}^{-1}\frac{2\epsilon_2 - \epsilon_1 - \epsilon_3}{\epsilon_1 - \epsilon_3}$$

Delta Rosette:



$$\epsilon_{p,q} = \frac{1}{3}\left[\epsilon_1 + \epsilon_2 + \epsilon_3 \pm \sqrt{2[(\epsilon_1 - \epsilon_2)^2 + (\epsilon_2 - \epsilon_3)^2 + (\epsilon_3 - \epsilon_1)^2]}\right]$$

$$\sigma_{p,q} = \frac{E}{3}\left[\frac{\epsilon_1 + \epsilon_2 + \epsilon_3}{1 - \nu} \pm \frac{1}{1 + \nu}\sqrt{2[(\epsilon_1 - \epsilon_2)^2 + (\epsilon_2 - \epsilon_3)^2 + (\epsilon_3 - \epsilon_1)^2]}\right]$$

$$\Theta_{p,q} = \frac{1}{2}\,\text{TAN}^{-1}\frac{\sqrt{3}\,(\epsilon_2\ \epsilon_3)}{2\epsilon_1 - \epsilon_2 - \epsilon_3}$$

Where:

$\epsilon p,q$ = Principal strains

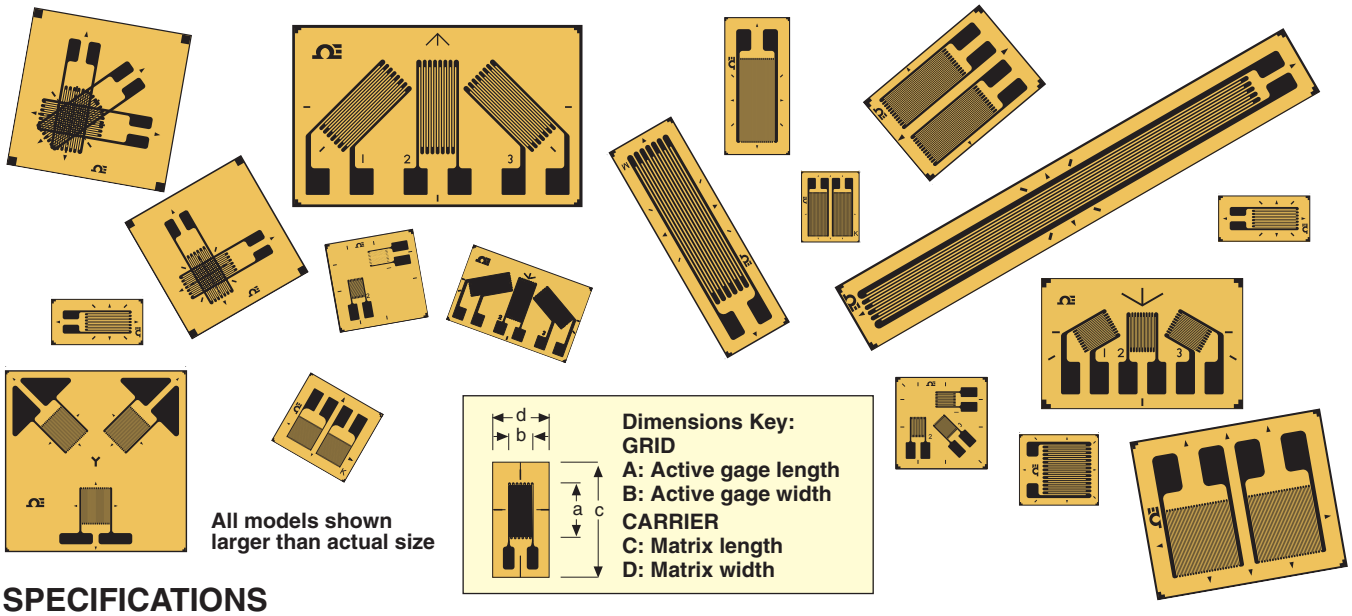
$\sigma p,q$ = Principal stresses

$\Theta p,q$ = the acute angle from the axis of gage 1 to the nearest principal axis. When positive, the direction is the same as that of the gage numbering and, when negative, opposite.

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

PRECISION SPECIFICATIONS CHART
TYPE SGD AND KFG



All models shown larger than actual size

Dimensions Key:
GRID
A: Active gage length
B: Active gage width
CARRIER
C: Matrix length
D: Matrix width

SPECIFICATIONS

	SGD SERIES	KFG SERIES—PRE-WIRED
Foil Measuring Grid	Constantan foil 5 microns thick	Constantan foil 6 microns thick
Carrier	Polyimide	Kapton®
Substrate Thickness	20 microns	15 microns
Cover Thickness	25 microns	9 microns
Connection Dimensions: mm (in)	Solder pads or ribbon leads, tinned copper flat wire 30 L x 0.1 D x 0.3 mm W (1.2 x 0.004 x 0.012"); other wire types available upon request	Pre-wired, 2 or 3 leads 27 AWG strand polyvinyl insulation 1 x 2 mm (0.04 x 0.08")
Nominal Resistance	Stated in "To Order" box	120 ±0.4 Ω
Resistance Tolerance Per Package	±0.15% to ±0.5% depending on gage spec	0.3%
Gage Factor (Actual Value Printed on Each Package)	2.0 ±5%	2.10 ±10%
Gage Factor Tolerance Per Package	1.00%	1.00%
THERMAL PROPERTIES		
Reference Temperature	23°C (73°F)	23°C (73°F)
SERVICE TEMPERATURE		
Static Measurements	-75 to 200°C (-100 to 392°F)	-20 to 100°C (-4 to 212°F)
Dynamic Measurements	-75 to 200°C (-100 to 392°F)	-20 to 100°C (-4 to 212°F)
TEMPERATURE CHARACTERISTICS		
Steel (and Certain Stainless Steels)	11 ppm/°C (6.1 ppm/°F)	10.8 ppm/°C (6 ppm/°F)
Aluminum	23 ppm/°C (12.8 ppm/°F)	——
Uncompensated	±20 ppm/°C (11.1 ppm/°F)	——
Temperature Compensated Range	-5 to 120°C (5 to 248°F)	10 to 80°C (50 to 176°F)
Tolerance of Temp Compensation	2 ppm/°C (1.0 ppm/°F)	1 ppm/°C (0.5 ppm/°F)
MECHANICAL PROPERTIES		
Maximum Strain	3% or 30,000 microstrain	5% or 50,000 microstrain
Hysteresis	Negligible	Negligible
Fatigue (at ±1500 microstrain)	>10,000,000 cycles	>10,000,000 cycles
Smallest Bending Radius	3 mm (⅛")	3 mm (⅛")
Transverse Sensitivity	——	Stated on each package

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

PRECISION STRAIN GAGE

SGD Series Starts at **$49**

PRECISION LINEAR PATTERN FOR STATIC AND DYNAMIC APPLICATIONS

NEW®

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

- Very Flexible, Mechanically Strong
- Small Bending Radius
- Broad Temperature Range
- Ribbon Leads or Solder Pads,
- Clear Alignment Marks
- Affix with Cold or Hot Curing Adhesives

OMEGADYNE® strain gages are available in a variety of models to cover most strain measurement applications. Their rugged construction and flexibility make them suitable for highly accurate static and dynamic measurement. The measuring grid is formed by etching constantan foil, which is then completely sealed in a carrier medium composed of polyimide film. The linear pattern strain gages are used to measure strain in a single direction. They are often used for experimental stress analysis applications. The strain gage pattern is shown on the left side of the table. Notice the "arrow" which indicates the principal stress direction.

The linear pattern strain gages are available in a variety or styles and sizes. OMEGADYNE is offering miniature linear patterns for strain measurement of a stress concentration or high gradient areas. We also have wide or narrow grid patterns, and small, medium or large patterns. To determine if the strain gages have ribbon leads or solder pads, see the column labeled "TERM" short for termination, "L" indicates ribbon leads, and "SP" indicates solder pads. To determine if the strain gages have temperature characteristics matched to steel or aluminum, see the column labeled "COMP" short for compensation, "ST" indicates steel, "AL" indicates aluminum, "UNC" indicates uncompensated. See the column labeled "BTP" for accessory bondable terminal pad model numbers.

Dimensions are listed for pattern gage grid length (A) and width (B), and the matrix or carrier length (C) and width (D). The patterns include alignment triangles. The carrier or matrix material on the patterns may be trimmed in the field on all sides to within 0.25 mm of the foil grid with no effect on strain gage performance.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size 4.70 mm	SGD-1.5/120-LY11	$49	120	1.50 (0.059)	1.20 (0.047)	4.70 (0.185)	3.40 (0.134)	2.5	L	ST	BTP-1
	SGD-1.5/120-LY13	49	120					3.5	L	AL	
	SGD-1.5/120-LY41	45	120					2.5	SP	ST	
	SGD-1.5/120-LY43	45	120					3.5	SP	AL	
				Miniature linear pattern Measurement of stress concentration 120 Ω							
Shown actual size 7.60 mm	SGD-2/350-LY11	$55	350	2.00 (0.079)	2.50 (0.098)	7.60 (0.299)	5.80 (0.228)	7.5	L	ST	BTP-2
	SGD-2/350-LY13	55	350					10	L	AL	
	SGD-2/350-LY41	45	350					7.5	SP	ST	
	SGD-2/350-LY43	45	350					10	SP	AL	
				Miniature linear pattern Measurement of stress concentration, higher resistance, reduced heat generation 350 Ω							
Shown actual size 7.10 mm	SGD-2D/350-LY11	$59	350	1.90 (0.075)	4.80 (0.189)	7.10 (0.280)	6.60 (0.260)	10	L	ST	BTP-2
	SGD-2D/350-LY13	59	350					14	L	AL	
	SGD-2D/350-LY41	49	350					10	SP	ST	
	SGD-2D/350-LY43	49	350					14	SP	AL	
				Miniature linear pattern, grid width, wide 350 Ω							
Shown actual size 7.00 mm	SGD-3/350-LY11	$55	350	3.20 (0.126)	2.50 (0.098)	7.00 (0.276)	4.00 (0.157)	9.5	L	ST	BTP-3
	SGD-3/350-LY13	55	350					13	L	AL	
	SGD-3/350-LY41	45	350					9.5	SP	ST	
	SGD-3/350-LY43	45	350					13	SP	AL	
				Linear pattern leads/pads at one end of grid 350 Ω							

*† For dimensions key, see page 12. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-3/350-LY11,** 3.2 mm grid, 350 Ω nominal-resistance strain gage, **$55.

NOTE

1: L = Ribbon Lead SP = Solder Pad

2: ST = Steel AL = Aluminum

NEW®

PRECISION LINEAR PATTERN FOR STATIC AND DYNAMIC APPLICATIONS

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size 7.80 mm	SGD-3/120-LY11	$55	120	3.00 (0.118)	1.50 (0.059)	7.80 (0.307)	3.80 (0.150)	4	L	ST	BTP-3
	SGD-3/120-LY13	55	120					5.5	L	AL	
	SGD-3/120-LY41	49	120		Linear pattern, grid width narrow 120 Ω			4	SP	ST	
	SGD-3/120-LY43	49	120					5.5	SP	AL	
Shown actual size 6.60 mm	SGD-3S/120-LY11	$55	120	3.00 (0.118)	1.70 (0.067)	6.60 (0.260)	3.30 (0.130)	4.5	L	ST	BTP-3
	SGD-3S/120-LY13	55	120					6	L	AL	
	SGD-3S/120-LY41	49	120		Linear pattern, small size 120 Ω			4.5	SP	ST	
	SGD-3S/120-LY43	49	120					6	SP	AL	
Shown actual size 7.90 mm	SGD-4/120-LY11	$59	120	3.80 (0.150)	5.70 (0.224)	7.90 (0.311)	7.10 (0.280)	9	L	ST	BTP-3
	SGD-4/120-LY13	59	120					12	L	AL	
	SGD-4/120-LY41	49	120		Linear pattern, grid width wide 120 Ω			9	SP	ST	
	SGD-4/120-LY43	49	120					12	SP	AL	
Shown actual size 9.80 mm	SGD-5/350-LY11	$65	350	4.50 (0.177)	3.20 (0.126)	9.80 (0.386)	5.20 (0.205)	12	L	ST	BTP-4
	SGD-5/350-LY13	65	350					17	L	AL	
	SGD-5/350-LY41	55	350		Linear pattern, medium size 350 Ω			12	SP	ST	
	SGD-5/350-LY43	55	350					17	SP	AL	

*† For dimensions key, see page 12. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGD-4/120-LY13,** 3.8 mm grid, 120 Ω nominal-resistance strain gage, **$59.

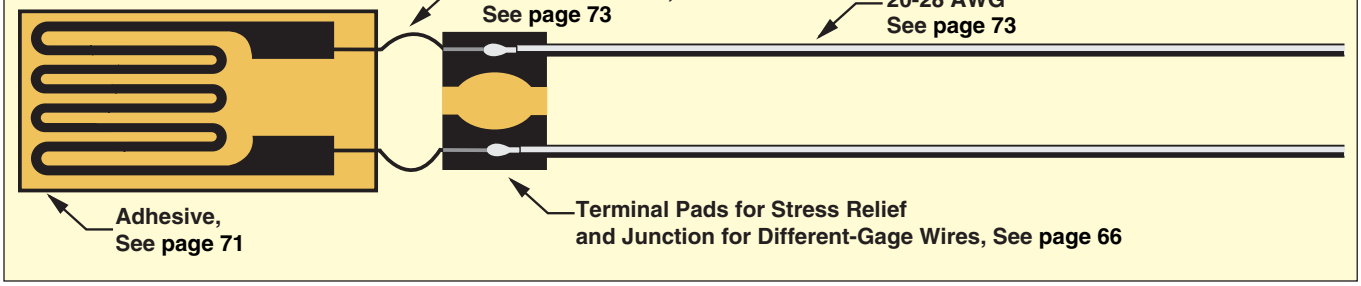
NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

TYPICAL STRAIN GAGE INSTALLATION

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.



Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

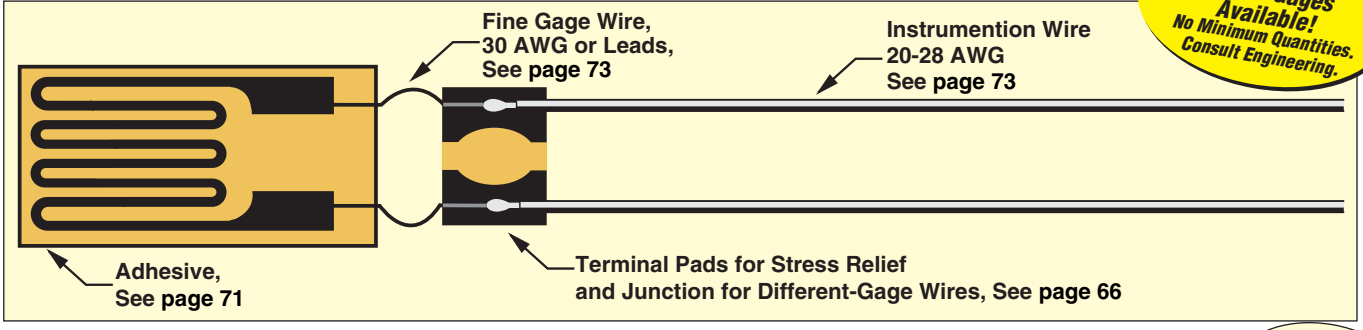
PRECISION STRAIN GAGE

NEW®

PRECISION LINEAR PATTERN FOR STATIC AND DYNAMIC APPLICATIONS

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

TYPICAL STRAIN GAGE INSTALLATION



MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 11.4 mm	SGD-6/120-LY11	$70	120	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	5.10 (0.201)	9	L	ST	BTP-4
	SGD-6/120-LY13	70	120					12	L	AL	
	SGD-6/120-LY41	62	120					9	SP	ST	
	SGD-6/120-LY43	62	120					12	SP	AL	
Shown actual size, 11.4 mm	SGD-7/350-LY11	$79	350	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	5.10 (0.201)	15	L	ST	BTP-5
	SGD-7/350-LY13	79	350					20	L	AL	
	SGD-7/350-LY41	65	350					15	SP	ST	
	SGD-7/350-LY43	65	350					20	SP	AL	
Shown actual size, 11.8 mm	SGD-7/1000-LY11	$145	1000	7.00 (0.276)	3.60 (0.142)	11.80 (0.465)	5.60 (0.220)	27	L	ST	BTP-5
	SGD-7/1000-LY13	145	1000					37	L	AL	
	SGD-7/1000-LY41	135	1000					27	SP	ST	
	SGD-7/1000-LY43	135	1000					37	SP	AL	
Shown actual size, 17.7 mm	SGD-10/120-LY11	$69	120	10.00 (0.394)	4.90 (0.193)	17.70 (0.697)	8.00 (0.315)	14	L	ST	BTP-5
	SGD-10/120-LY13	75	120					19	L	A	
	SGD-10/120-LY41	69	120					14	SP	ST	
	SGD-10/120-LY43	69	120					19	SP	AL	

† For dimensions key, see page 12.
** Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGD-6/120-LY13,** 6.5 mm grid, 120 Ω nominal-resistance strain gage, **$70.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

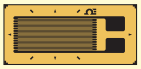
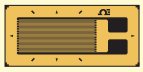
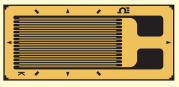
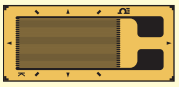
NEW

PRECISION LINEAR PATTERN AND EXTRA LONG PATTERN

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESISTANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²	TERM PAD
Shown actual size, 17.7 mm 	SGD-10/350-LY11	$75	350	10.00 (0.394)	4.90 (0.193)	17.70 (0.697)	8.00 (0.315)	22	L	ST	BTP-5
	SGD-10/350-LY13	75	350					32	L	AL	
	SGD-10/350-LY41	69	350					22	SP	ST	
	SGD-10/350-LY43	69	350					32	SP	AL	
Shown actual size, 17.7 mm 	SGD-10/1000-LY11	$95	1000	10.00 (0.394)	4.90 (0.193)	17.70 (0.697)	8.00 (0.315)	40	L	ST	BTP-5
	SGD-10/1000-LY13	95	1000					55	L	AL	
	SGD-10/1000-LY41	85	1000					40	SP	ST	
	SGD-10/1000-LY43	85	1000					55	SP	AL	
Shown actual size, 22.7 mm 	SGD-13/350-LY11	$95	350	13.00 (0.511)	7.20 (0.283)	22.70 (0.893)	10.00 (0.393)	30	L	ST	BTP-6
	SGD-13/350-LY13	95	350					40	L	AL	
	SGD-13/350-LY41	85	350					30	SP	ST	
	SGD-13/350-LY43	85	350					40	SP	AL	
Shown actual size, 22.7 mm 	SGD-13/1000-LY11	$125	1000	13.00 (0.511)	7.20 (0.283)	22.70 (0.893)	10.00 (0.393)	55	L	ST	BTP-6
	SGD-13/1000-LY13	125	1000					75	L	AL	
	SGD-13/1000-LY41	115	1000					55	SP	ST	
	SGD-13/1000-LY43	115	1000					75	SP	AL	

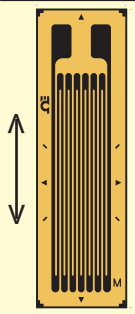
*† For dimensions key, see page 12. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGD-13/350-LY13,** 13 mm grid, 350 Ω nominal-resistance strain gage, **$95.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Extra-Long For Inhomageneous Material

MOST POPULAR MODEL HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESISTANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²	TERM PAD
	SGD-30/120-LY40	$105	120	25.00 (0.984)	8.00 (0.315)	40.00 (1.575)	12.00 (0.472)	12	SP	UNC	BTP-6
	SGD-30/350-LY40	115	350	30.00 (1.181)	3.00 (0.118)	36.00 (1.417)	5.00 (0.197)	14	SP	UNC	
	SGD-50/120-LY40	129	120	50.00 (1.969)	4.30 (0.169)	60.00 (2.362)	9.00 (0.354)	12	SP	UNC	
	SGD-150/240-LY40	135	240	150.00 (5.906)	5.00 (0.197)	165.00 (6.496)	9.00 (0.354)	35	SP	UNC	

† For dimensions key, see page 12.
** Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGD-30/120-LY40,** 120 Ω nominal-resistance strain gage, **$105.

NOTE
1: SP = Solder Pad
2: UNC = Uncompensated

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

PRECISION STRAIN GAGE

PRE-WIRED STRAIN GAGES

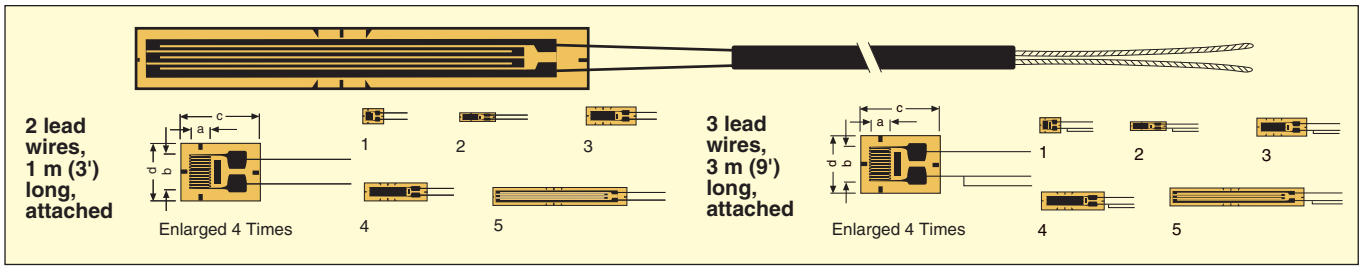
NEW®

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

ENCAPSULATED WITH 2 LEAD WIRES, 1 M (3') LONG, ATTACHED

MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V (Vrms)	TERMINATION	TEMP COMP.	FIG.
KFG-02-120-C1-11 L1 M2R	$140	120	0.2 (0.008)	1.3 (0.051)	3.3 (0.13)	2.4 (0.094)	1	2 wire	STE	1
KFG-1N-120-C1-11L1M2R	109	120	1.0 (0.039)	0.7 (0.028)	4.2 (0.17)	1.4 (0.055)	1.5	2 wire	STE	2
KFG-2N-120-C1-11L1M2R	94	120	2.0 (0.079)	0.9 (0.035)	5.3 (0.21)	1.4 (0.055)	2	2 wire	STE	2
KFG-3-120-C1-11L1M2R	88	120	3.0 (0.12)	1.3 (0.051)	7.4 (0.29)	2.8 (0.11)	4	2 wire	STE	3
KFG-3-350-C1-11L1M2R	121	350	3.0 (0.12)	1.3 (0.051)	7.4 (0.29)	2.8 (0.11)	15	2 wire	STE	3
KFG-5-120-C1-11L1M2R	80	120	5.0 (0.2)	1.4 (0.055)	9.4 (0.37)	2.8 (0.11)	8	2 wire	STE	3
KFG-5-350-C1-11L1M2R	124	350	5.0 (0.2)	1.4 (0.055)	9.4 (0.37)	2.8 (0.11)	20	2 wire	STE	4
KFG-10-120-C1-11L1M2R	100	120	10.0 (0.39)	3.0 (0.12)	16.0 (0.63)	5.2 (0.2)	15	2 wire	STE	4
KFG-30-120-C1-11 L1M2R	119	120	30.0 (1.18)	3.3 (0.13)	37.0 (1.46)	5.2 (0.2)	25	2 wire	STE	5



MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

ENCAPSULATED WITH 3 LEAD WIRES, 3 M (9') LONG, ATTACHED

MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V (Vrms)	TERMINATION	TEMP COMP.	FIG.
KFG-02-120-C1-11L3M3R	$184	120	0.2 (0.008)	1.3 (0.051)	3.3 (0.13)	2.4 (0.094)	1	3 wire	STE	1
KFG-1N-120-C1-11L3M3R	153	120	1.0 (0.039)	0.7 (0.028)	4.2 (0.17)	1.4 (0.055)	1.5	3 wire	STE	2
KFG-2N-120-C1-11L3M3R	138	120	2.0 (0.079)	0.9 (0.035)	5.3 (0.21)	1.4 (0.055)	2	3 wire	STE	2
KFG-3-120-C1-11L3M3R	131	120	3.0 (0.12)	1.3 (0.051)	7.4 (0.29)	2.8 (0.11)	4	3 wire	STE	3
KFG-3-350-C1-11L3M3R	165	350	3.0 (0.12)	1.3 (0.051)	7.4 (0.29)	2.8 (0.11)	15	3 wire	STE	3
KFG-5-120-C1-11L3M3R	124	120	5.0 (0.2)	1.4 (0.055)	9.4 (0.37)	2.8 (0.11)	8	3 wire	STE	3
KFG-5-350-C1-11L3M3R	165	350	5.0 (0.2)	1.4 (0.055)	9.4 (0.37)	2.8 (0.11)	20	3 wire	STE	4
KFG-10-120-C1-11L3M3R	145	120	10.0 (0.39)	3.0 (0.12)	16.0 (0.63)	5.2 (0.2)	15	3 wire	STE	4
KFG-30-120-C1-11L3M3R	163	120	30.0 (1.18)	3.3 (0.13)	37.0 (1.46)	5.2 (0.2)	25	3 wire	STE	5

† For dimensions key, see page 12. ***Note:*** *For strain gage accessories see pages 59 to 61.*
Ordering Example: KFG-02-120-C1-11L1M2R*, package of 10 pre-wired strain gages, encapsulated with 2 lead wires attached,* ***$140.***

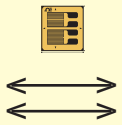
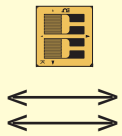
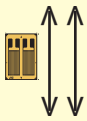
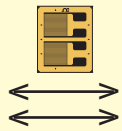
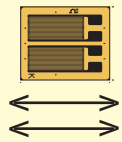
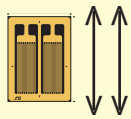
NEW

DUAL-PARALLEL STRAIN GAGES FOR MONITORING BENDING STRAINS
DUAL LINEAR PATTERN

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 5.5 mm 	SGD-2/350-DY11	$65	350	2.00 (0.079)	2.00 (0.079)	5.50 (0.217)	5.90 (0.232)	6.5	L	ST	BTP-2
	SGD-2/350-DY13	65	350	Miniature parallel dual grid pattern, bending strain 350 Ω				9.5	L	AL	
	SGD-2/350-DY41	59	350					6.5	SP	ST	
	SGD-2/350-DY43	59	350					9.5	SP	AL	
Shown actual size, 7.5 mm 	SGD-2/1000-DY11	$65	1000	2.10 (0.083)	2.70 (0.106)	7.50 (0.295)	8.00 (0.315)	13	L	ST	BTP-2
	SGD-2/1000-DY13	65	1000	Miniature parallel dual grid pattern, bending strain 1000 Ω				18	L	AL	
	SGD-2/1000-DY41	59	1000					13	SP	ST	
	SGD-2/1000-DY43	59	1000					18	SP	AL	
Shown actual size, 6 mm 	SGD-3/350-DY11	$65	350	3.00 (0.118)	1.60 (0.063)	6.00 (0.236)	4.10 (0.161)	7.5	L	ST	BTP-2
	SGD-3/350-DY13	65	350	Medium parallel dual grid pattern, grid width narrow, bending strain 350 Ω				10	L	AL	
	SGD-3/350-DY41	59	350					7.5	SP	ST	
	SGD-3/350-DY43	59	350					10	SP	AL	
Shown actual size, 7.4 mm 	SGD-3/1000-DY11	$55	1000	3.00 (0.118)	3.40 (0.134)	7.40 (0.291)	8.90 (0.350)	17	L	ST	BTP-3
	SGD-3/1000-DY13	55	1000	Medium parallel dual grid pattern, bending strain, higher resistance, reduced heat generation 1000 Ω				25	L	AL	
	SGD-3/1000-DY41	49	1000					17	SP	ST	
	SGD-3/1000-DY43	49	1000					25	SP	AL	
Shown actual size, 11.8 mm 	SGD-7/1000-DY11	$69	1000	7.00 (0.276)	3.60 (0.142)	11.80 (0.465)	9.70 (0.382)	27	L	ST	BTP-4
	SGD-7/1000-DY13	69	1000	Large parallel dual grid pattern, bending strain, higher resistance, reduced heat generation 1000 Ω				40	L	AL	
	SGD-7/1000-DY41	59	1000					27	SP	ST	
	SGD-7/1000-DY43	59	1000					40	SP	AL	
Shown actual size, 11.4 mm 	SGD-7/350-DY11	$49	350	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	8.40 (0.331)	15	L	ST	BTP-4
	SGD-7/350-DY13	49	350	Large parallel dual grid pattern, bending strain, grid width narrow 350 Ω				40	L	AL	
	SGD-7/350-DY41	49	350					15	SP	ST	
	SGD-7/350-DY43	49	350					40	SP	AL	

*† For dimensions key, see page 12. * Maximum permitted bridge energizing voltage (Vrms).*

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-2/350-DY43, *350 Ω nominal-resistance strain gage,* ***$59.***

NOTE

1: L = Ribbon Lead
SP = Solder Pad

2: ST = Steel
AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

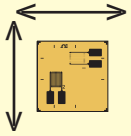
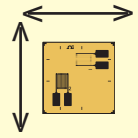
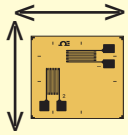
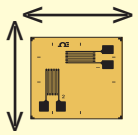
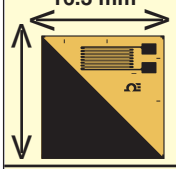
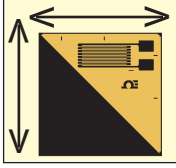
CORNER TEE ROSETTES

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

See page 66

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX PERMITTED BRIDGE ENERGIZING VOLTAGE (Vrms)	TERMINATION¹	TEMP COMP²	TERM PAD
Shown actual size, 9.3 mm 	SGD-1/120-RYB21	$72.60	120	1.6 (0.063)	1.7 (0.067)	9.3 (0.37)	9.3 (0.37)	3	L	ST	BTP-1
	SGD-1/120-RYB23	72.60	120					4	L	AL	
	SGD-1/120-RYB81	54.60	120					3	SP	ST	
	SGD-1/120-RYB83	54.60	120					4	SP	AL	
Shown actual size, 9.3 mm 	SGD-1/350-RYB21	$72.60	350	1.6 (0.063)	2.1 (0.083)	9.3 (0.37)	9.3 (0.37)	6	L	ST	BTP-1
	SGD-1/350-RYB23	72.60	350					8.5	L	AL	
	SGD-1/350-RYB81	54.60	350					6	SP	ST	
	SGD-1/350-RYB83	54.60	350					8.5	SP	AL	
Shown actual size, 11 mm 	SGD-3/120-RYB21	$76.80	120	3 (0.118)	1.7 (0.067)	11 (0.43)	11 (0.43)	4.5	L	ST	BTP-2
	SGD-3/120-RYB23	76.80	120					6	L	AL	
	SGD-3/120-RYB81	58.80	120					4.5	SP	ST	
	SGD-3/120-RYB83	58.80	120					6	SP	AL	
Shown actual size, 11 mm 	SGD-3/350-RYB21	$76.80	350	3 (0.118)	2.1 (0.083)	11 (0.43)	11 (0.43)	8.5	L	ST	BTP-3
	SGD-3/350-RYB23	76.80	350					12	L	AL	
	SGD-3/350-RYB81	58.80	350					8.5	SP	ST	
	SGD-3/350-RYB83	58.80	350					12	SP	AL	
Shown actual size, 16.3 mm 	SGD-6/120-RYB21	$88.20	120	6 (0.236)	3.2 (0.126)	16.3 (0.64)	16.3 (0.64)	8.5	L	ST	BTP-4
	SGD-6/120-RYB23	88.20	120					12	L	AL	
	SGD-6/120-RYB81	70.20	120					8.5	SP	ST	
	SGD-6/120-RYB83	70.20	120					12	SP	AL	
Shown actual size, 16.3 mm 	SGD-6/350-RYB21	$88.20	350	6 (0.236)	3.1 (0.122)	16.3 (0.64)	16.3 (0.64)	14	L	ST	BTP-4
	SGD-6/350-RYB23	88.20	350					20	L	AL	
	SGD-6/350-RYB81	70.20	350					14	SP	ST	
	SGD-6/350-RYB83	70.20	350					20	SP	AL	

† For dimensions key, see page 12.

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-1/120-RYB83, *120 Ω nominal-resistance strain gage,* ***$54.60.***

NOTE

1: L = Ribbon Lead, SP = Solder Pad

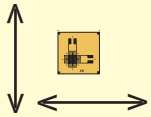
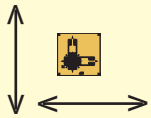
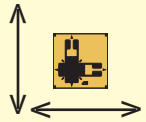
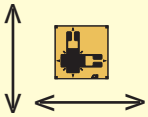
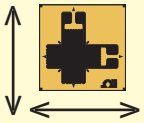
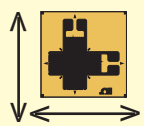
2: ST = Steel, AL = Aluminum

TEE STACKED ROSETTE FOR MEASURING AXIAL STRAIN

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size. 5.6 mm 	SGD-2/120-XY11	$115	120	2.00 (0.079)	1.10 (0.043)	5.60 (0.220)	5.60 (0.220)	3	L	ST	BTP-2
	SGD-2/120-XY13	115	120					4	L	AL	
	SGD-2/120-XY41	109	120					3	SP	ST	
	SGD-2/120-XY43	109	120					4	SP	AL	
Shown actual size. 5.6 mm 	SGD-2/350-XY11	$115	350	2.00 (0.079)	1.10 (0.043)	5.60 (0.220)	5.60 (0.220)	5	L	ST	BTP-2
	SGD-2/350-XY13	115	350					7	L	AL	
	SGD-2/350-XY41	109	350					5	SP	ST	
	SGD-2/350-XY43	109	350					7	SP	AL	
Shown actual size. 7.1 mm 	SGD-3/120-XY11	$125	120	3.00 (0.118)	1.70 (0.067)	7.10 (0.280)	7.10 (0.280)	4.5	L	ST	BTP-3
	SGD-3/120-XY13	125	120					6	L	AL	
	SGD-3/120-XY41	105	120					4.5	SP	ST	
	SGD-3/120-XY43	105	120					6	SP	AL	
Shown actual size. 7.1 mm 	SGD-3/350-XY11	$125	350	3.00 (0.118)	1.70 (0.067)	7.10 (0.280)	7.10 (0.280)	7.5	L	ST	BTP-3
	SGD-3/350-XY13	125	350					10	L	AL	
	SGD-3/350-XY41	105	350					7.5	SP	ST	
	SGD-3/350-XY43	105	350					10	SP	AL	
Shown actual size. 11.4 mm 	SGD-7/120-XY11	$155	120	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	11.40 (0.449)	9	L	ST	BTP-4
	SGD-7/120-XY13	155	120					12	L	AL	
	SGD-7/120-XY41	149	120					9	SP	ST	
	SGD-7/120-XY43	149	120					12	SP	AL	
Shown actual size. 11.4 mm 	SGD-7/350-XY11	$155	350	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	11.40 (0.449)	15	L	ST	BTP-4
	SGD-7/350-XY13	155	350					20	L	AL	
	SGD-7/350-XY41	149	350					15	SP	ST	
	SGD-7/350-XY43	149	350					20	SP	AL	

Small Tee stacked rosette pattern 120 Ω

Small Tee stacked rosette pattern 350 Ω

Medium Tee stacked rosette pattern 120 Ω

Medium Tee stacked rosette pattern 350 Ω

Large Tee stacked rosette pattern 120 Ω

Large Tee stacked rosette pattern 350 Ω

*† For dimensions key, see page 12. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-7/350-XY11,** 6.5 mm grid, 350 Ω large stacked Tee rosette pattern, **$155.

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

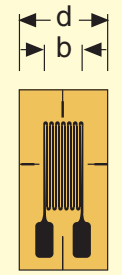
NEW®

TEE STACKED ROSETTE PRE-WIRED STRAIN GAGES

Termination
2 Wire: 2 lead wires, 3' attached
3 Wire: 3 lead wires, 9' attached
(minimize lead wire resistance effects)

Temperature Compensation
STE Steel 10.8ppm/C

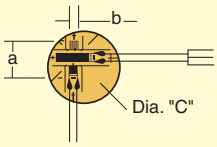
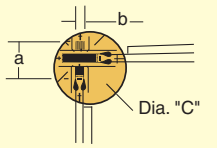
Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.



†Dimensions Key:
GRID
A: Active gage length
B: Active gage width
CARRIER
C: Matrix length
D: Matrix width

MOST POPULAR MODELS HIGHLIGHTED!

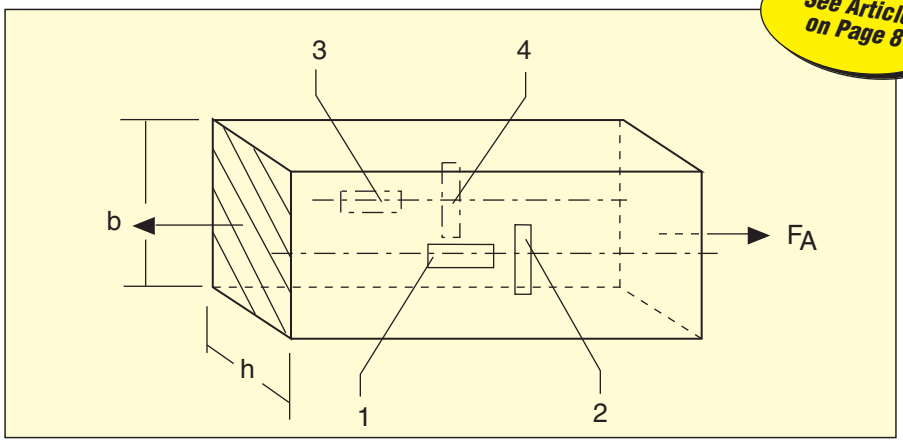
To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION	TEMP COMP.
	**KFG-1-120-D16-11L1M2S**	**$274**	120	1.0 (0.039)	1.2 (0.047)	5.0 (0.2)	—	1.5	2 wire	STE
	KFG-2-120-D16-11L1M2S	**194**	120	2.0 (0.079)	1.3 (0.051)	8.0 (0.31)	—	2	2 wire	STE
	KFG-3-120-D16-11L1M2S	**194**	120	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	4	2 wire	STE
	KFG-3-350-D16-11L1M2S	**279**	350	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	15	2 wire	STE
	KFG-5-120-D16-11L1M2S	**194**	120	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	8	2 wire	STE
	KFG-5-350-D16-11L1M2S	**279**	350	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	20	2 wire	STE
	**KFG-1-120-D16-11L3M3S**	**$361**	120	1.0 (0.039)	1.2 (0.047)	5.0 (0.2)	—	1.5	3 wire	STE
	KFG-2-120-D16-11L3M3S	**281**	120	2.0 (0.079)	1.3 (0.051)	8.0 (0.31)	—	2	3 wire	STE
	KFG-3-120-D16-11L3M3S	**281**	120	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	4	3 wire	STE
	KFG-5-120-D16-11L3M3S	**281**	120	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	8	3 wire	STE
	KFG-3-350-D16-11L3M3S	**366**	350	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	4	3 wire	STE
	KFG-5-350-D16-11L3M3S	**366**	350	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	8	3 wire	STE

Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: KFG-5-120-D16-11L1M2S, *120 Ω nominal-resistance strain gage,* ***$194.***

AXIAL STRAIN

See Article on Page 8



ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
EE-2590	**$190**	Reference Book: Measurement Instrumentation and Sensors Handbook

Strain Gage product line continues to expand, visit omegadyne.com for new details!

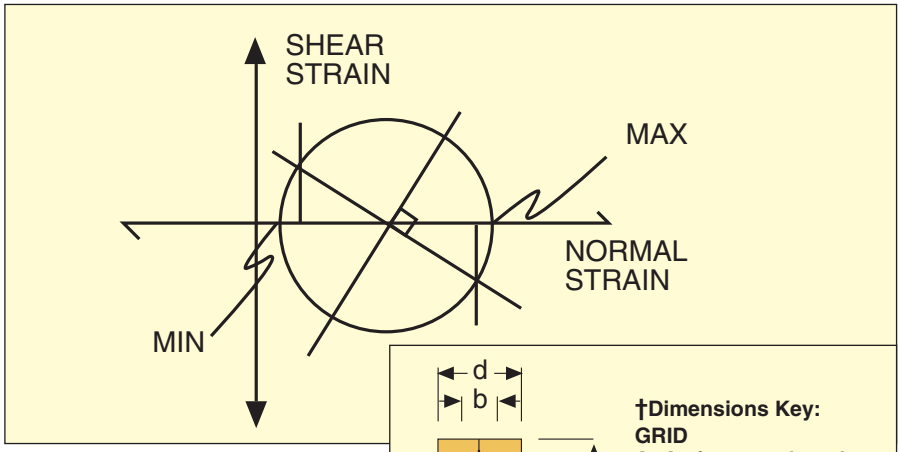
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

PRE-WIRED, STACKED (ROUND CARRIER) RECTANGULAR ROSETTE

KFG Series
Starts at
$286
Pkg/10

Rosettes are used to compute the state of stress at a particular point. The plotted results will form a Mohr circle, which gives the value and orientation of principal strains.



Termination
2 Wire: 2 lead wires, 1 m (3') attached
3 Wire: 3 lead wires, 3 m (9') attached (minimize lead wire resistance effects)

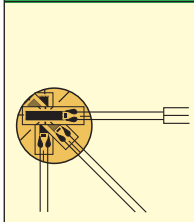
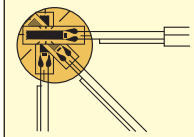
Temperature Compensation
STE Steel 10.8ppm/C

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

See Equations on Page 10

	MODEL NO.	PRICE PER PKG OF 10	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX PERMITTED BRIDGE ENERGIZING VOLTAGE (Vrms)	TERMINATION	TEMP COMP.
0°/45°/90° ENCAPSULATED WITH 2 LEAD WIRES 1 m (3') LONG—MATCHED TO STEEL										
	**KFG-1-120-D17-11L1M2S**	**$389**	120	1.0 (0.039)	1.2 (0.047)	5.0 (0.2)	—	1.5	2 Wire	STE
	KFG-2-120-D17-11L1M2S	**286**	120	2.0 (0.079)	1.3 (0.051)	8.0 (0.31)	—	2	2 Wire	STE
	KFG-3-120-D17-11L1M2S	**286**	120	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	4	2 Wire	STE
	KFG-3-350-D17-11L1M2S	**419**	350	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	15	2 Wire	STE
	KFG-5-120-D17-11L1M2S	**286**	120	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	8	2 Wire	STE
	KFG-5-350-D17-11L1M2S	**419**	350	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	20	2 Wire	STE
0°/45°/90° ENCAPSULATED WITH 3 LEAD WIRES 3 m (9') LONG—MATCHED TO STEEL										
	**KFG-1-120-D17-11L3M3S**	**$523**	120	1.0 (0.039)	1.2 (0.047)	5.0 (0.2)	—	1.5	3 Wire	STE
	KFG-2-120-D17-11L3M3S	**419**	120	2.0 (0.079)	1.3 (0.051)	8.0 (0.31)	—	2	3 Wire	STE
	KFG-3-120-D17-11L3M3S	**419**	120	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	4	3 Wire	STE
	KFG-3-350-D17-11L3M3S	**549**	350	3.0 (0.12)	1.3 (0.051)	10.0 (0.39)	—	15	3 Wire	STE
	KFG-5-120-D17-11L3M3S	**419**	120	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	8	3 Wire	STE
	KFG-5-350-D17-11L3M3S	**549**	350	5.0 (0.2)	1.4 (0.055)	11.0 (0.43)	—	20	3 Wire	STE

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: KFG-2-120-D17-11L3M3S, *package of 10 pre-wired rosette strain gages, encapsulated with 3 lead wires attached to each element, with temperature characteristics matched to steel,* ***$419.***

NEW

ROSETTE STRAIN GAGES 0/45/90° AND 0/60/120° RECTANGULAR AND DELTA, 3 ELEMENT

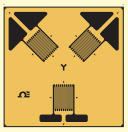
Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

OMEGADYNE® offers planar and stacked rosettes. Planar rosettes have all 3 strain gage elements in one plane. Stacked rosettes have the 3 strain gage elements stacked one on top of the other. Consider the difference when you make your strain gage selection. Planar rosettes have some advantages over stacked rosettes. Planar rosettes tend to be thinner and more flexible. They can be used on curved surfaces and conform better to the irregular surfaces. Reinforcement effects of planar gages are minimized. Planar rosettes have superior heat dissipation capability, and better stability. Stacked rosettes are thicker and stiffer because you have the multiple layers stacked on top of one another. They do not disperse heat as well when voltage is applied to them.

See page 66

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
0/45/90° RECTANGULAR 3 ELEMENT											
Shown actual size, 16 mm 	SGD-3/120-RY11	$115	120	3.00 (0.118)	2.90 (0.114)	16.00 (0.630)	16.00 (0.630)	5.5	L	ST	BTP-3
	SGD-3/120-RY13	139	120	Three-element 45° rectangular planar rosette 120 Ω				8	L	AL	
	SGD-3/120-RY31	129	120					5.5	SP	ST	
	SGD-3/120-RY33	129	120					8	SP	AL	
Shown actual size, 16 mm 	SGD-3/350-RY11	$139	350	3.00 (0.118)	2.90 (0.114)	16.00 (0.630)	16.00 (0.630)	9.5	L	ST	BTP-3
	SGD-3/350-RY13	139	350	Three-element 45° rectangular planar rosette 350 Ω				13	L	AL	
	SGD-3/350-RY31	139	350					9.5	SP	ST	
	SGD-3/350-RY33	129	350					13	SP	AL	

See Equations on Page 10

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
0/60/120° DELTA 3-ELEMENT											
Shown actual size, 16 mm 	†SGD-3/120-RY41	$115	120	3.00 (0.118)	2.90 (0.114)	16.00 (0.630)	16.00 (0.630)	5.5	L	ST	BTP-3
	SGD-3/120-RY43	115	120	Three-element 60° delta planar rosette 120 Ω				8	L	AL	
	†SGD-3/120-RY71	109	120					5.5	L	ST	
	†SGD-3/120-RY73	109	120					8	L	AL	
Shown actual size, 16 mm 	†SGD-3/350-RY41	$139	350	3.00 (0.118)	2.90 (0.114)	16.00 (0.630)	16.00 (0.630)	9.5	L	ST	BTP-3
	†SGD-3/350-RY43	139	350	Three-element 60° delta planar rosette 350 Ω				13	L	AL	
	†SGD-3/350-RY71	129	350					9.5	SP	ST	
	†SGD-3/350-RY73	129	350					13	SP	AL	

† For dimensions key, see page 24.
** Maximum permitted bridge energizing voltage (Vrms).*
Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: SGD-3/350-RY33, *350 Ω nominal-resistance strain gage,* ***$129.***

NOTE

1: L = Ribbon Lead SP = Solder Pad	2: ST = Steel AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

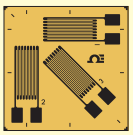
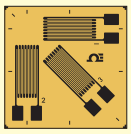
RECTANGULAR CORNER ROSETTE 0/45/90°

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX PERMITTED BRIDGE ENERGIZING VOLTAGE (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 9.3 mm 	SGD-1/120-RYT21	$92.40	120	1.6 (0.063)	1.7 (0.067)	9.3 (0.366)	9.3 (0.366)	3	L	ST	BTP-1
	SGD-1/120-RYT23	92.40	120					4	L	AL	
	SGD-1/120-RYT81	57.40	120					3	SP	ST	
	SGD-1/120-RYT83	57.40	120					4	SP	AL	
				Small corner rectangular 3-element rosette 120 Ω							
Shown actual size, 9.3 mm 	SGD-1/350-RYT21	$92.40	350	1.6 (0.063)	1.7 (0.067)	9.3 (0.366)	9.3 (0.366)	6	L	ST	BTP-1
	SGD-1/350-RYT23	92.40	350					8.5	L	AL	
	SGD-1/350-RYT81	57.40	350					6	SP	ST	
	SGD-1/350-RYT83	57.40	350					8.5	SP	AL	
				Small corner rectangular 3-element rosette 350 Ω							
Shown actual size, 11 mm 	SGD-3/120-RYT21	$96.60	120	3 (0.118)	1.7 (0.067)	11 (0.43)	11 (0.43)	4.5	L	ST	BTP-2
	SGD-3/120-RYT23	96.60	120					6	L	AL	
	SGD-3/120-RYT81	61.60	120					4.5	SP	ST	
	SGD-3/120-RYT83	61.60	120					6	SP	AL	
				Medium corner rectangular 3-element rosette 120 Ω							
Shown actual size, 11 mm 	SGD-3/350-RYT21	$96.60	350	3 (0.118)	1.7 (0.067)	11 (0.43)	11 (0.43)	8.5	L	ST	BTP-2
	SGD-3/350-RYT23	96.60	350					12	L	AL	
	SGD-3/350-RYT81	61.60	350					8.5	SP	ST	
	SGD-3/350-RYT83	61.60	350					12	SP	AL	
				Medium corner rectangular 3-element rosette 350 Ω							
Shown actual size, 16.3 mm 	SGD-6/120-RYT21	$102.60	120	6 (0.236)	3.2 (0.126)	16.3 (0.64)	16.3 (0.64)	8.5	L	ST	BTP-3
	SGD-6/120-RYT23	102.60	120					12	L	AL	
	SGD-6/120-RYT81	67.60	120					8.5	SP	ST	
	SGD-6/120-RYT83	67.60	120					12	SP	AL	
				Large corner rectangular 3-element rosette 120 Ω							
Shown actual size, 16.3 mm 	SGD-6/350-RYT21	$102.60	350	6 (0.236)	3.2 (0.126)	16.3 (0.64)	16.3 (0.64)	14	L	ST	BTP-3
	SGD-6/350-RYT23	102.60	350					20	L	AL	
	SGD-6/350-RYT81	67.60	350					14	SP	ST	
	SGD-6/350-RYT83	67.60	350					20	SP	AL	
				Large corner rectangular 3-element rosette 350 Ω							

See Equations on Page 10

† For dimensions key, see page 24.

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-1/120-RYT83, *120 Ω nominal-resistance strain gage,* ***$57.40.***

NOTE

1: L = Ribbon Lead SP = Solder Pad	2: ST = Steel AL = Aluminum

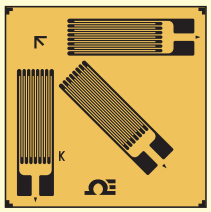
NEW RECTANGULAR CORNER ROSETTES AND RESIDUAL STRESS PATTERN

MOST POPULAR MODELS HIGHLIGHTED!

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

To Order (Specify Model Number)

See page 66

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX PERMITTED BRIDGE ENERGIZING VOLTAGE (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
RECTANGULAR CORNER ROSETTE											
Shown actual size, 27 mm 	SGD-13/120-RY91	$135	120	11 (0.433)	5.00 (0.197)	27.00 (1.06)	27.00 (1.06)	15	L	ST	BTP-6
	SGD-13/120-RY93	135	120					20	L	AL	
	SGD-13/120-RY21	119	120					15	SP	ST	
	SGD-13/120-RY23	119	120					20	SP	AL	

Corner rosette extra-large 120 Ω

Open-face gages available. Consult Pressure Sales and Engineering.

† For dimensions key, see page 24.

Note: *For strain gage accessories see pages 59-61.*

Ordering Example: SGD-13/120-RY91, *120 Ω nominal-resistance strain gage,* ***$135.***

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

To Order (Specify Model Number)

See page 66

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX PERMITTED BRIDGE ENERGIZING VOLTAGE (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
RESIDUAL STRESS PATTERN ROSETTE											
Shown actual size, 10.5 mm 	SGD-1.5/120-SR11	$135	120	1.20 (0.047)	1.33 (0.052)	10.50 (0.413)	10.50 (0.413)	2.5	L	ST	BTP-1
	SGD-1.5/120-SR13	135	120					3.5	L	AL	
	SGD-1.5/120-SR41	119	120					2.5	SP	ST	
	SGD-1.5/120-SR43	119	120					3.5	SP	AL	

Residual stress pattern 120 Ω

Open-face gages available. Consult Pressure Sales and Engineering.

† For dimensions key, see page 24. ***Note:*** *For strain gage accessories see pages 59 to 61.*

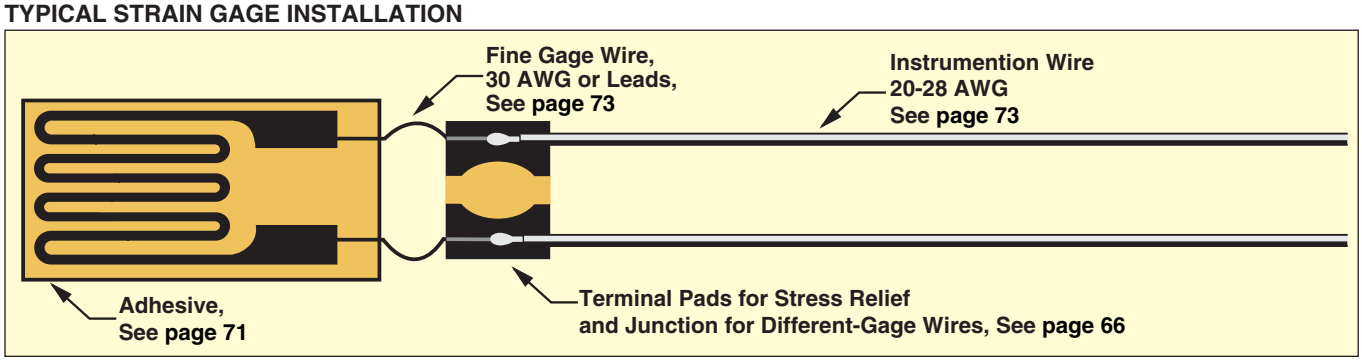
Ordering Example: SGD-1.5/120-SR11, *120 Ω nominal-resistance strain gage,* ***$135.***

See Equations on Page 10

OMEGADYNE® offers stress relief or residual stress pattern strain gages. These strain gages are mounted onto a test piece that is already stressed.

Instrumentation is attached to all 3 elements in the rosette. The stress magnitude is determined by unloading the test specimen by boring-out or drilling a small hole in the center of the strain gage. By removing material you are releasing the stress, and measuring the relaxed residual stress in the vicinity of the hole. Hole diameter and depth is 1.85 mm (0.07")

TYPICAL STRAIN GAGE INSTALLATION



Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

RECTANGULAR STACKED ROSETTE 0/45/90°

Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

See Equations on Page 10

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 5.6 mm 	SGD-2/120-RY51	$125	120	2.00 (0.79)	1.10 (0.043)	5.60 (0.220)	5.60 (0.220)	3	L	ST	BTP-1
	SGD-2/120-RY53	125	120					4	L	AL	
	SGD-2/120-RY61	125	120					3	SP	ST	
	SGD-2/120-RY63	125	120					4	SP	AL	
				Small 3-element rectangular stacked rosette 120 Ω							
Shown actual size, 5.6 mm 	SGD-2/350-RY51	$125	350	2.00 (0.79)	1.10 (0.043)	5.60 (0.220)	5.60 (0.220)	5	L	ST	BTP-1
	SGD-2/350-RY53	125	350					7	L	AL	
	SGD-2/350-RY61	125	350					5	SP	ST	
	SGD-2/350-RY63	125	350					7	SP	AL	
				Small 3-element rectangular stacked rosette 350 Ω							
Shown actual size, 7.1 mm 	SGD-3/120-RY51	$139	120	3.00 (0.118)	1.70 (0.067)	7.10 (0.280)	7.10 (0.280)	4.5	L	ST	BTP-2
	SGD-3/120-RY53	139	120					6	L	AL	
	SGD-3/120-RY61	139	120					4.5	SP	ST	
	SGD-3/120-RY63	139	120					6	SP	AL	
				Medium 3-element rectangular stacked rosette 120 Ω							
Shown actual size, 7.1 mm 	SGD-3/350-RY51	$139	350	3.00 (0.118)	1.70 (0.067)	7.10 (0.280)	7.10 (0.280)	7.5	L	ST	BTP-2
	SGD-3/350-RY53	139	350					10	L	AL	
	SGD-3/350-RY61	139	350					7.5	SP	ST	
	SGD-3/350-RY63	139	350					10	SP	AL	
				Medium 3-element rectangular stacked rosette 350 Ω							
Shown actual size, 11.4 mm 	SGD-7/120-RY51	$165	120	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	11.40 (0.449)	9	L	ST	BTP-3
	SGD-7/120-RY53	165	120					12	L	AL	
	SGD-7/120-RY61	165	120					9	SP	ST	
	SGD-7/120-RY63	165	120					12	SP	AL	
				Large 3-element rectangular stacked rosette 120 Ω							
Shown actual size, 11.4 mm 	SGD-7/350-RY51	$165	350	6.50 (0.256)	3.10 (0.122)	11.40 (0.449)	11.40 (0.449)	15	L	ST	BTP-3
	SGD-7/350-RY53	165	350					20	L	AL	
	SGD-7/350-RY61	165	350					15	SP	ST	
	SGD-7/350-RY63	165	350					20	SP	AL	
				Large 3-element rectangular stacked rosette 350 Ω							

*† For dimensions key, see page 32. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-2/350-RY51,** 350 Ω nominal-resistance strain gage, **$125.

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

RECTANGULAR ROSETTE SINGLE PLANE, PLANAR COMPACT GEOMETRY 0/45/90°

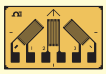
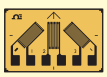
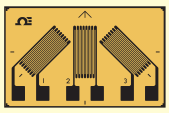
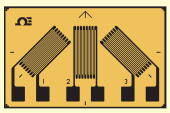
Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

See Equations on Page 10

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 10.5 mm 	SGD-1/120-RY21	$90.60	120	1.6 (0.063)	1.7 (0.067)	6.8 (0.268)	10.5 (0.413)	3	L	ST	BTP-1
	SGD-1/120-RY23	90.60	120					4	L	AL	
	SGD-1/120-RY81	73.60	120					3	SP	ST	
	SGD-1/120-RY83	73.60	120					4	SP	AL	
				Miniature rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 10.5 mm 	SGD-1/350-RY21	$90.60	350	1.6 (0.063)	2.1 (0.083)	6.8 (0.268)	10.5 (0.413)	6	L	ST	BTP-1
	SGD-1/350-RY23	90.60	350					8.5	L	AL	
	SGD-1/350-RY81	73.60	350					6	SP	ST	
	SGD-1/350-RY83	73.60	350					8.5	SP	AL	
				Miniature rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 10.5 mm 	SGD-2/350-RY11	$95.00	350	2.00 (0.079)	2.00 (0.079)	6.80 (0.268)	10.5 (0.413)	6.5	L	ST	BTP-1
	SGD-2/350-RY13	95.00	350					9.5	L	AL	
	SGD-2/350-RY31	110.00	350					6.5	SP	ST	
	SGD-2/350-RY33	110.00	350					9.5	SP	AL	
				Small rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 13 mm 	SGD-3/120-RY21	$95.40	120	3 (0.118)	1.7 (0.067)	8.3 (0.327)	13 (0.51)	4.5	L	ST	BTP-2
	SGD-3/120-RY23	95.40	120					6	L	AL	
	SGD-3/120-RY81	78.40	120					4.5	SP	ST	
	SGD-3/120-RY83	78.40	120					6	SP	AL	
				Medium rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 13 mm 	SGD-3/350-RY21	$95.40	350	3 (0.118)	2.1 (0.083)	8.3 (0.327)	13 (0.51)	8.5	L	ST	BTP-2
	SGD-3/350-RY23	95.40	350					12	L	AL	
	SGD-3/350-RY81	78.40	350					8.5	SP	ST	
	SGD-3/350-RY83	78.40	350					12	SP	AL	
				Medium rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 21.4 mm 	SGD-6/120-RY21	$109.20	120	6 (0.236)	3.2 (0.126)	13.4 (0.528)	21.4 (0.84)	8.5	L	ST	BTP-3
	SGD-6/120-RY23	109.20	120					12	L	AL	
	SGD-6/120-RY81	92.20	120					8.5	SP	ST	
	SGD-6/120-RY83	92.20	120					12	SP	AL	
				Large rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 21.4 mm 	SGD-6/350-RY21	$109.20	350	6 (0.236)	3.1 (0.126)	13.4 (0.528)	21.4 (0.84)	14	L	ST	BTP-3
	SGD-6/350-RY23	109.20	350					20	L	AL	
	SGD-6/350-RY81	92.20	350					14	SP	ST	
	SGD-6/350-RY83	92.20	350					20	SP	AL	
				Large rectangular, single plane rosette, compact geometry 350 Ω							

*† For dimensions key, see page 32. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-3/350-RY21,** rectangular planar rosette, package of 5, nominal resistance 350 Ω, **$95.40.

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

NEW

RECTANGULAR ROSETTE SINGLE PLANE, PLANAR COMPACT GEOMETRY 0/45/90°

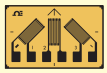
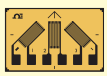
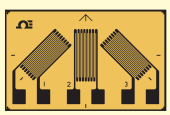
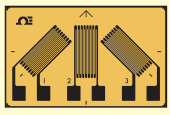
Custom-Designed Strain Gages Available! No Minimum Quantities. Consult Engineering.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

See Equations on Page 10

MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 10.5 mm 	SGD-1/120-RY21	$90.60	120	1.6 (0.063)	1.7 (0.067)	6.8 (0.268)	10.5 (0.413)	3	L	ST	BTP-1
	SGD-1/120-RY23	90.60	120					4	L	AL	
	SGD-1/120-RY81	73.60	120					3	SP	ST	
	SGD-1/120-RY83	73.60	120					4	SP	AL	
				Miniature rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 10.5 mm 	SGD-1/350-RY21	$90.60	350	1.6 (0.063)	2.1 (0.083)	6.8 (0.268)	10.5 (0.413)	6	L	ST	BTP-1
	SGD-1/350-RY23	90.60	350					8.5	L	AL	
	SGD-1/350-RY81	73.60	350					6	SP	ST	
	SGD-1/350-RY83	73.60	350					8.5	SP	AL	
				Miniature rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 10.5 mm 	SGD-2/350-RY11	$95.00	350	2.00 (0.079)	2.00 (0.079)	6.80 (0.268)	10.5 (0.413)	6.5	L	ST	BTP-1
	SGD-2/350-RY13	95.00	350					9.5	L	AL	
	SGD-2/350-RY31	110.00	350					6.5	SP	ST	
	SGD-2/350-RY33	110.00	350					9.5	SP	AL	
				Small rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 13 mm 	SGD-3/120-RY21	$95.40	120	3 (0.118)	1.7 (0.067)	8.3 (0.327)	13 (0.51)	4.5	L	ST	BTP-2
	SGD-3/120-RY23	95.40	120					6	L	AL	
	SGD-3/120-RY81	78.40	120					4.5	SP	ST	
	SGD-3/120-RY83	78.40	120					6	SP	AL	
				Medium rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 13 mm 	SGD-3/350-RY21	$95.40	350	3 (0.118)	2.1 (0.083)	8.3 (0.327)	13 (0.51)	8.5	L	ST	BTP-2
	SGD-3/350-RY23	95.40	350					12	L	AL	
	SGD-3/350-RY81	78.40	350					8.5	SP	ST	
	SGD-3/350-RY83	78.40	350					12	SP	AL	
				Medium rectangular, single plane rosette, compact geometry 350 Ω							
Shown actual size, 21.4 mm 	SGD-6/120-RY21	$109.20	120	6 (0.236)	3.2 (0.126)	13.4 (0.528)	21.4 (0.84)	8.5	L	ST	BTP-3
	SGD-6/120-RY23	109.20	120					12	L	AL	
	SGD-6/120-RY81	92.20	120					8.5	SP	ST	
	SGD-6/120-RY83	92.20	120					12	SP	AL	
				Large rectangular, single plane rosette, compact geometry 120 Ω							
Shown actual size, 21.4 mm 	SGD-6/350-RY21	$109.20	350	6 (0.236)	3.1 (0.126)	13.4 (0.528)	21.4 (0.84)	14	L	ST	BTP-3
	SGD-6/350-RY23	109.20	350					20	L	AL	
	SGD-6/350-RY81	92.20	350					14	SP	ST	
	SGD-6/350-RY83	92.20	350					20	SP	AL	
				Large rectangular, single plane rosette, compact geometry 350 Ω							

*† For dimensions key, see page 32. * Maximum permitted bridge energizing voltage (Vrms).*

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGD-3/350-RY21, *rectangular planar rosette, package of 5, nominal resistance 350 Ω,* ***$95.40.***

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

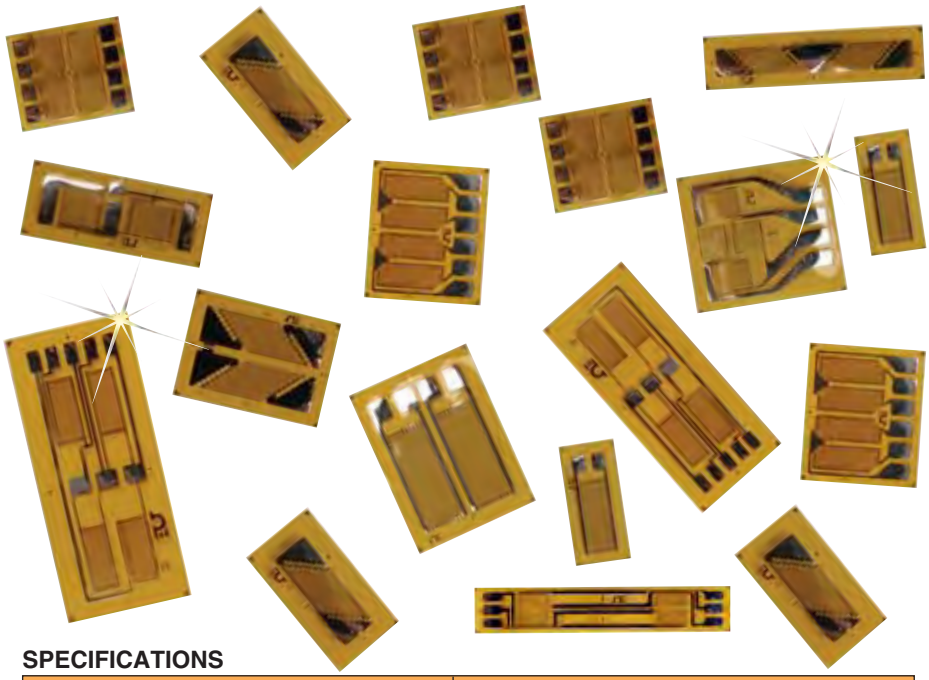
Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

TRANSDUCER QUALITY STRAIN GAGE

SPECIFICATION CHART

- Custom Strain Gages Available
- Uniform Carrier Matrix Dimensions
- Optimum Backing Thickness Tolerance
- Choice of Creep Code Available Upon Request
- Tighter Resistance Tolerance
- Available With Ribbon Leads or Solder Pads
- Temperature Characteristics Matched to Steel or Aluminum
- Available With or Without Encapsulation



OMEGADYNE® offers a full line of transducer quality strain gages. These high quality encapsulated foil strain gages are available in many configurations. They are commonly used for OEM transducer applications where transducers with exacting specifications must be produced. Transducer quality strain gages are designed with optimum backing thickness tolerance. Creep variations from one strain gage to another are kept to a minimum. In batch transducer production, this will keep bridge output differences between strain gage installations to a minimum. Choice of creep codes is available by custom order. Transducer quality strain gages have very uniform matrix or carrier dimensions. These tight trim dimensions allow for the carrier edge to be used for strain gage alignment in batch transducer production. Consistent strain gage placement will keep bridge output differences among the transducers to a minimum. Transducer quality strain gages will have a tighter resistance tolerance compared with the precision SGD series strain gages. The resistance tolerance depends on the nominal resistance of the gage, and the number of grid lines in the pattern. Usually the lower the nominal resistance and the fewer the grid lines, the tighter the resistance tolerance will be. Resistance tolerance is tighter for strain gages without encapsulation, available by custom order. The resistance tolerance provided in the table is wide, because the values tend to vary with the strain gage nominal resistance specification, encapsulation and pattern. Tolerance for gage type is available upon request.

SPECIFICATIONS

	SGT SERIES
Foil Measuring Grid	Constantan foil 5 microns thick
Carrier	Polyimide
Substrate Thickness	20 microns
Cover Thickness	25 microns
Connection Dimensions: mm (in)	Solder pads or ribbon leads, tinned copper flat wire 30 L x 0.1 D x 0.3 W (1.2 x 0.004 x 0.012); other wire types available upon request
Nominal Resistance	Stated in "To Order" box
Resistance Tolerance Per Package	±0.15% to ±0.5% depending on gage spec
Gage Factor (Actual Value Printed on Each Package)	2.0 ±5%
Gage Factor Tolerance Per Package	1.00%
THERMAL PROPERTIES	
Reference Temperature	23°C (73°F)
SERVICE TEMPERATURE	
Static Measurements	-75 to 95°C (-100 to 200°F)
Dynamic Measurements	-75 to 95°C (-100 to 200°F)
TEMPERATURE CHARACTERISTICS	
Steel (and Certain Stainless Steels)	11 ppm/°C (6.1 ppm/°F)
Aluminum	23 ppm/°C (12.8 ppm/°F)
Uncompensated	±20 ppm/°C (11.1 ppm/°F)
Temperature Compensated Range	-5 to 120°C (5 to 248°F)
Tolerance of Temp Compensation	2 ppm/°C (1.0 ppm/°F)
MECHANICAL PROPERTIES	
Maximum Strain	3% or 30,000 microstrain
Hysteresis	Negligible
Fatigue (at ±1500 microstrain)	>10,000,000 cycles
Smallest Bending Radius	3 mm (⅛")

LINEAR PATTERN STRAIN GAGES

The linear pattern strain gages are used to measure strain in a single direction. They are used for experimental stress analysis, and transducer applications. The strain gage pattern is shown on the left side of the table. Notice the "arrow" which indicates the principal stress direction. OMEGADYNE® offers miniature linear patterns for strain measurement of a stress concentration or high gradient areas, and larger sizes. The solder pads/ribbon leads are offered both at one end of the grid, or with one at each end of the grid. Wide or narrow linear grid patterns are available. Dimensions are listed for pattern gage grid length (A) and width (B), and the matrix or carrier length (C) and width (D). The patterns include alignment triangles.

Note: *To determine if the strain gages have ribbon leads or solder pads, see the column labeled "TERM" short for termination, "L" indicates ribbon leads, and "SP" indicates solder pads. To determine if the strain gages have temperature characteristics matched to steel or aluminum, see the column labeled "COMP" short for compensation, "ST" indicates steel, "AL" indicates aluminum. See the column labeled "BTP" for accessory bondable terminal pad model numbers.*

†Dimensions Key:
GRID
A: Active gage length
B: Active gage width
CARRIER
C: Matrix length
D: Matrix width

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²	TERM PAD
Shown actual size, 4 mm	SGT-1/350-TY11	$27.60	350	1 (0.039)	1.8 (0.071)	4 (0.157)	3 (0.118)	4.5	L	ST	BTP-1
	SGT-1/350-TY13	27.60	350	Miniature linear pattern, measurement of stress concentration 350 Ω				6	L	AL	
	SGT-1/350-TY41	19.60	350					4.5	SP	ST	
	SGT-1/350-TY43	19.60	350					6	SP	AL	
Shown actual size, 5.6 mm	SGT-1A/1000-TY11	$34.00	1000	1.5 (0.059)	2.9 (0.114)	5.6 (0.22)	4.1 (0.161)	11	L	ST	BTP-1
	SGT-1A/1000-TY13	34.00	1000	Miniature linear pattern, grid width, wide, higher resistance, reduced heat generation 1000 Ω				15	L	AL	
	SGT-1A/1000-TY41	27.00	1000					11	SP	ST	
	SGT-1A/1000-TY43	27.00	1000					15	SP	AL	
Shown actual size, 6.4 mm	SGT-2C/350-TY11	$28.80	350	1.5 (0.059)	4.6 (0.181)	6.4 (0.252)	6.4 (0.252)	9	L	ST	BTP-2
	SGT-2C/350-TY13	28.80	350	Miniature linear pattern, grid width, extra wide 350 Ω				12	L	AL	
	SGT-2C/350-TY41	20.80	350					9	SP	ST	
	SGT-2C/350-TY43	20.80	350					12	SP	AL	
Shown actual size, 8.8 mm	SGT-3E/350-TY11	$29.20	350	3 (0.118)	3.1 (0.122)	8.8 (0.346)	5.5 (0.217)	10	L	ST	BTP-2
	SGT-3E/350-TY13	29.20	350	Small linear pattern, lead/pad at each side of grid 350 Ω				14	L	AL	
	SGT-3E/350-TY41	21.20	350					10	SP	ST	
	SGT-3E/350-TY43	21.20	350					14	SP	AL	

** Maximum permitted bridge energizing voltage (Vrms).*
Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-3E/350-TY41, *350 Ω transducer quality uniaxial strain gage,* ***$21.20.***

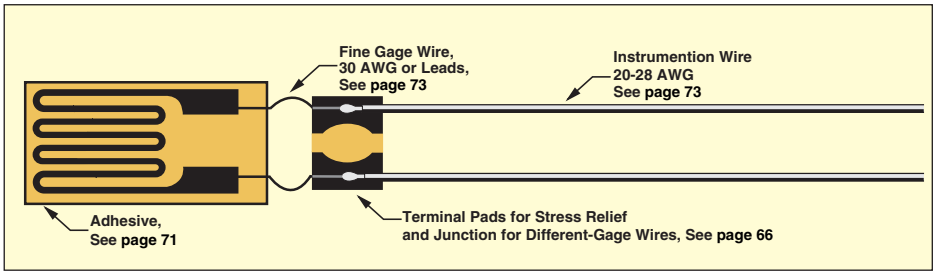
NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

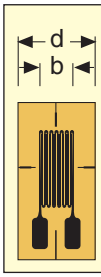
Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

LINEAR PATTERN STRAIN GAGES





†Dimensions Key:
GRID
A: Active gage length
B: Active gage width
CARRIER
C: Matrix length
D: Matrix width

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 7.5 mm	SGT-3F/350-TY11	$28.80	350	3.2 (0.126)	3.2 (0.126)	7.5 (0.295)	4.6 (0.181)	10	L	ST	BTP-3
	SGT-3F/350-TY13	28.80	350					14	L	AL	
	SGT-3F/350-TY41	20.80	350					10	SP	ST	
	SGT-3F/350-TY43	20.80	350					14	SP	AL	
Shown actual size, 8.6 mm	SGT-3J/350-TY11	$29.20	350	3 (0.118)	2.1 (0.083)	8.6 (0.339)	3.5 (0.138)	8	L	ST	BTP-3
	SGT-3J/350-TY13	29.20	350					12	L	AL	
	SGT-3J/350-TY41	21.20	350					8	SP	ST	
	SGT-3J/350-TY43	21.20	350					12	SP	AL	
Shown actual size, 6.6 mm	SGT-3S/350-TY11	$28.00	350	3 (0.118)	1.7 (0.067)	6.6 (0.26)	3.3 (0.13)	7.5	L	ST	BTP-3
	SGT-3S/350-TY13	28.00	350					10.5	L	AL	
	SGT-3S/350-TY41	20.00	350					7.5	SP	ST	
	SGT-3S/350-TY43	20.00	350					10.5	SP	AL	
Shown actual size, 7 mm	SGT-3N/350-TY11	$28.40	350	3.2 (0.118)	2.5 (0.067)	7 (0.28)	4 (0.157)	8	L	ST	BTP-3
	SGT-3N/350-TY13	28.40	350					13	L	AL	
	SGT-3N/350-TY41	20.40	350					8	SP	ST	
	SGT-3N/350-TY43	20.40	350					13	SP	AL	

** Maximum permitted bridge energizing voltage (Vrms).*
Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-3J/350-TY41, *350 Ω transducer quality uniaxial strain gage,* ***$21.20.***

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

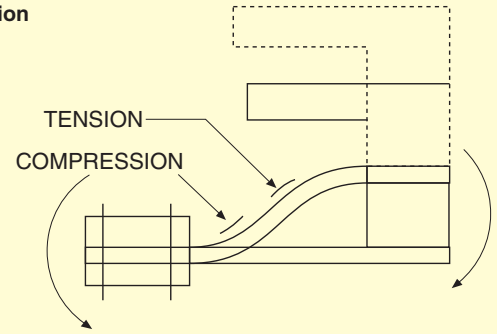
NEW®

HALF BRIDGE UNIAXIAL STRAIN GAGES

- Available with Ribbon Leads or Solder Pads
- Temperature Characteristics Matched to Steel or Aluminum
- Dual Linear Half-Bridge for Double Bend Transducer Applications
- Custom Gages Available

OMEGADYNE® offers transducer quality strain gages in dual linear patterns in a half-bridge design with a common tab. These strain gages might be used for transducer design for beams that have a contraflexure point. Defined as a point in a structure where bending occurs in opposite directions. A transducer may also be described as a reversed bending beam. The grids are linear, both in the same direction, and are typically used for bending strain applications.

Typical Application

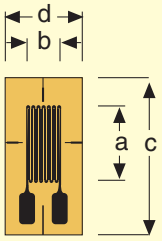


Three styles are available:

Standard: SGT-1LH/350-TY**, with grid centerline to centerline spacing of 5.46 mm (0.215")

Compact, Wide Grid: SGT-1LH/1000-TY**, with grid centerline to centerline spacing of 5.46 mm (0.215")

Large: SGT-2LH/350-TY**, with grid centerline to centerline spacing of 10.50 mm (0.413")



†Dimensions Key:
GRID
A: Active gage length
B: Active gage width
CARRIER
C: Matrix length
D: Matrix width

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²
Shown actual size, 9.2 mm 	SGT-1LH/350-TY11	$32.80	350	1.5 (0.059)	2.5 (0.098)	9.2 (0.362)	4 (0.157)	6.5	L	ST
	SGT-1LH/350-TY13	32.80	350	Linear pattern, dual grid, half-bridge, common-tab pattern 350 Ω				9	L	AL
	SGT-1LH/350-TY41	24.80	350					6.5	SP	ST
	SGT-1LH/350-TY43	24.80	350					9	SP	AL
Shown actual size, 9.2 mm 	SGT-1LH/1000-TY11	$34.00	1000	1.5 (0.059)	4.8 (0.198)	9.2 (0.362)	6 (0.236)	15	L	ST
	SGT-1LH/1000-TY13	34.00	1000	Compact linear pattern, dual grid, half-bridge, common-tab pattern 1000 Ω				20	L	AL
	SGT-1LH/1000-TY41	26.00	1000					15	SP	ST
	SGT-1LH/1000-TY43	26.00	1000					20	SP	AL
Shown smaller than actual size, 14.3 mm 	SGT-2LH/350-TY11	$35.60	350	1.6 (0.063)	2.3 (0.091)	14.3 (0.563)	4 (0.157)	6.5	L	ST
	SGT-2LH/350-TY13	35.60	350	Large linear pattern, dual grid, half-bridge, common-tab pattern 350 Ω				9	L	AL
	SGT-2LH/350-TY41	25.60	350					6.5	SP	ST
	SGT-2LH/350-TY43	25.60	350					9	SP	AL

** Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-2LH/350-TY11,** package of 5, with ribbon leads nominal resistance 350 Ω, **$35.60.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

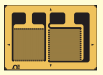
NEW®

BIAXIAL 90° X-Y "TEE" ROSETTE CAN BE USED TO MEASURE STRAIN IN THE X AND Y DIRECTIONS

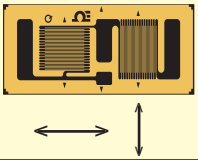
OMEGADYNE® offers 0/90° TEE planar rosette patterns, with 2 separate strain gages on one carrier. The gage grids are perpendicular, and are electrically independent. These can be used in transducer design for axial strain applications or can be wired separately to measure strain in the X and Y directions.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 4.9 mm 	SGT-2/350-XY11	$44.00	350	1.6 (0.063)	1.8 (0.071)	4.9 (0.193)	5.8 (0.228)	5.5	L	ST
	SGT-2/350-XY13	44.00	350					7.5	L	AL
	SGT-2/350-XY41	34.00	350					5.5	SP	ST
	SGT-2/350-XY43	34.00	350					7.5	SP	AL
				Small TEE rosette, leads/pads, electrically independant 350 Ω						
Shown actual size, 6.9 mm 	SGT-3/350-XY11	$48.00	350	3.2 (0.126)	3.6 (0.142)	6.9 (0.272)	9.9 (0.039)	11	L	ST
	SGT-3/350-XY13	48.00	350					16	L	AL
	SGT-3/350-XY41	38.00	350					11	SP	ST
	SGT-3/350-XY43	38.00	350					16	SP	AL
				Medium TEE rosette 350 Ω						
Shown actual size, 7 mm 	SGT-3/1000-XY11	$49.00	1000	3.2 (0.126)	3.6 (0.138)	7 (0.276)	9.6 (0.378)	18	L	ST
	SGT-3/1000-XY13	49.00	1000					25	L	AL
	SGT-3/1000-XY41	39.00	1000					18	SP	ST
	SGT-3/1000-XY43	39.00	1000					25	SP	AL
				Medium TEE rosette, higher resistance, reduced heat generation 1000 Ω						
Shown actual size, 8.6 mm 	SGT-4/350-XY11	$49.00	350	4 (0.157)	4.6 (0.181)	8.6 (0.339)	12.3 (0.484)	14	L	ST
	SGT-4/350-XY13	49.00	350					20	L	AL
	SGT-4/350-XY41	39.00	350					14	SP	ST
	SGT-4/350-XY43	39.00	350					20	SP	AL
				Large TEE rosette, leads/pads electrically independant 350 Ω						

OMEGADYNE offers 0/90° TEE planar rosette patterns, in a half-bridge with a common lead/solder pad. These would typically be used in transducer design for axial strain applications. Each carrier piece has 2 strain gages, with perpendicular grids. SGT-3H/350-XY** actually has 4 leads/solder pads. Notice that one of the strain gages has 2 leads/solder pads on one side of the grid. If the factory has installed leads, all 4 leads are installed, and one lead will be cut away, as it will not be needed. This design is offered to give variety of options for wire routing.

Shown larger than actual size, 12 mm 	SGT-3H/350-XY11	$47.50	350	2.5 (0.098)	2.5 (0.098)	12 (0.472)	4.8 (0.189)	9	L	ST
	SGT-3H/350-XY13	47.50	350					12	L	AL
	SGT-3H/350-XY41	37.50	350					9	SP	ST
	SGT-3H/350-XY43	37.50	350					12	SP	AL
				Small 90° TEE rosette, with repositioned lead/tab 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-3/350-XY11,** 350 Ω nominal resistance, medium TEE rosette strain gage, **$48.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

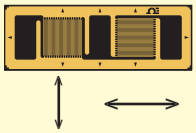
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

0/90° TEE ROSETTES

OMEGADYNE® offers 0/90° TEE planar rosette patterns, in a half-bridge with a common lead/solder pad. These would typically be used in transducer design for axial strain applications. Each carrier piece has 2 strain gages, with perpendicular grids, and 3 leads/solder pads.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 8.3 mm 	SGT-1/175-XY11	$44.00	175	1.1 (0.043)	1.7 (0.067)	8.3 (0.327)	3 (0.118)	3	L	ST
	SGT-1/175-XY13	44.00	175					5	L	AL
	SGT-1/175-XY41	34.00	175					3	SP	ST
	SGT-1/175-XY43	34.00	175	Miniature 90° TEE rosette, often used on small column transducers 175 Ω				5	SP	AL
Shown actual size, 8.8 mm 	SGT-1/350-XY11	$44.00	350	1.5 (0.059)	2 (0.079)	8.8 (0.346)	3.4 (0.134)	5.5	L	ST
	SGT-1/350-XY13	44.00	350					5	L	AL
	SGT-1/350-XY41	34.00	350					5.5	SP	ST
	SGT-1/350-XY43	34.00	350	Miniature 90° TEE rosette, often used on small column transducers 350 Ω				7.5	SP	AL
Shown actual size, 5.8 mm 	SGT-2H/350-XY11	$48.00	350	2 (0.079)	2.8 (0.11)	5.8 (0.228)	7.4 (0.291)	7.5	L	ST
	SGT-2H/350-XY13	48.00	350					11	L	AL
	SGT-2H/350-XY41	38.00	350					7.5	SP	ST
	SGT-2H/350-XY43	38.00	350	Small, general purpose 90° TEE rosette 350 Ω				11	SP	AL
Shown smaller than actual size, 13 mm 	SGT-3BH/350-XY11	$47.50	350	2.5 (0.098)	3.1 (0.122)	13 (0.512)	4.5 (0.177)	9	L	ST
	SGT-3BH/350-XY13	47.50	350					13	L	AL
	SGT-3BH/350-XY41	37.50	350					9	SP	ST
	SGT-3BH/350-XY43	37.50	350	90° TEE rosette, often used on column transducers 350 Ω				13	SP	AL
Shown actual size, 7.2 mm 	SGT-3H/1000-XY11	$49.00	1000	3.2 (0.126)	3.5 (0.138)	7.2 (0.283)	10 (0.394)	18	L	ST
	SGT-3H/1000-XY13	49.00	1000					25	L	AL
	SGT-3H/1000-XY41	39.00	1000					18	SP	ST
	SGT-3H/1000-XY43	39.00	1000	Medium 90° TEE rosette, higher resistance, reduced heat generation 1000 Ω				25	SP	AL
Shown actual size, 5.7 mm 	SGT-3L/350-XY11	$49.00	350	2.6 (0.102)	1.8 (0.071)	5.7 (0.224)	5.2 (0.205)	7	L	ST
	SGT-3L/350-XY13	49.00	350					10	L	AL
	SGT-3L/350-XY41	39.00	350					7	SP	ST
	SGT-3L/350-XY43	39.00	350	Small 90° TEE rosette, half-bridge with a common lead/tab 350 Ω				10	SP	AL

*†For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-3BH/350-XY41,** 350 Ω transducer quality TEE planar rosette strain gage, **$37.50.

NOTE

1: L = Ribbon Lead, SP = Solder Pad

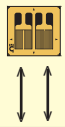
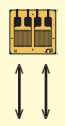
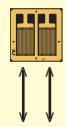
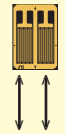
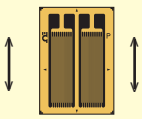
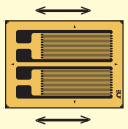
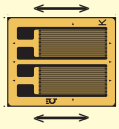
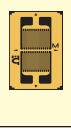
2: ST = Steel, AL = Aluminum

TRANSDUCER QUALITY STRAIN GAGE

DUAL GRID FOR BENDING APPLICATIONS

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 5.5 mm 	SGT-2/350-DY11	$44	350	2 (0.079)	2 (0.079)	5.5 (0.217)	5.9 (0.232)	6.5	L	ST
	SGT-2/350-DY13	44	350					9.5	L	AL
	SGT-2/350-DY41	34	350					6.5	SP	ST
	SGT-2/350-DY43	34	350					9.5	SP	AL
				Miniature, parallel dual grid pattern, bending strain 350 Ω						
Shown actual size, 6.1 mm 	SGT-2C/350-DY11	$44	350	1.9 (0.075)	2.5 (0.098)	6.1 (0.24)	6.4 (0.252)	7	L	ST
	SGT-2C/350-DY13	44	350					10	L	AL
	SGT-2C/350-DY41	34	350					7	SP	ST
	SGT-2C/350-DY43	34	350					10	SP	AL
				Small, parallel dual grid pattern, bending strain 350 Ω						
Shown actual size, 7 mm 	SGT-3N/350-DY11	$44	350	3.2 (0.126)	2.5 (0.098)	7 (0.276)	6.9 (0.272)	9	L	ST
	SGT-3N/350-DY13	44	350					13	L	AL
	SGT-3N/350-DY41	34	350					9	SP	ST
	SGT-3N/350-DY43	34	350					13	SP	AL
				Medium, parallel dual grid pattern, bending strain 350 Ω						
Shown actual size, 6 mm 	SGT-3/350-DY11	$44	350	3 (0.118)	1.6 (0.063)	6 (0.236)	4.1 (0.161)	7.5	L	ST
	SGT-3/350-DY13	44	350					10	L	AL
	SGT-3/350-DY41	34	350					7.5	SP	ST
	SGT-3/350-DY43	34	350					10	SP	AL
				Medium, parallel dual grid pattern, bending strain, grid narrow 350 Ω						
Shown actual size, 10 mm 	SGT-6/350-DY11	$48	350	6.3 (0.248)	2.5 (0.098)	10 (0.394)	7 (0.276)	13	L	ST
	SGT-6/350-DY13	48	350					18	L	AL
	SGT-6/350-DY41	38	350					13	SP	ST
	SGT-6/350-DY43	38	350					18	SP	AL
				Medium, parallel dual pattern, grid narrow 350 Ω						
Shown actual size, 11.8 mm 	SGT-7/350-DY11	$48	350	6.5 (0.256)	3.6 (0.142)	11.8 (0.465)	9.7 (0.382)	15	L	ST
	SGT-7/350-DY13	48	350					20	L	AL
	SGT-7/350-DY41	38	350					15	SP	ST
	SGT-7/350-DY43	38	350					20	SP	AL
				Large, parallel dual pattern 350 Ω						
Shown actual size, 11.8 mm 	SGT-7/1000-DY11	$50	1000	6.5 (0.256)	3.6 (0.142)	11.8 (0.465)	9.7 (0.382)	27	L	ST
	SGT-7/1000-DY13	50	1000					40	L	AL
	SGT-7/1000-DY41	40	1000					27	SP	ST
	SGT-7/1000-DY43	40	1000					40	SP	AL
				Large, parallel dual pattern, bending strain, higher resistance, reduced heat generation 1000 Ω						
Shown actual size, 7 mm 	SGT-2D/350-DY11	$44	350	1.5 (0.059)	0.7 (0.067)	7 (0.276)	3 (0.118)	5.5	L	ST
	SGT-2D/350-DY13	44	350					7.5	L	AL
	SGT-2D/350-DY41	34	350					5.5	SP	ST
	SGT-2D/350-DY43	34	350					7.5	SP	AL
				Dual-element pattern for narrow bending beams Centerline spacing 2 mm (0.079") 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-3/350DY11,** package of 5, dual grid pattern for bending strain, nominal resistance 350 Ω, **$44.

NOTE

1: L = Ribbon Lead, SP = Solder Pad

2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

TRANSDUCER QUALITY STRAIN GAGE

NEW®

FULL BRIDGE LINEAR DIAPHRAGM PATTERN

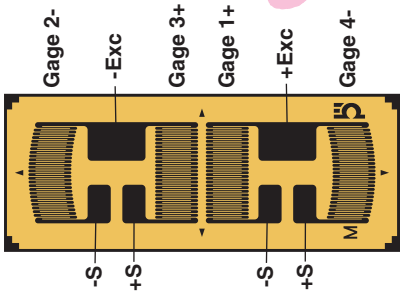
OMEGADYNE® offers transducer quality, linear diaphragm pattern strain gages for use in pressure transducer designs. These patterns have 4 strain gages mounted onto a single carrier. The strain gages in the center will go into tension, and the outer 2 will go into compression. In the pressure transducer design, a diaphragm is clamped around the outer edge, and subjected to a uniform pressure. Near the center of the diaphragm the radial and tangential strains will be positive, and will be nearly equal. The radial strain decreases and becomes negative as you move away from the center toward the outer edge. Midway between the center and the outer edge the strain is at its lowest and the leads/solder pads are located in this low stress area. In these patterns, there are 2 half-bridges. Each half-bridge has a common lead/solder pad. One of the patterns has been enlarged to show the detail. The strain gages and terminal pads have been numbered and labeled. The corners of the Wheatstone bridge have been left open for the addition of zero temperature compensation resistors, and zero balance compensation resistors if required. Several sizes are available.

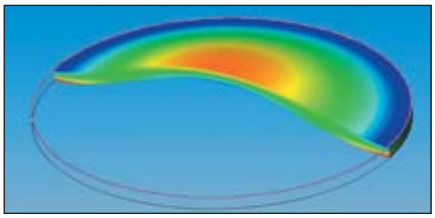
SGT-9/350-LD** can be used for a 0.4" diameter diaphragm.

SGT-12/350-LD** can be used for a 0.5" diameter diaphragm.

SGT-18/350-LD** and SGT-18/1000-LD** can be used for 0.75 to 0.8" diameter diaphragms.

SGT-24/350-LD** can be used for 1" diameter diaphragms.





MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 10.2 mm 	SGT-9/350-LD11	$89.00	350	0.8 (0.031)	2.6 (0.102)	10.2 (0.402)	4 (0.157)	4.5	L	ST
	SGT-9/350-LD13	89.00	350					6.5	L	AL
	SGT-9/350-LD41	74.00	350					4.5	SP	ST
	SGT-9/350-LD43	74.00	350					6.5	SP	AL
Shown actual size, 13.5 mm 	SGT-12/350-LD11	$89.00	350	1 (0.039)	2.6 (0.102)	13.5 (0.534)	4 (0.157)	5.5	L	ST
	SGT-12/350-LD13	89.00	350					7.5	L	AL
	SGT-12/350-LD41	74.00	350					5.5	SP	ST
	SGT-12/350-LD43	74.00	350					7.5	SP	AL
Shown actual size, 19.2 mm 	SGT-18/350-LD11	$95.50	350	1.8 (0.071)	5 (0.197)	19.2 (0.756)	6.4 (0.252)	10	L	ST
	SGT-18/350-LD13	95.50	350					14	L	AL
	SGT-18/350-LD41	80.50	350					10	SP	ST
	SGT-18/350-LD43	80.50	350					14	SP	AL
Shown actual size, 19.2 mm 	SGT-18/1000-LD11	$95.50	1000	1.8 (0.071)	4 (0.157)	19.2 (0.756)	5.5 (0.217)	9	L	ST
	SGT-18/1000-LD13	95.50	1000					13	L	AL
	SGT-18/1000-LD41	80.50	1000					9	SP	ST
	SGT-18/1000-LD43	80.50	1000					13	SP	AL
Shown actual size, 25.4 mm 	SGT-24/350-LD11	$98.50	350	1.8 (0.071)	5 (0.197)	25.4 (1)	6.4 (0.252)	10	L	ST
	SGT-24/350-LD13	98.50	350					14	L	AL
	SGT-24/350-LD41	83.50	350					10	SP	ST
	SGT-24/350-LD43	83.50	350					14	SP	AL

Full-bridge, 10.2 mm (0.4") diameter diaphragm, 350 Ω

Full-bridge, 13.5 mm (0.5") diameter diaphragm, 350 Ω

Full-bridge, 19.2 mm (0.75 to 0.8") diameter diaphragm, 350 Ω

Full-bridge, 19.2 mm (0.75 to 0.8") diameter diaphragm, higher resistance, reduced heat generation, 1000 Ω

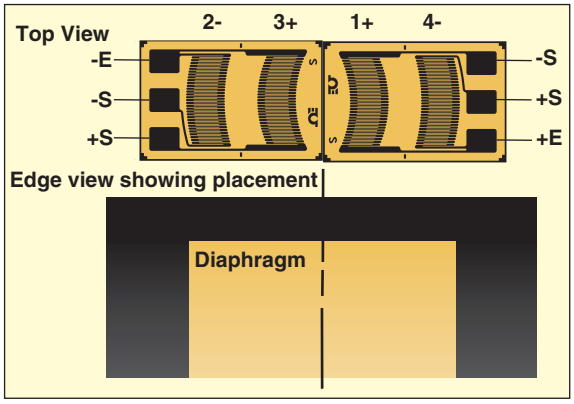
Full-bridge, 25.4 mm (1") diameter diaphragm, 350 Ω

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-9/350-LD11,** package of 5, full bridge linear diaphragm pattern **$89.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

1/2 BRIDGE LINEAR DIAPHRAGM

The following types of linear diaphragm strain gages can be used when the bonding area is larger than the diaphragm diameter. For example, if a body has a flat surface with a diameter of 1" onto which the strain gage is to be bonded, but a 0.5" diameter hole is drilled through the body leaving just a thin layer of material, then this thin 0.5" diameter is the diaphragm. So the strain gage grids are located above the thin high stress area and the leads/solder pads are over the solid part of the body in the low stress area. This linear diaphragm pattern has 2 strain gages mounted onto a single carrier. These types are used in pairs on a 0.5" diameter diaphragm. The strain gage closer to center will go into tension, and the outer gage will go into compression. Near the center of the diaphragm the radial and tangential strains will be positive, and will be nearly equal. The radial strain decreases and becomes negative as you move away from the center toward the outer edge of the diaphragm. The leads/solder pads are in the low stress area over thicker material. In this pattern, each carrier piece has one half-bridge with a common lead/solder pad. The corners of the Wheatstone bridge have been left open for the addition of zero temperature compensation resistors, and zero balance compensation resistors, if required. SGT-8/350-LD** and SGT/500-LD** are used in pairs on a 0.5" diameter diaphragm. Below we show a diagram with 2 pieces of the SGT-8/350-LD**, shown as they might be positioned on a 0.5" diameter diaphragm. The strain gages have been numbered and labeled. Also available is the SGT-7/350-LD** which offers 2 half-bridges mounted onto one carrier piece, which can be used on a 0.28" diameter diaphragm again where the bonding area is larger. The grids are placed, centered over the diaphragm, and the leads/solder pads are over solid material in a low stress area.



MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

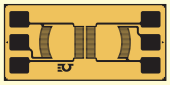
	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 8.4 mm 	SGT-8/350-LD11	$54.50	350	1.1 (0.043)	4.3 (0.169)	8.4 (0.331)	5.5 (0.217)	7	L	ST
	SGT-8/350-LD13	54.50	350					10	L	AL
	SGT-8/350-LD41	44.50	350					7	SP	ST
	SGT-8/350-LD43	44.50	350					10	SP	AL
Shown actual size, 8.4 mm 	SGT-8/500-LD11	$56.50	500	1.2 (0.047)	4.3 (0.169)	8.4 (0.331)	5.5 (0.217)	7.5	L	ST
	SGT-8/500-LD13	56.50	500					11	L	AL
	SGT-8/500-LD41	46.50	500					7.5	SP	ST
	SGT-8/500-LD43	46.50	500					11	SP	AL

Half-bridge, used in pairs, 13 mm (0.5") diameter diaphragm 350 Ω

Half-bridge, used in pairs, 13 mm (0.5") diameter diaphragm nominal resistance 500 Ω

FULL BRIDGE LINEAR DIAPHRAGM

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 12.3 mm 	SGT-7/350-LD11	$54.50	350	0.5 (0.02)	2.5 (0.098)	12.3 (0.484)	5.8 (0.228)	3.5	L	ST
	SGT-7/350-LD13	54.50	350					5	L	AL
	SGT-7/350-LD41	44.50	350					3.5	SP	ST
	SGT-7/350-LD43	44.50	350					5	SP	AL

Full-bridge, 7 mm (0.28") diameter diaphragm 350 Ω

† For dimensions key, see page 35.
** Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-8/350-LD11,** package of 5, half bridge linear diaphragm pattern, **$54.50.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

SHEAR GAGES FOR SHEAR BEAM AND TORQUE APPLICATIONS SINGLE STRAIN GAGES

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

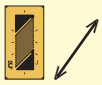
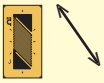
	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 7 mm 	SGT-1/350-SY11	$40	350	1.4 (0.055)	1.5 (0.059)	7 (0.276)	3.4 (0.134)	6	L	ST
	SGT-1/350-SY13	40	350					8	L	AL
	SGT-1/350-SY41	30	350					6	SP	ST
	SGT-1/350-SY43	30	350					8	SP	AL
				Single element miniature shear 350 Ω						
Shown actual size, 8.6 mm 	SGT-2/350-SY11	$40	350	2.3 (0.091)	1.8 (0.071)	8.6 (0.339)	3.4 (0.134)	8	L	ST
	SGT-2/350-SY13	40	350					12	L	AL
	SGT-2/350-SY41	30	350					8	SP	ST
	SGT-2/350-SY43	30	350					12	SP	AL
				Single element small shear 350 Ω						

† For dimensions key, see page 35.
** Maximum permitted bridge energizing voltage (Vrms).*
Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-2/350-SY43, *package of 5, single element, small shear, nominal resistance 350 Ω,* ***$30.***

MATCHED SHEAR/TORSION PAIRS AVAILABLE

Single strain gages are available in matched shear/torsion pairs. Purchase one package of each; SGT-3D/350-SY** and matched, but with reversed grid angle is the SGT-3ES/350-SY**. Use these in pairs, back to back in the transducer design, along the centerline of the shaft or beam.

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 9.7 mm 	SGT-3ES/350-SY11	$42	350	3 (0.118)	2.5 (0.098)	9.7 (0.382)	5.1 (0.201)	9	L	ST
	SGT-3ES/350-SY13	42	350					12	L	AL
	SGT-3ES/350-SY41	32	350					9	SP	ST
	SGT-3ES/350-SY43	32	350					12	SP	AL
				Single element reverse grid pattern of SGT-3D/350 350 Ω						
Shown actual size, 9.7 mm 	SGT-3D/350-SY11	$42	350	3 (0.118)	2.5 (0.098)	9.7 (0.382)	5.1 (0.201)	8	L	ST
	SGT-3D/350-SY13	42	350					12	L	AL
	SGT-3D/350-SY41	32	350					8	SP	ST
	SGT-3D/350-SY43	32	350					12	SP	AL
				Single element right hand version grid of pattern SGT-3ES/350 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: *Purchase one package of each,* ***SGT-3ES/350-SY11, $42,*** *and* ***SGT-3D/350-SY11, $42,*** *for matched shear/torsion pairs, 5 per package.*

NOTE

1: L = Ribbon Lead
SP = Solder Pad

2: ST = Steel
AL = Aluminum

NEW®

DUAL SHEAR GAGES
2 SEPARATE GAGES WITH REVERSED GRIDS ON ONE CARRIER

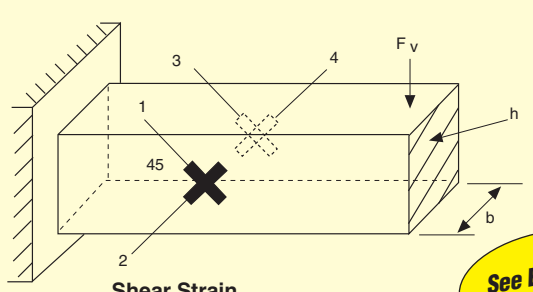
To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 7 mm 	SGT-1D/350-SY11	$42	350	1.4 (0.055)	1.5 (0.059)	7 (0.276)	5.1 (0.201)	5.5	L	ST
	SGT-1D/350-SY13	42	350					7.5	L	AL
	SGT-1D/350-SY41	32	350					5.5	SP	ST
	SGT-1D/350-SY43	32	350					7.5	SP	AL
				Dual grid, miniature rectangular shear 350 Ω						
Shown actual size, 10 mm 	SGT-2DC/350-SY11	$42	350	3 (0.118)	2.6 (0.102)	10 (0.394)	8.4 (0.331)	5.5	L	ST
	SGT-2DC/350-SY13	42	350					8	L	AL
	SGT-2DC/350-SY41	32	350					5.5	SP	ST
	SGT-2DC/350-SY43	32	350					8	SP	AL
				Dual grid, miniature shear all leads/solder pads at one end of grid 350 Ω						
Shown actual size, 7 mm 	SGT-2D/350M-SY11	$42	350	1.8 (0.071)	1.6 (0.063)	7 (0.276)	5.7 (0.224)	5.5	L	ST
	SGT-2D/350M-SY13	42	350					7.5	L	AL
	SGT-2D/350M-SY41	32	350					5.5	SP	ST
	SGT-2D/350M-SY43	32	350					7.5	SP	AL
				Dual grid shear, leads/solder pads one at each end of grid 350 Ω						
Shown actual size, 7.2 mm 	SGT-2D/1000-SY11	$47	1000	1.6 (0.063)	2 (0.079)	7.2 (0.283)	6.4 (0.252)	14	L	ST
	SGT-2D/1000-SY13	47	1000					19	L	AL
	SGT-2D/1000-SY41	37	1000					14	SP	ST
	SGT-2D/1000-SY43	37	1000					19	SP	AL
				Dual grid, rectangular shear pattern, higher resistance, reduced heat generation 1000 Ω						
Shown actual size, 10 mm 	SGT-3FS/350-SY11	$45	350	3 (0.118)	2.6 (0.102)	10 (0.394)	8.4 (0.331)	8	L	ST
	SGT-3FS/350-SY13	45	350					12	L	AL
	SGT-3FS/350-SY41	35	350					8	SP	ST
	SGT-3FS/350-SY43	35	350					12	SP	AL
				Dual grid shear, all leads/solder pads one at each end of grid 350 Ω						
Shown actual size, 9.6 mm 	SGT-3D/1000-SY11	$47	1000	3.3 (0.13)	2.4 (0.094)	9.6 (0.378)	7 (0.276)	17	L	ST
	SGT-3D/1000-SY13	47	1000					23	L	AL
	SGT-3D/1000-SY41	37	1000					17	SP	ST
	SGT-3D/1000-SY43	37	1000					23	SP	AL
				Dual grid shear, leads/solder pads, one at each end of grid, higher resistance reduced heat generation 1000 Ω						
Shown actual size, 9.9 mm 	SGT-3GS/350-SY11	$45	350	3 (0.118)	2.6 (0.102)	9.9 (0.390)	8.1 (0.319)	9	L	ST
	SGT-3GS/350-SY13	45	350					13	L	AL
	SGT-3GS/350-SY41	35	350					9	SP	ST
	SGT-3GS/350-SY43	35	350					13	SP	AL
				Dual grid, shear pattern leads/solder pads, one at each end of grid 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-1D/350-SY11,** package of 5, dual grid miniature, **$42.

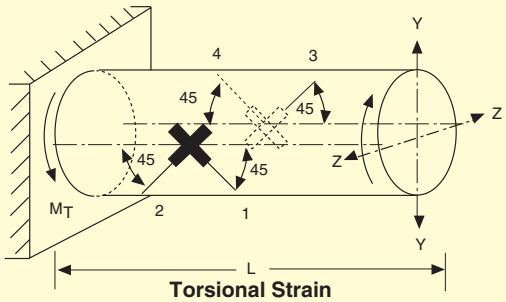
NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

HALF BRIDGE SHEAR GAGES–2 REVERSED GRIDS ON ONE CARRIER WITH A COMMON BRIDGE CONNECTION



Shear Strain

See Equations on Page 9



Torsional Strain

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 8.6 mm 	SGT-2DH/350-SY11	$47	350	2.3 (0.091)	1.8 (0.071)	8.6 (0.339)	5.5 (0.217)	9	L	ST
	SGT-2DH/350-SY13	47	350					11	L	AL
	SGT-2DH/350-SY41	37	350					9	SP	ST
	SGT-2DH/350-SY43	37	350					11	SP	AL
Shown actual size, 10.9 mm 	SGT-3JS/350-SY11	$48	350	3 (0.118)	2.4 (0.094)	10.9 (0.429)	6.8 (0.268)	10	L	ST
	SGT-3JS/350-SY13	48	350					14	L	AL
	SGT-3JS/350-SY41	38	350					10	SP	ST
	SGT-3JS/350-SY43	38	350					14	SP	AL
Shown actual size, 10 mm 	SGT-3H/350K-SY11	$59	350	3.2 (0.126)	2.6 (0.102)	10 (0.394)	7.4 (0.291)	9.5	L	ST
	SGT-3H/350K-SY13	59	350					13.5	L	AL
	SGT-3H/350K-SY41	49	350					9.5	SP	ST
	SGT-3H/350K-SY43	49	350					13.5	SP	AL
Shown actual size, 10 mm 	SGT-3HB/350K-SY11	$59	350	3.2 (0.126)	2.7 (0.106)	10 (0.394)	8.4 (0.331)	9.5	L	ST
	SGT-3HB/350K-SY13	59	350					9.5	L	AL
	SGT-3HB/350K-SY41	49	350					9.5	SP	ST
	SGT-3HB/350K-SY43	49	350					9.5	SP	AL
Shown actual size, 14.6 mm 	SGT-2H/350-SY11	$47	350	2.3 (0.091)	1.8 (0.071)	14.6 (0.575)	3.4 (0.134)	8	L	ST
	SGT-2H/350-SY13	47	350					12	L	AL
	SGT-2H/350-SY41	37	350					8	SP	ST
	SGT-2H/350-SY43	37	350					12	SP	AL

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGT-3H/350K-SY41,** package of 5, half bridge shear, with solder pads, matched to steel, nominal resistance 350 Ω, **$49.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

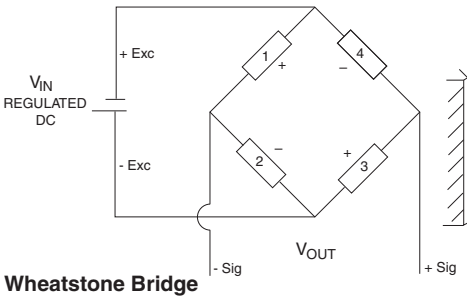
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

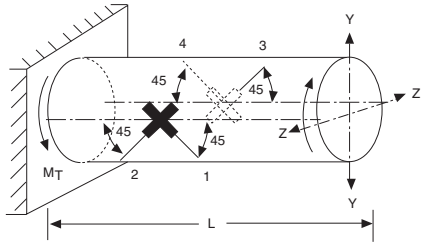
SHEAR GAGES—FULL BRIDGE SHEAR

OMEGADYNE® offers full bridge transducer quality strain gages for shear and torsional strain applications. These strain gages can be used in transducer design for shear beam load cells, or they can also be used for reaction torque on a shaft.

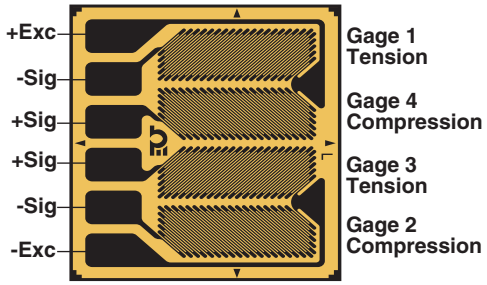
SGT-2DD/350-SY** has 2 half bridges on one carrier piece. Each half bridge has a dual shear pattern, with opposite grids and a common lead/solder pad. SGT-3/700-FB** has 4 independent shear strain gages, with opposite grid angles, on one carrier, with separate leads/pads (electrically independent). Below we show one wiring example; SGT-2DD/350-SY** used to measure a reaction torque on a shaft. The strain gages have been numbered, and the leads/solder pads labeled.



Wheatstone Bridge



Torsional Strain



See Equations on Page 9

4 STRAIN GAGES ON ONE CARRIER PIECE, 2 HALF BRIDGES CAN BE USED AS 1 FULL WHEATSTONE BRIDGE

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 7.6 mm 	SGT-2DD/350-SY11	$63	350	1.6 (0.063)	1.7 (0.067)	7.6 (0.299)	8.9 (0.350)	9	L	ST
	SGT-2DD/350-SY13	63	350					13	L	AL
	SGT-2DD/350-SY41	53	350					9	SP	ST
	SGT-2DD/350-SY43	53	350					13	SP	AL

Full bridge, shear pattern, 2 half bridge with common lead/solder pad 350 Ω

4 STRAIN GAGES ON ONE CARRIER PIECE CAN BE USED AS 1 FULL WHEATSTONE BRIDGE

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 9.8 mm 	SGT-3/700-FB11	$99.50	700	1.9 (0.075)	3.4 (0.134)	9.8 (0.386)	8.2 (0.323)	11	L	ST
	SGT-3/700-FB13	99.50	700					16	L	AL
	SGT-3/700-FB41	84.50	700					11	SP	ST
	SGT-3/700-FB43	84.50	700					16	SP	AL

Full bridge, 4 shear strain gages, on one carrier with separate leads/solder pads 700 Ω

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-2DD/350-SY11, *package of 5, full bridge shear, with ribbon leads, matched to steel,* ***$63.***

NOTE

1: L = Ribbon Lead SP = Solder Pad	2: ST = Steel AL = Aluminum

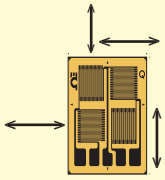
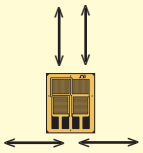
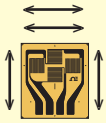
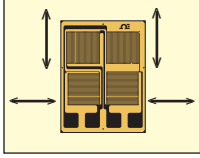
NEW®

FULL WHEATSTONE BRIDGE, BENDING OR AXIAL TENSION OR COMPRESSION PERPENDICULAR GRIDS SINGLE SURFACE GAGING

Quickly and easily design and build your own transducer for bending or axial strain applications where only one side of the beam is available for strain gage installation. Look up the Modulus of Elasticity and the Yield Strength of your material, and design your spring element so that you will be working in the linear portion of the stress-strain curve. For best results use stainless steel or aluminum and match the material to the strain gage temperature characteristics. Install one full bridge, as the one carrier piece has all 4 strain gages. Having one carrier with multiple strain gages offers several advantages. Alignment of the 4 strain gages with respect to each other has already done for you. Strain gages share common ribbon leads or solder pads which saves wiring steps and valuable time. Simply, position the bondable terminal pad close by, and connect your 4 leads (+Excitation, -Excitation, +Signal, -Signal) to the already completed full Wheatstone bridge. Power up your transducer, and calibrate it with a known applied load. The full bridge has 2 fully active strain gages in the principal stress direction and 2 strain gages that will see the effect of Poisson's Ratio. The full Wheatstone bridge tends to cancel thermal and off-axis errors. SGT-3G/350-FB** has 5 terminals, which means it has an open corner at the signal terminals, for addition of zero temperature compensation, and zero balance compensation resistors. All of the other full bridge gages on this page have 4 terminals.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 10.5 mm 	**SGT-3G/350-FB11**	**$101.00**	350	2.5 (0.098)	2.9 (0.114)	10.5 (0.413)	9.3 (0.366)	9	L	ST
	SGT-3G/350-FB13	**101.00**	350	Full bridge for bending or axial strain, single surface gaging, 5 leads/solder pads, open corner in bridge 350 Ω				13	L	AL
	SGT-3G/350-FB41	**86.00**	350					9	SP	ST
	SGT-3G/350-FB43	**86.00**	350					13	SP	AL
Shown actual size, 8 mm 	**SGT-2/1000-FB11**	**$97.50**	1000	1.8 (0.071)	2.4 (0.094)	8 (0.315)	6.5 (0.256)	12	L	ST
	SGT-2/1000-FB13	**97.50**	1000	Full bridge for bending or axial strain, single surface gaging 1000 Ω				16	L	AL
	SGT-2/1000-FB41	**82.50**	1000					12	SP	ST
	SGT-2/1000-FB43	**82.50**	1000					16	SP	AL
Shown actual size, 10 mm 	**SGT-2/350-FB11**	**$100.50**	350	1.8 (0.071)	2 (0.079)	10 (0.394)	9 (0.354)	6.5	L	ST
	SGT-2/350-FB13	**100.50**	350	Full bridge for bending or axial strain 350 Ω				9	L	AL
	SGT-2/350-FB41	**85.50**	350					6.5	SP	ST
	SGT-2/350-FB43	**85.50**	350					9	SP	AL
Shown actual size, 14.8 mm 	**SGT-4/1000-FB11**	**$106.50**	1000	4 (0.157)	4.3 (0.169)	14.8 (0.583)	11.1 (0.437)	23	L	ST
	SGT-4/1000-FB13	**106.50**	1000	Full bridge for bending or axial strain, single surface gaging 1000 Ω				33	L	AL
	SGT-4/1000-FB41	**91.50**	1000					23	SP	ST
	SGT-4/1000-FB43	**91.50**	1000					33	SP	AL

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-2/350-fb11,** package of 5, full bridge for bending, nominal resistance 350 Ω, **$100.50.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

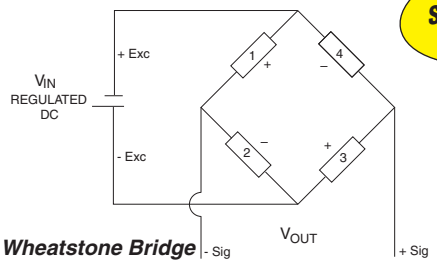
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

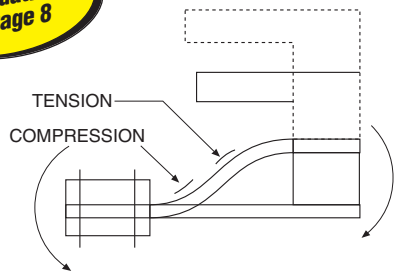
FULL WHEATSTONE BRIDGE, REVERSED-BENDING BEAM OR CONTRAFLEXURE BEAM ALL GRIDS IN THE SAME DIRECTION

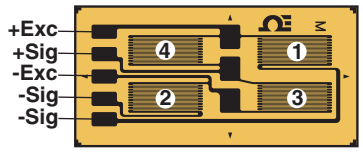
Design and build your own transducers. These full bridge strain gages might be used to design transducers for beams that have a contraflexure point. Contraflexure is defined as a point in a structure where bending occurs in opposite directions. This may also be described as a reversed bending beam, or a double bending beam. The 4 grids are linear, all in the same direction. Look up the modulus of elasticity and the yield strength of your material, and design the spring element so that you will be working in the linear portion of the stress-strain curve. For best results use stainless steel or aluminum and match the strain gage temperature characteristics. You may use these full bridge strain gages for bending strain applications where only one side of the beam is available for strain gage installation. These gages are easy to work with as the carrier piece has all 4 strain gages for fast and easy installation. Having one carrier with multiple strain gages offers several advantages. Alignment of the 4 strain gages with respect to each other is already done. Some of the strain gages share common ribbon leads or solder pads which saves wiring steps and valuable time. The corners of the Wheatstone bridge at the signal output have been left open so that sensor performance can be tested and improved. Zero temperature compensation resistors and zero balance compensation resistors can be easily added into the open corners of the Wheatstone bridge circuit. An extra bondable terminal pad can be placed at the open corner so that the appropriate resistors can be wired in. Or you can simply connect your 4 leads (+Excitation, -Excitation, +Signal, -Signal) and jumper the signal leads together as needed to complete the Wheatstone bridge. Power up your transducer, and calibrate it with a known applied load.

See Equations on Page 8



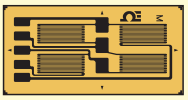
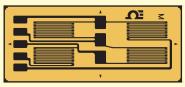
Wheatstone Bridge





MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown smaller than actual size, 13.8 mm 	SGT-3E/350-FB11	$100.50	350	3.2 (0.126)	1.5 (0.059)	13.8 (0.543)	6.8 (0.268)	7.5	L	ST
	SGT-3E/350-FB13	100.50	350	Full bridge pattern for double bending beam, center line spacing 6.35 mm (0.25") 350 Ω				11	L	AL
	SGT-3E/350-FB41	85.50	350					7.5	SP	ST
	SGT-3E/350-FB43	85.50	350					11	SP	AL
Shown smaller than actual size, 15..9 mm 	SGT-3F/350-FB11	$102.00	350	3.2 (0.126)	1.5 (0.059)	15.9 (0.626)	6.8 (0.268)	7.5	L	ST
	SGT-3F/350-FB13	102.00	350	Full bridge pattern for double bending beam, center line spacing 8.38 mm (0.33") 350 Ω				11	L	AL
	SGT-3F/350-FB41	87.00	350					7.5	SP	ST
	SGT-3F/350-FB43	87.00	350					11	SP	AL
Shown smaller than actual size, 28 mm 	SGT-3/1000-FB11	$105.50	1000	3 (0.118)	1.6 (0.063)	28 (1.102)	4.9 (0.193)	13	L	ST
	SGT-3/1000-FB13	105.50	1000	Full bridge pattern for double bending beam, higher resistance, reduced heat generation, center line spacing 15 mm (0.59") 1000 Ω				17	L	AL
	SGT-3/1000-FB41	90.50	1000					13	SP	ST
	SGT-3/1000-FB43	90.50	1000					17	SP	AL

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGT-3/1000-FB11,** package of 5 full bridge pattern for double bending beam, nominal resistance 1000 Ω, **$105.50.

NOTE

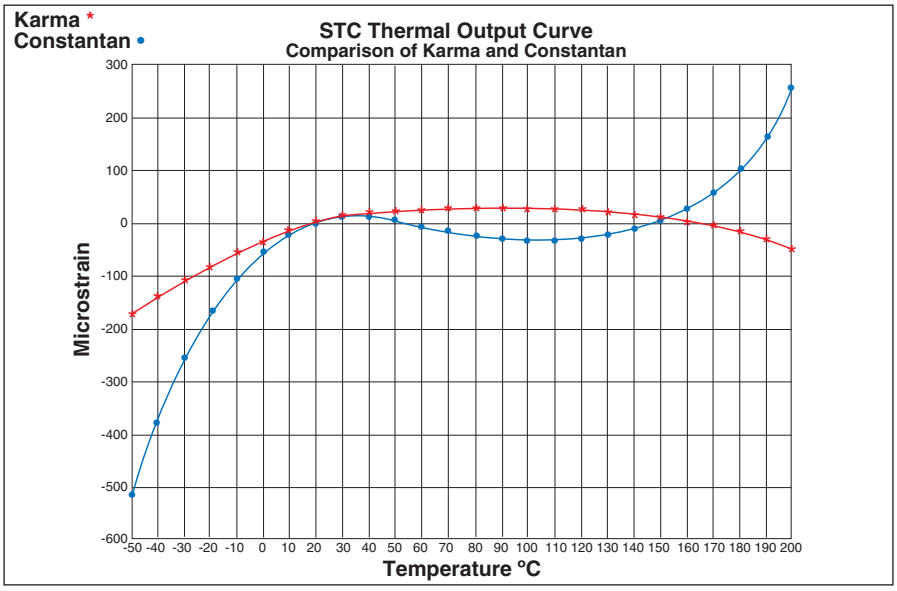
1: L = Ribbon Lead
SP = Solder Pad

2: ST = Steel
AL = Aluminum

TRANDUCER QUALITY STRAIN GAGES, COMPARABLE PART NUMBER SELECTION GUIDE

OMEGADYNE® is offering a full line of strain gages at competitive prices and we look forward to supplying strain gages for all of your future needs. Below you will find a listing of comparable Omega strain gages, in stock for fast delivery. Strain gages offered by Omega are the same precise high quality that you require, and have come to expect, for all of your transducer applications. We stock the most popular strain gage models with temperature characteristics matched to steel and aluminum. Custom strain gages, with custom creep ranges, temperature compensation and trim dimensions can be provided to meet your transducer design needs. Please consult with the Pressure and Strain Engineers at OMEGADYNE and let us know what you need.

Typical Temperature-Induced Apparent Strain Curves
Comparison of Karma and Constantan Foil



Note: *Curves are available for the Precision, Transducer Quality and K-Series strain gages upon request. Locate the CTH Number on the strain gage package and contact Pressure Engineering Department.*

Transducer Quality

OMEGADYNE MODEL NO.	COMPARABLE MODEL NO.
SGT-1/350-TYxx	N2A-XX-S071P-350
SGT-2C/350-TYxx	N2A-XX-T002Q-350
SGT-2/350-DYxx	N2A-XX-S061P-350
SGT-2C/350-DYxx	J2A-XX-S181N-350
SGT-1LH/350-TYxx	N2A-XX-T028K-350
SGT-2LH/350-TYxx	N2A-XX-T012R-350
SGT-3F/350-TYxx	N2A-XX-T004R-350
SGT-3N/350-TYxx	J2A-XX-S033P-350
SGT-3E/350-TYxx	N2A-XX-S044Q-350
SGT-3/350-DYxx	N2A-XX-T006Q-350
SGT-3N/350-DYxx	N2A-XX-S138K-350
SGT-7/350-DYxx	N2A-XX-T026P-350
SGT-1/350-XYxx	N2A-XX-S063Q-350
SGT-2/350-XYxx	N2A-XX-S064L-350
SGT-2H/350-XYxx	J2A-XX-S114L-350
SGT-3L/350-XYxx	N2A-XX-S153R-35B
SGT-3/350-XYxx	N2A-XX-S054Y-350
SGT-3/1000-XYxx	N2K-XX-S145R-10C/DP
SGT-3H/1000-XYxx	N2K-XX-S146R-10C/DP
SGT-1/350-SYxx	N2A-XX-S069P-350
SGT-2D/350M-SYxx	N2A-XX-T031P-350
SGT-2DC/350-SYxx	J2A-XX-S036R-350
SGT-2D/1000-SYxx	J2A-XX-S173R-10C
SGT-3C/350-SYxx	N2A-XX-S028T-350
SGT-3D/350-SYxx	J2A-XX-S149K-350
SGT-3M/350-SYxx	N2A-XX-T029Q-350
SGT-3FS/350-SYxx	J2A-XX-S034P-350
SGT-3HB/350K-SYxx	J2A-XX-S111K-350
SGT-2/350-FBxx	J2A-XX-S1425-35B
SGT-3E/350-FBxx	N2A-XX-S055R-350
SGT-3F/350-FBxx	N2A-XX-S014N-350
SGT-3G/350-FBxx	N2A-XX-S056R-350
SGT-9/350-LDxx	N2A-XX-S094N-350
SGT-18/350-LDxx	EA-XX-S079R-350
SGT-18/1000-LDxx	N2A-XX-S208R-10C
SGT-24/350-LDxx	N2A-XX-S062W-350

Karma

OMEGADYNE MODEL NO.	COMPARABLE MODEL NO.
SGK-L1D-K350P-PCxx	N2K-XX-T009-350/DP
SGK-L1E-K350T-PCxx	N2K-XX-T003Q-350/DP
SGK-LH1B-K350T-PCxx	N2K-XX-T011Q-350/DP
SGK-LH1C-K350T-PCxx	N2K-XX-T016Q-350/DP
SGK-L3A-K350U-PCxx	N2K-XX-T005R-350/DP
SGK-L3E-K350W-PCxx	N2K-XX-T020T-350/DP
SGK-L6A-K350U-PCxx	N2K-XX-T008R-350/DP
SGK-B5A-K350W-PCxx	N2K-XX-S015T-350/DP
SGK-D3A-K350U-PCxx	N2K-XX-S082R-350/DP
SGK-SD3A-K350U-PCxx	N2K-XX-T032P-350/DP
SGK-SS3A-K350U-PCxx	N2K-XX-S090R-350/DP
SGK-SS3B-K350U-PCxx	N2K-XX-S142R-350/DP
SGK-LD1B-K350Q-PCxx	N2K-XX-S092N-350/DP

Omega SGT strain gages are encapsulated. Comparable N2A and EA strain gages are open-faced patterns. Comparable J2A strain gages are encapsulated.

SPECIFICATION CHART

OMEGADYNE® K-Series Karma Strain Gages Specifications Chart

OMEGADYNE now offers a full line of Karma strain gages. The K-Series strain gages are often used for OEM transducer applications where transducers with exacting specifications must be produced. K-Series strain gages are designed with optimum backing thickness tolerance. Creep variations from one strain gage to another are kept to a minimum. For batch production, this will keep bridge output differences between strain gage installations to a minimum. The K-Series gages have very uniform matrix or carrier dimensions. These tight trim dimensions allow for the carrier edge to be used for strain gage alignment. Consistent strain gage placement will keep bridge output differences among the transducers to a minimum.

Karma material is a nickel chromium alloy which can be used for strain sensing. The characteristics of the alloy compared with standard constantan alloy strain gages are as follows:

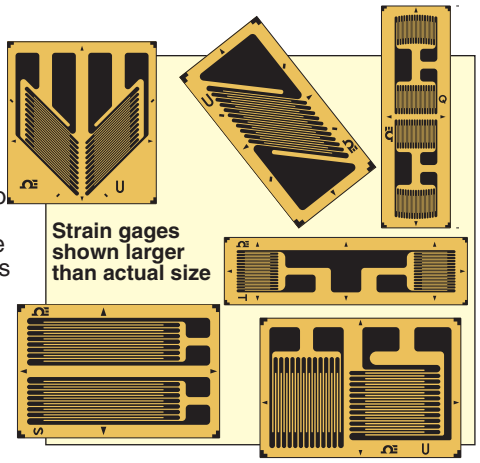
- Improved fatigue life.
- Excellent Stability over a wide temperature range.
- A much flatter thermal output curve which provides for more accurate thermal correction over a wider temperature range.
- A higher resistivity which enables higher resistance strain gages for the same size or same resistance in a smaller size.

Karma gages are available with temperature characteristics matched to stainless steel or aluminum. Karma is known to be difficult to solder, even with special flux. OMEGADYNE is offering ribbon leads or copper plated solder pads, so that standard soldering techniques can be used, making wiring easier.

Creep compensation is available for Karma strain gages. It may be necessary in transducer design to match the strain gage transducer creep characteristics to the spring element. Karma strain gages are labeled with a letter code which identifies a creep code value. The creep characteristics of a strain gage pattern can be modified by varying the length of the end loops and the limb or strand width. Creep codes are a ratio of the end loop length to the limb width. An increasing ratio will give a longer end loop and a more positive creep characteristic. OMEGADYNE will work with you to develop the custom creep value needed for your application. K-Series strain gages are suggested for static strain measurement over a wide temperature range from -75 to 200°C (-100 to 392°F) due to their good linearity over this wide temperature range.

K-Series strain gages are often used for fatigue-rated transducer designs. The fatigue life of Karma alloy tends to be much better than constantan, and so transducers using Karma strain gages provide good fatigue life. You will notice if you compare the fatigue specifications that Karma is rated at ±1800 micro strain, >10,000,000 cycles, and constantan is rated at SGD series is rated at ±1500 micro strain, >10,000,000 cycles.

A transducer designed at ±1500 micro strain or below, using Karma strain gages will have improved fatigue life.



SPECIFICATIONS

SGK SERIES	
Foil Measuring Grid	Karma foil 5 microns thick
Carrier	Polyimide
Substrate Thickness	20 microns
Cover Thickness	25 microns
Connection Dimensions: mm (in)	Copper plated solder pads or ribbon leads, tinned copper flat wire 30 L x 0.1 D x 0.3 W(1.2 x 0.004 x 0.012); other wire types available upon request
Nominal Resistance	Stated in “To Order” box
Resistance Tolerance Per Package	±0.15% to ±0.5% depending on gage spec
Gage Factor (Actual Value Printed on Each Package)	2.1 ±5%
Gage Factor Tolerance Per Package	1.00%
THERMAL PROPERTIES	
Reference Temperature	23°C (73°F)
SERVICE TEMPERATURE	
Static Measurements	-75 to 200°C (-100 to 392°F)
Dynamic Measurements	-75 to 200°C (-100 to 392°F)
TEMPERATURE CHARACTERISTICS	
Steel (and Certain Stainless Steels)	11 ppm/°C (6.1 ppm/°F)
Aluminum	23 ppm/°C (12.8 ppm/°F)
Temperature Compensated Range	-10 to 180°C (14 to 356°F)
Tolerance of Temp Compensation	1 ppm/°C (0.5 ppm/°F)
MECHANICAL PROPERTIES	
Maximum Strain	1.5% or 15,000 microstrain
Hysteresis	Negligible
Fatigue (at ±1800 microstrain)	>10,000,000 cycles
Smallest Bending Radius	3 mm (⅛")

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

LINEAR PATTERN STRAIN GAGES

- K-Series, Transducer-Quality
- Stock Delivery with Solder Pads
- Good Linearity Over Wide Temperature Range -75 to 200°C (-100 to 392°F)
- Good Fatigue Life
- Custom Gages Available

The linear pattern strain gages are used to measure strain in a single direction. The strain gage pattern is shown on the left side of the table. Notice the "arrow" which indicates the principal stress direction.

The linear pattern strain gages are available in a variety of styles and sizes. OMEGADYNE® offers miniature linear patterns for strain measurement of a stress concentration or high gradient areas. The ribbon leads/solder pads are offered both at one end of the grid, or with one at each end of the grid. Wide or narrow linear grid patterns are available. To determine if the strain gages have ribbon leads or solder pads, see the column labeled "TERM" short for termination, "L" indicates ribbon leads, and "SP" indicates solder pads. To determine if the strain gages have temperature characteristics matched to steel or aluminum, see the column labeled "COMP" short for compensation, "ST" indicates steel, "AL" indicates aluminum. See the column labeled "BTP" for accessory bondable terminal pad model numbers.

Dimensions are listed for pattern gage grid length (A) and width (B), and the matrix or carrier length (C) and width (D). The patterns include alignment triangles and letter codes indicating creep code.

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²	TERM PAD
Shown actual size, 5.5 mm	SGK-L1D-K350P-PC11-LE	$47	350	1.5 (0.059)	2.5 (0.098)	5.5 (0.22)	4 (0.16)	6.5	L	ST	BTP-1
	SGK-L1D-K350P-PC23-LE	47	350					9	L	AL	
	SGK-L1D-K350P-PC11-E	38	350					6.5	SP	ST	
	SGK-L1D-K350P-PC23-E	38	350					9	SP	AL	
				Miniature linear pattern, measurement of stress concentration 350 Ω							
Shown actual size, 6 mm	SGK-L1E-K350T-PC11-LE	$40	350	1.51 (0.059)	4.5 (0.177)	6 (0.24)	6 (0.24)	8.5	L	ST	BTP-1
	SGK-L1E-K350T-PC23-LE	40	350					12.5	L	AL	
	SGK-L1E-K350T-PC11-E	31	350					8.5	SP	ST	
	SGK-L1E-K350T-PC23-E	31	350					12.5	SP	AL	
				Miniature linear pattern, grid width, wide 350 Ω							
Shown actual size, 7.5 mm	SGK-L3A-K350U-PC11-LE	$40	350	3.2 (0.126)	3.2 (0.126)	7.5 (0.3)	4.6 (0.18)	10.5	L	ST	BTP-2
	SGK-L3A-K350U-PC23-LE	40	350					14.5	L	AL	
	SGK-L3A-K350U-PC11-E	31	350					10.5	SP	ST	
	SGK-L3A-K350U-PC23-E	31	350					14.5	SP	AL	
				Small linear pattern, lead/pads at one end of grid 350 Ω							
Shown actual size, 7.2 mm	SGK-L3B-K350S-PC11-LE	$40	350	3.2 (0.126)	2.5 (0.098)	7.2 (0.28)	4 (0.16)	9	L	ST	BTP-2
	SGK-L3B-K350S-PC23-LE	40	350					13	L	AL	
	SGK-L3B-K350S-PC11-E	31	350					9	SP	ST	
	SGK-L3B-K350S-PC23-E	31	350					13	SP	AL	
				Small linear pattern, lead/pads at one end of grid 350 Ω							

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: SGK-L3A-K350U-PC11-E,** package of 5, linear pattern strain gages with copper plated solder pads, nominal resistance 350 Ω, **$31.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

LINEAR PATTERN STRAIN GAGES CONTINUED

MOST POPULAR MODELS HIGHLIGHTED!

See page 66

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]	TERM PAD
Shown actual size, 8.3 mm 	SGK-L3C-K350T-PC11-LE	$41	350	3.2 (0.126)	3.1 (0.122)	8.3 (0.33)	4.6 (0.18)	10.5	L	ST	BTP-3
	SGK-L3C-K350T-PC23-LE	41	350					14.5	L	AL	
	SGK-L3C-K350T-PC11-E	31	350					10.5	SP	ST	
	SGK-L3C-K350T-PC23-E	31	350					14.5	SP	AL	
Shown actual size, 8.5 mm 	SGK-L3D-K350P-PC11-LE	$41	350	2.8 (0.110)	2.1 (0.083)	8.5 (0.34)	3.5 (0.14)	8	L	ST	BTP-3
	SGK-L3D-K350P-PC23-LE	41	350					12	L	AL	
	SGK-L3D-K350P-PC11-E	31	350					8	SP	ST	
	SGK-L3D-K350P-PC23-E	31	350					12	SP	AL	
Shown actual size, 7 mm 	SGK-L3E-K350W-PC11-LE	$39	350	3.2 (0.126)	1.5 (0.059)	7 (0.28)	3 (0.12)	7.5	L	ST	BTP-3
	SGK-L3E-K350W-PC23-LE	39	350					10.5	L	AL	
	SGK-L3E-K350W-PC11-E	31	350					7.5	SP	ST	
	SGK-L3E-K350W-PC23-E	31	350					10.5	SP	AL	
Shown actual size, 11 mm 	SGK-L6A-K350U-PC11-LE	$60	350	6.3 (0.248)	3.2 (0.126)	11 (0.43)	4.7 (0.18)	15	L	ST	BTP-4
	SGK-L6A-K350U-PC23-LE	60	350					20	L	AL	
	SGK-L6A-K350U-PC11-E	50	350					15	SP	ST	
	SGK-L6A-K350U-PC23-E	50	350					20	SP	AL	
Shown actual size, 11 mm 	SGK-L6A-K1000U-PC11-LE	$66	1000	6.3 (0.248)	3.2 (0.126)	11 (0.43)	4.7 (0.18)	25	L	ST	BTP-4
	SGK-L6A-K1000U-PC23-LE	66	1000					35	L	AL	
	SGK-L6A-K1000U-PC11-E	56	1000					25	SP	ST	
	SGK-L6A-K1000U-PC23-E	56	1000					35	SP	AL	
Shown actual size, 11.3 mm 	SGK-L6B-K350U-PC11-LE	$66	350	6.3 (0.248)	4.4 (0.173)	11.3 (0.44)	6 (0.24)	17	L	ST	BTP-4
	SGK-L6B-K350U-PC23-LE	66	350					24	L	AL	
	SGK-L6B-K350U-PC11-E	56	350					17	SP	ST	
	SGK-L6B-K350U-PC23-E	56	350					24	SP	AL	
Shown actual size, 11.3 mm 	SGK-L6B-K1000U-PC11-LE	$66	1000	6.3 (0.248)	4.4 (0.173)	11.3 (0.44)	6 (0.24)	28	L	ST	BTP-4
	SGK-L6B-K1000U-PC23-LE	66	1000					40	L	AL	
	SGK-L6B-K1000U-PC11-E	56	1000					28	SP	ST	
	SGK-L6B-K1000U-PC23-E	56	1000					40	SP	AL	

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-L6B-K1000U-PC11-E,** package of 5 linear pattern strain gages with copper plated solder pads, temperature characteristics matched to steel, nominal resistance 1000 Ω, **$56.

NOTE

1: L = Ribbon Lead
SP = Solder Pad

2: ST = Steel
AL = Aluminum

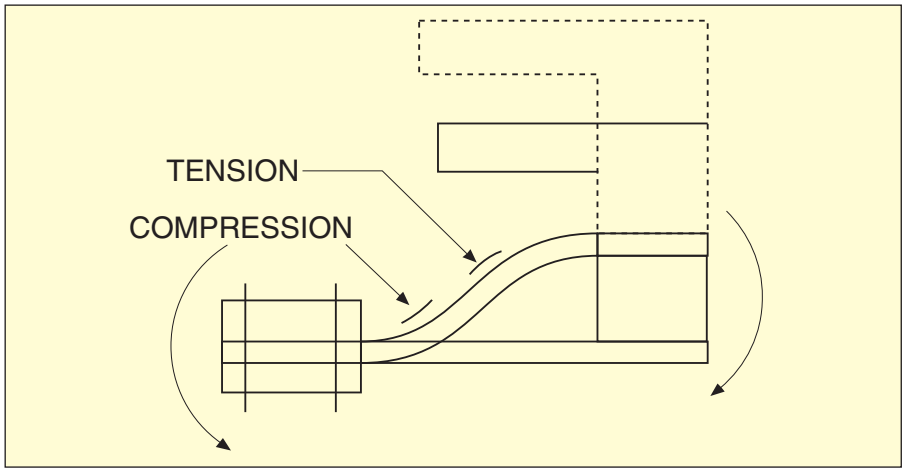
Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

DUAL LINEAR PATTERN IN HALF BRIDGE DESIGN WITH A COMMON LEAD/TAB

- K-Series, Transducer-Quality
- Stock Delivery with Solder Pads
- Temperature Characteristics Matched to Steel or Aluminum
- Custom Gages Available
- Dual Linear Half-Bridge for Doublebend Application



OMEGADYNE® offers K-Series strain gages in dual linear patterns in a half-bridge design with a common tab. These strain gages might be used for transducer design for beams that have a contraflexure point. Defined as a point in a structure where bending occurs in opposite directions. A transducer may also be described as a reversed bending beam. The grids are linear, both in the same direction, and are typically used for bending strain applications.

Three Styles are Available:

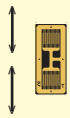
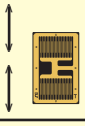
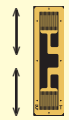
Standard: SGK-LH1A-K350T-****, with grid centerline to centerline spacing of 5.52 mm (0.217")

Compact: Wide grid, SGK-LH1B-K350T-****, with grid centerline to centerline spacing of 5.50 mm (0.216")

Large: SGK-LH1C-K350T-****, with grid centerline to centerline spacing of 10.50 mm (0.413")

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²
Shown actual size, 9.2 mm 	SGK-LH1A-K350T-PC11-LE	$46	350	1.5 (0.059)	2.5 (0.098)	9.2 (0.36)	4 (0.16)	6.5	L	ST
	SGK-LH1A-K350T-PC23-LE	46	350					9	L	AL
	SGK-LH1A-K350T-PC11-E	36	350					6.5	SP	ST
	SGK-LH1A-K350T-PC23-E	36	350					9	SP	AL
Shown actual size, 9.3 mm 	SGK-LH1B-K350T-PC11-LE	$47	350	1.5 (0.059)	4.5 (0.177)	9.3 (0.37)	6 (0.24)	8.5	L	ST
	SGK-LH1B-K350T-PC23-LE	47	350					12.5	L	AL
	SGK-LH1B-K350T-PC11-E	38	350					8.5	SP	ST
	SGK-LH1B-K350T-PC23-E	38	350					12.5	SP	AL
Shown actual size, 14.4 mm 	SGK-LH1C-K350T-PC11-LE	$50	350	1.5 (0.059)	2.5 (0.098)	14.4 (0.57)	4 (0.16)	6.5	L	ST
	SGK-LH1C-K350T-PC23-LE	50	350					9	L	AL
	SGK-LH1C-K350T-PC11-E	40	350					6.5	SP	ST
	SGK-LH1C-K350T-PC23-E	40	350					9	SP	AL

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-LH1A-K350T-PC11-E, *package of 5, dual linear half-bridge, with solder pads, nominal resistance 350 Ω* ***$36***

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

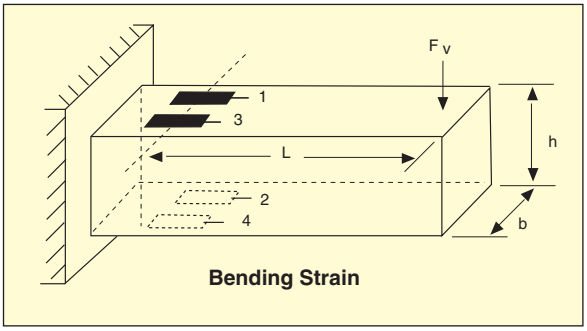
NEW®

DUAL PARALLEL GRID STRAIN GAGES

- K-Series, Transducer-Quality
- Stock Delivery, Copper Plated Solder Pads
- Temperature Characteristics Matched to Steel or Aluminum
- Dual Parallel Grid for Bending Strain Applications
- Custom Gages Available

See Equations on Page 9

OMEGADYNE® offers K-Series dual linear strain gage patterns. These strain gages can be used for bending beam transducer designs where you have access to both sides of the beam. Each carrier has 2 separate parallel linear strain gages.



Bending Strain

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION[1]	TEMP COMP[2]
Shown actual size, 6 mm	SGK-D2A-K350Q-PC11-LE	$61	350	2 (0.079)	2.5 (0.098)	6 (0.24)	6.2 (0.24)	7.5	L	ST
	SGK-D2A-K350Q-PC23-LE	61	350					10.5	L	AL
	SGK-D2A-K350Q-PC11-E	51	350					7.5	SP	ST
	SGK-D2A-K350Q-PC23-E	51	350					10.5	SP	AL
				Small dual parallel grid for bending strain 350 Ω						
Shown actual size, 7 mm	SGK-D3A-K350U-PC11-LE	$61	350	3.2 (0.126)	1.6 (0.63)	7 (0.28)	5.2 (0.2)	7.5	L	ST
	SGK-D3A-K350U-PC23-LE	61	350					10.5	L	AL
	SGK-D3A-K350U-PC11-E	51	350					7.5	SP	ST
	SGK-D3A-K350U-PC23-E	51	350					10.5	SP	AL
				Medium, dual parallel grid pattern for bending strain 350 Ω						
Shown actual size, 7.2 mm	SGK-D3B-K350Q-PC11-LE	$61	350	3.2 (0.126)	2.5 (0.098)	7.2 (0.29)	7.2 (0.28)	9	L	ST
	SGK-D3B-K350Q-PC23-LE	61	350					13	L	AL
	SGK-D3B-K350Q-PC11-E	51	350					9	SP	ST
	SGK-D3B-K350Q-PC23-E	51	350					13	SP	AL
				Medium, dual parallel grid pattern for bending strain 350 Ω						
Shown actual size, 10.6 mm	SGK-D6A-K350S-PC11-LE	$67	350	6.3 (0.248)	2.5 (0.098)	10.6 (0.42)	7 (0.28)	14	L	ST
	SGK-D6A-K350S-PC23-LE	67	350					19	L	AL
	SGK-D6A-K350S-PC11-E	60	350					14	SP	ST
	SGK-D6A-K350S-PC23-E	60	350					19	SP	AL
				Large, dual parallel grid pattern for bending strain 350 Ω						
Shown actual size, 10.6 mm	SGK-D6A-K1000S-PC11-LE	$71	1000	6.3 (0.248)	2.5 (0.098)	10.6 (0.42)	7 (0.28)	22	L	ST
	SGK-D6A-K1000S-PC23-LE	71	1000					32	L	AL
	SGK-D6A-K1000S-PC11-E	63	1000					22	SP	ST
	SGK-D6A-K1000S-PC23-E	63	1000					32	SP	AL
				Large, dual parallel grid pattern for bending strain, higher resistance, reduced heat generation 1000 Ω						

*†For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-D3B-K350Q-PC11-E,** package of 5, dual parallel grid for bending strain, with copper solder pads, nominal resistance 350 Ω, **$51.

NOTE
1: L = Ribbon Lead, SP = Solder Pad
2: ST = Steel, AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

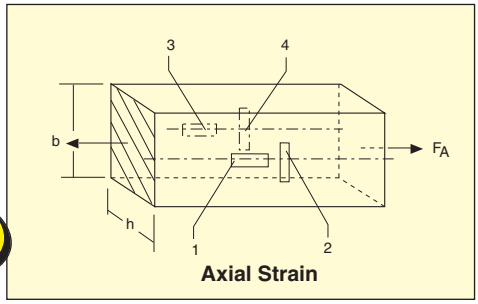
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

TEE ROSETTE GAGES

- K-Series, Transducers Quality
- Good Linearity Over Wide Temperature Range -75 to 200°C (-100 to 392°F)
- Good Fatigue Life
- Custom Gages Available

See Equations on Page 9



Axial Strain

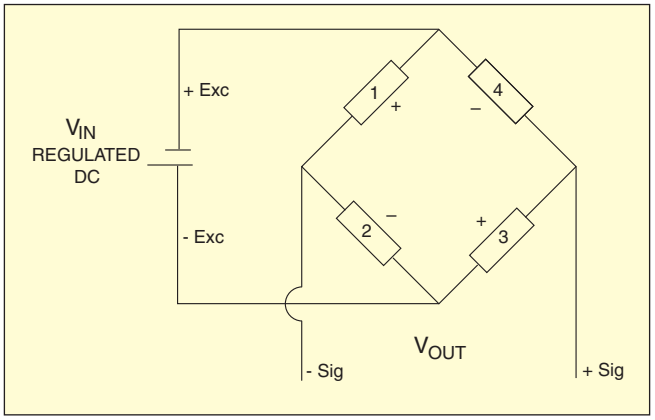
OMEGADYNE® offers K-Series Tee Rosettes for Axial strain transducer designs.

Three different Tee Rosette styles available:

SGK-B3A-K350U -***** has 2 separate strain gages with perpendicular grids on a single carrier.

SGK-BH3A-K350U-***** is a half-bridge design, with 2 strain gages, perpendicular grids with a common lead/pad on a single carrier.

SGK-B5A-K350W-***** is a half-bridge Tee Rosette design, often used for column load cell design where high accuracy is a requirement. The geometry for this strain gage is shown with the tabs along the top, and the center strain gage is vertical, and used for the principal stress direction in the column. The Perpendicular grid is split, half on each side. This may also be known as transverse grid. The transverse grid tends to correct for bending strain, or off-axis loading in the column.



MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²
Shown actual size, 7.5 mm	SGK-B3A-K350U-PC11-LE	$67	350	3.2 (0.126)	4 (0.157)	7.5 (0.3)	10.8 (0.43)	12.5	L	ST
	SGK-B3A-K350U-PC23-LE	67	350					17.5	L	AL
	SGK-B3A-K350U-PC11-E	60	350					12.5	SP	ST
	SGK-B3A-K350U-PC23-E	60	350					17.5	SP	AL
				90° TEE rosette axial strain, separate gages 350 Ω						
Shown actual size, 7.5 mm	SGK-BH3A-K350U-PC11-LE	$67	350	3.2 (0.126)	4 (0.157)	7.5 (0.3)	10.8 (0.43)	12.5	L	ST
	SGK-BH3A-K350U-PC23-LE	67	350					17.5	L	AL
	SGK-BH3A-K350U-PC11-E	60	350					12.5	SP	ST
	SGK-BH3A-K350U-PC23-E	60	350					17.5	SP	AL
				90° TEE rosette half-bridge, common lead/pad 350 Ω						
Shown actual size, 9.8 mm	SGK-B5A-K350W-PC11-LE	$80	350	5 (0.197)	2.3 (0.091)	9.8 (0.39)	9 (0.35)	11	L	ST
	SGK-B5A-K350W-PC23-LE	80	350					15	L	AL
	SGK-B5A-K350W-PC11-E	70	350					11	SP	ST
	SGK-B5A-K350W-PC23-E	70	350					15	SP	AL
				Used for high accuracy column load cells 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-BH3A-K350U-PC11-E,** package of 5, Tee rosette for axial strain, half-bridge with a common solder pad, nominalresistance 350 Ω, **$60.

NOTE

1: L = Ribbon Lead
SP = Solder Pad

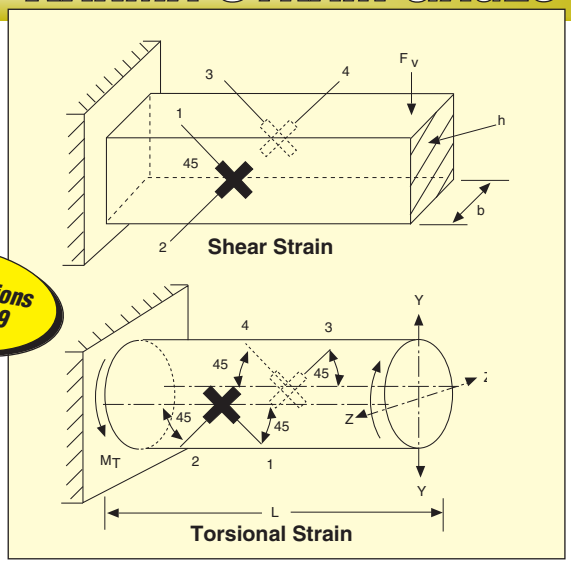
2: ST = Steel
AL = Aluminum

NEW®

SHEAR AND TORQUE PATTERN GAGES

- K-Series, Transducer Quality
- Available as Single ¼ Bridge, Single ¼ Matched Reversed Pattern, ½ Bridge with Separate Leads/Tabs, or ½ Bridge with Common Lead/Tab
- Custom Gages Available

OMEGADYNE® offers K-Series strain gages for shear and torsional strain applications. These strain gages can be used in transducer design for shear beam load cells. They can also be used for reaction torque on a shaft. Single strain gages are available, SGK-SS3A-K350U-**** and matched, but with opposite grid angle is the SGK-SS3B-K350U-****. The SGK-SD3A-K350U-**** and the SGK-SD3B-K350U-**** have 2 shear strain gages, with opposite grid angles, on one carrier, with separate leads/tabs(electrically independent). The SGK-SDH3B-K350U-**** has 2 shear strain gages, with opposite grid angles with a common lead/tab.



See Equations on Page 9

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²
Shown actual size, 9.2 mm	SGK-SS3A-K350U-PC11-LE	$58	350	3.2 (0.126)	3.38 (0.133)	9.2 (0.36)	4.7 (0.19)	11	L	ST
	SGK-SS3A-K350U-PC23-LE	58	350					15	L	AL
	SGK-SS3A-K350U-PC11-E	48	350					11	SP	ST
	SGK-SS3A-K350U-PC23-E	48	350					15	SP	AL
				Single shear gage 350 Ω						
Shown actual size, 9.2 mm	SGK-SS3B-K350U-PC11-LE	$63	350	3.2 (0.126)	3.38 (0.133)	9.2 (0.36)	4.7 (0.19)	11	L	ST
	SGK-SS3B-K350U-PC23-LE	63	350					15	L	AL
	SGK-SS3B-K350U-PC11-E	52	350					11	SP	ST
	SGK-SS3B-K350U-PC23-E	52	350					15	SP	AL
				Single shear gage with opposite grid angle 350 Ω						
Shown actual size, 9.8 mm	SGK-SD3A-K350U-PC11-LE	$58	350	3.2 (0.126)	3.38 (0.133)	9.8 (0.39)	8.5 (0.33)	11	L	ST
	SGK-SD3A-K350U-PC23-LE	58	350					15	L	AL
	SGK-SD3A-K350U-PC11-E	48	350					11	SP	ST
	SGK-SD3A-K350U-PC23-E	48	350					15	SP	AL
				Shear torque, 2 gages on one carrier 350 Ω						
Shown actual size, 10.2 mm	SGK-SD3B-K350U-PC11-LE	$63	350	3.2 (0.126)	3.38 (0.133)	10.2 (0.4)	9.4 (0.37)	11	L	ST
	SGK-SD3B-K350U-PC23-LE	63	350					15	L	AL
	SGK-SD3B-K350U-PC11-E	52	350					11	SP	ST
	SGK-SD3B-K350U-PC23-E	52	350					15	SP	AL
				Shear torque, 2 gages on one carrier 350 Ω						
Shown actual size, 10.2 mm	SGK-SDH3B-K350U-PC11-LE	$67	350	3.2 (0.126)	3.38 (0.133)	10.2 (0.4)	9.4 (0.37)	11	L	ST
	SGK-SDH3B-K350U-PC23-LE	67	350					15	L	AL
	SGK-SDH3B-K350U-PC11-E	56	350					11	SP	ST
	SGK-SDH3B-K350U-PC23-E	56	350					15	SP	AL
				Shear half bridge with common lead/pad 350 Ω						

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*
***Note:** For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-SD3B-K350U-PC23-E,** package of 5, Karma K-Series shear/torque pattern, with copper plated solder pads, half-bridge with 2 shear strain gages, with opposite grid angles on one carrier, electrically independant, nominal resistance 350 Ω, **$52.

NOTE

1: L = Ribbon Lead SP = Solder Pad	2: ST = Steel AL = Aluminum

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

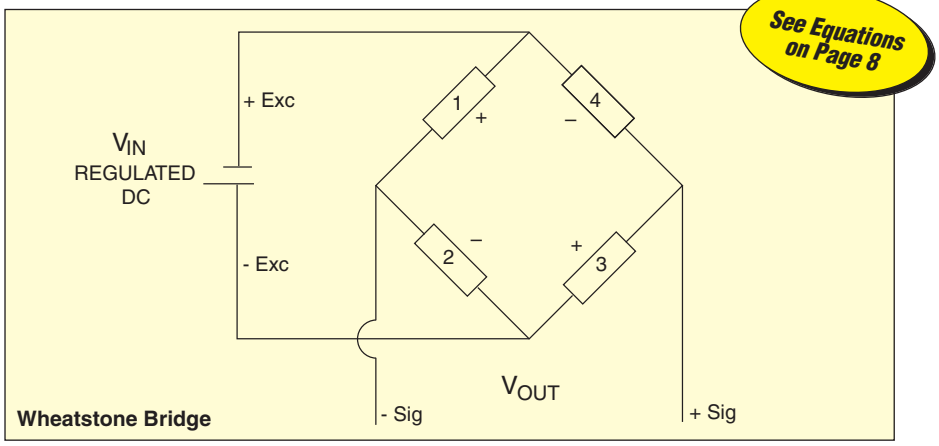
NEW®

LINEAR DIAPHRAGM GAGES

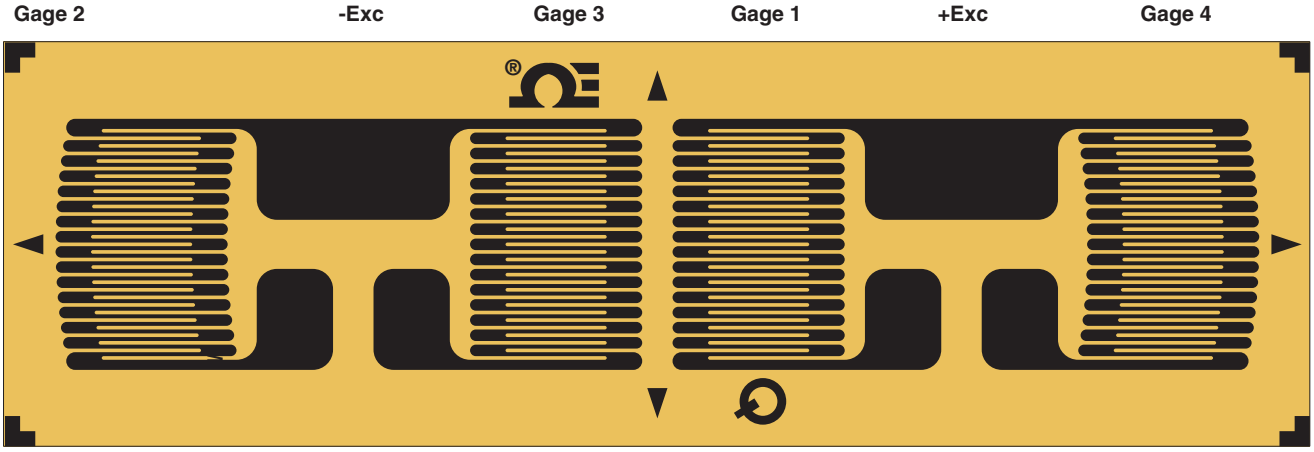
- **K-Series, Transducer Quality**
- **Stock Delivery with Plated Solder Pads**
- **Custom Gages Available**

OMEGADYNE® offers K-Series, linear diaphragm pattern strain gages for use in pressure transducer designs. This linear diaphragm pattern has 4 strain gages mounted onto a single carrier. The strain gages in the center will go into tension, and the outer 2 will go into compression. In the pressure transducer design, a diaphragm is clamped around the outer edge, and subjected to a uniform pressure. Near the center of the diaphragm the radial and tangential strains will be positive, and will be nearly equal. The radial strain decreases and becomes negative as you move away from the center toward the outer edge. Midway between the center and the outer edge the strain is at its lowest and the leads/solder pads are located in this low stress area. In this pattern, there are 2 half-bridges. Each half-bridge has a common lead/solder pad. The pattern has been enlarged to show the detail. The strain gages and terminal pads have been numbered and labeled. The corners of the Wheatstone bridge have been left open for the addition of zero temperature compensation resistors, and zero balance compensation resistors if required. SGK-LD1B-K350Q-**** can be used for a 0.500" diameter diaphragm.

See Equations on Page 8



Wheatstone Bridge



MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

	MODEL NO.	PRICE PER PKG OF 5	NOM. RESIS-TANCE (Ω)	DIMENSIONS mm (in)† GRID A	GRID B	CARRIER C	CARRIER D	MAX V* (Vrms)	TERMINATION¹	TEMP COMP²
Shown actual size, 12.9 mm 	SGK-LD1B-K350Q-PC11-LE	$123	350	1 (0.039)	2.49 (0.098)	12.9 (0.51)	4 (0.16)	5	L	ST
	SGK-LD1B-K350Q-PC23-LE	123	350					7.5	L	AL
	SGK-LD1B-K350Q-PC11-E	111	350					5	SP	ST
	SGK-LD1B-K350Q-PC23-E	111	350					7.5	SP	AL

Shear half bridge with common lead/pad 350 Ω

*† For dimensions key, see page 35. * Maximum permitted bridge energizing voltage (Vrms).*

Note: *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGK-LD1B-K350Q-PC11-E, *package of 5, Karma K-Series linear diaphragm full bridge for 1/2" diameter diaphragm,nominal 350 Ω resistance,* ***$111.***

NOTE

1: L = Ribbon Lead
SP = Solder Pad

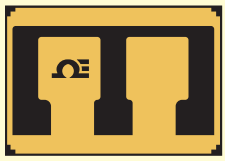
2: ST = Steel
AL = Aluminum

NEW®

GUIDE TO STRAIN GAGE ACCESSORIES AND INSTRUMENTATION

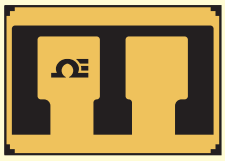
SGN Span Temperature-Compensation Resistors. Fixed span temperature compensation resistors can be added to the excitation legs in the full Wheatstone bridge for span temperature compensation. As the temperature increases, the bridge output for a certain load also increases. This can be offset due to the temperature increasing the SGN resistance, causing the bridge to see less voltage, reducing the output. The SGN is available as **"-E"**, encapsulated, or as **"-PN"**, open faced with no encapsulation.

See page 64



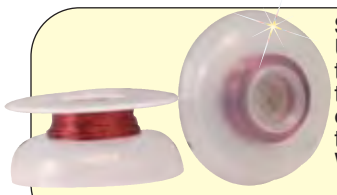
RES-2C, RES-5C, Zero Balance Compensation Resistors (Constantan Foil). These low-TC resistors, or low coefficient of resistance with temperature resistors, are relatively insensitive to temperature changes, and are used to balance the bridge, adjusting the "no load" bridge output to zero mV/V. They are inserted into the corners of the Wheatstone bridge using the same strain gage adhesive between gages 1 and 2, and 3 and 4. The center terminal pad becomes the signal lead, and the resistor halves are wired to the strain gages. Abrade the surface using an eraser to adjust the resistance value.

See page 64



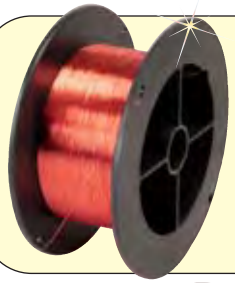
RES-2N, RES-5N, Temperature Compensation Resistors (Nickel Foil). These high-TC resistors, or temperature sensitive resistors, are used to insure that the full Wheatstone bridge does not drift with temperature in the "no load" condition. They are inserted into the corners of the Wheatstone bridge using the same strain gage adhesive, between strain gages 1 and 2 and 3 and 4. The center terminal pad becomes the signal lead, and the resistor halves are wired to the strain gages. Abrade the surface of the resistor with an eraser to adjust the resistor value.

See page 64



SGB-36 Solid Balco Wire 42AWG, 0.064 mm (0.0025") with Nylon/Polyurethane Enamel. Used for zero and span temperature compensation in the full Wheatstone bridge. High-TC, or temperature sensitive wire, used to insure that the full Wheatstone bridge does not drift with temperature in the "no load" condition. Various lengths of this wire are soldered into the corners of the full Wheatstone bridge circuit for zero temperature adjustment. Also used for span temperature compensation by soldering in various lengths into the excitation legs of the full Wheatstone bridge. As the temperature increases, the balco wire resistance increases in the excitation leads to cause the bridge to see less voltage, reducing the output. Temperature Coefficient is 0.45%/C. Nominal resistance is 65 Ωs/m (20 Ωs/f).

See page 66

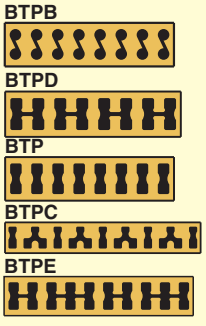


SGC-36 Solid Copper Wire 36AWG, 0.127 mm (0.0050") with Red Poly Insulation. Used for zero and span temperature compensation in the full Wheatstone bridge. High-TC, or temperature sensitive wire, used to insure that the full Wheatstone bridge does not drift with temperature in the "no load" condition. Various lengths of this wire are soldered into the corners of the full Wheatstone bridge circuit for zero temperature adjustment. Also used for span temperature compensation by soldering in various lengths into the excitation legs of the full Wheatstone bridge. As the temperature increases, the copper wire resistance increases in the excitation leads to cause the bridge to see less voltage, reducing the output. Temperature Coefficient is 0.39%/C. Nominal resistance is 0.415 Ωs/f. Can also be used in strain gage bridge wiring to make the jumper wire from solder pad or tab to bondable terminal pad.

See page 66

SGM-36 Solid Manganin Wire 37AWG, 0.114 mm (0.0045") with Nylon/Polyurethane Enamel. Low-TC, or low coefficient of resistance with temperature, wire that is relatively insensitive to temperature changes, and is used to balance the bridge, adjusting the "no load" bridge output to zero mV/V. Various lengths are cut and soldered into the corners of the Wheatstone bridge. Temperature Coefficient is 0.002%/C. Nominal resistance is 50 Ωs/m (15 Ωs/f).

See page 66

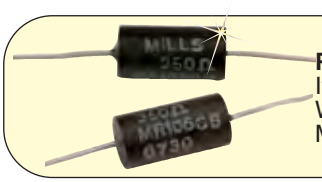


BTP, BTPB, BTPC, BTPD, BTPE Bondable Terminal Pads. Which is a strip of copper foil pads, mounted onto a polyimide carrier material. BTP is cut into pieces as needed and bonded adjacent to the strain gage, using the same strain gage adhesive, and the instrument lead wires are soldered onto these. These are used with strain gages that have solder pads or ribbon leads. If you have solder pads, you will use a flexible, curved jumper wire, from the strain gage to BTP, and then you will solder your heavy insulated instrumentation wire onto BTP. If you have the ribbon leads, form a gentle curve into the ribbon lead, bring it onto the BTP, solder the ribbon lead and trim any excess, and then you will solder your heavy insulated instrument wire onto BTP. BTPs act as intermediate connection points for lead wire attachment and stress relief. They are available in a variety of sizes and geometries to suit your strain gage installation needs. BTPC is often used for 3-wire bridge connection. BTPD is often used for full Wheatstone bridge connections.

See page 66

NEW

GUIDE TO STRAIN GAGE ACCESSORIES AND INSTRUMENTATION



RES-120, RES-350 Bridge Completion Resistors. Used with 120 or 350 ohm strain gages. If you are using one 120 ohm strain gage, purchase 3 pieces of RES-120 to complete the Wheatstone bridge. Also, see the BCM-1, Omega Engineering's Bridge Completion Modules for fast and easy bridge completion.

See page 66

TT-300 Strain Gage Adhesive. For long term use, for strain measurement up to 200°C (392°F). Two-part epoxy, includes resin and hardener, must be clamped and cured at an elevated temperature. Recommended curing cycle is two hours at 150°C (302°F).

See page 71

SG401 Cold Cure Adhesive. For short term use on materials that are more porous (example: wood), used for strain measurement up to 82°C (180°F). Ethyl-based cyanoacrylate.

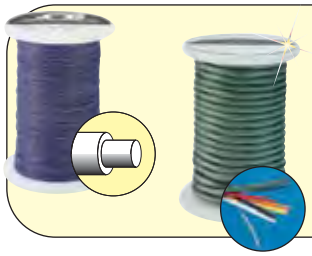
See page 71

SG496 Cold Cure Adhesive. For short term use on metal parts, used for strain measurement up to 82°C (180°F). Methyl-based cyanoacrylate.

See page 71

SG1-KIT Tool Kit. For use installing strain gages. SG1-KIT is a great accessory for students or engineers. It contains all the tools necessary to apply strain gages and a selection of popular strain gages, and cold cure adhesives.

See page 72



TX4-100, TFCP-010 Strain Gage Sensor and Transducer Wire and Cable. Available in convenient pre-spooled lengths. TX4 is 4-conductor, 24AWG tinned copper wires, PVC insulated, and shielded with an integral drain wire. TX4 can be used for three-wire ¼ bridge, ½ bridge or full Wheatstone bridge connections. In electrically noisy environments, the shield can be tied to an earth ground to drain the noise off to the earth ground. The TFCP-010, 30AWG single strand, PTFE coated wire is often used as the curved interconnecting wire from the strain gage solder pad onto the bondable terminal pad.

See page 73

BCM-1 Strain Gage Bridge Completion Module. The BCM-1 can be used with a single 120 or 350 Ω strain gage, to complete the full Wheatstone bridge. Can also be used to complete a ½ Wheatstone bridge of any resistance, ¼ bridge of 120 or 350 Ω or a ½ bridge of any resistance.

See page 75

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

GUIDE TO STRAIN GAGE ACCESSORIES AND INSTRUMENTATION

TX20B Radio Telemetry System. For use with strain gages, thermocouples, and voltage signals. Ideal for transmitting signals from sensors that are mounted onto rotating shafts. For a complete system you would purchase a transmitter, a mounting clamp to hold the transmitter onto the rotating shaft and a receiver. Battery or induction powered systems available, for single, 4 or 8 channels. Also available; LDTX20, long distance radio telemetry system.

See page 76 for other wireless transmitters or visit omega.com/wireless

DP25B-S 4-Digit AC Powered Digital Panel Meter. Can be used to measure one full Wheatstone bridge input. If you are using one strain gage, you will need to complete the Wheatstone bridge using bridge completion resistors or the BCM-1. Bridge excitation settings are selected using a dip switch at 5, 10 or 12 Vdc. The meter can be scaled in micro strain using a shunt calibration resistor.

See page 78

DP41-S 6-Digit AC Powered Digital Panel Meter. Can be used to measure one full Wheatstone bridge input. If you are using one strain gage, you will need to complete the Wheatstone bridge using bridge completion resistors or the BCM-1. Bridge excitation is adjustable from 5 to 10 Vdc using an internal potentiometer. The meter can be scaled in micro strain using a shunt calibration resistor.

See page 79

CNiS32, CNiS8 4-Digit AC Powered Strain and Process Controller. Can be used to measure one full Wheatstone bridge input. If you are using one strain gage, you will need to complete the Wheatstone bridge using bridge completion resistors, or the BCM-1. CNiS features a choice of control outputs such as solid state relays, SSR, mechanical relays, form "C" 3A, 120/240 Vac, or analog output, 0 to 10 Vdc or 0-20/4-20mA, selectable control or retransmission. Input is single polarity only.

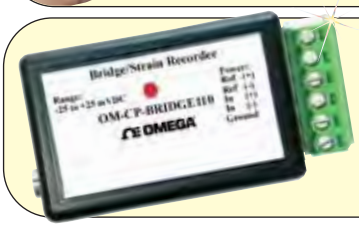
See page 82

DMD-460 Series AC Powered Strain Amplifier, Signal Conditioner Modules. Can be used to measure one full Wheatstone bridge input. If you are using one strain gage, you will need to complete the Wheatstone bridge using bridge completion resistors or the BCM-1. Potentiometers onboard are used to adjust the bridge excitation (4 to 15 Vdc), and there are offset and gain potentiometers. The amplifier can be scaled in micro strain using a shunt calibration resistor. DMD-465 will provide an analog voltage signal out, and DMD-466 will provide an analog 4 to 20 mA output signal.

See page 84

HHP-SG Handheld Battery Operated, 3-Digit Strain Gage Indicator with Excitation. It will take one full Wheatstone bridge. Can be calibrated with a known load and scaled in pounds, or it can be scaled in micro strain units using a shunt calibration resistor.

See page 85



OM-CP-BRIDGE110 Battery-Powered Bridge/Strain Gage Data Logger. This portable, standalone unit with 2.5 Vdc excitation onboard can take a full Wheatstone bridge input and read and record up to 32,767 measurements. Data can easily be downloaded using the RS-232 or the USB interface cable and software sold separately.

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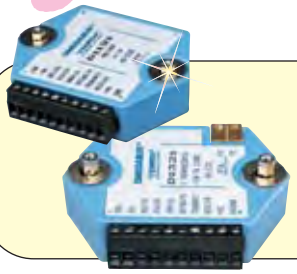
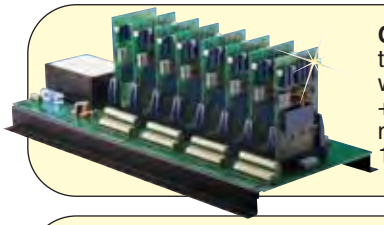
NEW

GUIDE TO STRAIN GAGE ACCESSORIES AND INSTRUMENTATION



D1500/2500 Bridge Input Module. Series of digital transmitters, easy to use interface modules for personal computers and other processor based equipment with standard serial I/O ports. The modules convert strain gage bridge analog input signals into engineering units and transmit in ASCII format to any host computer with a standard RS-232 or RS-485 port.

Visit omegadyne.com



OM2 Modular Signal Conditioning System. OM2 is a modular signal conditioning system that can be used with ¼, ½ or full Wheatstone bridge inputs. OM2 modules interface directly with strain gages and condition the input signals to an amplified voltage output of +/-10Vdc. For a complete single channel system you would purchase an OM2 module and a backplane. 8 channel backplanes are available. Power options, 115Vac, 230Vac or DC.

See page 91

iDRN/iDRX Analog and Digital Output Signal Conditioners are Available. The iDRN-ST (analog output) and iDRX-ST(RS485 output) signal conditioners provide highly accurate, stable, isolated measurement for full Wheatstone bridge strain gage transducers. Both models can accept signals from 30 to 100 mV full scale and provide 10 Vdc excitation. 32 iDRX RS485 signal conditioners can be connected to an Ethernet network using the optional EIS-2B iServer module.

See page 95

DRF, DIN Rail Mount Signal Conditioners. DRF-LC is a DIN rail mounted signal conditioner for use with a load cell, or full Wheatstone bridge input. You will need to get the FAR-1, 10Vdc power supply to provide excitation for the load cell. The DRF-LC signal conditioners can accept load cells with a 1mV/V, 2mV/V, or 3mV/V input signals and provide an isolated 0-10Vdc or 4 to 20ma output. Models are available with three different power options; 24Vdc, 120Vac and 240Vac.

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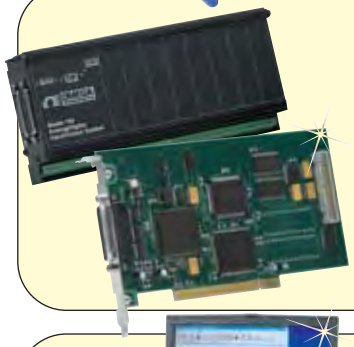

instruNet (iNET) Series Direct Sensor to Data Acquisition. iNET series can be used for direct sensor connections to Windows or Macintosh computers. At the heart of this real-time data acquisition system is the iNET-200 PCI (WIN95/98/NT/2000/XP) controller card (for a desktop computer) or the iNET-230 PC-card (WIN95/98/2000/XP) controller (for a laptop computer). For a complete system, use either an iNET-200 or iNET-230 controller card along with an iNET-100HC external A/D box, and you will be able to bring 8 full Wheatstone bridge inputs, with bridge excitation, into your computer. The analog electronics are close to the sensor in the electrically quite A/D boxes that remain outside the computer, while noisy digital electronics are left inside. The external A/D boxes contain signal conditioning amplifiers for each channel and attach directly to full Wheatstone bridge inputs.

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OMB-DAQ-54/55/56 USB Data Acquisition Modules. OMB-DAQ-54, OMB-DAQ-55, OMB-DAQ-56 modules are used for multiple channels, static strain applications. The 22-bit data acquisition system directly measures multiple channels of voltage, thermocouple, pulse, frequency, and digital I/O. A single cable to the PC provides high-speed operation and power to the module. Strain gage input must be full Wheatstone bridge. User must use external regulated power supply for bridge excitation.

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OMB-DAQ-3000 USB Data Acquisition Modules. OMB-DAQ-3000 series is a high-speed, multifunction data acquisition system used for dynamic strain applications. The OMB-DAQ-3000 features a 16-bit/1-MHz A/D converter, 16 analog input channels, user-expandable to 64, up to four 16-bit/1M-Hz analog outputs, 24 high-speed digital I/O, 2 timer outputs and four 32-bit counters. Strain gage input must be full Wheatstone bridge. User must use external regulated power supply for bridge excitation.

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Strain Gage product line continues to expand, visit omegadyne.com for new details!

SHUNT CALIBRATION RESISTOR VALVES

Formulas	
Rs = (Rg/eGF)-Rg e = strain (μS x 10^{-6}) GF = gage factor Rs = shunt resistance Rg = gage resistance	Range of Constantan Gage Factor for OMEGADYNE® Gages 2.2 to 1.8 Range of K-Series Gage Factor for OMEGADYNE Gages 2.31 to 1.89

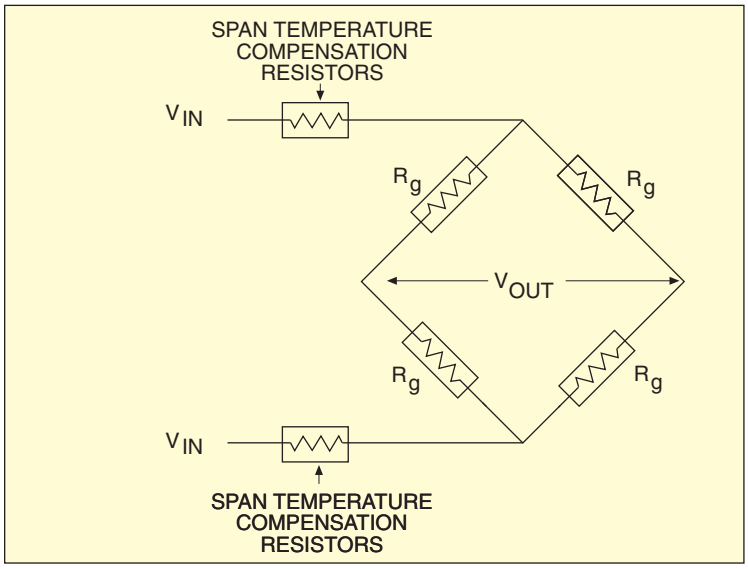
Real World Calculator		
	Input	
GF	2.07	
Rg	350	micro strain = 2000
Rs	84191	

	1000 μS			2000 μS			3000 μS		
	Gage Resistance			Gage Resistance			Gage Resistance		
GF	120	350	1000	120	350	1000	120	350	1000
1.80	66,547	194,094	554,556	33,213	96,872	276,778	22,102	64,465	184,185
1.81	66,178	193,020	551,486	33,029	96,335	275,243	21,979	64,107	183,162
1.82	65,814	191,958	548,451	32,847	95,804	273,725	21,858	63,753	182,150
1.83	65,454	190,907	545,448	32,667	95,278	272,224	21,738	63,402	181,149
1.84	65,097	189,867	542,478	32,489	94,759	270,739	21,619	63,056	180,159
1.85	64,745	188,839	539,541	32,312	94,245	269,270	21,502	62,713	179,180
1.86	64,396	187,822	536,634	32,138	93,736	267,817	21,385	62,374	178,211
1.87	64,051	186,816	533,759	31,966	93,233	266,380	21,270	62,039	177,253
1.88	63,710	185,820	530,915	31,795	92,735	264,957	21,157	61,707	176,305
1.89	63,372	184,835	528,101	31,626	92,243	263,550	21,044	61,378	175,367
1.90	63,038	183,861	525,316	31,459	91,755	262,158	20,933	61,054	174,439
1.91	62,707	182,896	522,560	31,294	91,273	260,780	20,822	60,732	173,520
1.92	62,380	181,942	519,833	31,130	90,796	259,417	20,713	60,414	172,611
1.93	62,056	180,997	517,135	30,968	90,324	258,067	20,605	60,099	171,712
1.94	61,736	180,062	514,464	30,808	89,856	256,732	20,499	59,787	170,821
1.95	61,418	179,137	511,821	30,649	89,394	255,410	20,393	59,479	169,940
1.96	61,104	178,221	509,204	30,492	88,936	254,102	20,288	59,174	169,068
1.97	60,794	177,315	506,614	30,337	88,482	252,807	20,185	58,872	168,205
1.98	60,486	176,418	504,051	30,183	88,034	251,525	20,082	58,573	167,350
1.99	60,182	175,529	501,513	30,031	87,590	250,256	19,981	58,276	166,504
2.00	59,880	174,650	499,000	29,880	87,150	249,000	19,880	57,983	165,667
2.01	59,581	173,779	496,512	29,731	86,715	247,756	19,780	57,693	164,837
2.02	59,286	172,917	494,050	29,583	86,284	246,525	19,682	57,406	164,017
2.03	58,993	172,064	491,611	29,437	85,857	245,305	19,584	57,121	163,204
2.04	58,704	171,219	489,196	29,292	85,434	244,098	19,488	56,840	162,399
2.05	58,417	170,382	486,805	29,148	85,016	242,902	19,392	56,561	161,602
2.06	58,132	169,553	484,437	29,006	84,601	241,718	19,297	56,284	160,812
2.07	57,851	168,732	482,092	28,866	84,191	240,546	19,204	56,011	160,031
2.08	57,572	167,919	479,769	28,726	83,785	239,385	19,111	55,740	159,256
2.09	57,296	167,114	477,469	28,588	83,382	238,234	19,019	55,471	158,490
2.10	57,023	166,317	475,190	28,451	82,983	237,095	18,928	55,206	157,730
2.11	56,752	165,527	472,934	28,316	82,588	235,967	18,837	54,942	156,978
2.12	56,484	164,744	470,698	28,182	82,197	234,849	18,748	54,681	156,233
2.13	56,218	163,969	468,484	28,049	81,810	233,742	18,659	54,423	155,495
2.14	55,955	163,201	466,290	27,917	81,426	232,645	18,572	54,167	154,763
2.15	55,694	162,441	464,116	27,787	81,045	231,558	18,485	53,914	154,039
2.16	55,436	161,687	461,963	27,658	80,669	230,481	18,399	53,662	153,321
2.17	55,180	160,940	459,829	27,530	80,295	229,415	18,313	53,413	152,610
2.18	54,926	160,200	457,716	27,403	79,925	228,358	18,229	53,167	151,905
2.19	54,675	159,467	455,621	27,277	79,559	227,311	18,145	52,922	151,207
2.20	54,425	158,741	453,545	27,153	79,195	226,273	18,062	52,680	150,515
2.21	54,179	158,021	451,489	27,029	78,836	225,244	17,980	52,440	149,830
2.22	53,934	157,308	449,450	26,907	78,479	224,225	17,898	52,203	149,150
2.23	53,692	156,601	447,430	26,786	78,125	223,215	17,817	51,967	148,47
2.24	53,451	155,900	445,429	26,666	77,775	222,214	17,737	51,733	147,810
2.25	53,213	155,206	443,444	26,547	77,428	221,222	17,658	51,502	147,148
2.26	52,977	154,517	441,478	26,429	77,084	220,239	17,579	51,272	146,493
2.27	52,743	153,835	439,529	26,312	76,743	219,264	17,501	51,045	145,843
2.28	52,512	153,159	437,596	26,196	76,404	218,298	17,424	50,820	145,199
2.29	52,282	152,488	435,681	26,081	76,069	217,341	17,347	50,596	144,560
2.30	52,054	151,824	433,783	25,967	75,737	216,391	17,271	50,375	143,928
2.31	51,828	151,165	431,900	25,854	75,408	215,450	17,196	50,155	143,300

NEW

SPAN TEMPERATURE-COMPENSATION RESISTOR

SGN-2/20-E
Starts at
$19
Pkg of 5

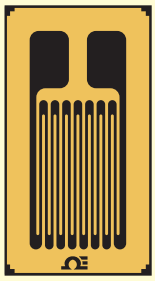


SPECIFICATIONS

Foil Measuring Grid:
Nickel foil 5 microns thick
Carrier: Polyimide
Substrate Thickness: 20 microns
Cover Thickness: 25 microns
Tolerance in Ω: ±1 Ω
Temp Coefficient of Resistance:
0.6%/°C (0.34%/°F)
Temperature Range: 0 to 100°C (32 to 212°F)

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

TEMPERATURE COMPENSATION RESISTORS ENCAPSULATED	MODEL NO.	PRICE PER PKG OF 5	NOMINAL RESISTANCE (Ω)	DIMENSIONS mm (in)*			
				GRID		CARRIER	
				A	B	C	D
 Typical resistor pattern.	SGN-2/20-E	$19	20	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-2/25-E	19	25	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-2/30-E	19	30	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-3/10-E	19	10	3.2 (0.126)	3.2 (0.126)	8.6 (0.339)	5.2 (0.205)
	SGN-3/12-E	$19	12	3.2 (0.126)	3.2 (0.126)	8.6 (0.339)	5.2 (0.205)
	SGN-3/34-E	19	34	3 (0.118)	3.2 (0.126)	7.3 (0.287)	4.8 (0.189)
	SGN-3/36-E	19	36	3 (0.118)	3.2 (0.126)	7.3 (0.287)	4.8 (0.189)
	SGN-4/14-E	19	14	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/16-E	$19	16	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/20-E	19	20	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/24-E	19	24	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/28-E	19	28	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/30-E	$19	30	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/32-E	19	32	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/48-E	19	48	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/60-E	19	60	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)

** For dimensions key, see page 35.* ***Note:*** *For strain gage accessories see pages 59 to 61.*
Ordering Example: SGN-4/28-E, *28 Ω nominal-resistance span temperature-compensation resistor,* ***$19.***

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

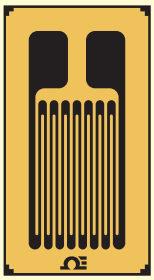
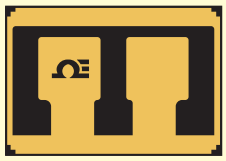
NEW®

SPAN TEMPERATURE-COMPENSATION, BRIDGE-BALANCING, AND ZERO TEMPERATURE-COMPENSATION RESISTORS

SPECIFICATIONS	RES-C	RES-N
Foil Measuring Grid	Constantan foil 5 microns thick	Nickel foil 5 microns thick
Carrier	Polyimide	Polyimide
Substrate Thickness	20 microns	20 microns
Tolerance in Ω	±1 Ω	±1 Ω
Temp Coefficient of Resistance	——	0.6%/°C (0.34%/°F)
Temperature Range	-75 to 200°C (-100 to 392°F)	0 to 100°C (32 to 212°F)

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

TEMPERATURE-COMPENSATED RESISTORS OPEN FACE	MODEL NO.	PRICE PER PKG OF 5	NOMINAL RESISTANCE (Ω)	DIMENSIONS mm (in)* GRID A	GRID B	CARRIER C	CARRIER D
 Typical resistor pattern.	SGN-2/20-PN	$16	20	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-2/25-PN	16	25	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-2/30-PN	16	30	1.9 (0.075)	3 (0.118)	4.8 (0.189)	4 (0.157)
	SGN-3/10-PN	16	10	3.2 (0.126)	3.2 (0.126)	8.6 (0.339)	5.2 (0.205)
	SGN-3/12-PN	$16	12	3.2 (0.126)	3.2 (0.126)	8.6 (0.339)	5.2 (0.205)
	SGN-3/34-PN	16	34	3 (0.118)	3.2 (0.126)	7.3 (0.287)	4.8 (0.189)
	SGN-3/36-PN	16	36	3 (0.118)	3.2 (0.126)	7.3 (0.287)	4.8 (0.189)
	SGN-4/14-PN	16	16	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/16-PN	$16	16	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/20-PN	16	20	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/24-PN	16	24	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/28-PN	16	28	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/30-PN	$16	30	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/32-PN	16	32	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/48-PN	16	48	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
	SGN-4/60-PN	16	60	4 (0.157)	3.2 (0.126)	8.8 (0.346)	4.8 (0.189)
BRIDGE-BALANCING AND ZERO TEMPERATURE-COMPENSATION RESISTORS							
	RES-2C	$10	2	3.4 (0.134)	6.3 (0.248)	4.6 (0.181)	6.7 (0.264)
	RES-5C	10	5	3.4 (0.134)	6.3 (0.248)	4.6 (0.181)	6.7 (0.264)
	RES-2N	10	2	3.4 (0.134)	6.3 (0.248)	4.6 (0.181)	6.7 (0.264)
	RES-5N	10	5	3.4 (0.134)	6.3 (0.248)	4.6 (0.181)	6.7 (0.264)

** For dimensions key, see page 35.* ***Note:*** *For strain gage accessories see pages 59 to 61.*

Ordering Example: SGN-4/28-PN, *28 Ω nominal-resistance span temperature-compensation resistor,* ***$16.***

NEW

RESISTANCE WIRE FOR TEMPERATURE COMPENSATION AND ZERO BALANCE

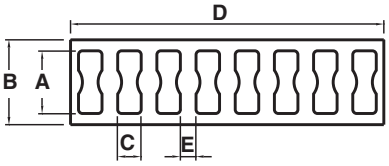
MOST POPULAR MODEL HIGHLIGHTED!

To Order *(Specify Model Number)*

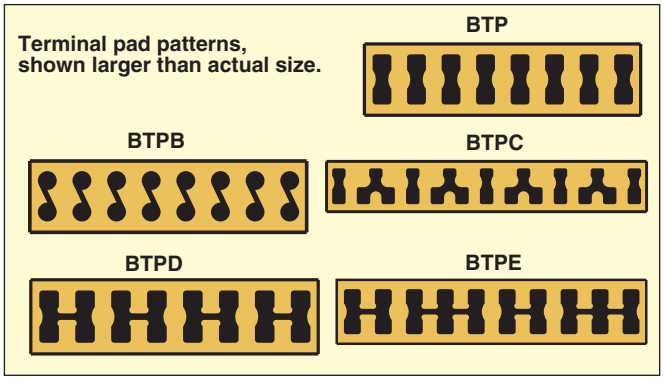
MODEL NO.	PRICE	FUNCTION	MATERIAL	Ω/FT	TEMP COEFF.	SPOOL LENGTH
SGB-36	$70	Zero and span temp comp.	Balco	19.7	0.45%/°C	500'
SGC-36	20	Zero and span temp comp.	Copper	0.415	0.39%/°C	500'
SGM-36	26	Zero balance	Manganin	15.2	0.002%/°C	200'

BONDABLE TERMINAL PADS

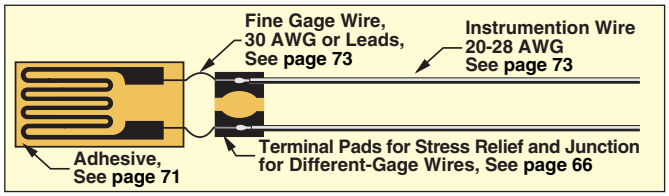
Terminal pads serve 2 main purposes. First, they act as intermediate points for attaching ribbon leads of thin-gage wire to heavier instrumentation wires. Second, they give stress relief to strain gage systems. When the heavy instrumentation wire moves, the terminal pad protects the strain gage. Carrier is polyimide with a thickness of 0.075 mm (0.003"). Minimum bending radius is 2 mm (0.079"). Maximum temperature is 220°C (428°F).



BTP-5, $40, shown actual size.



TYPICAL STRAIN GAGE INSTALLATION



BRIDGE COMPLETION RESISTORS

Accuracy: 0.1%
Temperature Compensation: 5 ppm; -20 to 80°C (-4 to 176°F)
Power: ¼ W

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	Ω	MAX BRIDGE EXC.
RES-120	$7.50	120	10 Vdc
RES-250	7.50	250	15 Vdc
RES-350	7.50	350	18 Vdc

Note: *For strain gage accessories see pages 59 to 61.*
Ordering Example: RES-350, *350 Ω bridge completion resistor,* ***$7.50.***

BONDABLE TERMINAL PADS

To Order *(Specify Model Number)*

MODEL NO.	PRICE	STRIPS PER PACK	DIMENSIONS mm (in) A	B	C	D	E
BTP-1	$18.50	70	1.8 (0.07)	2.6 (0.1)	0.7 (0.03)	9.9 (0.39)	0.6 (0.02)
BTP-2	20.50	60	2.4 (0.09)	3.4 (0.13)	0.9 (0.04)	13.2 (0.52)	0.8 (0.03)
BTP-3	29.00	50	3.2 (0.13)	4.5 (0.18)	1.2 (0.05)	17.6 (0.69)	1 (0.04)
BTP-4	32.00	30	4.8 (0.19)	6.5 (0.26)	1.8 (0.07)	24 (0.94)	1.2 (0.05)
BTP-5	40.00	20	6 (0.24)	8.5 (0.33)	2.3 (0.09)	32.4 (1.28)	1.8 (0.07)
BTP-6	40.00	10	9 (0.35)	11.8 (0.46)	3.4 (0.13)	41.4 (1.63)	1.8 (0.07)
BTPB-1	18.50	70	1.8 (0.07)	2.6 (0.1)	0.7 (0.03)	9.9 (0.39)	0.6 (0.02)
BTPB-2	20.50	60	2.4 (0.09)	3.4 (0.13)	0.9 (0.04)	13.2 (0.52)	0.8 (0.03)
BTPB-3	29.00	50	3.2 (0.13)	4.5 (0.18)	1.2 (0.05)	17.6 (0.69)	1 (0.04)
BTPB-4	32.00	30	4.8 (0.19)	6.5 (0.26)	1.8 (0.07)	24 (0.94)	1.2 (0.05)
BTPB-5	40.00	20	6 (0.24)	8.5 (0.33)	2.3 (0.09)	32.4 (1.28)	1.8 (0.07)
BTPB-6	40.00	10	9 (0.35)	11.8 (0.46)	3.4 (0.13)	41.4 (1.63)	1.8 (0.07)
BTPC-1	36.00	30	3.2 (0.13)	4.5 (0.18)	1.2 (0.05)	28.6 (1.13)	1 (0.04)
BTPC-2	36.00	25	3.8 (0.15)	5.4 (0.21)	1.4 (0.06)	34.3 (1.35)	1.2 (0.05)
BTPC-3	36.00	20	4.8 (0.19)	6.5 (0.26)	1.8 (0.07)	39 (1.54)	1.2 (0.05)
BTPC-4	42.00	15	6 (0.24)	8.5 (0.33)	2.3 (0.09)	52.7 (2.07)	1.8 (0.07)
BTPD-1	18.50	25	2.4 (0.09)	3.4 (0.13)	0.9 (0.04)	13.2 (0.52)	0.8 (0.03)
BTPD-2	23.50	25	3.2 (0.13)	4.5 (0.18)	1.2 (0.05)	17.6 (0.69)	1 (0.04)
BTPD-3	26.00	20	4.8 (0.19)	6.5 (0.26)	1.8 (0.07)	24 (0.94)	1.2 (0.05)
BTPE-1	28.50	25	2.4 (0.09)	3.4 (0.13)	0.9 (0.04)	16.5 (0.65)	0.8 (0.03)
BTPE-2	34.00	25	3.2 (0.13)	4.5 (0.18)	1.2 (0.05)	22 (0.87)	1 (0.04)
BTPE-3	35.50	20	4.8 (0.19)	6.5 (0.26)	1.8 (0.07)	30 (1.18)	1.2 (0.05)

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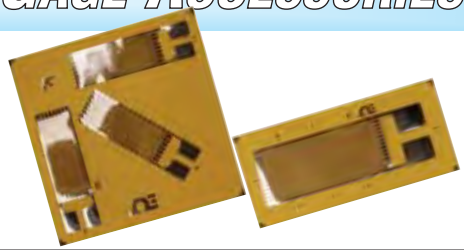
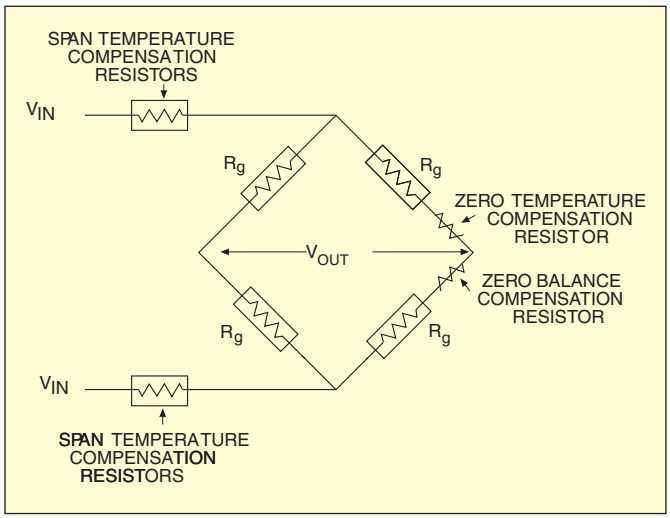
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW®

TRANSDUCER BRIDGE COMPENSATION



A basic full Wheatstone Bridge will work as a sensor, but not to the same performance level as sensors presently available in the marketplace. The three main areas that need to be improved are the Zero Temperature, Zero Balance and the Span Temperature characteristics. Below is a figure which shows where compensation resistors are located in the bridge. All of the compensation is purely resistive and contains no active electronics.



This article will be broken down into three main areas: zero temperature compensation, zero balance and span temperature compensation. All of the equations used in the three main sections are derived from the basic Gage Factor equation (Equation 1):

$$GF = \frac{\Delta R/R}{E}$$

where GF = gage factor

ΔR = change in resistance

R = original Strain gage resistance

E = strain

Equation 1

ZERO TEMPERATURE COMPENSATION

A zero temperature resistor is added to insure that the bridge does not drift with temperature in the "no load" condition. The basic bridge can drift under "no load" for several reasons: the gages are glued on curved surfaces, which affects the temperature coefficient; the temperature coefficient of the gages and specimen are never exactly the same; and there is a temperature coefficient tolerance between different gages. To determine what resistance of compensation is needed, you need to take one measurement at room temperature and another measurement at an elevated temperature.

let M_1 = mV/V output at room temperature T_1

let M_2 = mV/V output at elevated temperature T_2

ΔR = change in resistance required to offset temperature effects = GF * R * E

Knowing: If GF = 2, then 4000 µE equals 2 mv/v output

$$\Delta R = 2(4000 \times 10^{-6}/2)(M_2 - M_1)R$$
$$= 4000 \times 10^{-6} (M_2 - M_1)R$$

Equation 2

In Equation 2, ΔR is causing the output to change as a result of an increase in temperature. The relationship between ΔR and temperature is fairly linear in foil-type strain gages. Knowing ΔR and the fact that it is linear with temperature means that you can compensate for this output change by adding a resistor to the bridge that will also change its resistance linearly with temperature. A common resistor which changes resistance with a change in temperature is a copper wire. The amount of resistance needed to produce the ΔR required is referred to as R_t in Equation 3.

$$R_t = \left(\begin{array}{c}\text{total resistance}\\ \text{required to produce}\\ \Delta R\end{array}\right) = \frac{\Delta R}{\alpha\,(T_2 - T_1)}$$

where α = resistivity coefficient

Equation 3

If wire is used for the temperature compensation resistance, then the length of wire (L) needed is as follows:

$$L = R_t/W_r$$

where W_r = resistance per length of wire

Equation 4

By standardizing units and using Equations 1-4 above, we arrive at the following equation for determining the amount of wire needed for temperature compensation:

$$(L \text{ in}) = \frac{(M_2 - M_1 \text{ mV/V})(4000 \times 10^{-6})(R \text{ ohms})}{(\alpha\ \%/°C)(1/100)(1/1.8°C/°F)(T_2 - T_1°F)(W_r \text{ ohms/ft})(1/12 \text{ ft/in})}$$

$$(L \text{ in}) = \frac{8.64\ (M_2 - M_1 \text{ mV/V})(R \text{ ohms})}{(\alpha\ \%/°C)(T_2 - T_1°F)(W_r \text{ ohms/ft})}$$

Equation 5

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ZERO BALANCE COMPENSATION

Zero balance resistance compensation is needed to insure that the bridge produces zero mV/V in a "no load" condition. The basic bridge needs zero compensation for several reasons: gluing pressures alter the resistance in the strain gages; the resistance tolerance between strain gages; and curved gluing surfaces affect gage resistances. Basic Equations 1 and 2 apply for the zero balance as well as for zero temperature compensation.

Zero balance is very similar to zero temperature compensation, except the wire or resistor used to balance the transducer should have a low coefficient of resistance to temperature. Manganin is often used because its coefficient of resistance with temperature is 0.002%/°C.

By standardizing units and using Equations 1 and 2, we arrive at the following equation for determining the amount of wire needed for temperature compensation:

$$(L \text{ in}) = \frac{(M_1 \text{ mV/V})(4000 \times 10^{-6})(R \text{ ohms})}{(W_r \text{ ohms/ft})(\frac{1}{12} \text{ ft/in})}$$

$$(L \text{ in}) = [0.048\ (M_1 \text{ mV/V})(R \text{ ohms})]/(W_r \text{ ohms/ft})$$

Equation 6

causes the bridge to see less voltage, thereby reducing the output. Sometimes, the required resistance is divided into two equal parts that are inserted into each excitation leg to keep the Wheatstone Bridge balanced. Using two span resistors insures that each output leg will carry approximately half the excitation voltage. Equation 7 below illustrates the relationship among gage factor temperature coefficient, Young's Modulus temperature coefficient and the span temperature coefficient of resistance. Table 1 lists typical coefficient values for strain gages and commonly used specimens.

R_S = Span Temperature Resistor =
where $\Delta\alpha = \alpha_{GF} - \alpha_E$

where

α_{GF} is the gage factor temperature coefficient

α_E is the specimen's Young's Modulus temperature coefficient

R ohms = strain gage resistance

α_S = span resistor's resistance temperature coefficient

Equation 7

Just as in the earlier compensations, resistors or wire can be used to perform span compensation. When using wire, the length required will depend on the resistance per foot.

L_S = Length of span temperature wire = R_S/W_r
where W_r = resistance per length of wire

Equation 8

SPAN TEMPERATURE COMPENSATION

Span temperature resistors can be added to insure that the bridge does not drift with temperature in the loaded condition. A basic bridge can drift under load for several reasons: the gage's GF changes with temperature; the specimen's Young's Modulus changes with temperature; and because of the GF temperature coefficient tolerance between gages.

The wire or resistance needed to combat span shift must change its resistance with temperature. The wire is added to the excitation legs of the Wheatstone Bridge; as temperature increases, the wire's resistance increases. The increase in resistance

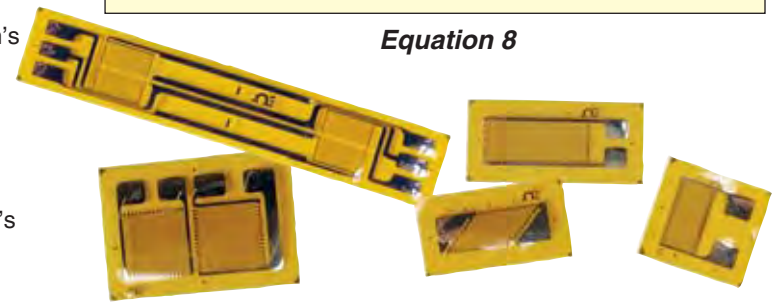

TABLE 1

GAGE FACTOR	TEMP COEFFICIENT	SPECIMEN MODULUS	TEMP COEFFICIENT	SPAN RESISTOR	TEMP COEFFICIENT
Foil	αGF	Material	αE	Resistor	α
Constantan	+0.0090 %/°C	17-4, 15-5 ph SS	-0.027%/°C	Nickel	0.59%/°C
Karma	-0.0103%/°C	Carbon Steel	-0.023%/°C	Balco	0.45%/°C
		Aluminum	-0.097%/°C	Copper	0.39%/°C

NEW

INSTALLATION

Surface Preparation
The test specimen surface must be prepared before the strain gages and bondable terminal pads can be installed. Cleanliness is important for successful strain gage bonding. The object of preparation is to create a smooth surface which can be wetted so it can receive the adhesive. Some steps may be disregarded or modified, based on the condition of the test piece and the type of material.

Coarse Cleaning
Rust, scale, paint and other contaminants must be removed from the location where strain gages will be installed. Remove any surface coating by sand blasting or by abrading with coarse grade emery paper.

Smoothing Surface
Surface imperfections must be removed. Pitting, scratches, protrusions, etc can be removed by grinding, filing or other suitable methods to smooth the surface where strain gages will be installed. Follow with a light sanding with a fine grit (240 grit) silicon carbide or emery paper.

De-Grease the Surface
Use a solvent, and a soft tissue to remove all excess oil and grease. Select a solvent. Check the chemical resistance of the material, making sure that the solvent will not damage the test piece.

Clean Surface with Metal Conditioner and Neutralizer
Clean the surface with a mild acid or metal conditioner. Sand lightly with the metal conditioner and wipe clean with a clean tissue or gauze pad. Clean the surface with a mild base, or metal neutralizer, wipe with a clean tissue or gauze pad. Brush with lint-free brush to remove any dust particles that may have settled.

Bonding Procedure
Specific instructions may be provided with strain gage adhesives. Instructions may vary with the type of adhesive that has been selected. For example, a two-part epoxy may need to be mixed, clamped and cured at an elevated temperature. Some adhesives, like the cold cure SG496 (typically used for metals) and SG401 contain solvents. Check the chemical resistance of the material, making sure that the solvent used in the adhesive will not damage the test piece. For best strain gage installation results consider the following procedures.

Clean Tools and Surfaces
Clean and degrease the tools that will be used to handle the strain gages. Prepare a clean and degreased work surface. A piece of glass can be used as a work surface. Do not handle the strain gages or bondable terminal pads with your hands, as you may introduce oils and contaminants that will cause bonding problems.

Orienting, Handling, and Bonding the Strain Gage
Use tweezers to remove the strain gage from the package. Place the strain gage onto the work surface making sure that the ribbon leads or solder pads are facing up. Use cellophane tape, placed gently on top of the strain gage to lift it from the work surface. PTFE tape may be required for use with adhesive that will need to be cured at an elevated temperature. Position the strain gage onto the transducer or test specimen. Secure one end of the tape onto the test specimen. Gently, lift the other end of the tape, lifting the strain gage assembly being careful not to stretch the gage. Leave a hinge of tape so that access to the bottom of the strain gage is available, yet the position is fixed. Continue onto bonding of the strain gage. Adhesive can be applied to the bottom surface of the strain gage and it can be returned to the correct position. Follow instructions that were provided with the strain gages adhesive. Clamping and curing instructions vary with the adhesive selected. Repeat the procedure for the bondable terminal pad. Locate the bondable terminal pad within reach of the ribbon leads or in a convenient position for connection to the strain gage solder pads. When bonding has been completed, remove the tape. Peel the tape back carefully. Lift the edge of the tape, lay it back onto its self, and peel the tape back so that the tape is not pulling the strain gage up off the surface. You may need to use a small tool to hold the edge of the strain gage, or ribbon leads down to avoid pulling them up or damaging them.

Inspect the Strain Gage Installation
Take a close look at the strain gage installation. Inspect to make sure that there are no loose edges, bubbles or voids beneath the strain gage. The color should be consistent. Check the strain gage resistance and verify that it is correct. Measure from solder-pad to solder-pad, or lead to lead. Check the resistance from the strain gage to ground. Measure from one solder-pad/lead on the strain gage, to the metal test piece, to make sure that the resistance to ground is 100MΩ or higher. Replace the strain gage if any problem is found.

Wiring
Remove oxidation from the bondable terminal pads. An eraser on the back of a pencil can be used to gently rub the terminal pad, making the copper tabs shinny. Tin the bondable terminal pads using rosin core solder and a small soldering pencil. If you have ribbon leads, bring the lead over to the bondable terminal pad leaving a small flex loop. Solder down onto the bondable terminal pad. Trim the end of the ribbon lead to length if required. With solder pads or tabs, you will need to make up a small jumper wire. For example, you can use the TFCP-010-50 spool of cable, and cut a small length, strip the PTFE coating from each end, tin the ends of the jumper wire. Solder one end of the jumper wire onto the strain gage solder tab, again, leave a flex loop, and bring the other end of the jumper onto the bondable terminal pad, solder it in place. Next, you will attach your insulated instrumentation wire. For example, you can use the TX4-100, which is color coded, 4-conductor, PVC coated, shielded cable. This can be used for short 2-wire runs, 3-wire bridge (compensates for effect of temperature on the lead wire), ½ bridge, or 4-wire full Wheatstone bridge. Solder the instrumentation onto the bondable terminal pad. Again, check the strain gage resistance, now at the end of the instrumentation lead wire, and verify correct. Check the resistance from the strain gage to ground.

Complete the Strain Gage Installation
Clean the area using Rosin Solvent. Allow the area to dry, and then apply protective coating.

Safety Precautions
Personnel who are working with solvents, metal conditioners, neutralizers, adhesives, epoxy and cements should receive proper instruction from their company prior to handling of these materials. The strain gage installation area should be well ventilated. Personnel should avoid prolonged contact of these materials with the skin. MSDS sheets are available at omegadyne.com

SG1-KIT, $549, shown smaller than actual size. Not all kit contents shown here. See next page.

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HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

ADHESIVES

TT300
$190

TT300, complete strain gage adhesive kit, $190, shown smaller than actual size.

KIT INCLUDES

- Two 1 oz Resin Bottles (½ Filled)
- Two 1 oz Hardener Bottles (½ Filled)
- Two Plastic Funnels (35 mm Dia.)
- Two Brush Caps
- One 2 oz Bottle of Acetone
- One 2 oz Bottle of Acid Primer
- One 2 oz Bottle of Neutralizer
- One 2 oz Bottle of Resin Solvent
- Operator's Manual

OMEGADYNE® TT300 cement is a heat-cured, 2-part epoxy adhesive that can be used to bond polyimide-backed strain gages for strain measurement up to 200°C (392°F). Each TT300 kit includes 2 bottles of resin and hardener that are pre-measured to ensure proper mixing proportions. To use, simply pour one bottle of hardener into one bottle of resin and shake for 1 minute.

A bottle each of hardener and resin produce approximately ¾ oz of adhesive. The shelf life of the resin-hardener mixture is 6 weeks at room temperature. The shelf life of the unmixed components is indefinite, provided that the bottles are kept tightly sealed. Each TT300 kit includes 2 oz of acetone, acid primer, neutralizer, and rosin solvent for cleaning and preparing the surface, as well as 2 funnels and 2 cap brushes.

SG496 and SG401 are general purpose cold-curing, 1-part glues. They are the most commonly used adhesives for strain gages. They cure in 1 minute, but require 24 hours to set. SG401 is an ethyl-based cyanoacrylate, and SG496 is a methyl-based cyanoacrylate. They have a 1-year shelf life at room temperature, but shelf life may be longer at colder temperatures. The glue temperature range is -54 to 82°C (-65 to 180°F).

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
TT300	$190	Complete strain gage adhesive kit
SG496	28	1 oz methyl-based cyanoacrylate (approx. 750 gages)
SG401	10	0.1 oz ethyl-based cyanoacrylate (approx. 50 gages)

***Note:** For strain gage accessories see pages 59 to 61.*
Ordering Example: TT300,** complete strain gage adhesive kit, **$190.

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
CM-4225	$103	Reference Book: Principles and Practice of Automatic Process Control

NEW

APPLICATION KIT

SG1-KIT

$549

- Tools
- Adhesives
- Coatings
- Strain Gage Assortment

The SG1-KIT contains all the necessary tools to apply strain gages, plus an assortment of popular strain gages.

SG1-KIT, $549, shown smaller than actual size. Not all kit contents shown here.

KIT CONTENTS

- **Strain Gages (10/Pkg):**
  - SG-3/350-LY11 (Ribbon Leads)
  - SGD-7/350-LY41 (Solder Pads)
  - KFG-10-120-C1-11L1M2R (Lead Wire)
  - BTP-1 (Terminal Pads)
  - BTP-2 (Terminal Pads)
- **Coatings:** ABM75 Aluminum Foil with Putty
- **Adhesives:**
  - SG401 (0.1 oz)
  - SG496 (1 oz)
- **Application Note:** Guide to Applying Strain Gages/Manual
- **Tools:**
  - Flat Brush
  - Fold-Out 6x Magnifier
  - 12" Ruler
  - 10' Flexible Ruler
  - Glass Fiber Eraser
  - Scissors, Dented
  - Scissors, Pointed
  - Dental Probe with Bent Point
  - Dental Spatula for Cement
  - Stripper for Removing Insulation
  - Knife with 6 Blades
  - 10' Roll of Multicolor Ribbon Cable
  - Roll of Mylar® Tape
  - Sheet of 180-, 240-, 400-Grade Emery Cloth
  - Straight Tweezers
  - Curved Tweezers
  - Rugged Carrying Case

AVAILABLE FOR FAST DELIVERY!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
SG1-KIT	$549	Complete strain gage application kit

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
ME-1805	$131	Reference Book: Instrumentation Fundamentals

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

SENSOR AND TRANSDUCER WIRE AND CABLE
CONVENIENT PRE-SPOOLED LENGTHS

FINE-GAGE INSULATED WIRE

- 3 Mil PTFE Wall
- Single Strand
- Extruded PFA
- Excellent in Vacuum
- Non-Flammable

OMEGADYNE's thin-wall covering process guarantees continuous lengths up to 304 m (1000'). This wire is ideal for connecting strain gages to solder terminal strips and pads.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

DIA. mm (in)	LENGTH m (ft)	MODEL NO.	PRICE
0.076 (.003)	15.2 (50)	TFCP-003-50	$16
0.076 (.003)	30.5 (100)	TFCP-003-100	29
0.076 (.003)	154 (500)	TFCP-003-500	119
0.127 (.005)	15.2 (50)	TFCP-005-50	16
0.127 (.005)	30.5 (100)	TFCP-005-100	29
0.127 (.005)	154 (500)	TFCP-005-500	119
0.254 (.010)	15.2 (50)	TFCP-010- 50	16
0.254 (.010)	30.5 (100)	TFCP-010-100	29
0.254 (.010)	154 (500)	TFCP-010-500	119
0.381 (.015)	15.2 (50)	TFCP-015- 50	16
0.381 (.015)	30.5 (100)	TFCP-015-100	29
0.381 (.015)	154 (500)	TFCP-015-500	119
0.508 (.020)	15.2 (50)	TFCP-020-50	16
0.508 (.020)	30.5 (100)	TFCP-020-100	29
0.508 (.020)	154 (500)	TFCP-020-500	119
0.813 (.032)	15.2 (50)	TFCP-032-50	42
0.813 (.032)	30.5 (100)	TFCP-032-100	73
0.813 (.032)	154 (500)	TFCP-032-500	208

MULTICONDUCTOR RIBBON CABLE

- 28 AWG 10 to 50 Conductors
- PVC Rating to 105°C (221°F)
- Color Coded
- 30.5 m (100') Rolls

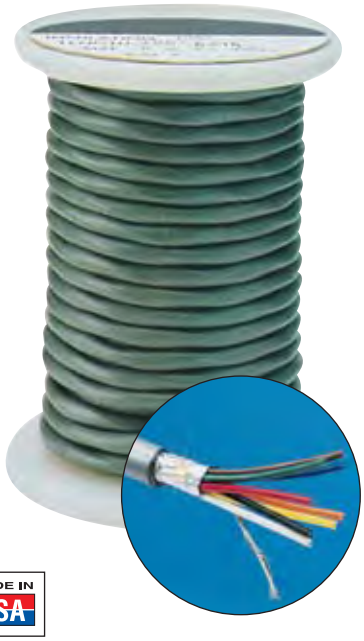
OMEGADYNE's ribbon cables are PVC pre-insulated conductors laminated to a clear PVC film for easy termination. The color coding facilitates quick identification and circuit tracing. For different uses, the multiconductor ribbon cable can easily be trimmed to any desired width.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

NO. OF COND.	MODEL NO.	PRICE 30.4 m (100')
4	RC4-100	$145
10	RC10-100	180
14	RC14-100	275
16	RC16-100	285
20	RC20-100	395
26	RC26-100	445
50	RC50-100	885

MULTICONDUCTOR SHIELDED CABLE



MADE IN USA

- 24 AWG Tinned Copper Wires
- PVC Insulation
- Aluminum-Polyester Shield with #24 Drain Wire
- PVC Jacket Overall
- 30.5 m (100') Rolls

Shielded cable provides the high conductivity and noise immunity required for instrumentation hookups to transducers. It is suitable for low- and high-level voltage signals and mA pickup in high EMI/RFI environments.

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

NO. OF COND.	NOM OD mm (in)	MODEL NO.	PRICE 30.4 m (100')
2	3.18 (0.125)	TX2-100	$35
4	4.83 (0.190)	TX4-100	35
8	5.59 (0.220)	TX8-100	95
15	7.11 (0.280)	TX15-100	140

Also available in 200, 500, and 1000' lengths.

NEW

BRIDGE COMPLETION MODULE

BCM-1

$69

5 YEAR WARRANTY MADE IN USA

BCM-1, $69, shown actual size.

- **Internal Bridge Balance Adjustment for Nulling Out Unstrained Conditions**
- **¼ Bridge Completion for 120 or 350 Ω Strain Gages**
- **½ Bridge Completion for Gages of Any Resistance**
- **5 ppm Temp Coefficient Resistors for High Temperature Stability**

SPECIFICATIONS

Maximum Excitation:
120 Ω Bridge: 10 Vdc
350 Ω Bridge: 16 Vdc
Temperature Limits: -20 to 80°C (-4 to 176°F)
Temperature Effects: ±1.5 µV/V/°C
Zero Adjust: ±6 mV/V
Resistor Tolerance: ±0.1%
Resistor Temp Coefficient: 5 ppm/°C
Dimensions: 50.8 W x 31.8 H x 25.4 mm D (3 x 1.25 x 1")
Mounting Holes: 4.4 mm (0.175") holes (2) on 63.5 mm (2.5") center

The BCM-1 bridge module completes the Wheatstone bridge circuit. The module can be used for quarter-bridge measurements with 120 or 350 Ω gages, or for half-bridges with gages of any resistance. A bridge-balance-adjustment potentiometer zeros the bridge output. Strain gage, excitation, and output signals are connected via screw terminals. Quarter-bridges with 2- or 3-wire hookup can be accommodated.

AVAILABLE FOR FAST DELIVERY!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
BCM-1	$69	Strain gage bridge completion module

Comes with complete operator's manual.
Ordering Example: BCM-1,** strain gage bridge completion module, **$69.

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
CM-4333	$115	Reference Book: Plantwide Process Control

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

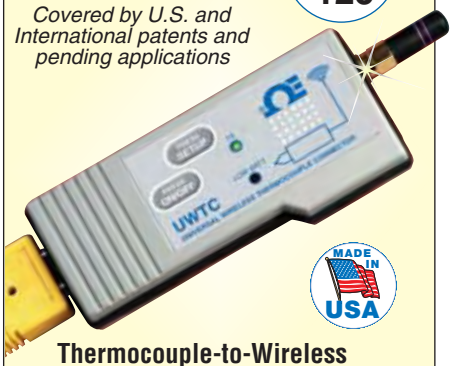
NEW

WIRELESS TRANSMITTERS AND RECEIVERS

UWTC Series

Starts at $125

PATENTED
Covered by U.S. and International patents and pending applications



MADE IN USA

Thermocouple-to-Wireless Connector/Converter
The Smart Connector™

UWRTD Series

Starts at $135

PATENTED
Covered by U.S. and International patents and pending applications

MADE IN USA

RTD-to-Wireless Connector/Converter
The Smart Connector™

UWRTD-NB9 Series

Starts at $195

Wireless RTD Probe Assembly

MADE IN USA

UWTC-2-NEMA

Starts at $165

MADE IN USA

Weather Resistant Wireless Thermocouple and RTD Transmitters

UWTC-REC1

Starts at $225

MADE IN USA

Standard 12-Channel Receiver

UWTC-REC2-D

Starts at $265

MADE IN USA

Standard 12-Channel Receiver with 1-Channel Analog Output and Optional Local Display

UWTC-REC1-NEMA

Starts at $325

MADE IN USA

Basic 12-Channel Receiver

zSeries End Devices

Starts at $95

PATENTED PENDING

MADE IN USA

Wireless Sensor System

wi8 Series

Starts at $395

wireless Meter Scanner & Controller

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS
1-800-872-3963®
1-800-USA-DYNE

NEW

WIRELESS TRANSMITTERS AND RECEIVERS

wiDR Series

Starts at $395 5 pack

wireless
DIN Rail Monitor and Controller

zED-TP Series

Starts at $195 5 pack

wireless
High Power Sensors

WUSB Series

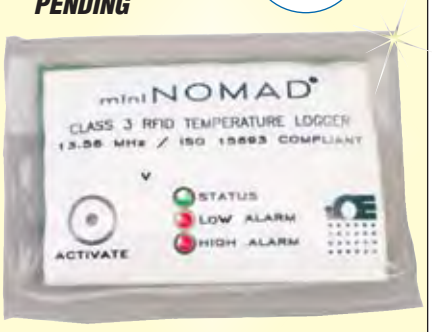
Starts at $159

Universal Wireless
RS232 to USB Transceiver

OM-81

PATENT PENDING

Starts at $60



The Mini NOMAD® Series

OM-82

PATENT PENDING

Starts at $60 5 pack

The Mini NOMAD® Series

HH802

Starts at $150

High Accuracy
Thermocouple
Thermometers

HH806

Starts at $199

High Accuracy
Data Logger/
Thermometers

HH804U Dual RTD Input

Starts at $149

High Accuracy RTD Thermometers

This is a small sampling of our wireless product selection. Please visit omega.com/wireless for complete details!

NEW

ECONOMICAL STRAIN INDICATORS WITH BUILT-IN SENSOR EXCITATION

DP25B-S, $245, shown smaller than actual size.

Select Your Color!

Program to display in RED, AMBER, or GREEN.

The OMEGADYNE® DP25B Series meters and controllers have totally programmable color displays—for RED, AMBER, or GREEN.

PATENTED
Covered by U.S. and International patents and pending applications

DP25B-S

$245

5 YEAR WARRANTY · MADE IN USA · CE · c UL us

- **NEMA 4 (IP65) Front Panel**
- **4-Digit Display, -1999 to 9999 counts**
- **Excitation Supply, Front Panel Tare, and Peak Hold Standard**
- **Accepts Voltage, Current, or Millivolt Inputs**
- **Easily Scaled to Display Readings in Engineering Units**

The DP25B-S is a low-cost digital panel meter for use with voltage, current, or bridge-type transducers. For bridge sensors, the DP25B-S has a ratiometric input to correct for variations in excitation voltage. Standard features include a front-panel tare button and a peak hold feature. Options include dual 5 A alarm relays and a scalable analog output configurable for 0 to 10 V or 4 to 20 mA.

SPECIFICATIONS

Accuracy (@ 25°C/77°F): ±0.03% of reading, ±1 count
Operating Temp: 0 to 50°C (32 to 122°F)
Span Temp Coefficient: ±50 ppm/°C
Storage Temperature: -40 to 185°F (-40 to 85°C)
Relative Humidity: 90% at 40°C (104°F), non-condensing
CMR: 120 dB
NMR: 60 dB
Isolation: Dielectric strength to 2500 V transient per 3 mm spacing based on EN 61010 for 260 Vrms or DC working voltage
Display: 4-digit, 9-segment, 21 mm (0.83") high, red, amber or green LED (programmable)
Display Range: -1999 to 9999 counts
Conversion Rate: 3 per second
Step Response: 1 to 2 seconds
Relays: Dual 250 Vac, 5 A, SPDT or 30 Vdc
Analog Output: Scalable 0 to 10 V or 4 to 20 mA

POWER REQUIREMENTS

Voltage: 115 (standard) or 230 Vac (optional), ±10%
Frequency: 50/60 Hz
Power Consumption: 9.5, 11.5 W

MECHANICAL SPECIFICATIONS WITH AI-R OPTION

Bezel: (96 W x 48 H x 20 mm D) (3.78 x 1.89 x 0.80")
Panel Cutout: (92 W x 45 mm H) (3.622 x 1.772")
Depth Behind Panel: 152 mm (6.0")

AVAILABLE FOR FAST DELIVERY!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	INPUT RANGES*	EXCITATION
DP25B-S	$245	0 to 100 mV, ±50 mV, 0 to 10 V, ±5 V, 0 to 20 mA, 4 to 20 mA	24 V @ 25 mA or 12 V @ 50 mA, 5 V @ 60 mA or 10 V @ 120 mA

** Input ranges and excitation are user selectable.*
Ordering Example: DP25B-S-AR,** 115 Vac powered digital strain meter with analog and relay output options, $245 + 80 + 70 = **$395.

OPTIONS (NOT FIELD INSTALLABLE)

SUFFIX	PRICE	DESCRIPTION
-230	N/C	230 Vac power
-DC10/32	$95	10 to 32 Vdc power
-DC26/32	120	26 to 56 Vdc power
-A	80	Scalable analog output
-R	70	Dual 5 A alarm relays
-AI-R	160	Isolated analog output and dual 5A alarm relays

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

HIGH PERFORMANCE METER WITH HIGH RESOLUTION 6-DIGIT DISPLAY

DP41-S
$545

All Have Red LED Display Standard, Also Available In Green

5 YEAR WARRANTY · MADE IN USA · CE

DP41-S, $545, shown smaller than actual size.

Shown actual size.
See omegadyne.com for a complete selection of strain gages.

- **Compatible with Strain Gage Bridge Sensors or Ratiometric Voltage Sensors**
- **Adjustable Filtering Up to 13 Hz**
- **Displays Up to 999,999 Counts**
- **NEMA 4 (IP65) Front Panel**
- **Remote Tare, Min, Max, Reset, and Hold Features**
- **Min/Max (Peak/Valley) Detection**

The high-performance DP41-S strain gage indicators have inputs for strain gage bridge and ratiometric voltage sensors. Built-in excitation is standard. The input range is selected via internal jumpers, and the user can perform scaling to engineering units on the front keypad. With optional RS232 or RS485 communications, the operator can program the display remotely.

Visit omegadyne.com for complete specifications.

ACCESSORIES FOR COMPUTER COMMUNICATIONS

MODEL NO.	PRICE	DESCRIPTION
DP40-9SC2	$30	9-pin serial connector for RS232
DP40-9SC4	30	9-pin serial connector for RS485
DP40-25SC2	30	25-pin serial connector for RS232
DP40-25SC4	30	25-pin serial connector for RS485

MOST POPULAR MODEL HIGHLIGHTED!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
DP41-S	$545	Strain gage indicator

ANALOG OUTPUT/COMPUTER COMMUNICATIONS

MODEL NO.	PRICE	DESCRIPTION
DP40-A3	$110	Analog output
DP40-S24	110	Isolated RS232/RS485 communications*

** Order communication option using suffix **"-S2"** or **"-S4"**; factory will configure the DP40-S24 board for selected option. 6.5' communications cable with phone plug termination included. For proper termination to a computer, 9-pin and 25-pin connectors are offered on this page.*

CONTROL/BCD OUTPUTS

MODEL NO.	PRICE	DESCRIPTION
DP40-B	$110	Isolated BCD output board*
DP40-R	75	Dual 7 A mechanical relays*
DP40-R4	175	Dual 7 A and dual 1 A relays*

** Order either DP40-B, DP40-R or DP40-R4; only 1 option can be used per unit. **DC power option not available on models with DP40-R or DP40-R4.***

POWER AND DISPLAY OPTIONS

SUFFIX	PRICE	DESCRIPTION
-230	N/C	230 Vac power
-DC	$110	9 to 32 Vdc isolated power
-GN	N/C	Green LED display

ACCESSORIES FOR DP41 METERS

MODEL NO.	PRICE	DESCRIPTION
SPC4	$30	NEMA 4 (IP65) heavy-duty splashproof lens, screw clamp
SPC18	30	NEMA 4 (IP65) splashproof lens, spring clip
DP41-TBS	25	Economical bench stand

Ordering Examples: DP41-S-S2-A,** DP41 unit for one full Wheatstone bridge inputs with 115 Vac power, RS232 communications and analog output, $545 + 110 + 110 = **$765

NEW

CNI32 Series
Starts at
$195

iSeries
OMEGA

½ DIN TEMPERATURE, PROCESS, AND STRAIN PID CONTROLLERS

MADE IN USA | 5 YEAR WARRANTY | CE | c UL us

CNi3233, $195, shown smaller than actual size.

- High Quality
- 5-Year Warranty
- High Accuracy ±0.5°C (±0.9°F), 0.03% Reading
- First ½ DIN Instrument with Totally Programmable Color Displays (Standard)
- User-Friendly, Simple to Configure
- Free Software, Active X Controls
- Full Autotune PID Control
- Universal Inputs: Thermocouple RTD, Process Voltage/ Current, Strain
- First ½ DIN Instrument Offering Both RS232 and RS485 Serial Communications in 1 Instrument (Optional)
- First ½ DIN Instrument with Built-in Excitation, 24 Vdc, Standard Temperature Stability
- ±0.04°C/°C RTD and ±0.05°C/°C TC @ 25°C (77°F)
- NEMA 4 (IP65) Front Bezel
- First ½ DIN Instrument with Analog Output Selectable as a Control Output or as Retransmission of Process Variable
- 2 Control or Alarm Outputs (Optional): DC Pulse, Solid State Relays, Mechanical Relays, Analog Voltage and Current
- Front Removable and Plug Connectors

The CNi32 is the iSeries controller in the extremely compact and increasingly popular ½ DIN size. The CNi32 is the most sophisticated and accurate instrument available in the small ½ DIN package, yet is still easy to configure.

The CNi32 handles more thermocouple, RTD, process voltage and current inputs than any other ½ DIN controller.

The CNi32 is the first ½ DIN controller with built-in excitation for transmitters or other devices, 24 Vdc @ 25 mA.

The CNiS32 has built-in excitation for bridge transducers, 5 Vdc @ 40mA or 10 Vdc @ 60mA. When communications options are installed, external excitation may be used and ratiometric operation maintained by connecting the external excitation to the sense leads. Both 4- or 6-wire bridge configurations are supported for internal or external excitation. Non-ratiometric operation is supported for voltage and current transducers and is also valuable in measuring offset and millivolt output of bridge devices during manufacturing and calibration. This model also features 10-point linearization which allows the user to linearize the signal input from extremely nonlinear transducers of all kinds.

The CNi32 introduces a number of unique features not yet found on any other ½ DIN instrument. The CNi32 is the first ½ DIN controller with a totally programmable display that can change color between **GREEN, AMBER,** and **RED** at any setpoint or alarm point. The unique 9-segment LED characters greatly improves alphanumeric representations.

The CNi32 is the first ½ DIN controller offering 2 SPDT Form C relays, instead of the single throw relays on typical ½ DIN controllers.

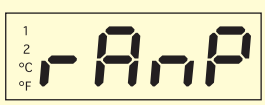
The CNi32 is the first to offer both RS232 and RS422/485 serial communications in 1 instrument (C24 option). Both ASCII protocol and modbus protocol are selectable from the menu.

PATENTED
Covered by U.S. and International patents and pending applications

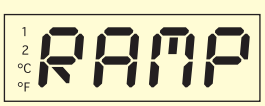
The **iSeries** displays feature unique 9-segment LED characters, which greatly improves alphanumeric representations. The 7-segment LED characters found on most instruments are adequate for presenting numbers, but not letters.

Words are easier to read with the unique 9-segment LED characters on the **iSeries**, which makes operating and programming simpler and easier.

9-segment LED



7-segment display



9-segment display

Strain Gage product line continues to expand, visit omegadyne.com for new details!

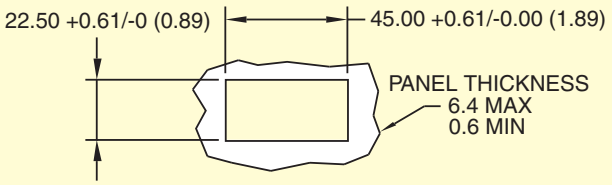
HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

CNi3233, $195, shown larger than actual size.

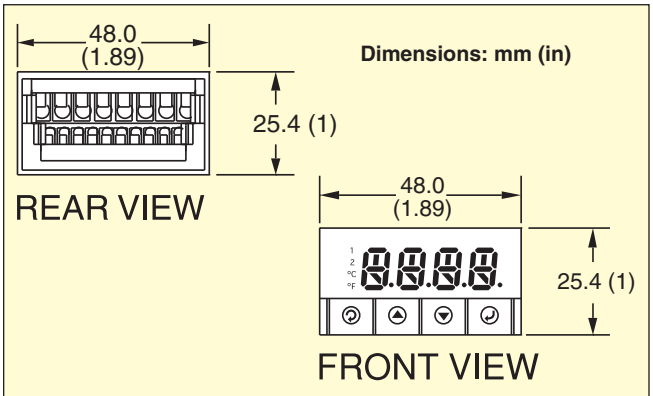
CNi3244, $195, shown larger than actual size.

DPi32-B-COVER supplied with each unit, standard.



PANEL CUTOUT
1/32 DIN

Please see omegadyne.com for standard DIN size panel punches



Options

Ordering Suffix	Add'l Price	Description
-AL	**N/C**	Limit alarm version (simplified menu, alarms only, no PID control)[2]
-SM	**N/C**	Simplified menu (on/off control or alarms, no PID)[3]
Network Options		
-C24	**$60**	Isolated RS232 and RS485/422, 300 to 19.2 Kb[1]
-EIS-2B	**195**	Industrial iServer Microserver™, serves 32 devices
Power Supply		
	N/C	Standard power input: 90 to 240 Vac/dc, 50 to 400 Hz (no entry required)
-DC	**$25**	20 to 36 Vac/dc, 24 Vac[1]
Factory Setup (Requires Network Option)		
-FS	**N/C**	Factory setup and configuration
-FS(RTD-1N)	**N/C**	Factory scaled for MIL-T-7990B nickel RTD input, 0 to 200°C (32 to 392°F)
-FS(RTD-2N)	**N/C**	Factory scaled for MIL-T-7990B nickel RTD input,-40 to 300°C (-40 to 572°F)
Software (Requires Network Option)		
OPC-SERVER LICENSE	**$295**	OPC server/driver software license

[1] *"-DC", "-C24", and "-C4EI" not available with excitation.*
[2] *Analog output is not available with "-AL" units.*
[3] *"-SM" option not avaialbe on CNiS strain models.*

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

Model No.	Price	Output 1	Output 2
2 Control Outputs			
CNi3233	**$195**	Relay	Relay
CNi3244	**195**	DC pulse	DC pulse
CNi3243	**195**	DC pulse	Relay
CNi3242	**195**	DC pulse	0.5 A SSR
CNi3222	**195**	0.5 A SSR	0.5 A SSR
CNi3223	**195**	0.5 A SSR	Relay
CNi3224	**195**	0.5 A SSR	DC pulse
CNi3253	**195**	Analog	Relay
CNi3254	**195**	Analog	DC pulse
CNi3252	**195**	Analog	0.5 A SSR
Strain/Process Input with 2 Control Outputs			
CNiS3233	**$240**	Relay	Relay
CNiS3234	**240**	Relay	DC pulse
CNiS3242	**240**	DC pulse	0.5 A SSR
CNiS3244	**240**	DC pulse	DC pulse
CNiS3243	**240**	DC pulse	Relay
CNiS3222	**240**	0.5 A SSR	0.5 A SSR
CNiS3223	**240**	0.5 A SSR	Relay
CNiS3224	**240**	0.5 A SSR	DC pulse
CNiS3253	**240**	Analog	Relay
CNiS3254	**240**	Analog	DC pulse
CNiS3252	**240**	Analog	0.5 A SSR

Comes with DPi32-B-COVER and complete operator's manual.

Ordering Examples: CNi3222-C24, *½ DIN PID controller with 2 solid-state relays for PID control and serial communications, both RS232 and RS485, $195 + 60 =* ***$255.***

CNiS322-AL, *½ DIN strain/process controller, limit alarm version with SSR output,* ***$240.***

NEW

STRAIN AMPLIFIER/SIGNAL CONDITIONER MODULES FOR STRAIN GAGES, LOAD CELLS, AND TRANSDUCERS

DMD-460 Series Starts at

$350

5 YEAR WARRANTY MADE IN USA

Up to 2 kHz Dynamic Response DMD-465WB

- Bridge Excitation 4 to 15 Vdc Up to 120 mA
- Works with 120, 350, 500 Ω and Greater Bridge Circuits
- Adjustable Gain and Offset
- 6-Wire Bridge Connections
- Voltage and Current Output Versions
- 115 and 230 Vac, and DC-Powered Models

DMD-465, $350, shown smaller than actual size.

The DMD-460 Series bridge amplifiers are self-contained, AC-or DC-powered, signal conditioning modules for strain gages, load cells, and bridge-type sensors. The DMD-465 contains a precision differential instrumentation amplifier with voltage output. The similar DMD-465WB has a frequency response to 2 kHz, while the DMD-466 has a 4 to 20 mA output instead of a voltage output.

SPECIFICATIONS

COMMON

Power: Standard 115 Vac or optional 220 Vac ±10% 50/60 Hz or 10 to 36 Vdc 0.7 A @ 10 V, 0.17 A @ 36 V at maximum excitation load

Operating Temperature: 0 to 70°C (32 to 158°F)

Storage Temperature: -25 to 85°C (-13 to 185°F)

Weight: 510 g (18 oz)

Size: 96 L x 51 W x 73 mm H (3.75 x 2 x 2.87")

BRIDGE SUPPLY

Excitation Voltage Range: 4 to 15 Vdc

Current Output: 120 mA max

Line and Load Regulation: (0 to 100 mA) 0.05% max

Output Noise: 0.5 mVrms

VOLTAGE OUTPUT DMD-465 and DMD-465WB

Gain Range: 40 to 250 (up to 1000 with external resistor on DMD-465 only)

Dynamic Response:
DMD-465: DC to -3 dB = 3 Hz
DMD-465WB: DC to -3 dB = 2 kHz

Max Output (2 kΩ Load): ±10 Vdc

Output Impedance: 0.01 to 1 Ω

Output Offset: -5 to 2 V (DMD-465WB only)

Gain Temp Coefficient: 200 ppm/°C

Input Bias Current: 30 nA

Input Impedance: 3000 MΩ

Output Noise (RTO): @ gain = 100
DMD-465: 120 µVrms
DMD-465WB: 1 Hz to 2 kHz = 2 mV

Input Noise Line Frequency: 15 µV p-p

Common-Mode Rejection: 90 dB @ gain 40, 100 dB @ gain 250

Common-Mode Input Voltage: ±15 V

4 to 20 mA Transmitter DMD-466

Output: 4 to 20 mA, 0 to 20 mA

Input Range for 20 mA Output: 10 mV min, 50 mV max

Zero Adjust: 0 to ±12 mA

Linearity: ±0.05% FS

Temperature Stability: 200 ppm/°C

Input Impedance: 1000 MΩ

Common-Mode Rejection: 90 dB

Common-Mode Input Voltage: ±15 V

Compliance Voltage: 10 Vdc

Output Noise: 1 µA rms @ gain 0.2 mA/mV, 1 to 100 Hz

Dynamic Response: DC to -3 dB = 3 Hz

Response Time: To 99% of final value 200 ms, typical; to 99.9% of final value 300 ms, typical

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
DMD-465	$350	Voltage output
DMD-465-220V	350	220 Vac powered DMD-465
DMD-465WB	350	High-frequency voltage output
DMD-465WB-220V	350	220 Vac powered DMD-465WB
DMD-466	350	Current output (4 to 20 mA)
DMD-466-220V	350	220 Vac powered DMD-466
DMD-466-DC	395	10 to 36 Vdc powered DMD-466

Comes with complete operator's manual.

Ordering Example: DMD-465WB,** wide bandwidth amplifier/signal conditioner module with 115 Vac power, **$350.

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
EE-2454	$160	Reference Book: The Industrial Electronics Handbook

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

HANDHELD TRANSDUCER INDICATOR WITH EXCITATION FOR MILLIVOLT TRANSDUCERS

HHP-SG, $575, shown smaller than actual size, with TQ103, socket extension reaction torque sensor, $775, see omegadyne.com.

HHP-SG

$575

1 YEAR WARRANTY — MADE IN USA

- **Handheld Indicator for Bridge-Type Transducers**
- **9 Volt Battery (Included)**
- **Scalable Display with Dummy Zero**
- **Built-In Transducer Excitation**

The HHP-SG is a handheld digital indicator for strain-gage-type transducers such as load cells, torque sensors, and millivolt pressure sensors. It provides excitation voltage for the transducer and displays the readings on an LCD.

Front-panel zero and span adjustments allow scaling in the desired engineering units. The LCD has 3½ active digits (0 to 1999 counts) and an additional dummy zero if needed. The HHP-SG can display either the actual value of the signal (tracking mode) or the peak value (peak mode). It operates on a standard 9 V battery and has a low-battery indicator.

SPECIFICATIONS

Transducer Excitation Voltage: 2.46 Vdc

Minimum Transducer Resistance: 350 Ω

Input Signal Sensitivity: 0.5 to 4.0 mV/V for full scale indication peak

Detector Bleed-Off: Less than 0.01% per second

Display Type: 3½ digit LCD (plus dummy zero)

Digit Height: 10 mm (0.4")

Conversion Rate: 3 readings per second

Power: 9 V battery (included); low-battery indicator

Battery Life: 15 hours minimum with 350 Ω bridge transducer

Size: 91 W x 171 H x 44 mm D (3.6 x 6.75 x 1.75")

Weight: 230 g (9 oz)

Case Material: Molded ABS impact-resistant plastic

Connection Method: 4 color-coded binding posts to accept spade lugs, banana plugs, bare wire or alligator clips

AVAILABLE FOR FAST DELIVERY!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	DESCRIPTION
HHP-SG	$575	Handheld strain gage indicator

Comes with 9 V battery and complete operator's manual.

Ordering Example: HHP-SG,** handheld strain gage indicator, **TQ103,** socket extension reaction torque sensor, $575 + 775 = **$1350.

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
ME-1805	$131	Reference Book: Instrumentation Fundamentals

NEW

BRIDGE/STRAIN GAGE DATA LOGGER PART OF THE NOMAD® FAMILY OM-CP-BRIDGE110

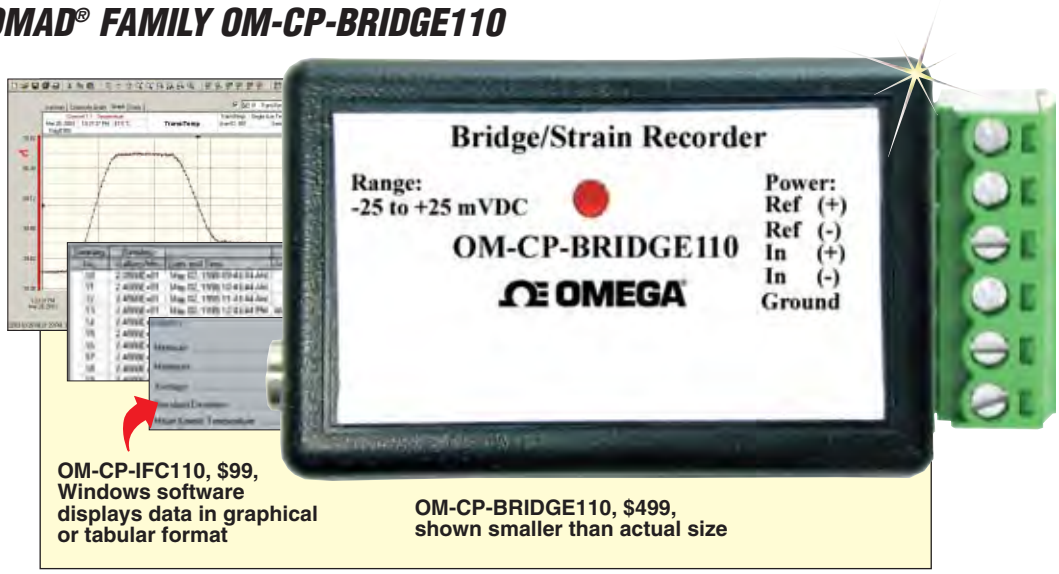
OM-CP-BRIDGE110

$499

All Models

MADE IN USA — 5 YEAR WARRANTY

- **10-Year Battery Life**
- **High-Speed Downloads**
- **Programmable Start Time**
- **Miniature Size**
- **Real-Time Operation**
- **Reads in Microstrain and Engineering Units**
- **Use with Strain Gages, Load Cells, Pressure Transducers, Torque Sensors, Load Bolts, and Position Transducers**



OM-CP-IFC110, $99, Windows software displays data in graphical or tabular format

OM-CP-BRIDGE110, $499, shown smaller than actual size

The OM-CP-BRIDGE110 is a miniature, battery-powered, standalone, bridge/strain gage data logger. It features a real-time clock module that extends the battery life to more than 10 years (15-minute reading rate at 25°C) and allows for high-speed downloads. This portable, easy-to-use device will read and record up to 32,767 measurements. The storage medium is non-volatile solid state memory, providing maximum data security even if the battery becomes discharged. The logger can be started and stopped from a computer and its small size allows it to fit almost anywhere. The OM-CP-BRIDGE110 makes data retrieval quick and convenient. Simply plug it into an available com port and our user-friendly software does the rest. The software converts a PC into a real-time strip chart recorder. Data can be printed in graphical and tabular format or exported to a text or Microsoft Excel file.

SPECIFICATIONS

Input Connection: 6-position removable screw terminal
Input Impedance: 1 MΩ during acquisition, low impedance when inactive
Reference Voltage Output: 2.5 Vdc, 2.5 mA (1 KΩ) maximum load
Maximum Input Signal Impedance: 5 KΩ (350 Ω sensors can be used with series resistors to produce >1 KΩ; 120 Ω gages can be used in half and quarter bridge configurations)
Temperature Effect on Span and Offset: <25 µV over -40 to 80°C
Engineering Units: Stored in device; user may define any desired scale and offset from ±1.000E-31 to ±9.999E+31
Start Time: Start time and date are programmable through software up to six months in advance
Real-Time Recording: Device can be used with PC to monitor and record data in real-time
Memory: 32,767 readings
Recording Interval: 1 reading every 2 seconds to 1 every 12 hours
Calibration:
Digital calibration through software
Calibration Date: Automatically recorded within device to alert user when calibration is required
Battery Life:
10 years at 15 min reading rate, 25°C
Power: 3.6 V lithium battery included
Data Format: Date and time stamped: %, ppm; e, µe, V, mV, µV engineering units specified through software
Time Accuracy:
±1 minute per month at 20 to 30°C
Computer Interface: PC serial, RS-232C COM or USB (interface cable required); 56,600 baud
Software:
Windows 95/98/ME/NT/2000/XP
Operating Environment:
-40 to 80°C (-40 to 176°F)
0 to 95% RH non-condensing
Dimensions: 42 H x 68 W x 20 mm D (1.7 x 2.7 x 0.8")
Weight: 60 g (2 oz)

Input Ranges OM-CP-BRIDGE110 Nominal Range				
Nominal Range	±10 mV	±25 mV	±100 mV	±1000 mV
Measurement Range	±15 mV	±37.5 mV	±150 mV	±1200 mV
Resolution	1 µV	2.5 µV	5 µV	50 µV
Calibrated Accuracy	±0.25% FSR	±0.10% FSR	±0.05% FSR	±0.01% FSR

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

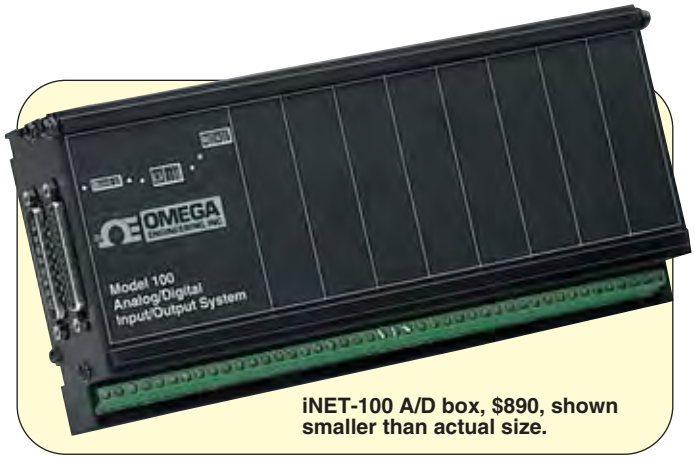
Model No.	Price	Description
OM-CP-BRIDGE110-10	**$499**	Bridge input data logger (±10 mV input range)
OM-CP-BRIDGE110-25	**499**	Bridge input data logger (±25 mV input range)
OM-CP-BRIDGE110-100	**499**	Bridge input data logger (±100 mV input range)
OM-CP-BRIDGE110-1000	**499**	Bridge input data logger (±1000 mV input range)
OM-CP-IFC110	**99**	Windows software and 1.2 m (4') RS-232 cable with DB9F termination
OM-CP-IFC200	**119**	Windows software and 3.7 m (12') USB interface cable
OMP-CP-BAT105	**12**	Replacement 3.6 V lithium battery
OM-CP-CONNECTOR-6	**10**	Replacement 6 position terminal block connector

*Comes with complete operator's manual and RS-232 cable. The **OM-CP-IFC110** Windows software sold separately.*
Ordering Example: OM-CP-BRIDGE110-100** bridge input data logger (±100 mV input range) with **OM-CP-IFC110** Windows software and RS-232 cable, $499 + 99 = **$598.

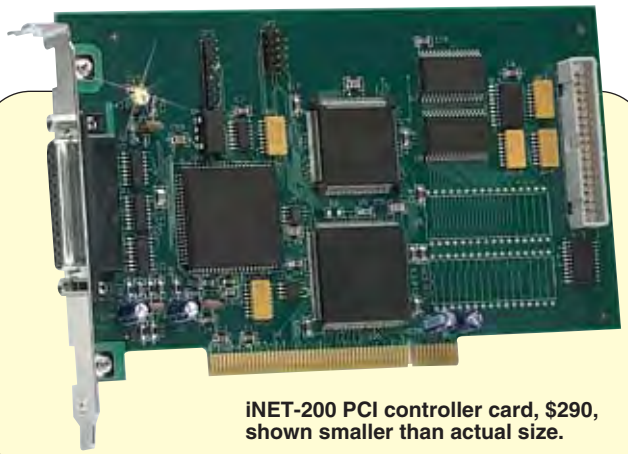
Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

instruNet SERIES DIRECT SENSOR TO DATA ACQUISITION



iNET-100 A/D box, $890, shown smaller than actual size.



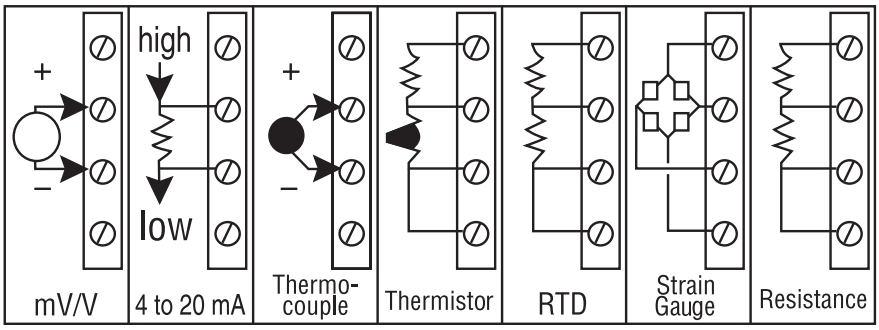
iNET-200 PCI controller card, $290, shown smaller than actual size.

iNet-100 Series Starts at

$1180

1 YEAR WARRANTY · MADE IN USA · OMEGACARE Extended Warranty Program · CE

- **High-Accuracy Data Acquisition for Windows 95/98/NT/2000/XP and Macintosh Computers**
- **16 Single-Ended/8 Differential 14-Bit Analog Inputs, 8 Analog Outputs, and 8 Digital I/O**
- **Controller Card Includes 10 Counter/ Timer Channels**
- **Direct Connection to RTD, Thermocouple, Voltage, Current, Accelerometer, Potentiometer, Load Cell, Thermistor, Bridge, and Strain Gage Sensors**
- **Each Channel Has Independently Programmable Analog and Digital Filters, Integration Time, Voltage Range, and Sample Rate**
- **166 KS/s Throughput to RAM or Disk**
- **Includes Strip Chart Software and Drivers for C, Visual Basic.Net, HPVEE, and TestPoint**



iNET-100 hook-up diagram.

- **Optional LabVIEW Drivers are Available**
- **Optional DASYLab Software Includes iNET Drivers for Easy-to-Use, Icon-Based Programming**

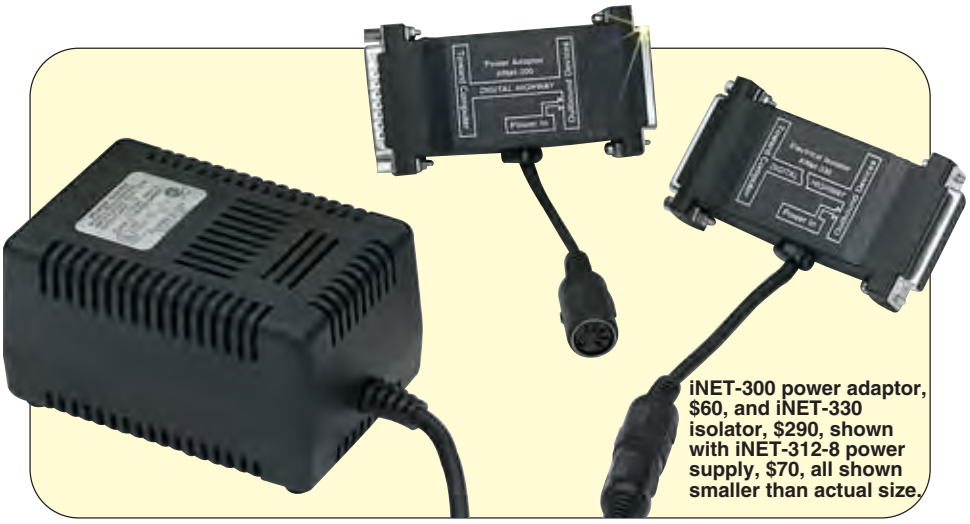
instruNet provides tens of microvolts of absolute accuracy instead of tens of millivolts, at the same cost and at the same throughput rates as typical general purpose data acquisition boards. It does this with a completely different topology in which the analog electronics are close to the sensor in electrically quiet boxes outside the PC, and noisy digital electronics are left inside. The external boxes contain signal conditioning amplifiers for each channel and can attach directly to sensors such as thermocouples, thermistors, RTDs, strain gages, load cells, resistance sources, current sources, and voltage sources. The box returns engineering units to the PC (e.g., °C, volts, amps).

At the heart of the real-time system is a PCI (WIN95/98/NT/2000/XP) or PC-card (WIN95/98/2000/XP) controller board that plugs into a Windows or Macintosh computer.

Each controller contains a 32-bit microprocessor with 256 KB of RAM that manages the external "network" of devices. All real-time tasks are off-loaded to this processor so that the host computer is not burdened with real-time issues. Each instruNet iNET-100 box provides 16 single-ended/8 differential analog inputs, 8 analog outputs, and 8 digital I/O lines. The iNET-100 includes 44 screw terminals. The iNET-100B version adds 16 BNCs for analog inputs. The controllers themselves have 10 counter/timer channels, each of which can function as a digital input bit, a digital output bit, a clock output channel, a pulse counter, a frequency counter, a period measurement input, or a quadrature counter.

Distributed and Expandable

The instruNet system is ideally suited for distributed measurement and control systems. The network cable can extend up to 304.8 m (1000'). Each controller card in the PC can connect to up to 8 instruNet boxes for a total of 128 analog inputs, 64 analog outputs, and 64 digital I/O. For additional inputs, multiple controller cards can be placed in one computer, with the maximum number of controller cards limited only by the number of available slots.



iNET-300 power adaptor, $60, and iNET-330 isolator, $290, shown with iNET-312-8 power supply, $70, all shown smaller than actual size.

Since each controller card has its own microprocessor, multiple cards do not place any additional burden on the computer. It should be noted that multiple instruNet boxes on a single network may degrade the maximum system throughput of 166 KS/s.

Performance

The instruNet system supports the digitizing of multiple channels at a maximum aggregate sample rate of 166 KS/s, where each channel can be digitized at its own rate. This maximum rate decreases when the total cable length increases, optical isolation is used, digital filtering or plotting is enabled, more boxes are added, more channels are digitized, amplifier gain is increased, or spooling to disk is added. Each channel can be independently digitally filtered with low-pass, high-pass, band-stop and band-pass filters; the filter specification for each channel is independently set in software. Each channel provides a programmable analog low-pass filter with programmable A/D measurement integration time. The network can be hundreds of feet long and can support multiple hardware devices connected in a daisy-chain configuration. The start of digitizing can be triggered from any channel. There are no jumpers or pots; the system automatically self-calibrates on power-up. Because instruNet is modular, it can easily be expanded as needs evolve. One can easily move the system hardware from one computer family to another, since the various controllers are functionally identical.

High-Current Version (HC)

The iNET-100HC is similar to the iNET-100, yet the voltage output channels have a higher drive capability, providing up to 15 mA of current to capacitive loads as high as 0.01 µF. The iNET-100 and iNET-100B devices support only 4 mA/0.001 µF voltage output drive. The iNET-100HC is recommended for use with sensors such as strain gages, RTDs, and thermistors, since these sensors may exceed the current or capacitive drive limits of the iNET-100 or iNET-100B. The iNET-100HC, furthermore, provides greater compatibility with sensors that have capacitive loading on the excitation lines, therefore it is recommended for all sensors requiring excitation, including RTDs and thermistors. Since the HC version has a greater power demand, an external power supply must be used. The iNET-312-8 can be used for three additional iNET-100HC boxes.

Software

"instruNet World" is a FREE application program that manages, monitors, and operates the instruNet system. It digitizes long continuous waveforms, spools them to disk, views incoming waveforms in real time, and then allows post-acquisition viewing, much like an oscilloscope or strip chart recorder.

instruNet World provides a spreadsheet-like environment in which one can set and view channel parameters such as sensor type, integration time, analog filter, and digital filter. Each channel has its own row in the spreadsheet, with the various options in the columns.

instruNet is also compatible with a variety of off-the-shelf software products, including TestPoint, HPVEE, SuperScope II Macintosh, Microsoft Excel 8 for Windows, and DASYLab. For users writing their own programs, instruNet includes drivers callable from Visual Studio.Net Basic or C. The driver includes a main routine, called "iNet( )", that reads or writes any of the options or channels on the system. Optional drivers are also available for LabVIEW software.

instruNet World Plus (for Windows 95/98/NT/2000/XP, not Macintosh) software adds valuable features to the standard instruNet World software included with instruNet hardware. It enables the user to digitize, plot, control, analyze, and save to disk A/D, D/A, and digital I/O data from instruNet hardware. In addition, it enables one to define a personal instrument front panel with buttons, pop-up menus, edit fields, dynamic text, text editor regions, and waveform graphs. instruNet World Plus is programmed with a simple script language that can define tasks such as control loops. For example, one can type "Dac1 = OnOff (Ain1, 3)" to define D/A #1 as a function of A/D #1.

Below is a list of the additional features available only in instruNet World Plus:

Generate Analog and Digital Output Waveforms

Define an analog or digital output channel mathematically (e.g., sine wave, square wave, pulse train) that updates in real time (e.g., every 100 ms).

Run Feedback/Control Loops

Define an analog or digital output channel as a real-time function of analog and/or digital input channels (e.g. PID control, on/off control).

Create a Custom Instrument

Create buttons, pop-up menus, edit fields, dynamic text fields, text edit regions, and pages to build a custom application program.

Powerful Script Programming Language

instruNet World Plus is programmed with a simple BASIC-like script language that provides feedback/control, waveform generation, math, file, hardware, and user-interface functions.

instruNet World Plus also Includes Digitize Direct to Excel Software

InstruNet World Plus includes the Digitize Direct to Excel program, which populates an Excel (Version ≥ 8.0, Office ≥ 97) spreadsheet in real time while digitizing.

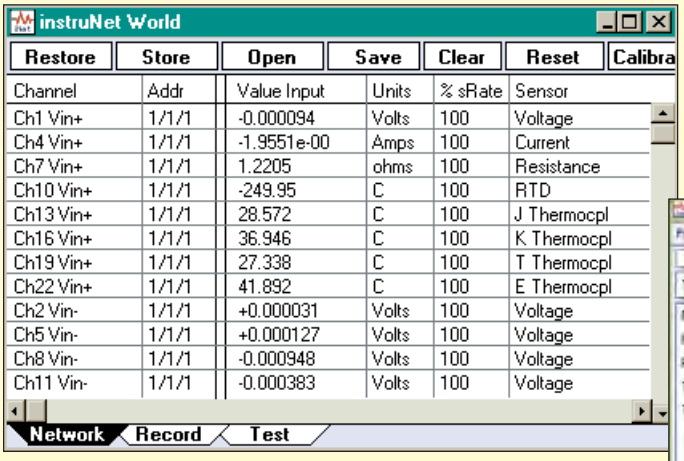
Power Requirements

Since instruNet is powered directly from the iNET-200 controller card, it is possible to exceed the power capacity of the controller card if multiple instruNet iNET-100 boxes are attached to a network. For systems using the iNET-200 PCI bus controller card with more than 2 iNET-100/100B boxes or 1 iNET-100HC instruNet box on a network, external power is required. Two power adaptors are available: the iNET-300 power adaptor and the iNET-330 adapter/isolator. Both devices connect in line with the instruNet communications cable; the iNET-300 provides power only, while the iNET-330 provides power and electrical isolation between the iNET-100 boxes and the computer. Isolation helps eliminate ground loop problems.
Both the iNET-300 and iNET-330 require either the iNET-312-8 (USA plug) or iNET-312-8EU (Euro plug) power supply. The iNET-312-8 can power 4 additional iNET-100/100B or 3 additional iNET-100HC. The iNET-230 controller card does not provide power; the iNET-312-8 or iNET-312-8EU power; supply must be used with this card.

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW



instruNet World Data Acquisition Software (included with the instruNet System).

instruNet World Plus Data Acquisition Software below (not included—need to puchase software license), iNET-iWPLUS, $199.

Thermocouple Ranges/Accuracy

Thermocouple	Range	Accuracy
J	-210 to -100°C -100 to 1200°C	±0.8°C ±0.5°C
K	-200 to -50°C -50 to 1360°C	±0.8°C ±0.6°C
T	-200 to -100°C -100 to 400°C	±0.8°C ±0.5°C
E	-200 to -60°C -60 to 1000°C	±0.7°C ±0.5°C
R	-50 to 70°C 70 to 1768°C	±3.5°C ±2.0°C
S	-50 to 150°C 150 to 1768°C	±2.8°C ±1.8°C
B	250 to 600°C 600 to 1300°C	±3.8°C ±2.0°C
N	-200 to -110°C -110 to 1260°C	±1.3°C ±0.8°C
C	0 to 2315°C	±2.4°C
D	0 to 2315°C	±2.2°C
G	0 to 100°C 100 to 300°C 300 to 2315°C	±16.0°C ±3.4°C ±1.8°C

OMEGACARE℠ extended warranty program is available for models shown on this page. Ask your sales representative for full details when placing an order. OMEGACARE℠ covers parts, labor and equivalent loaners.

iNET-100B, $990, shown smaller than actual size with KMTSS-125U-6 thermocouple probe, sold separately, $26. Search omegadyne.com for more information.

Voltage Range/Accuracy

Voltage Range	Integration (Seconds)	Accuracy
±5 V	1 ms none	±700 µV ±1500 µV
±0.6 V	1 ms none	±75 µV ±150 µV
±80 mV*	1 ms none	±15 µV ±45 µV
±10 mV*	1 ms none	±10 µV ±30 µV

**±80 mV and ±10 mV are nominal ranges. Actual ranges may be as low as ±78 mV and ±8 mV, respectively*

RTD Accuracy Ranges

RTDs with α = 0.00385 and 0.00392 supported. One user-supplied shunt resistor per RTD channel is required.

RTD	Range	Shunt	Accuracy
100 Ω	0 to 200°C	1 kΩ	±0.37°C
100 Ω	0 to 850°C	2 kΩ	±1.0°C
500 Ω	0 to 200°C	4.7 kΩ	±0.38°C
500 Ω	0 to 850°C	10 kΩ	±0.9°C
1000 Ω	0 to 200°C	10 kΩ	±0.36°C
1000 Ω	0 to 850°C	20 kΩ	±0.85°C

SPECIFICATIONS

Analog Inputs: 16 single-ended/8 differential
Resolution: 14-bit
System Throughput: 166K samples/s
A/D Conversion Time: 4 µs min
Signal-to-Noise Ratio: 78 dB
Linearity: Differential ±1.5 LSB; integral ±2 LSB
Input Overvoltage Protection: ±15 V
Input Impedance: >22 MΩ, 3pf
Common-Mode Voltage: ±5 V min (CMR ±80 dB)

Gain and Offset Drift: ±5 ppm/°C of 5 V FSR; offset self-calibrated to 0

Thermistor Accuracy/Ranges

All OMEGADYNE® 44000 Series thermistors supported. (Consult Sales for other thermistors); one user-supplied shunt resistor per thermistor channel is required.

Range	Shunt	Accuracy
-80 to 40°C	47 kΩ	±0.2°C
0 to 70°C	4.7 kΩ	±0.1°C
0 to 200°C	200 Ω	±0.4°C

Analog Outputs: 8
Resolution: 8-bit
Output Range:
iNET-100/100B: ±5 V @ 5 mA
iNET-100HC: ±5 V @ 15 mA
Output Protection:
Short-to-ground continuous
Output Settling Time:
4 µs (to ±2 LSB, ±5 V step)

Analog Output Accuracy: ±0.4%
Digital Coupling: ±20 mV
Gain and Offset Drift: ±10 ppm/°C of 5 V FSR and ±5 µV/°C offset drift

Digital I/O Number: 8 non-latching inputs and 8 latching outputs at 8 bidirectional screw terminals
Input Levels:
V_{IH} = 3.2 V min to 12 V max
V_{IL} = 1.0 V max to -12 V min
I_{IH} = -200 µA, V^i = 3.2 V
I_{IL} = -0.5 mA max
Output Levels:
V_{OH} = 2 V min to 5 V max
I_{OH} = -0.5 mA max
I_{OL} = 500 mA max, V^o =1.7 V
I_{OL} = 50 mA max, V^o = 0.7 V

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

Model No.	Price	Description
iNET-100	**$890**	instruNet external A/D box with screw terminal connections
iNET-100B	**990**	instruNet external A/D box with screw terminal and BNC connections
iNET-100HC	**990**	Same as INET-100 with 15 mA excitation current per channel
iNET-200	**290**	PCI-Bus controller card for Windows 95/98/NT/2X/XP or Macintosh computers (controls up to 8 iNET-100s)
iNET-230†	**290**	PC-Card controller, type II for Windows® 95/98/2X/XP (does not provide power, requires iNET-312-8 power supply)

Comes with operator's manual, instruNet World data acquisition software, driver software and network terminator.
The iNET-100/100B/100HC include a 3 m (10') cable for connecting the iNET-100/100B/100HC to the controller card or other iNET-100/100B/100HCs.
Ordering Example: iNET-100** external A/D box, **OMEGACARE℠** 1-year extended warranty for **iNET-100** (adds 1-year to standard 1-year warranty), **iNET-200** controller card and **OMEGACARE℠** 1-year extended warranty for **iNET-200** (adds 1 year to standard 1-year warranty), $890 + 89 + 290 + 29 = **$1298.
† ***iNET-230** is not supported under Windows NT.*

Accessories

Model No.	Price	Description
iNET-300	**$60**	Power adaptor, required if using more than 2 iNET-100/100B boxes or one iNET-100HC box with the iNET-200 PCI controller card; the iNET-230 PC card controller provides its own power adaptor
iNET-330	**290**	Optical isolator, isolates signal and power lines (replaces iNET-300, requires iNET-312-8 power supply)
iNET-312-8	**70**	Power supply; 110/220 Vac, 5 V/2 A, ±12 V/0.8 A; USA plug used with iNET-300/330/230, iNET-300 included (powers 3 additional iNET-100HC or 4 additional iNET-100/100B); includes iNET-300 power adaptor
iNET-312-8EU	**70**	Power supply; 110/220 Vac, 5 V/2 A, ±12 V/0.8 A; 2-prong Euro plug, used with iNET-300/330/230 (powers 3 additional iNET-100HC or 4 additional iNET-100/100B); includes iNET-3000 power adaptor
iNET-340	**50**	DIN rail mounting brackets for one iNET-100
iNET-34S	**75**	34-pin screw terminal panel, breaks out digital I/O on iNET-2xx controller (requires iNET-34W3F cable)
iNET-34W3F	**25**	0.9 m (3') 34-wire ribbon cable to connect iNET-34S to iNET-2xx controller card
iNET-CABLE-1FT	**12**	instruNet cable, 0.3 m (1') length
iNET-CABLE-10FT	**16**	instruNet cable, 3.0 m (10') length
iNET-CABLE-25FT	**24**	instruNet cable, 7.6 m (25') length
iNET-CABLE-50FT	**38**	instruNet cable, 15.2 m (50') length
iNET-CABLE-100FT	**78**	instruNet cable, 30.5 m (100') length
iNET-iWPLUS	**199**	instruNet World Plus software license for one controller card (includes CD and license certificate for Windows 95/98/NT/2000/XP, not Macintosh)
iNET-380	**195**	LabVIEW drivers (LabVIEW versions 4 to 6 currently supported on Windows 98/NT/XP and Mac OS9)
OMX-R250	**1**	Precision 250 Ω shunt resistor (1% tolerance)
OMX-R(*)	**10**	Precision shunt resistor, insert resistance code
OMX-R1K	**11**	Precision shunt resistor, 1K

**** Note:** Insert resistance code in Ωs. Available resistance codes are 200, 2K, 4.7K, 10K, 20K and 47K.*
Ordering Example: iNET-312-8,** power supply, 110/220 Vac, **$70.

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

BRIDGE AMPLIFIER MODULES WITH INTEGRAL BRIDGE COMPLETION CIRCUITRY

OM2-162

$300

5 YEAR WARRANTY — MADE IN USA

- Half- or Full-Bridge Inputs
- Integral Zero and Span Adjustments
- Gain of 2 to 5000
- Adjustable Filtering
- Remote Sensing
- Eliminates Lead Resistance Effects
- 0.002% Linearity
- DIP Switch Frequency Cutoff Adjustment
- On-Board Bridge Balance

OM2-162, $300, shown larger than actual size.

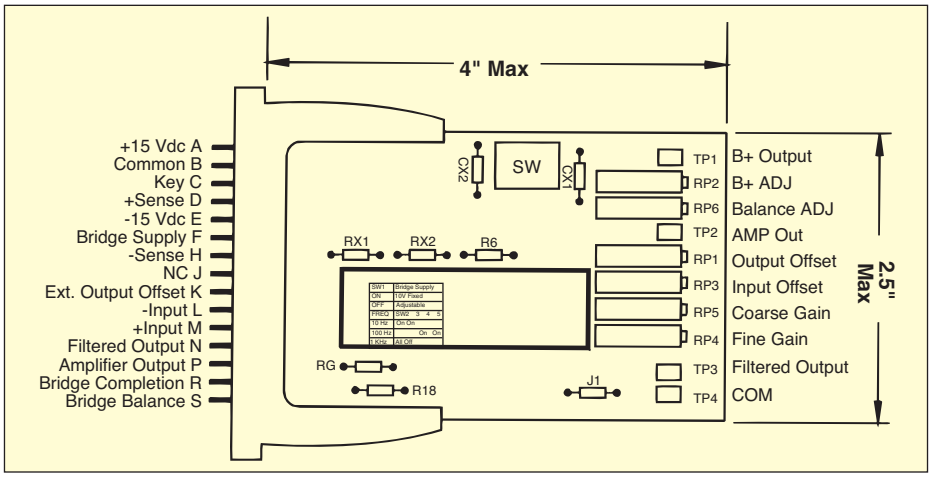
The OM2-162 is a complete signal conditioning system on a card designed expressly for either half- or full-bridge transducers. It consists of a high-performance instrumentation amplifier, a user-adjustable active filter, a high-stability bridge supply, and all the required circuitry, trimpots, etc. To get a complete system up and running, the only required point-to-point wiring is for inputs, outputs, and power.

The unit provides coarse and fine gain-adjustment trimpots, along with input and output offset adjustments, DIP switches for setting the bridge supply output, and active low-pass filter cutoff frequency. There are also provisions for mounting a quarter-bridge completion resistor and a calibration resistor, which can be wired to an external CAL switch. Two close-tracking half-bridge completion resistors are included.

SPECIFICATIONS

Gain Range: 100 to 500
(2 to 5000 with external resistor)
External Resistor Calculation:
R = 100,000/(gain-2)
Max Output Voltage: ±10 Vdc
Linearity: 0.002%
Output Offset Range: ±0 Vdc
Input Power:
±15 Vdc @ 12 mA
Bridge Supply: 4 to 10 Vdc @ 130 mA
Line and Load Regulation: 0.05%
Output Noise: 200 pV p-p
Dynamic Response: 10 kHz @ gain 100; adjustable filter 10, 100, 1000 Hz unfiltered bandwidth 25 kHz
Gain Change with Temperature:
75 ppm/°C
Input Impedance: 4 GΩ
Common-Mode Input Voltage:
±15 Vdc maximum
Input Noise Voltage: 0.1 to 10 Hz, 0.3 µV p-p; 10 to 100 Hz, 1.0 µV p-p

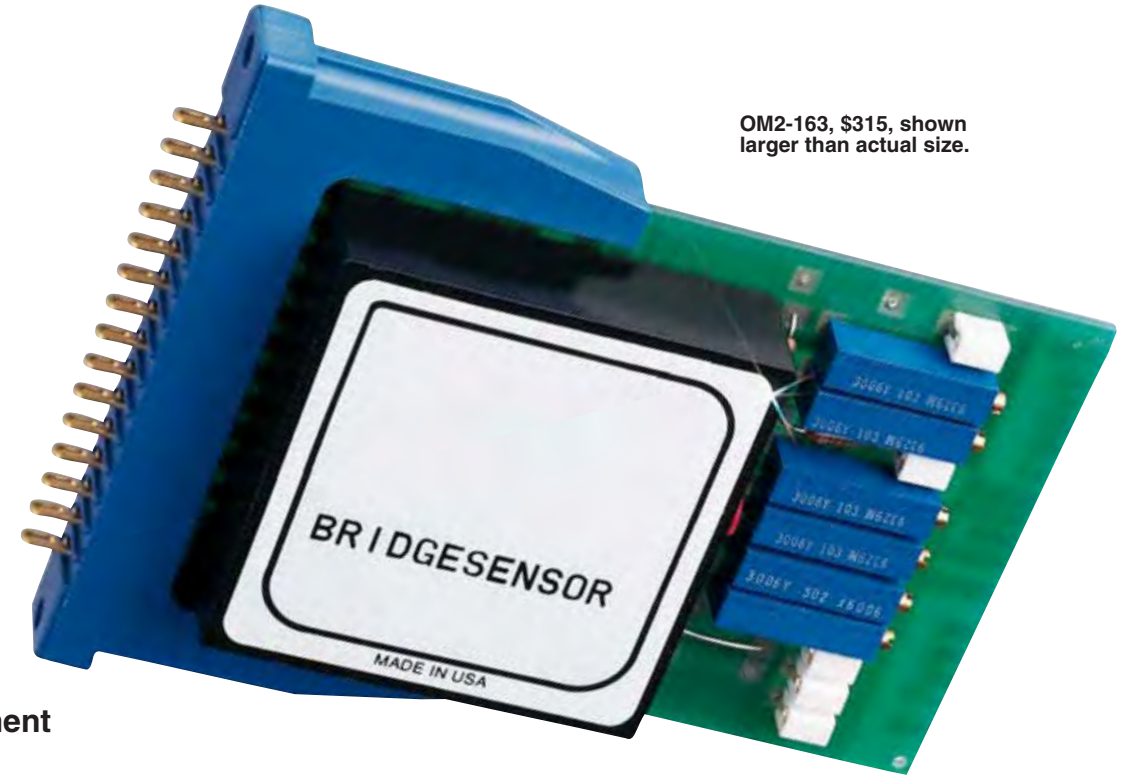
Half-Bridge Completion:
Nominal Resistance Value: 10 kΩ
Initial Accuracy: ±0.1%
Temperature Tracking: 5 ppm/°C
Balance Adjustment Range: 350 Ω
Bridge: ±15 mV
Operating Temperature:
-25 to 55°C (-13 to 131°F)
Storage Temperature:
-40 to 80°C (-40 to 176°F)



BRIDGE AMPLIFIER MODULE WITH OPEN-COLLECTOR OUTPUT

OM2-163
$315

5 YEAR WARRANTY — MADE IN USA



OM2-163, $315, shown larger than actual size.

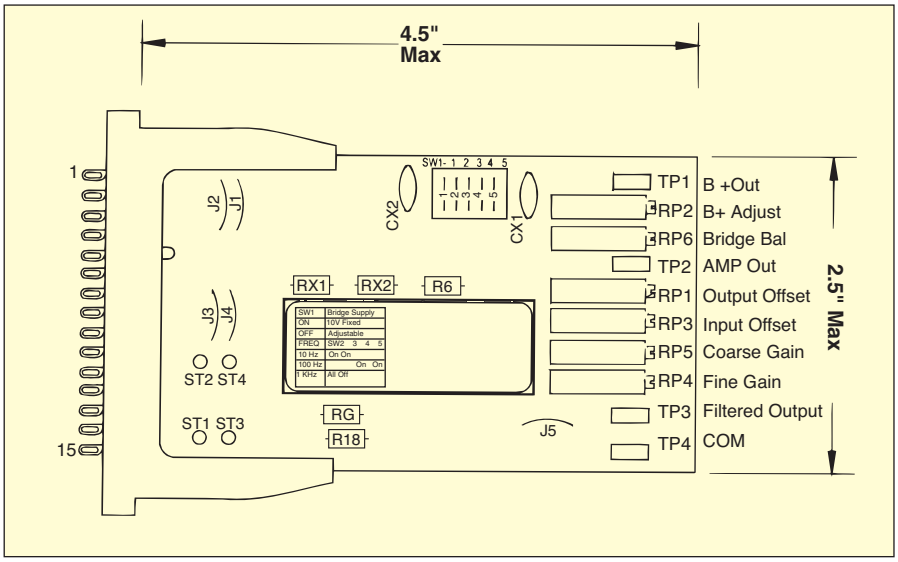
- ¼, ½, and Full-Bridge Inputs
- Gain of 2 to 5000
- Remote Sensing Eliminates Lead Resistance Effects
- On-Board Bridge Balance Trimpot
- DIP Switch Cutoff Frequency Adjustment
- Bridge Supply from 4 to 10 Vdc
- ½ Bridge Completion Resistors On-Board
- ¼ Bridge Completion Resistor—User Supplied

The OM2-163 is a complete signal conditioning system on a card designed expressly for single half- or full-bridge transducers. It consists of a high-performance instrumentation amplifier, a user-adjustable active filter, a high-stability bridge supply, and all the required circuitry, trimpots, etc. To get a complete system up and running, the only required point-to-point wiring is inputs, outputs, and power.

The unit provides coarse and fine gain adjustments, along with input and output offset adjustments, DIP switches for setting the bridge supply output, and active low-pass filter cutoff frequency.

SPECIFICATIONS

Gain Range: 100 to 500 card only, 2 to 5000 with external resistor
External Gain Resistor Calculation: R = 100,000/(gain – 2)
Output Max: ±10 Vdc
Linearity: 0.002%
Input Offset Voltage (Adjustable): ±2 mV
Input Power: ±15 Vdc @ 45 mA
Bridge Supply: 4 to 10 Vdc @ 120 mA
Load Regulation: 0.02% max
Noise Voltage: 1 mVrms max
Dynamic Response @ Gain 100: 10 kHz
Gain Temp Coefficient: ±75 ppm/°C using trimpots; 25 ppm/°C alone
Input Resistance: Differential 10 MΩ
Common Mode: 500 MΩ
Common-Mode Voltage: -7 to 7 V
Minimum Load Resistance: 2 kΩ
Hysteresis: 8 mV max
Leakage Current: 10 µA
Response Time: 70 µs
Operating Temperature Range: -25 to 55°C (-13 to 131°F)



Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

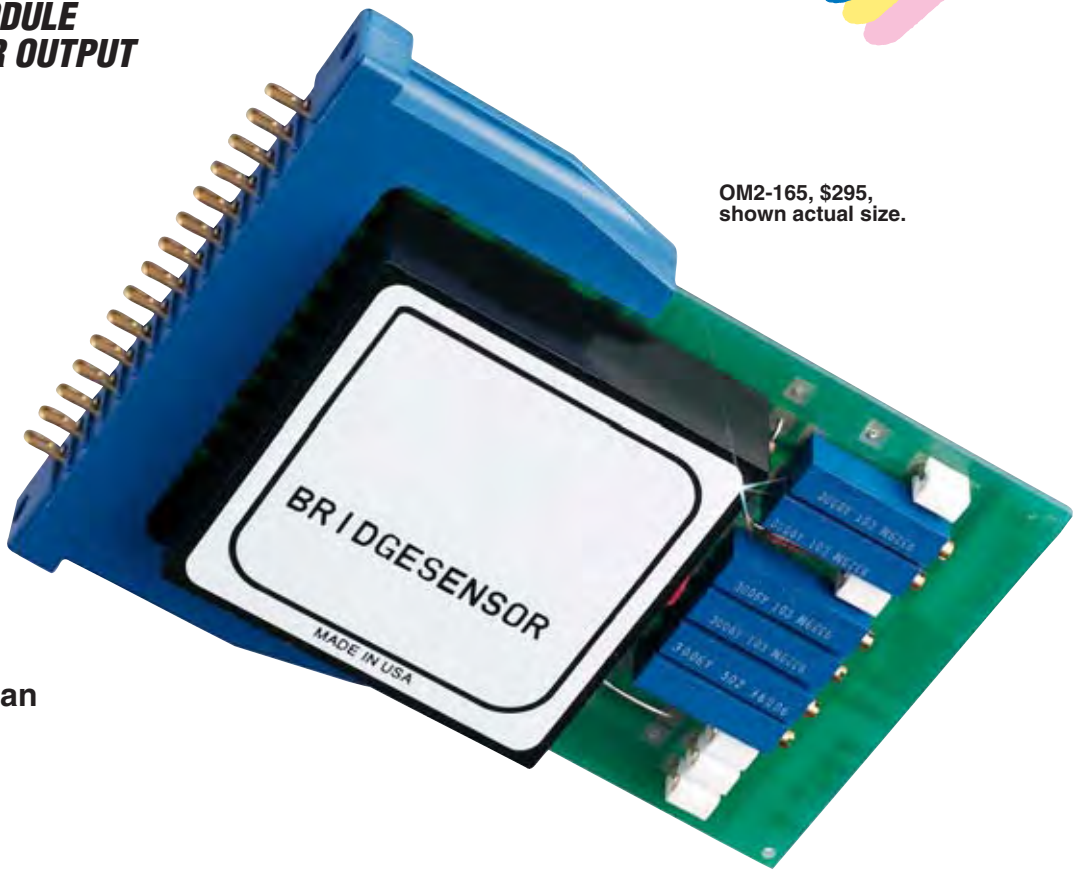
NEW®

BRIDGE AMPLIFIER MODULE WITH OPEN COLLECTOR OUTPUT

OM2-165

$295

5 YEAR WARRANTY MADE IN USA



OM2-165, $295, shown actual size.

- **Solid State Open-Collector Output (100 mA max)**
- **Integral Zero and Span Adjustments**
- **Gain of 10 to 1000**
- **Remote Sensing Eliminates Lead Resistance Effects**

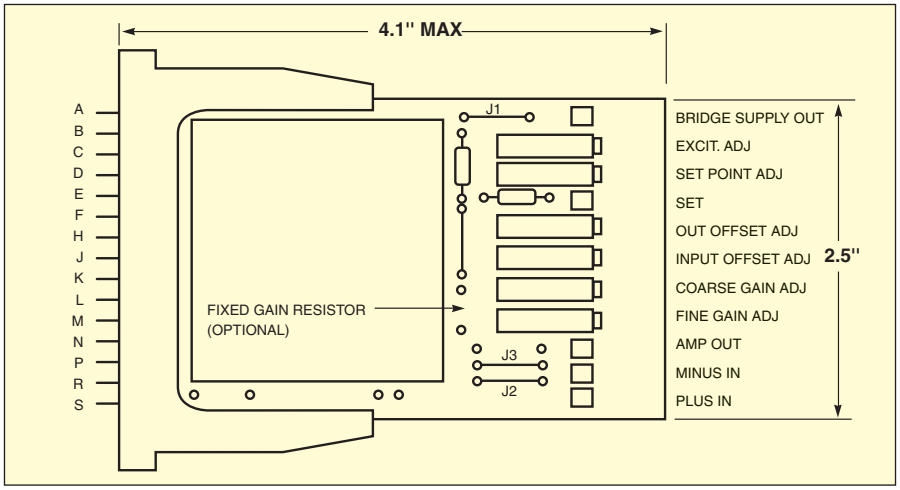
The OM2-165 module is a complete signal conditioning system designed for use with strain gage–based transducers. It provides 4 to 10 Vdc to excite a strain gage or other type of bridge signal. A sensitive comparator that can be connected to monitor the amplifier output is included. The comparator drives a solid state switch that can be used to operate a relay, light, or audible alarm. The solid state switch has non-latching and latching capability. It is packaged in a state-of-the-art hybrid circuit, which is mounted on a PC board mounting kit containing all required external circuitry and trim potentiometers.

The card has trimpots for coarse and fine gain adjustments, input adjustments, and offset adjustments. DIP switches set the bridge supply output. A complete instrumentation or control system can be set up using the OM2-165, a power source, and a strain gage type transducer. The OM2-165 module has a user-selectable gain between 10 and 1000.

SPECIFICATIONS

Gain Range: 10 to 1000
Output Max: ±10 Vdc
Linearity: 0.01%
Input Offset Voltage (Adjustable): ±2 mV
Input Power: ±15 Vdc @ 45 mA
Bridge Supply: 4 to 10 Vdc @ 100 mA
Load Regulation: 0.01% max
Noise Voltage: 1 mV rms max
Dynamic Response @ Gain 100: 10 kHz
Gain Temp Coefficient: ±50 ppm/°C

Input Resistance: Differential 10 MΩ
Common Mode: 500 MΩ
Common-Mode Voltage: -7 to 7 V
Minimum Load Resistance: 2 kΩ
Open Collector Output: 16 Vdc @ 100 mA
Hysteresis: 8 mV max
Leakage Current: 10 µA
Response Time: 70 µs
Operating Temperature Range: 0 to 70°C (32 to 158°F)



NEW

MODULAR SIGNAL CONDITIONING SYSTEM
¼, ½, FULL BRIDGE, 1 TO 8 CHANNELS

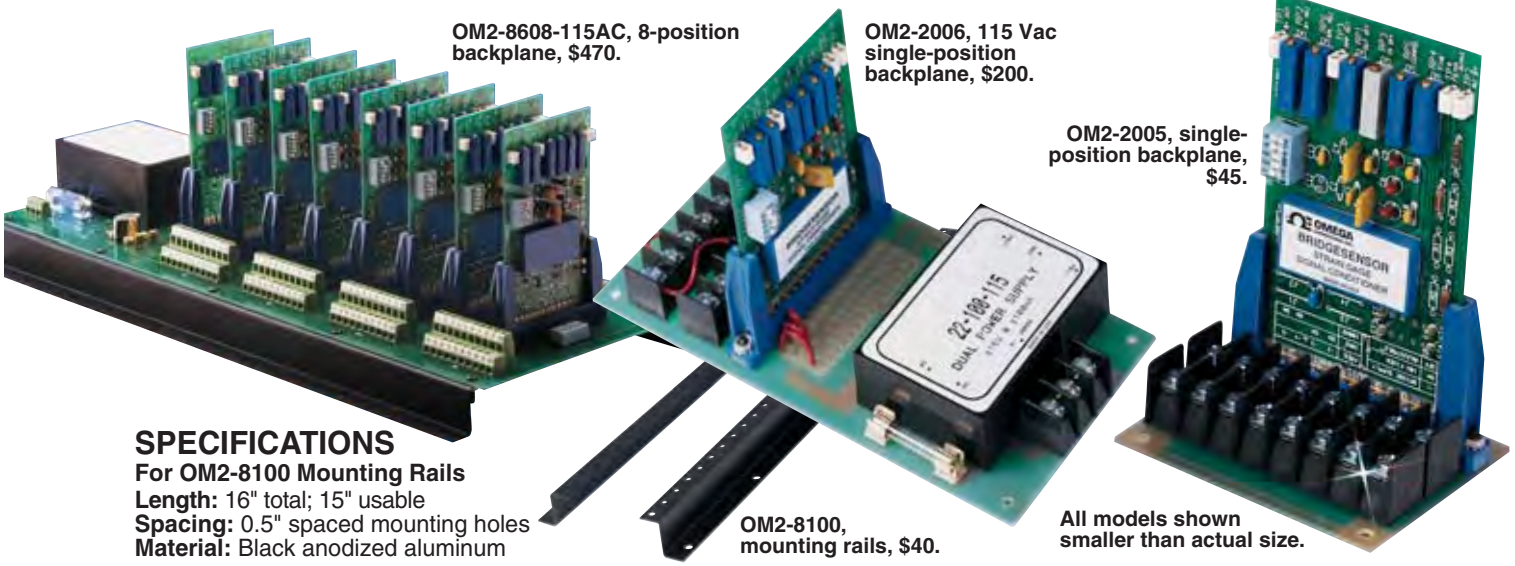
MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*			
MODEL NO.	**PRICE**	**GAIN RANGE***	**DESCRIPTION**
OM2-162	**$300**	2 to 5000	Signal conditioning module for ½ and full-strain bridge circuits
OM2-163	**315**	10 to 1000	Signal conditioning module for ¼, ½ or full-strain bridge circuits or transducers with open-collector output
OM2-165	**295**	10 to 1000	Signal conditioning module for full-strain bridge circuits or transducers with open-collector output

ACCESSORIES

MODEL NO.	PRICE	DESCRIPTION
OM2-8608-115AC	**$470**	115 Vac powered backplane for 8 OM2 signal conditioning modules with power supply and mounting rails included
OM2-8608-230AC	**470**	230 Vac powered backplane for 8 OM2 signal conditioning modules with power supply and mounting rails included
OM2-8608-24DC	**470**	DC-powered backplane for 8 OM2 signal conditioning modules with power supply and mounting rails included; 10 to 36 Vdc power
OM2-8608-48DC	**470**	DC-powered backplane for 8 OM2 signal conditioning modules with power supply and mounting rails included; 24 to 72 Vdc power
OM2-2006	**200**	115 Vac powered backplane for one OM2 signal conditioning module with power supply (mounting rails not included; not compatible with OM2-163)
OM2-2005	**45**	Backplane for one OM2 signal conditioning module (screw terminals only; not compatible with OM2-163)
OM2-8100	**40**	Two 16" mounting rails (2 rails already included with OM2-8608)

** 10 V maximum. Comes with complete operator's manual.*
Ordering Example:** Complete system, including **OM2-162,** signal conditioning module for ½ and full-bridge strain gage measurement, **OM2-2006,** single module back panel with power supply and **OM2-8100,** mounting rails, $300 +200 + 40 = **$540.



SPECIFICATIONS
For OM2-8100 Mounting Rails
Length: 16" total; 15" usable
Spacing: 0.5" spaced mounting holes
Material: Black anodized aluminum

SPECIFICATIONS FOR OM2 SERIES BACKPLANES						
MODEL	**OM2-8608-115AC**	**OM2-8608-230AC**	**OM2-8608-24DC**	**OM2-8608-48DC**	**OM2-2006**	**OM2-2005**
Input Range	115 Vac ±10 V	230 Vac ±10 V	10 to 36 Vdc	24 to 72 Vdc	115 Vac ±10 V	N/A
Frequency	50/60 Hz	50/60 Hz	N/A	N/A	50/60 Hz	N/A
Temperature	0 to 55°C 32 to 131°F	0 to 55°C 32 to 131°F	0 to 55°C 32 to 131°F	0 to 55°C 32 to 131°F	0 to 55°C 32 to 131°F	0 to 55°C 32 to 131°F
Size	159 x 419 mm (6.25 x 16.5")	159 x 419 mm (6.25 x 16.5")	159 x 419 mm (6.25 x 16.5")	159 x 419 mm (6.25 x 16.5")	89 x 175 mm (3.5 x 6.9")	70 x 83 mm (2.75 x 3.25")
Weight	1.43 kg (3 lb, 3 oz)	1.43 kg (3 lb, 3 oz)	0.62 kg (1 lb, 6 oz)	0.62 kg (1 lb, 6 oz)	425 g (15 oz)	113 g (4 oz)

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

ANALOG & DIGITAL OUTPUT SIGNAL CONDITIONERS/TRANSMITTERS

iDRN/iDRX Series Starts at

$250

MADE IN USA | 5 YEAR WARRANTY | CE

PATENTED

Covered by U.S and International patents and pending applications

- **Analog or Digital Output**
- **Models Available for: Thermocouple, RTD, Process Voltage & Current, Strain, Frequency/Pulse, AC Voltage and Current**
- **Up to 1800 Vdc Isolation**
- **iDRN Series Provide 0 to 10 Vdc, 4 to 20 mA or 0 to 20 mA Output**
- **iDRX Series Provide RS-485 Output (ASCII Serial Protocol and MODBUS® Serial Protocol)**
- **Free Setup and Configuration Software**
- **Factory Setup and Configuration Available at No Charge (for iDRN Analog Output Models)**

The iD Series signal conditioners combine the accuracy of laboratory instrumentation with the performance required by demanding industrial applications. The iD Series signal conditioners are ideal for those applications in Data Acquisition, Test & Measurement, Process Control, and Industrial Automation where accuracy, performance, and reliability are critically important.The iD Series signal conditioners mount on a 35mm DIN rail, and operate on any voltage between 10 to 32 DC power. (A matching 24 Vdc 850 mA switching power supply is also available.) The devices feature three-way isolation of up to 1800 Vdc between the signal inputs, outputs, and power supply.

The iD series feature seven (7) models designed for each of the most widely measured signal inputs: Process (DC) Voltage and Current; Strain Gage; Thermocouples; RTD's; AC Voltage; AC Current; Frequency/Pulse.

The iD series devices are designed to work directly with a variety of sensors and transducers; no other components are necessary. For sensors such as RTD's, strain gages, and some process transducers, precise stable excitation is provided directly from the iD module.

The iD series is available with two different types of signal outputs: Analog or Digital. The iDRN series provides a totally scalable analog output in DC voltage or current and a digital RS-485 output. Both iD Series signal conditioners are intelligent microprocessor based instruments that can be scaled and programmed by computer via serial communications, or over an Ethernet network.

iDRN Series Analog Output

The iDRN series feature a 0 to 10 Vdc, or 0 to 20 mA (including 4 to 20 mA) analog output signal that is typically scaled to be directly proportional to the input signal. It is an ideal component in a system with PLC's or PC's with analog data acquisition boards.

The iDRN series are an excellent choice for applications that demand an extra measure of accuracy and performance that is not possible with conventional "analog" signal conditioners or transmitters. Unlike conventional analog devices that are scaled by adjusting zero and span "pots", the programmable, micro-processor based iDRN instruments are scaled precisely on a PC with free and simple Windows software. The iDRN modules connect directly to a PC's RS-232 Serial Communications port for programming and scaling.

Once the module is configured, the parameters are saved in non-volatile memory. The device can be disconnected from the PC, or the RS-232 output from the module can be used for continuous data acquisition in addition to the analog output.

Alternatively, the iDRN signal conditioner can be connected to a PC's Ethernet port or an Ethernet network using the EIS-2B module as a Serial/Ethernet bridge.

NEW®

Free Setup and Configuration

If an iDRN signal conditioner is not going to be connected to a computer, it can be ordered preconfigured by the factory at no extra charge. The user can select the input types, ranges and output scale, and OMEGADYNE® will program the instruments to those specific requirements in our calibration lab prior to shipment. For custom factory setup and scaling of the iDRN model, please specify the "-FS" option.

iDRX Series Digital Output

The iDRX Series Signal Conditioners provide highly accurate digital outputs. Each module provides an RS-485 Serial output that can be transmitted directly to computers and other devices with serial communications capability, or converted to Ethernet.

On an RS-485 bus, up to 32 modules can be connected over a distance of 1200 m (4000') on a single pair of wires. With optional RS-485 repeaters, up to 254 modules may be connected to a single RS-485 port. The iDRX Series digital conditioners may be connected to an RS-485 bus using either screw terminator or RJ-12 connector.

ASCII and MODBUS

The user can select between an easy-to-use, straightforward ASCII protocol, or the popular MODBUS protocol found in many existing industrial installations. With the simple ASCII commands, writing programs using the iDRX does not require special drivers or libraries. In addition, many off-the-shelf software packages can be used with the iDRX devices without any programming.

OMEGADYNE also provides a number of useful programs and demos for the iDRX at no charge.

OPC Server And Active X Controls

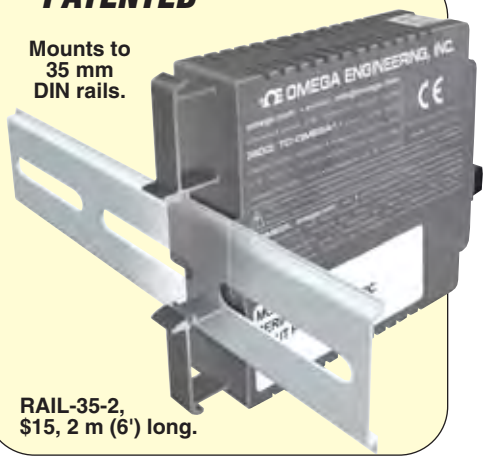
OMEGADYNE offers an optional OPC Server (OLE for Process Control) and ActiveX Controls for the iDRX Series. These programs make it easy to integrate the iDRX devices with information systems using "ActiveX Containers" such as Microsoft Visual Basic and Microsoft Excel as well as with popular OLE and OPC compliant data acquisition, process control, and industrial automation software from OMEGADYNE, Iconics, Wonderware, Intellution, Rockwell Automation, and GE Fanuc Cimplicity among others.

iDRX and iDRN Series SPECIFICATIONS

Input Power Supply: 10 to 32 Vdc
iDRX Output: 2-wire (half duplex) RS-485 (OMEGADYNE® Serial Protocol and Modbus Serial Protocol)
iDRN Output: 0 to 10V @ 10 mA max; 0 to 20 mA or 4 to 20 mA, 10V compliance
Isolation: 1800 Vdc peak
Typical Step Response to 99%: 1 second
Operating Ambient: -5 to 55°C (23 to 131°F)
Storage Temperature Range: -40 to 85°C (-40 to 185°F)
Mounting: 35 mm DIN rail
Dimensions: 90 H x 25 W x 107 mm D (3.54 x 0.99 x 4.21")

PATENTED

Mounts to 35 mm DIN rails.



RAIL-35-2, $15, 2 m (6') long.

MOST POPULAR MODEL HIGHLIGHTED!

Input	Thermocouple	RTD	ac Voltage	ac Current	Process	Strain/Bridge	Frequency Pulse
Model No.	**iDRN/iDRX-TC**	**iDRN/iDRX-RTD**	**iDRN/iDRX-ACV**	**iDRN/iDRX-ACC**	**iDRN/iDRX-PR**	**iDRN/iDRX-ST**	**iDRN/iDRX-FP**
Input Type	Thermocouple temperature sensor	RTD Temperature sensor Pt100, 500, 1000Ω	ac Voltage	ac Current	dc Millivolt, Volt and Current	Millivolt	NAMUR Contact closure low level open collector
Input Range	J, K, T, E, R, S, B, N, J DIN thermocouple full range	α = 385, 392 Full range of RTD 2, 3 or 4-wire	Full Scale Range: 400 mV to 400V	Full Scale Range: 10 mA to 5 A	Full Scale Range: ±400 mV to ±10V 0 to 20 mA	0 to 30 mV 0 to 100 mV ±100 mV	Full Scale Range 20k to 200 M pulses 0 to 50 kHz
Accuracy	±1°C	±0.5°C	0.2%	0.2%	0.1% FS	0.2% FS	0.1% FS
Resolution	0.1°C	0.1°C	10 to 14 Bit	10 to 14 Bit	12 to 15 Bit	13 to 15 Bit	15 to 19 Bit
Output	iDRX Series: 2-wire (half duplex) RS-485/iDRN Series: 0 to 10V @ 10 mA max; 0 to 20 mA or 4 to 20 mA						
Excitation	N/A	N/A	N/A	N/A	14 Vdc @ 25 mA	10V @ 30 mA	5, 8.2 and 12.5 Vdc @ 25 mA
iDRN RS-232 ANALOG	**$325**	**$355**	**$345**	**$345**	**$325**	**$345**	**$295**
iDRX RS-485	**$250**	**$250**	**$270**	**$270**	**$275**	**$300**	**$250**

Strain Gage product line continues to expand, visit omegadyne.com for new details!

HOTLINE TO STRAIN GAGE PRODUCTS 1-800-872-3963® 1-800-USA-DYNE

NEW

Fast-Response Thermocouples with Self-Adhesive Backing

SA1 Series Starts at
$60
5-pack

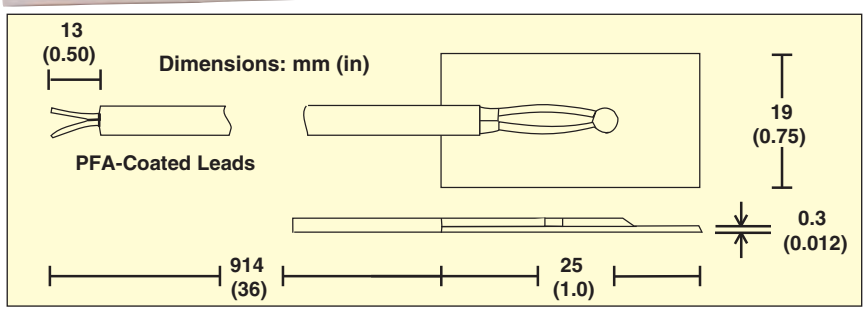
MADE IN USA

175°C (347°F) Temperature Rating

SA1-K, $60, shown smaller than actual size.

- **Special-Limits-of-Error Wire**
- **Self-Adhesive Backing for Easy Installation**
- **Better Than 0.3 Second Response Time**
- **0.9 m (36") Color-Coded PFA-Insulated Leads**
- **Rated to 175°C (347°F) Long Term**
- **Available in J, K, T, and E Calibrations**

OMEGADYNE's self-adhesive thermocouples are designed for fast measurement of surface temperature. These sensors are manufactured from 30 AWG PFA-coated thermocouple wire, with a flattened bead secured between a high-temperature polymer and a high-temperature, fiber-reinforced polymer. This combination affords good thermal conductivity and fast response. The self-adhesive backing makes installation easy; no epoxy or cement is required.



SPECIFICATIONS

Thermocouple Calibrations:
J: Iron-constantan
K: CHROMEGA®-ALOMEGA®
T: Copper-constantan
E: CHROMEGA®-constantan

Adhesive: Silicon-based cement
Max Temp: 175°C (347°F) continuous
Min Temp: -60°C (-75°F) continuous
Laminates: High-temperature polymer, fiberglass-reinforced polymer layers
Wire: 0.9 m (36") leads, 30 AWG PFA coated

Shown with DP25B-TC, meter, $245, see omegadyne.com

MOST POPULAR MODELS HIGHLIGHTED!

To Order *(Specify Model Number)*

MODEL NO.	PRICE (PKG/5)	DESCRIPTION
SA1-(*)	$60	Thermocouple, 36" long, stripped ends
SA1-(*)-72	80	Thermocouple, 72" long, stripped ends
SA1-(*)-SC	75	Thermocouple, 36" long, spool cap connector
SA1-(*)-72-SC	95	Thermocouple, 72" long, spool cap connector

** Specify J, K, T or E thermocouple type.* ***Note:*** *Maximum wire length with spool cap is 72". To order probes with 120" leads, add* ***"-120"*** *to model number, and* ***$100*** *per package of 5.*
Ordering Example: SA1-K-SC-120, *package of 5 Type K thermocouples with spool caps and 120" wire leads,* ***$100.***

ACCESSORY

MODEL NO.	PRICE	DESCRIPTION
CM-4363	$85	Reference Book: Plant Design for Safety

NEW®

Advanced-Design Surface-Mount RTD Provides Class A Accuracy "Stick-On" or "Cement-On" to Target Device

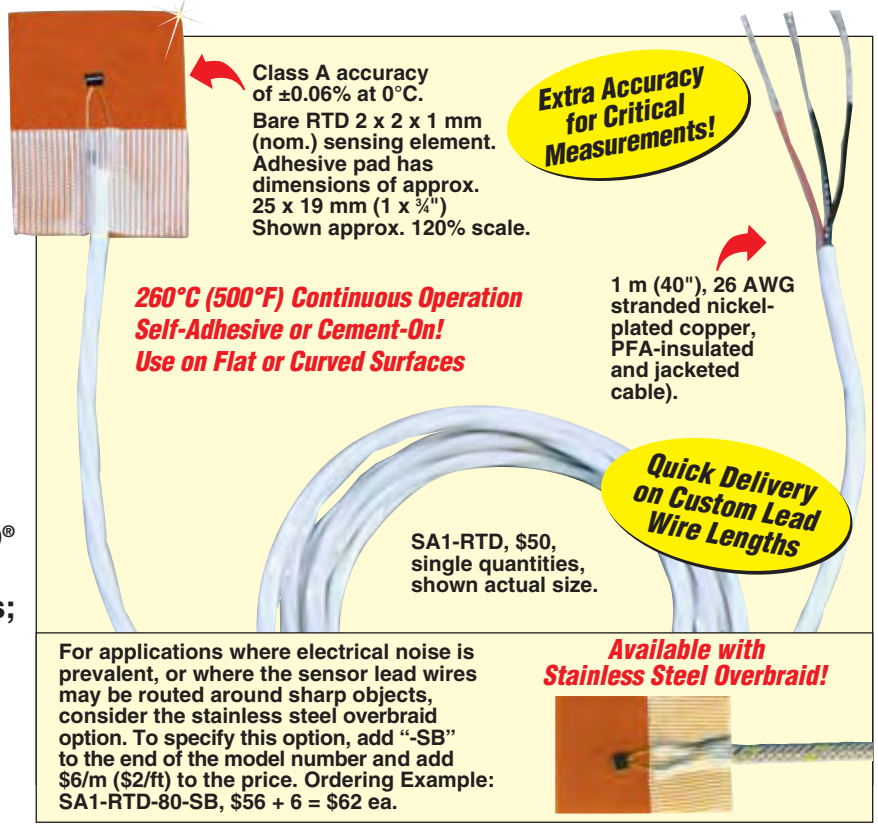
SA1-RTD Series Starts at

$50

MADE IN USA

- **100 Ω DIN Class A (±0.06 Ω or ±0.06% at 0°C) Accuracy Standard**
- **Easy-Installation Silicone-Based, Self-Adhesive Backing Rated to 260°C (500°F)**
- **Sensor Can be Reapplied**
- **290°C (554°F) Short-Term Operation When Used as a "Cement-On" (OMEGABOND® Air Set Cements)**
- **Stocked in 1 m (40") Lengths; Also Available in 2 and 3 m (80 and 120") and Custom Length Lead Wires**

The SA1-RTD surface-mount RTD temperature sensor mounts on flat or curved surfaces and provides Class A accuracy for critical temperature monitoring applications. Based on a 2 x 2 x 0.8 mm (0.08 x 0.08 x 0.03") thin-film platinum RTD and supplied in PFA-insulated 3- or 4-wire configurations (connectors optional), it can be customized for use in a wide variety of applications. The sensor can be easily applied using its self-adhesive backing, or permanently mounted using OMEGABOND cements.



For applications where electrical noise is prevalent, or where the sensor lead wires may be routed around sharp objects, consider the stainless steel overbraid option. To specify this option, add "-SB" to the end of the model number and add $6/m ($2/ft) to the price. Ordering Example: SA1-RTD-80-SB, $56 + 6 = $62 ea.

Available with Stainless Steel Overbraid!

SPECIFICATIONS

Minimum/Maximum Temperature: -73°C (-100°F) to 260°C (500°F) continuous, 290°C (554°F) short-term (when cemented in place)
Sensing Element: 100 Ω at 0°C (32°F), temp coefficient of 0.00385 Ω/Ω/°C (IEC60751)
Accuracy: ±0.06% at 0°C (DIN Class A)
Stability: Less than 0.2°C drift/year
Response Time: Less than 0.9 s (63% response time in water immersion), less than 2 s response time on a hot plate
Self-Heating Effect: 2.5 mW/°C
Lead Wire: 1 m (40"), 26 AWG stranded nickel-plated copper, PFA-insulated and jacketed cable

ALL MODELS AVAILABLE FOR FAST DELIVERY!

To Order *(Specify Model Number)*

MODEL NO.	PRICE	SS BRAID -SB OPTION	STYLE	LENGTH: m (in)	COLD END TERMINATION
SA1-RTD	$50	$56	3-wire	1 (40)	Stripped leads, 1½" (1" insulated singles, ½" bare), 3 wires
SA1-RTD-80	56	68		2 (80)	
SA1-RTD-120	65	83		3 (120)	
SA1-RTD-MTP	57	63	3-wire 3 (120)	1 (40)	"MTP" style miniature flat 3-pin connector
SA1-RTD-80-MTP	63	75		2 (80)	
SA1-RTD-120-MTP	72	90			
SA1-RTD-4W	55	61	4-wire	1 (40)	Stripped leads, 1½" (1" insulated singles, ½" bare), 4 wires
SA1-RTD-4W-80	61	73		2 (80)	
SA1-RTD-4W-120	70	88		3 (120)	
SA1-RTD-4W-TA4F	66	72	4-wire	1 (40)	TA4F Connector; Pins 1 and 2 common, 3 and 4 common
SA1-RTD-4W-80-TA4F	72	84		2 (80)	
SA1-RTD-4W-120-TA4F	81	99		3 (120)	

Ordering Examples: SA1-RTD-80-MTP, *Class A, surface-mount RTD sensor, 3-wire leads, 2 m (80") lead-wire length with a miniature 3-pin MTP connector,* ***$63. SA1-RTD-4W-80-TA4F,*** *Class A, surface-mount RTD sensor, 4 wire leads, 2 m (80") lead-wire length with a 4-pin audio-style connector,* ***$72.*** *For special lengths, add* ***$2.25/ft.*** *For the* ***"-SB"*** *option, add* ***$4.25/ft.***

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Technical Guides

Strain Gage Accessories

TT300, complete strain gage adhesive kit, $190, shown smaller than actual size, see page 71.

SG1-KIT, strain gage application kit, $549, shown smaller than actual size, see page 72.

Strain Instrumentation

CNi3233, ½ DIN process and strain PID controllers, $195, shown smaller than actual size, see page 80.

DP25B-S, strain indicator, $245, shown smaller than actual size, see page 78.

DMD-465, strain amplifier/signal conditioner, $350, shown smaller than actual size, see page 82.

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