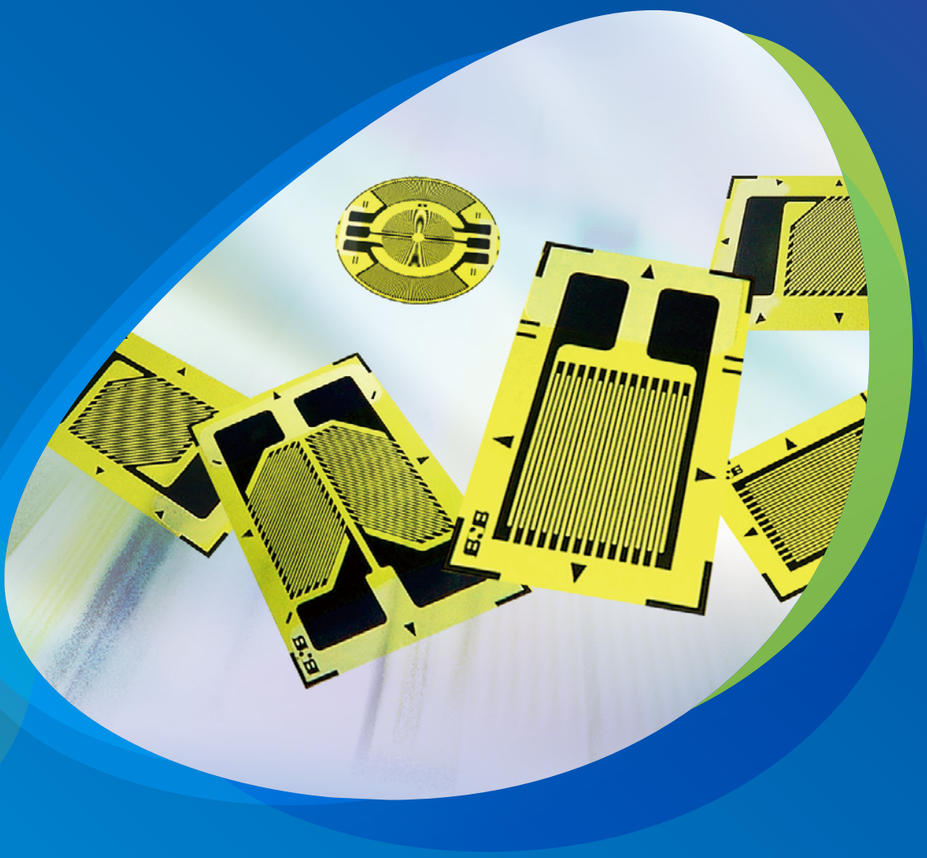
STRAIN GAUGE CATALOGUE



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marmatek®
measurement technologies

COMPANY PROFILE

As a manufacturer of strain gauges, we design and produce force sensors and load cells all based on the strain gauge principle.
We are here to help our European customers with all enquiries and assisting you with your challenges. With 40 years of being active in the field of weighing you can expect from us a professional technical support for your application and we can give you advice for the “best fit” load cell, strain gauge or mounting hardware.
With our high tech production facilities and engineering capacity we are able to produce small prototype series and large batches. We ensure your measurements are not just precise, but also reliable. We offer over 1000 standardized force sensors from 20 grams up to 1000 tonnes. With over 60.000 loadcells available from stock in the Netherlands, we offer you the best quality / service/ price ratio in Europe.

Our mission? Creating value for you in order you can differentiate your products and services in the market! We believe we make you stronger!

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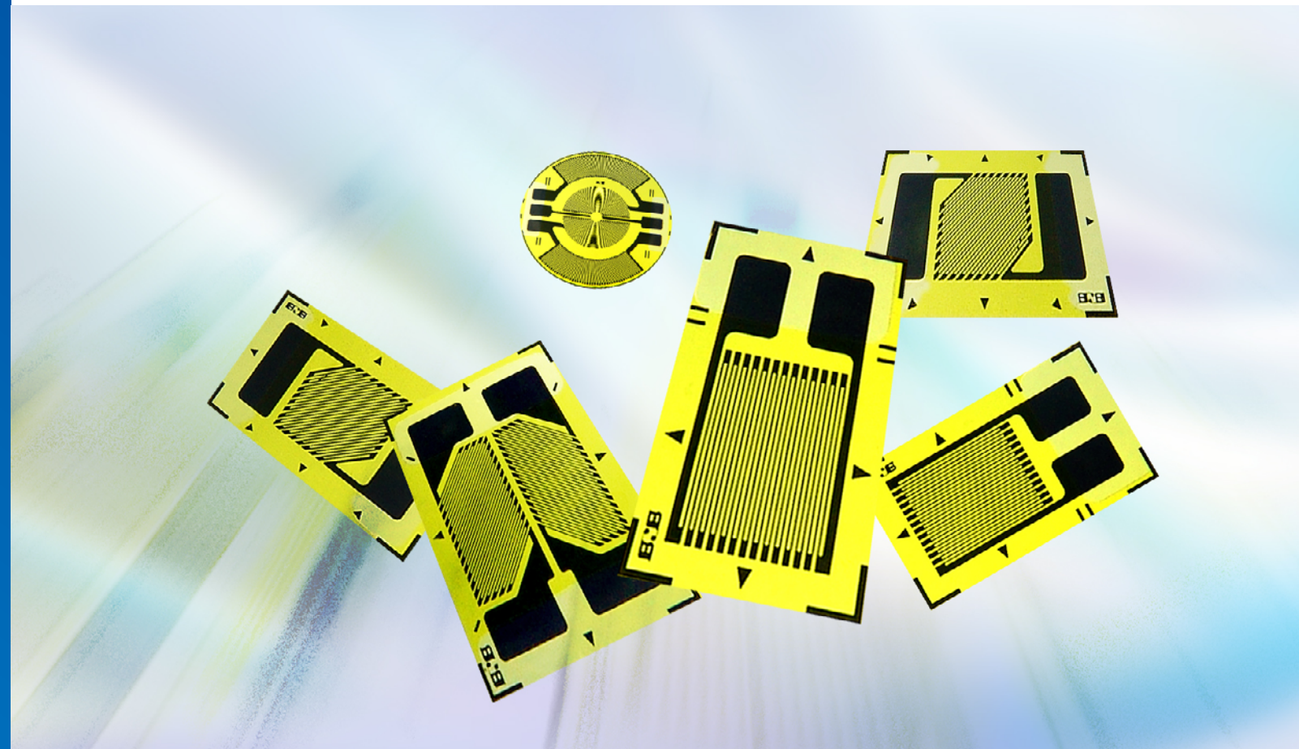


STRAIN GAUGE INTRODUCTION

Sensor strain gauges are a set of products specifically designed for sensor applications. Its main purpose is to provide a series of low-cost and suitable strain gauges for mass production of high-precision sensors. High precision sensors can meet the needs of high-precision strain sensors in fields such as force measurement, weighing, control, and detection.

The characteristics of this series of resistance strain gauges include:

● Consistent substrate thickness deviation. This reduces the creep dispersion.

● Consistent base cutting dimensions. This ensures the placement accuracy in application.

● Temperature self compensation. We can provide different temperature compensation coefficients options to match various material.

● Creep self compensation. Our company provides dozens of creep codes options(difference of adjacent codes is 0.01-0.015% FS/30min) which is very useful for sensor manufacturing.

PLEASE NOTE

The Products described in this manual, although It has carefully proofread and verified its accuracy and correctness and the information inside is believed to be correct, Specifications and dimensions are subject to change without notice and do not constitute any liability whatsoever. For the application of the products which need specific requirements or in special conditions please advise the supplier for verification and validation of the suitability of the strain gauges in that certain situation. Please note: We attempts to supply the product information and use to be correct and up-to-dat.

DISCLAIMER FOR LIFE SUPPORTING TECHNOLOGY APPLICATIONS

Life support technology is an important technology that concerns the rights and interests of human life. If there is a malfunction or abnormality in the components or components of the life support technology system, it will directly threaten human life or cause harm to the development of life. The products described in this catalogue are not designed and used for medical, life-saving, or life-sustaining unless otherwise expressly indicated.

Customers using or sellinstrain gauges from this catalog in the above mentioned applications do so entirely at their own risk and agree to fully indemniffor any damages arising or resulting from such use or sale. Please contact authorized contact to obtain written terms and conditions regarding products designed for such applications.

STRAIN GAUGE COMPENSATION THEORY AND METHOD

1. Self-temperature Compensation

Introduction

Strain gauges are usually installed on an element where no external forces are applied. When environmental temperature changes, the resistance of the strain gauge changes accordingly. This phenomenon is called the thermal output. This thermal output is the result of interactions and superposition of the resistance temperature coefficient of grid materials, the sensitive grid materials and the linear expansion coefficient. The effects of these factors is described in the formula below:

$$\varepsilon_t=[(\alpha_g/K)+(\beta_s-\beta_g)]\ \Delta\ t$$

In this formula α_g and β_g refer to the resistance temperature coefficient of the grid material and the linear expansion coefficient of the strain gauge. K refers to the strain gauges gauge-factor and β_s refers to the linear expansion coefficient of the tested object . Δ t refers to the relative change in temperature of the tested subject and environment.

Common strain gauges often have a large thermal output as shown in figure 1. Thermal output is the biggest source of errors in static strain measurements. And the dispersion of thermal output will also increase with the increase of thermal output value. When there are temperature gradients or transients in the testing environment, this difference is even greater. Therefore, the ideal scenario is for the thermal output value of the strain gauge to approach zero, and a strain gauge that meets this requirement is called a temperature self-compensation strain gauge.

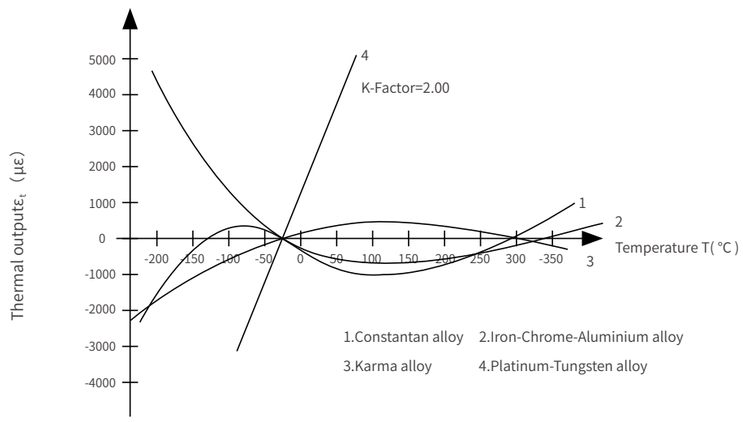


Figure 1 Thermal output curve of strain gauges on different steel materials

By adjusting the composition ratio of the alloys of the strain gauge grid material and cold rolling compression ratio, and through additional proper heat treatment, the internal crystalline structure of the grid material will be altered. It will make the thermal output close to zero when temperature changes. In another words, strain gauges archive temperature self-compensation to element or tested object and fulfill requirement from high accuracy stress analysis and sensor production. Figure 2 shows the typical thermal output curves of constantan and karma alloy self temperature compensating strain gauges, their thermal output is very small in range +20°C ～ +250°C .

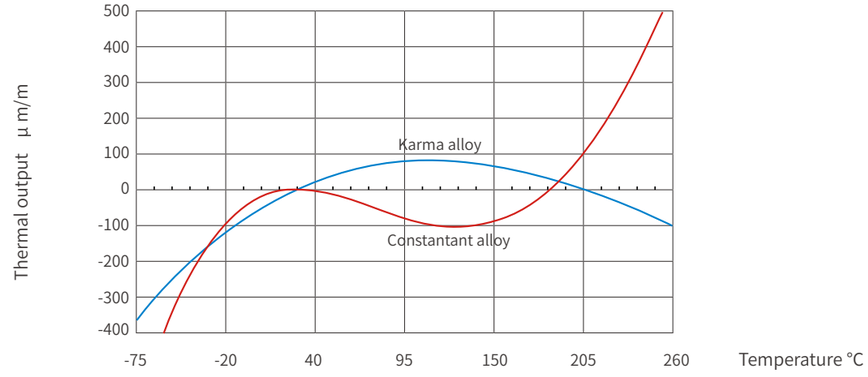


Figure 2 Thermal output for Self-Temperature compensated Karma and Constantan alloy strain gauges

Choice In Self-Temperature Compensation

- currently offers strain gauges with the following optional self-temperature compensation codes:

9 Titanium test surfaces with a typical expansion coefficient of 8.8×10^{-6}/°C	**11** Martensitic, Age hardenable-stainless and alloy steel test surfaces with a typical expansion coefficient of 11.3×10^{-6}/°C
16 Copper-based and austenitic stainless steel test surfaces with a typical expansion coefficient of 16×10^{-6}/°C	**23** Aluminum-alloy test surfaces with a typical expansion coefficient of 23.2×10^{-6}/°C
27 Magnesium-alloy test surfaces with a typical expansion coefficient of 26.1×10^{-6}/°C	

- When the temperature compensated strain gauge matches the test surface material, no further adjustments have to be made to this thermal output.
- When the temperature compensated strain gauges' test surface has a slight difference in material composition, a half or full bridge of strain gauges should be used to compensate impact from the thermal output.
- A quarter bridge setup for high precision stress measurements should consist of one strain gauge attached to a tested object and another compensation strain gauge applied to the test surface of another same material object. With the same temperature and environmental conditions, the two strain gauges should be connected to each other in the Wheatstone bridge to eliminate the thermal output impact.

2.Self-Creep Compensation

Introduction

Creep characteristics exist due to the elasticity of a spring element. This is a material characteristic. Due to this characteristic, a transducers output increases with the passing of time (Positive creep). This characteristic is depending on several variables such as the spring element material, structure, strain field, span, heat treatment and test temperature. The backing material of the strain gauges and the bonding adhesive have a very high viscoelasticity which results in an output decrease over time. On the other hand the grid material of the strain gauge has anelastic properties which results in a positive output change over time. The accumulation of these two make that a strain gauge can have either a positive or negative creep under fixed load. The direction and value of this compensation can be adjusted by modifying the design of the grid structure, backing material ratio and key technology parameters. For example, by changing the dimensions of the end grid and fixing the other parameters, a curve as seen in figure 3 can be created. After selecting the material of a spring element, a strain gauge can be selected with the same creep as the element but in the opposite direction. This way the creep can be compensated to a value close to 0. In the same way, during the production of transducers, the creep error which is caused by other factors can be compensated. In this way the creep value could be brought to a minimum and within specifications of the transducer.

The N※、T※、C※ in Strain gauge model is creep code. These codes stand for different creep value. The rules is as below:

N9(C1) > N7(C2) > N5(C3) > N3(C4) > N1(C5) > N0(C6) > N8(C7) > N6(C8) > N4(C9) > N2(C10) > T0(C11) > T2(C12) > T4(C13) > T6(C14) > T8(C15) > T1(C16) > T3(C17) > T5(C18) > T7(C19) > T9(C20)

\+ Creep —

the creep difference between two closed codes is 0.01-0.015%FS/30min

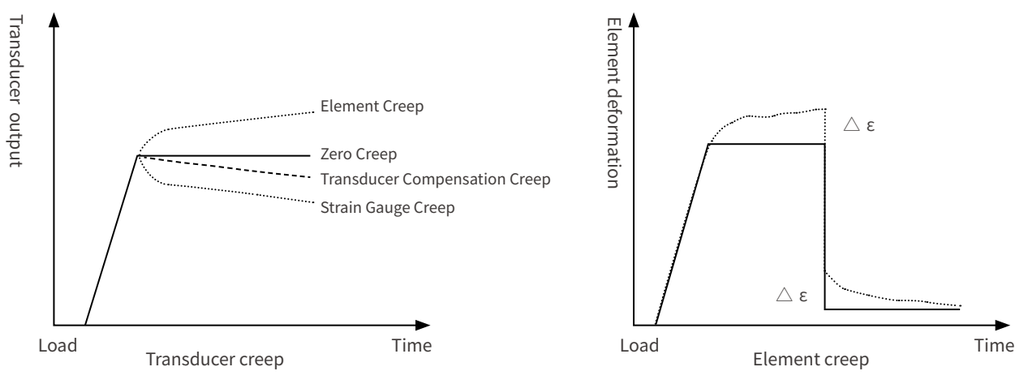


Figure 3 Creep compensation and effect of creep

Choice in self-creep compensation

1. It is advised when using strain gauges for the first time to select one or two models with a great difference in creep values and bond them to the spring element. The actual creep code will be determined according to the actual value of the creep and the difference with the applied strain gauges
2. When selecting a strain gauge for transducers with the same spring materials and structure, the smaller the capacity the more positive creep will occur. Therefore the lower the capacity of the transducer, the bigger negative creep code should be chosen.
3. Different element materials show different creep characteristics. Therefore, different creep codes should be selected for the steel and aluminum transducers with the same capacity and structure.
4. The creep value of transducers is depending on many variables such as spring elements, strain gauge type, adhesive used as well as the way of sealing, the protective coating etc. The direction and magnitude of the creep however can be predicted to a certain amount and this should therefore be taken into account when selecting a strain gauge creep code.

3. Self-Elastic Modulus Compensation

Introduction

With an increase of the ambient temperature, the elastic modulus of the material usually decreases. According to Hooke's law, as environmental temperature increases the deformation of a structure will be bigger when the applied load isn’ t changed. Therefore, the strain measured by the strain gauges will also increase. When this happens, the gauge factor of a strain gauge also decrease with temperature increase, the output of the strain gauge will not change with the temperature. Strain gauges with such feature are called self-elastic modulus compensation strain gauges.

The function of these self-elastic modulus compensation gauges is the same as for normal strain gauges but also have the function of an elastic modulus compensation resistor. It eliminates the sensitivity error of transducers which is caused by the elastic modulus change with temperature. If the self-elastic modulus compensation strain gauge is matched with the element materials, the temperature drift of transducers will be less than 0.002%FS/ °C . Compared to commonly used method of serial connecting elastic modulus resistor, the self-elastic modulus compensating strain gauges have the advantage of having high accuracy in compensation, good stability, higher sensitivity, easier usage and lower cost. However, the thermal output of self-elastic modulus compensated strain gauges are a bit higher. Therefore zero temperature drift of transducers will be higher. This is a limitation which will improve the further precision of transducers. This has solved problem which were especially present at half- and full bridge setups. These strain gauges have become very popular because of their excellent temperature capability.

Choice in self-temperature and elastic modulus compensation

1. In order to get a satisfactory compensation result, the selected elastic modulus compensating strain gauge should match the transducers element material. Generally, it is advised to test strain gauges on at least five sensors.
2. For most materials, the self-temperature compensation of the strain gauges has only little effect. This is because the thermal output of the strain gauge is usually larger than the ordinary self-temperature compensated strain gauge. Therefore it is recommended to apply them only for sensor used in smaller temperature grads. It is better to use a half-bridge or full-bridge setup because this will reduce the zero-temperature drift.
3. Please note that self-elastic modulus compensation strain gauges are harder to solder than ordinary strain gauges.

STRAIN GAUGE SELECTION

Choosing the right strain gauge is the first step in completing the test task with high quality. It is also a key step. It is very important to carefully and reasonably choose the characteristics and parameters of the strain gauge. For the test environment and operating conditions, choose the appropriate strain gauge to meet the test requirements to obtain accurate and reliable strain testing, and maximize the cost savings.

The installation and working characteristics of the strain gauge are affected by the following parameters. From different angles, you can choose sensitive grid materials, base materials, resistance, sensitive grid structure, sensitive grid length, self -compensation function, and lead method.

The choice process of the strain gauge is to determine the accurate matching of the installation environment and other operating conditions. At the same time, ensure the best installation and non -conditioning restrictions, such as accuracy, stability, temperature, extension rate, test duration, cycle durability, installation difficulty, environment, etc.

1. Strain gauge grid length selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

The output strain of the strain gauge in the loading state is the average strain of the sensitive grid area. In order to obtain a real measurement value, the grid length of the strain meter should not be greater than 1/5 to 1/10 of the radius of the measurement area. The long grid has the advantages of easy bonding and wiring, and good heat dissipation. The performance of the corresponding variant has a certain improvement of the performance. It is recommended that users choose a grid length of 3 to 6mm. If strain measurement is carried out on non-uniform materials (such as concrete, cast iron, cast steel), a strain gauge with a grid length not less than the uneven particle size of the material should be selected to accurately reflect the average strain within the structure. For the strain measurement of large -strain gradient, you should use the strain gauge with a small sensitive grid length as much as possible.

2. The grid material and backing material selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

Within 60 °C , for a long time, with measure maximum strain below 1000μm/m strain gauges (ZYM, BA, ZA series) with constantan alloy or Karma alloy foil as sensitive gate and modified phenolic or polyimide as substrate are generally selected; For strain measurement within 150 °C , strain gauges (BA, ZA series) with constantan and Karma alloy foils as sensitive gates and polyimide as substrates are generally used; Strain gauges (BYM, ZYM series) commonly used for high-precision sensors within 60 °C , with constantan alloy or Karma alloy foil as sensitive gate and special polyimide as substrate.

3. Grid pattern selections

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

When measuring the strain of a specimen with unknown principal stress direction or when measuring shear strain, a multi-axial strain gauge is used. The former can be used as a strain gauge with a three-axis angle of 45 ° , or 60 ° , or 120 ° , while the latter can be used as a bi-axial strain gauge with an angle of 90 ° ; When measuring the strain of a specimen with a known principal stress direction, a uniaxial strain gauge can be used; The strain gauge used for pressure sensors can be a multi axis strain gauge with circular sensitive grids; When measuring stress distribution, multi-axial strain gauges with 4-8 sensitive grids arranged in series or rows can be selected.

4.Grid center distance selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

The grid center distance of bi-axial (GB structure) or multi-axial (FG structure) strain gauges generally includes L6=6.0, L68=6.8, L7=7.0, L8=8.0, L0=10.5, L2=12.0, L4=14.0, etc. Users can freely choose strain gauges with different grid center distance according to their needs.

5. Strain gauge resistance selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

The selection of strain gauge resistance should be based on the heat dissipation area of the strain gauge, the influence of wire resistance, signal-to-noise ratio, and power consumption. For sensors, it is generally recommended to use strain gauges with resistance of 350 Ω and 1000 Ω. For stress distribution testing, stress testing, static strain measurement, etc., it is recommended to choose resistance values that match the instrument as much as possible. Generally, strain gauges of 120 Ω and 350 Ω are recommended.

6.Ultimate work temperature selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

This value represents the ultimate working temperature of the strain gauge. When the ultimate working temperature is not higher than 60 °C , this term is generally omitted in our strain gauge model designation system.

7.Temperature or elastic modulus

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

The selection of temperature or elastic modulus self compensation coefficients for strain gauges can be based on code range details mentioned in the self-temperature compensation function and self elastic modulus compensation function.

8.Creep code selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

The N※、T※、C※ in Strain gauge model is creep code. These codes stand for different creep value. The rules is as below:

N9(C1) > N7(C2) > N5(C3) > N3(C4) > N1(C5) > N0(C6) > N8(C7) > N6(C8) > N4(C9) > N2(C10) > T0(C11) > T2(C12) > T4(C13) > T6(C14) > T8(C15) > T1(C16) > T3(C17) > T5(C18) > T7(C19) > T9(C20)

+	creep	−

The creep difference between two closed codes is 0.01-0.015%FS/30min.

9.Lead wire form selection

Steps	2	5	1	3	4	6	7	8	9	
	ZYM	1000	-2	GB-B	L6	-80	(23)	N2	-X	Constituent units

When selecting the strain gauge wiring method, users can choose according to their needs and refer to the strain gauge wiring method.

10.Necessary check list in selecting common strain gauge parameters

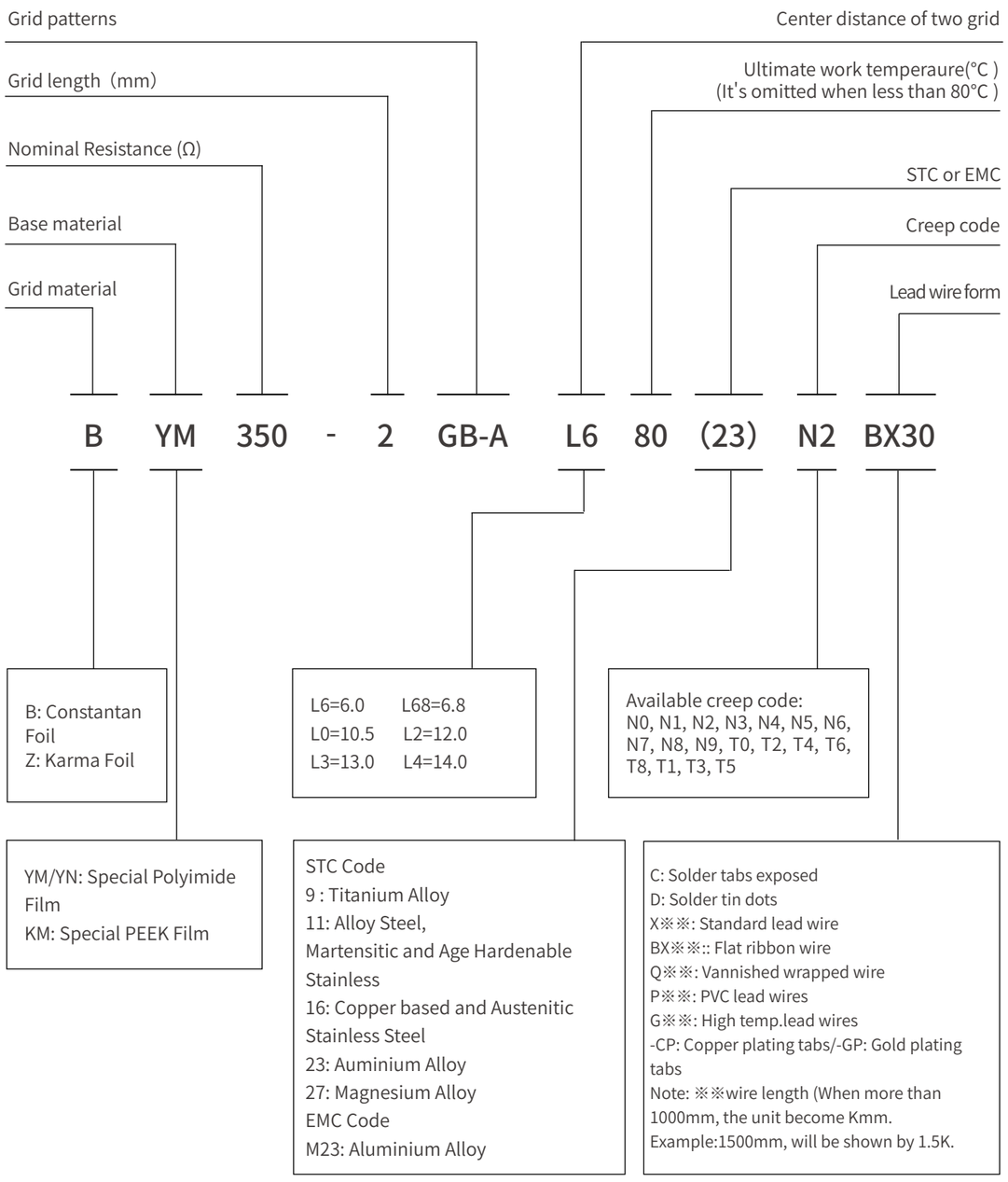
When conducting strain measurement or manufacturing sensors, strain gauge parameters must be selected based on the actual situation. Table 1 lists the considerations for selecting strain gauge parameters, which are only applicable to conventional situations and do not include special situations such as nuclear radiation, strong magnetic fields, and high centrifugal forces.

Table 1 Check list for common strain gauge selection

Step	Parameter	Check points
1	Grid length	1. Strain gradient; 2. Maximum strain area; 3. Required accuracy; 4. Static strain stability; 5. Maximum strain value; 6. Number of alternating installation cycles; 7. Heat dissipation; 8. Easy installation
2	Grid pattern	1. Strain gradient; 2. Stress dimension; 3. Heat dissipation conditions; 4. Installation space; 5. Is there a suitable strain gauge resistance; 6. Creep
3	Strain gauge series	1. Type of measurement (static, dynamic); 2. Working temperature; 3. Test cycle; 4. Number of strain cycles; 5. Required accuracy; 6. Easy installation
4	Resistance	1. Heat dissipation; 2. The influence of wire resistance; 3. Signal to noise ratio
5	Self temperature compensation or Self elastic modulus compensation	1. Test piece material; 2. Operating temperature range; 3. Required accuracy
6	Creep compensation code	1. The inherent creep of the elastic body; 2. Protective adhesive; 3. Sealing form; 4. Process methods; 5. Required accuracy

FILM-BASE STRAIN GAUGE

Film base strain gauge designation system



Film based strain gauge features

BYM/BYN Series

- Made of laminated Constantan foil and special polyimide film, fully sealed structure, with self temperature compensation and self creep compensation functions;
- High peel strength, strong substrate rigidity, low shrinkage rate, good creep consistency and repeatability, excellent zero return and hysteresis performance;
- Strong weather resistance and moisture resistance, with good resistance stability and reliability;
- Good dynamic response performance;
- The substrate has a certain degree of toughness;
- BYM is suitable for high-precision sensors of Class C3 and above, while BYN is suitable for precision sensors of Class C3 and below.

BKM Series

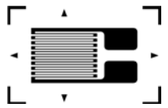
- Made of laminated Constantan foil and special PEEK film, fully sealed structure, with self temperature compensation and self creep compensation functions;
- Has extremely low moisture absorption and good resistance to dampness and heat;
- Excellent creep and zero return performance;
- The substrate has a certain degree of toughness;
- Suitable for high-precision sensors above C3 level and balance sensors.

ZYM/ZYN Series

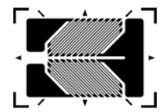
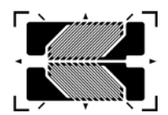
- It is laminated with Karma foil and special polyimide film, with a fully sealed structure and self temperature compensation and self creep compensation functions;
- The characteristics are similar to the BYM/BYN series products, which can achieve the manufacturing of large resistance and small size strain gauges, as well as the production of high resistance and low power consumption products;
- We can provide copper plated products for solder pads to improve welding reliability and stability;
- Suitable for use with high-precision sensors of Class C3 and above.

Strain Gauge Specifications			
Typical specification	BYM/BYN	BKM	ZYM/ZYN
Base material	Special polyimide film	Special PEEK film	Special polyimide film
Grid material	Constantan foil	Constantan foil	Karma foil
Base thickness(μm)	30 ～ 31		
Cover thickness(μm)	13 ～ 15	25 ～ 27	13 ～ 15
Typical resistance(Ω)	350、650、1000		350、1000、3000
Tolerance of resistance	⩽ ±0.1%		
Sensitivity factor	2.00 ～ 2.20		1.80 ～ 2.40
Sensitivity distribution	⩽ ±1%		
Ultimate strain	2.0%		
Fatigue life	⩾ 10^7(±1000)		
Temperature range(°C)	-30 ～ +80		
Self temperature compensation (STC)	9、11、16、23、27		9、11、16、23、27、M23

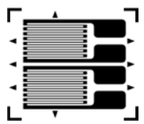
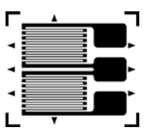
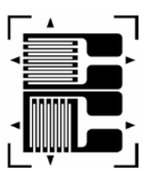
BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BYM/BYN(BKM)100-4AA(**)N*	4.0×1.9	8.0×3.6	T0
	BYM/BYN(BKM)120-1AA(**)N*	1.0×1.9	4.3×3.5	T0
	BYM/BYN(BKM)120-2AA(**)N*	1.8×1.8	5.2×3.2	T0
	BYM/BYN(BKM)120-3AA(**)N*	2.8×2.0	6.4×3.5	T0、N0、N1、N3、N4、N6、N8
	BYM/BYN(BKM)120-4AA(**)N*	4.0×3.3	7.9×4.6	N6
	BYM/BYN(BKM)120-5AA(**)N*	5.0×2.0	10.1×4.0	N0
	BYM/BYN(BKM)120-6AA(**)N*	5.9×2.7	9.8×4.3	N5
	BYM/BYN(BKM)175-1AA(**)N*	1.5×2.6	4.6×3.6	N0、N6、N8
	BYM/BYN(BKM)175-2AA(**)N*	2.1×1.9	6.0×3.5	N6
	BYM/BYN(BKM)175-3AA(**)N*	3.0×2.4	6.8×3.5	N8、N0
	BYM/BYN(BKM)200-4AA(**)N*	4.0×2.2	8.0×3.6	T0
	BYM/BYN(BKM)200-6AA(**)N*	6.0×2.2	10.4×4.5	N0、T0
	BYM/BYN(BKM)200-12AA(**)N*	12.6×4.5	18.0×10.0	
	BYM/BYN(BKM)240-3AA(**)N*	3.2×3.1	7.4×4.4	N8
	BYM/BYN(BKM)300-2AA-W(**)N*	2.0×2.0	3.8×2.8	T8
	BYM/BYN(BKM)300-3AA-A(**)N*	3.0×1.9	5.5×2.5	T4
	BYM/BYN(BKM)350-10AA(**)N*	9.4×4.1	15.4×6.1	N9
	BYM/BYN(BKM)350-1AA(**)N*	1.5×2.6	4.6×3.6	N0、N1、N2、N3、N4、N6、N7、N8、T0、T1、T2、T3、T4、T5、T6、T8
	BYM/BYN(BKM)350-1.5AA(**)N*	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8
	BYM/BYN(BKM)350-2AA-A(**)N*	2.4×3.0	4.9×4.0	N1、N4、N6、T4、T0
	BYM/BYN(BKM)350-2AA（**)N*	2.5×3.3	6.4×4.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T5、T6、T8
	BYM/BYN(BKM)350-2AA-P(**)N*	2.0×2.4	5.0×3.5	N0、N2、N4、T0、T1、T2、T3、T4、T5、T6、T8
	BYM/BYN(BKM)350-3AA-A(**)N*	3.2×1.6	6.9×3.1	N0、N6、N8
	BYM/BYN(BKM)350-3AA(**)N*	3.2×3.1	7.4×4.4	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T5、T6、T8
	BYM/BYN(BKM)350-3.1AA(**)N*	3.2×1.5	6.9×3.0	N2、N6、T4
	BYM/BYN(BKM)350-3AA-B(**)N*	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8
	BYM/BYN(BKM)350-4AA(**)N*	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6
	BYM/BYN(BKM)350-5AA(**)N*	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2
	BYM/BYN(BKM)350-6AA(**)N*	6.1×3.1	10.4×5.4	N0、N6、T0

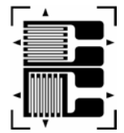
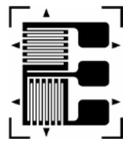
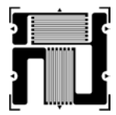
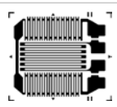
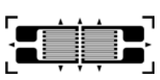
BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BYM/BYN(BKM)500-4AA(**)N*	4.0×3.3	7.9×4.6	T0、N4、N6
	BYM/BYN(BKM)650-4AA-A(**)N*	4.0×3.2	7.8×4.2	N6
	BYM/BYN(BKM)650-4AA(**)N*	4.0×4.4	8.6×6.0	N6
	BYM/BYN(BKM)650-5AA(**)N*	5.0×3.9	9.0×5.6	N6
	BYM/BYN(BKM)650-6AA(**)N*	6.0×4.2	10.0×5.2	N6
	BYM/BYN(BKM)700-3AA(**)N*	3.2×3.1	7.4×4.4	N2、N4、N6、T0、N6
	BYM/BYN(BKM)840-4AA(**)N*	4.0×3.6	7.9×4.6	N6
	BYM/BYN(BKM)1000-2AA(**)N*	2.2×4.6	5.8×5.8	N0、N2、N6、T0、T1、T2、T4、T5、T6、T8
	BYM/BYN(BKM)1000-3AA(**)N*	3.0×5.3	6.7×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T6、T8
	BYM/BYN(BKM)1000-3.2AA(**)N*	3.2×3.3	7.6×4.5	N0
	BYM/BYN(BKM)1000-4AA(**)N*	4.0×4.2	7.7×5.4	N8
	BYM/BYN(BKM)1000-6AA(**)N*	6.0×4.0	9.9×5.4	N6
	BYM/BYN(BKM)1000-10AA(**)N*	10.0×4.2	14.8×6.0	N0
	BYM/BYN(BKM)350-2HA(**)N*	2.0×4.4	9.0×5.6	N2、N4、N5、N6、T0、T4
	BYM/BYN(BKM)350-3HA(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T3、T4、T8
	BYM/BYN(BKM)350-4HA(**)N*	3.8×4.2	9.0×7.8	N4、N6、T0、T4
	BYM/BYN(BKM)350-6HA(**)N*	5.7×6.1	10.9×10.5	N4
	BYM/BYN(BKM)1000-3HA(**)N*	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8
	BYM/BYN(BKM)1000-4HA(**)N*	4.0×5.6	9.9×7.5	T0
	BYM/BYN(BKM)350-2HA-A(**)N*	2.0×4.4	9.0×5.6	N2、N4、N6、T0、T4、T8
	BYM/BYN(BKM)350-3HA-A(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T4、T6、T8
	BYM/BYN(BKM)350-4HA-A(**)N*	3.8×4.2	9.0×7.8	N4
	BYM/BYN(BKM)350-6HA-A(**)N*	5.7×6.1	10.9×10.5	N8
	BYM/BYN(BKM)1000-3HA-A(**)N*	3.0×5.5	9.9×6.2	N2、N4、T2
	BYM/BYN(BKM)350-2HA-B(**)N*	2.0×2.5	7.2×6.3	N6、N8
	BYM/BYN(BKM)350-3HA-B(**)N*	3.1×4.0	9.5×7.8	N4、N6、N8、T0、T4
	BYM/BYN(BKM)350-5HA-B(**)N*	4.8×4.1	10.7×9.3	N4
	BYM/BYN(BKM)1000-5HA-B(**)N*	4.8×6.5	15.7×9.6	N4

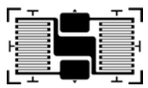
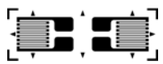
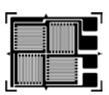
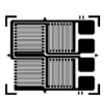
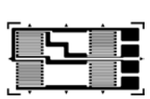
BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BYM/BYN(BKM)350-2HA-C(**)N*	2.0×2.5	7.2×6.3	N0、N2、N4、N6、N8、T2、T4、T8
	BYM/BYN(BKM)350-3HA-C(**)N*	3.1×4.0	9.5×7.8	N2、N4、N6、N8、N9、T0、T4、T6、T8
	BYM/BYN(BKM)1000-3HA-C(**)N*	3.1×5.4	10.7×7.8	N4、N8、T0、T4
	BYM/BYN(BKM)60-3AB(**)N*	3.0×3.0	8.2×5.1	T0
	BYM/BYN(BKM)120-6AB(**)N*	5.8×5.8	9.7×7.4	N8
	BYM/BYN(BKM)175-2AB(**)N*	2.0×2.0	6.7×3.7	N8、T0
	BYM/BYN(BKM)175-3AB(**)N*	3.0×3.0	8.2×5.1	N8
	BYM/BYN(BKM)350-2AB(**)N*	2.0×2.0	6.7×3.7	N0、N4、N8
	BYM/BYN(BKM)280-3AB(**)N*	3.0×3.0	8.2×5.1	N0
	BYM/BYN(BKM)350-3AB(**)N*	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5、N6、N8、T0、T6
	BYM/BYN(BKM)350-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	BYM/BYN(BKM)350-6AB(**)N*	5.9×5.9	12.0×8.3	N5
	BYM/BYN(BKM)350-8AB(**)N*	7.9×7.9	13.3×10.0	N8
	BYM/BYN(BKM)500-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	BYM/BYN(BKM)1000-3AB-A(**)N*	3.0×7.3	11.0×4.0	N4
	BYM/BYN(BKM)350-3FB(**)N*	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、N6、N8、N9、T0、T2、T4、T8
	BYM/BYN(BKM)350-4FB(**)N*	4.0×2.4	7.8×6.2	N6、T0
	BYM/BYN(BKM)350-6FB(**)N*	5.9×2.8	9.8×7.3	N6
	BYM/BYN(BKM)1000-3FB(**)N*	3.0×5.3	12.1×6.7	T0
	BYM/BYN(BKM)1000-6FB(**)N*	6.0×4.2	9.8×9.6	T0
	BYM/BYN(BKM)350-3FB-A(**)N*	3.2×2.5	6.8×6.4	N2
	BYM/BYN(BKM)100-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BYM/BYN(BKM)120-2BB(**)N*	1.8×2.4	6.3×5.5	N2
	BYM/BYN(BKM)120-3BB(**)N*	2.8×3.3	8.5×6.5	N6
	BYM/BYN(BKM)120-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BYM/BYN(BKM)240-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BYM/BYN(BKM)350-1BB(**)N*	2.4×2.1	5.5×5.5	N0
	BYM/BYN(BKM)350-2BB(**)N*	2.0×2.6	7.2×6.0	N8

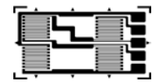
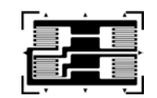
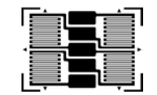
BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BYM/BYN(BKM)350-3BB(**)N*	3.0×3.3	8.6×6.6	N2、N8、T4
	BYM/BYN(BKM)350-4BB(**)N*	4.0×4.1	9.7×7.7	T0
	BYM/BYN(BKM)350-6BB(**)N*	6.0×6.0	13.8×9.7	T0
	BYM/BYN(BKM)600-4BB(**)N*	3.9×4.1	9.7×7.7	N6、N0
	BYM/BYN(BKM)650-4BB(**)N*	4.0×4.4	10.3×7.9	N6
	BYM/BYN(BKM)120-2BB-A(**)N*	1.8×2.2	6.3×5.4	T0
	BYM/BYN(BKM)120-3BB-A(**)N*	2.8×3.3	8.5×6.5	N6
	BYM/BYN(BKM)120-4BB-A(**)N*	4.0×4.4	10.3×7.5	T0
	BYM/BYN(BKM)350-1.6BB-A(**)N*	1.5×2.0	10.0×6.0	N6
	BYM/BYN(BKM)350-2BB-A(**)N*	2.0×2.7	6.9×6.0	T4、N0
	BYM/BYN(BKM)350-2.1BB-A(**)N*	1.8×2.4	5.4×5.3	N2
	BYM/BYN(BKM)350-3BB-A(**)N*	3.0×3.4	9.8×6.8	N2
	BYM/BYN(BKM)350-4BB-A(**)N*	4.0×4.1	9.7×7.7	T0、N6
	BYM/BYN(BKM)350-6BB-A(**)N*	5.9×6.3	14.3×9.6	T0、N6
	BYM/BYN(BKM)800-2BB-A(**)N*	2.0×3.5	5.8×5.8	T0
	BYM/BYN(BKM)1000-4BB-A(**)N*	3.6×4.0	9.4×7.0	T0
	BYM/BYN(BKM)160-5BB(**)N*	4.9×3.0	9.6×9.8	N4
	BYM/BYN(BKM)600-5BB(**)N*	4.9×3.2	9.6×9.8	T0
	BYM/BYN(BKM)350-2.9BB-A(**)N*	2.9×2.3	7.1×7.4	N8
	BYM/BYN(BKM)600-5BB-A(**)N*	4.9×3.2	9.6×9.8	N0、N1、N4、N6、N8、T0
	BYM/BYN(BKM)700-5BB-A(**)N*	4.9×3.2	9.6×9.8	N0、N4、N6、N8、T0、
	BYM/BYN(BKM)1000-5BB-A(**)N*	4.9×3.2	9.6×9.8	N6
	BYM/BYN(BKM)120-07BB-B(**)N*	0.7×3.6	15.0×1.3	T8
	BYM/BYN(BKM)160-5BB-C(**)	5.2×2.6	9.4×8.1	
	BYM/BYN(BKM)350-5BB-C(**)	5.2×2.6	9.4×8.1	
	BYM/BYN(BKM)700-5BB-C(**)	5.2×2.6	9.4×8.1	
	BYM/BYN(BKM)350-2GB(**)N*	2.1×3.0	10.8×4.4	T0、N6
	BYM/BYN(BKM)350-3GB(**)N*	3.1×2.8	12.4×4.4	N4、N6
	BYM/BYN(BKM)350-4GB(**)N*	4.0×3.8	15.3×5.8	T0
	BYM/BYN(BKM)350-1GB-AL0(**)N*	1.5×2.5	13.8×3.8	T0
	BYM/BYN(BKM)350-1.5GB-AL68(**)N*	1.5×3.1	9.8×4.3	N6
	BYM/BYN(BKM)350-2GB-AL0(**)N*	2.0×3.1	14.4×4.4	N1、N3、N4、N6

BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	BYM/BYN(BKM)350-2GB-AL5.5(**)N*	2.0×2.8	8.9×3.8	N8、T0、T2、T6、T8	5.5
	BYM/BYN(BKM)350-2GB-AL6(**)N*	2.0×2.8	9.4×3.8	N6	6.0
	BYM/BYN(BKM)350-2GB-AL7(**)N*	2.0×3.1	10.8×4.4	N0、N2、N6、T0、T4、	7.0
	BYM/BYN(BKM)350-3GB-AL0(**)N*	3.0×2.9	15.4×4.2	N0、N2、N6、T0、T5	10.5
	BYM/BYN(BKM)350-3GB-AL13(**)N*	3.2×4.2	19.0×5.6	T0	13.2
	BYM/BYN(BKM)350-3GB-AL15(**)N*	3.0×2.7	20.0×4.1	N2、N4、N8、T0、T2、T4	15.0
	BYM/BYN(BKM)350-3GB-AL13(**)N*	3.2×4.2	19.0×5.6	T0	13.2
	BYM/BYN(BKM)750-3GB-AL0(**)N*	3.0×3.5	15.2×4.3	N8	10.5
	BYM/BYN(BKM)750-3GB-AL12(**)N*	3.0×3.5	16.7×4.3	T0	12.0
	BYM/BYN(BKM)750-3GB-AL14(**)N*	3.0×3.5	18.7×4.2	N0	14.0
	BYM/BYN(BKM)500-2GB-BL8(**)N*	2.1×5.3	11.3×6.3	N0	8.0
	BYM/BYN(BKM)500-3GB-BL7(**)N*	3.0×4.1	12.0×5.5	T0	7.1
	BYM/BYN(BKM)500-4GB-BL7(**)N*	3.4×4.1	13.0×5.5	N6	7.2
	BYM/BYN(BKM)750-2GB-BL12.8(**)N*	2.5×5.2	16.9×6.0	N0	12.8
	BYM/BYN(BKM)1000-2GB-BL6(**)N*	2.5×5.0	10.1×6.0	N6	6.0
	BYM/BYN(BKM)1000-3GB-BL7(**)N*	3.0×5.5	11.7×6.5	N8、T4	7.0
	BYM/BYN(BKM)350-2GB-CL0(**)N*	2.5×3.3	14.7×4.5	N6、N8、T0、T8	10.5
	BYM/BYN(BKM)350-2GB-CL8(**)N*	2.5×3.3	12.9×4.5	T2、T4	8.0
	BYM/BYN(BKM)350-3GB-CL15(**)N*	3.0×2.8	20.0×4.1	N2、T1、T2、T4	15.0
	BYM/BYN(BKM)350-2EB(**)N*	2.3×2.7	8.6×7.2	N2	
	BYM/BYN(BKM)350-2EB-B(**)N*	2.3×2.8	8.6×7.4	N2	
	BYM/BYN(BKM)1000-3EB-A(**)-N*	3.2×3.7	9.6×11.1	N4	
	BYM/BYN(BKM)350-2.5EB-A(**)-N*	2.5×2.9	7.9×9.0	T0	
	BYM/BYN(BKM)350-2FG-L8.8(**)N*	2.0×2.7	14.5×6.5	N6	8.8
	BYM/BYN(BKM)350-2FG-L0(**)N*	2.0×2.7	16.2×6.5	N2、T2	10.5

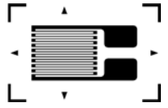
BYM/BYN、BKM

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	BYM/BYN/BYN(BKM)350-2FG-AL6(**)N*	2.0×2.2	12.0×7.1	N2、T0、T4、T8	6.0
	BYM/BYN(BKM)350-3FG-AL6(**)N*	3.0×2.1	13.0×6.8	T4	6.0
	BYM/BYN(BKM)350-3FG-AL0(**)N*	3.1×3.0	17.9×8.4	N2、T2、T6	10.5
	BYM/BYN(BKM)350-3FG-AL14(**)N*	3.0×2.1	20.5×6.8	N6、T1、T6、T0	14.0
	BYM/BYN(BKM)350-1FG-BL0(**)N*	1.5×2.7	13.7×6.9	T4、T6	6.0
	BYM/BYN(BKM)350-2FG-BL10(**)N*	2.6×2.7	14.8×8.0	N8	10.0
	BYM/BYN(BKM)350-3FG-BL0(**)N*	3.1×2.8	15.5×6.8	T2	10.5
	BYM/BYN(BKM)350-2FG-CL6(**)N*	2.1×2.9	9.8×6.9	T0、T2、T4	
	BYM/BYN(BKM)350-3FG-CL0(**)N*	3.1×2.8	15.3×7.0	N2、N6、T0、T4	
	BYM/BYN(BKM)350-1FG-DL0(**)N*	1.5×2.5	13.9×6.6	T0、T0、T8	10.5
	BYM/BYN(BKM)350-3FG-DL15(**)N*	2.8×2.3	19.0×6.0	T0	15.0

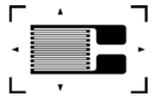
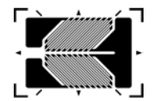
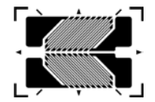
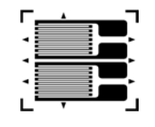
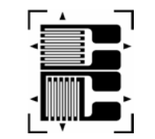
Notes:

1. N* in the strain gauge model is the creep number. Different numbers have different creep values.
2. L* in the strain gauge model is the grid pitch code. For example, L0 means the grid pitch is 10.5mm, and L6 means the grid pitch is 6.0mm.
3. For strain gauges with sensitive gate structures of FG and EB: When nominal value =350Ω, resistance range: 350±50Ω, bridge zero balance ⩽ 0.5mV/V； When nominal value ⩾ 1000Ω, resistance range: 1000±10%, bridge zero balance ⩽ 1.0mV/V
4. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern; the actual size of the strain gauge base is 0 to 0.6mm larger than the design size; please check. To select a strain gauge, select a strain gauge model of appropriate size based on the patch area.
5. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

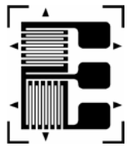
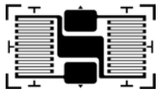
ZYM/ZYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZYM/ZYN/ZYN120-3AA-A(**)N*	3.0×0.6	6.3×1.5	T0
	ZYM/ZYN175-1AA(**)N*	1.0×1.8	4.5×3.0	T8
	ZYM/ZYN300-1AA(**)N*	1.1×1.2	3.6×2.2	T8
	ZYM/ZYN200-1AA-W(**)N*	1.0×0.5	2.8×1.8	T8
	ZYM/ZYN250-1AA-W(**)N*	1.1×1.0	2.9×2.0	T8
	ZYM/ZYN300-2AA-W(**)N*	2.0×1.0	3.8×2.0	T8
	ZYM/ZYN300-2AA-A-W(**)N*	2.0×2.0	3.8×2.8	T8
	ZYM/ZYN350-1AA-W(**)N*	1.1×1.0	2.9×2.0	T8
	ZYM/ZYN350-1.6AA(**)N*	1.6×1.7	9.0×7.9	N9
	ZYM/ZYN350-2AA-W(**)N*	2.0×1.0	3.8×2.0	T8
	ZYM/ZYN300-3AA-A(**)N*	2.9×1.9	5.5×2.5	T4
	ZYM/ZYN350-2AA(**)N*	1.9×2.8	5.7×4.0	N0、N1、N3、N4、N6、N8、T0、T4、T6
	ZYM/ZYN350-3AA(**)N*	3.1×2.6	7.0×3.8	N1、N2、N3、N4、N5、N6、N0、T0、T2、T4
	ZYM/ZYN350-4AA(**)N*	4.0×2.5	8.0×3.9	N6
	ZYM/ZYN350-5AA(**)N*	5.0×2.3	9.0×3.7	N6
	ZYM/ZYN350-7AA(**)N*	7.0×2.6	10.8×4.0	N4
	ZYM/ZYN1000-1.2AA(**)N*	1.2×3.6	4.5×4.5	T8
	ZYM/ZYN1000-1.5AA-A(**)N*	1.5×2.5	4.5×3.1	T4、T8
	ZYM/ZYN1000-1.5AA(**)N*	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8
	ZYM/ZYN1000-2AA-T(**)N*	2.1×3.3	5.8×4.5	N0、T4、T8
	ZYM/ZYN1000-2AA-W(**)N*	1.8×1.9	3.9×2.5	T8
	ZYM/ZYN1000-2AA(**)N*	2.5×3.3	6.4×4.5	N0、N2、N5、N6、T0、T1、T2、T3、T4、T6
	ZYM/ZYN1000-3AA-B(**)N*	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8
	ZYM/ZYN1000-3AA(**)N*	3.2×3.2	7.4×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2、T3、T4、T5、T6、T8
	ZYM/ZYN1000-4AA(**)N*	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6
	ZYM/ZYN1000-5AA(**)N*	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2
	ZYM/ZYN1500-2AA(**)N*	2.5×3.6	6.5×4.7	T2
	ZYM/ZYN1500-3AA(**)N*	3.2×3.2	7.4×4.5	N6、N4
	ZYM/ZYN2000-2AA-A(**)N*	2.1×4.2	5.4×5.2	T1、T6
	ZYM/ZYN2000-2.1AA(**)N*	2.0×3.8	4.8×4.4	N6
	ZYM/ZYN2000-3AA(**)N*	3.2×4.0	7.4×5.3	N0、T4
	ZYM/ZYN2000-4AA(**)N*	4.0×4.4	8.6×6.0	N6

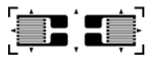
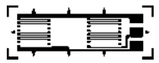
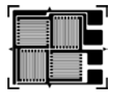
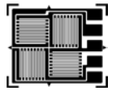
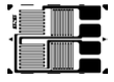
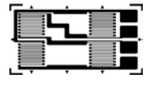
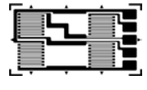
ZYM/ZYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZYM/ZYN2500-3AA(**)N*	3.2×3.2	7.4×4.5	N2、N6、N8、T0、T1、T2、T3、T4、T5、T6、T7、T8
	ZYM/ZYN2500-6AA(**)N*	6.0×6.4	11.0×8.0	N0
	ZYM/ZYN3000-5AA(**)N*	5.2×4.0	8.7×5.2	N6
	ZYM/ZYN3000-6AA(**)N*	6.1×3.9	9.8×5.2	T0、T4
	ZYM/ZYN5000-3AA(**)N*	3.2×4.6	6.7×5.8	N6
	ZYM/ZYN350-2HA(**)N*	1.9×2.2	6.0×4.9	T0
	ZYM/ZYN350-3HA(**)N*	3.0×4.4	9.4×6.5	N1、N4、N8
	ZYM/ZYN350-4HA(**)N*	3.7×2.0	7.9×7.9	N3
	ZYM/ZYN650-4HA(**)N*	3.8×4.2	9.0×7.8	N5
	ZYM/ZYN700-4HA(**)N*	3.8×4.2	9.0×7.8	N5
	ZYM/ZYN1000-3HA(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T3、T4、T8
	ZYM/ZYN1000-4HA(**)N*	3.8×4.2	9.0×7.8	N4、N6、T0、T4
	ZYM/ZYN2000-3HA(**)N*	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8
	ZYM/ZYN350-3HA-A(**)N*	3.0×4.4	9.4×6.5	N4、N6、N8、T0
	ZYM/ZYN650-3HA-A(**)N*	2.9×4.0	8.5×6.3	T0
	ZYM/ZYN1000-3HA-A(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T4、T6、T8
	ZYM/ZYN1000-4HA-A(**)N*	3.8×4.2	9.0×7.8	N4
	ZYM/ZYN350-3AB(**)N*	3.0×3.0	8.0×5.2	N8
	ZYM/ZYN1000-3AB(**)N*	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5、N6、N8、T0、T6
	ZYM/ZYN1000-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	ZYM/ZYN350-3FB(**)N*	3.0×2.6	7.4×7.2	N6
	ZYM/ZYN350-4FB(**)N*	4.0×2.4	7.8×6.2	N6、N2
	ZYM/ZYN1000-2FB(**)N*	2.1×2.8	6.4×7.6	N6、T0
	ZYM/ZYN1000-3FB(**)N*	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、N6、N8、T0、T2、
	ZYM/ZYN1000-4FB(**)N*	4.0×2.4	7.8×6.2	N6、T0
	ZYM/ZYN1000-6FB(**)N*	6.0×2.4	9.5×6.8	N2
	ZYM/ZYN1000-2BB(**)N*	2.0×2.6	7.2×6.0	N8
	ZYM/ZYN1000-3BB(**)N*	3.0×3.4	8.6×6.6	T4
	ZYM/ZYN1000-6BB(**)N*	6.0×6.0	13.8×9.7	T0

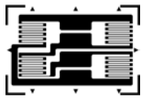
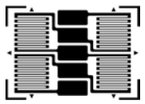
ZYM/ZYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	ZYM/ZYN350-2BB-A(**)N*	1.5×2.0	5.9×4.5	T0	
	ZYM/ZYN1000-2BB-A(**)N*	2.0×2.7	6.9×6.0	T4、N0	
	ZYM/ZYN1000-2.1BB-A(**)N*	1.8×2.4	5.4×5.3	N2	
	ZYM/ZYN1000-2BB-A(**)-KR	2.6×2.2	5.4×5.4	N4	
	ZYM/ZYN1000-3BB-A(**)N*	3.0×3.4	9.8×6.8	N2	
	ZYM/ZYN350-1GB-AL68(**)N*	1.5×3.2	9.8×4.3	N0、N6、T0、T4	6.8
	ZYM/ZYN350-2GB-AL7(**)N*	2.0×2.7	10.8×3.9	N2、N4、N6、T0	7.0
	ZYM/ZYN350-1GB-AL8(**)N*	1.5×3.5	11.0×4.3	N2	8.0
	ZYM/ZYN350-2GB-AL0(**)N*	2.0×2.7	14.4×3.9	N0、N2、N4、N6、T0、T2、T8	10.5
	ZYM/ZYN350-2GB-AL12(**)N*	2.0×2.7	15.8×3.9	N0、N4	12.0
	ZYM/ZYN350-2GB-AL15(**)N*	2.0×2.7	18.8×3.9	N2、T4	15.0
	ZYM/ZYN750-2GB-AL12(**)N*	2.0×3.3	15.8×4.5	N0、T6、T8	12.0
	ZYM/ZYN1000-1.5GB-AL5.5(**)N*	1.5×2.5	9.1×4.3	N6	5.5
	ZYM/ZYN1000-1.5GB-AL9(**)N*	1.5×4.0	12.0×5.2	T2、T3、T8	9.0
	ZYM/ZYN1000-1.6GB-AL0(**)N*	1.6×3.9	13.7×5.1	T1、T4	10.5
	ZYM/ZYN1000-2GB-AL5(**)N*	2.0×3.3	8.9×4.5	N2	5.3
	ZYM/ZYN1000-2GB-AL5.5(**)N*	2.0×2.8	8.9×3.8	N6	5.5
	ZYM/ZYN1000-2GB-AL6(**)N*	2.0×2.8	9.4×3.8	N0、N2、N6、T0、T4、T6	6.0
	ZYM/ZYN1000-2GB-AL7(**)N*	2.0×3.1	10.8×4.4	N0、N2、N4、N6、T0、T5	7.0
	ZYM/ZYN1000-2GB-AL0(**)N*	2.5×3.3	14.7×4.5	N0、N2、N3、N4、N5、N6、N8、T1、T6	10.5
	ZYM/ZYN1000-3GB-AL7(**)N*	3.0×3.2	11.6×4.4	N2	7.0
	ZYM/ZYN1000-3GB-AL0(**)N*	3.0×3.2	15.4×4.4	N6、T0、T2、T4、T6、T8	10.5
	ZYM/ZYN1000-3GB-AL14(**)N*	2.9×3.0	18.7×4.2	N0、N1	14.0
	ZYM/ZYN1100-2GB-AL6(**)N*	2.0×3.0	9.4×4.0	N2	6.0
	ZYM/ZYN2000-2GB-AL0(**)N*	2.5×4.0	14.7×5.0	T0、T4	10.5
	ZYM/ZYN500-2GB-BL6(**)N*	2.1×5.0	9.8×6.0	N4	6.0
	ZYM/ZYN1000-1GB-BL6(**)N*	1.5×4.8	9.1×6.5	T6	6.0
	ZYM/ZYN1000-2GB-BL6(**)N*	2.1×4.1	9.7×5.5	N0、N2、N6、T0、T1、T2、T3、T4、T5、T6	6.0
	ZYM/ZYN1000-2GB-BL7(**)N*	2.1×4.1	10.7×5.5	N6、T1、T3、T5、T8	7.0
	ZYM/ZYN1000-2GB-BL0(**)N*	2.1×4.1	14.2×5.5	T1、T3、T5	10.5
	ZYM/ZYN1000-3GB-BL6(**)T*	3.0×3.6	10.7×4.8	T0、T2	6.0
	ZYM/ZYN2000-2GB-BL6(**)N*	2.1×4.2	9.7×5.5	T6	6.0
	ZYM/ZYN2000-2GB-BL7(**)N*	2.1×5.4	10.8×6.4	N6、T0	7.0

ZYM/ZYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	ZYM/ZYN1000-2GB-CL8(**)N*	2.5×3.3	12.9×4.5	N2、T1、T2、T4	8.8
	ZYM/ZYN1000-2GB-CL0(**)N *	2.5×3.3	14.7×4.5	T2、T4	10.5
	ZYM/ZYN350-3GB-L12(**)N*	3.0×3.3	20.3×4.2	N6	12.0
	ZYM/ZYN500-3GB-L0(**)N*	3.0×4.8	18.8×5.3	N6	10.5
	ZYM/ZYN500-3GB-L12(**)N*	3.0×4.8	16.8×5.3	N6	12.0
	ZYM/ZYN1000-2GB-L6(**)N*	2.1×3.4	11.7×5.2	T4	10.5
	ZYM/ZYN1000-3GB-L6(**)N*	3.0×3.8	13.2×4.8	T8	6.0
	ZYM/ZYN1000-3GB-L0(**)N*	3.0×3.8	17.2×4.9	N2、T2、T8	10.5
	ZYM/ZYN1000-3GB-L12(**)N*	3.1×3.9	18.5×4.9	N2	12.0
	ZYM/ZYN1000-4GB-L12(**)N*	4.0×2.5	19.5×4.5	N8	12.0
	ZYM/ZYN2000-3GB-L0(**)N*	3.0×2.8	17.8×4.4	T8	10.5
	ZYM/ZYN1000-3GB-TL0(**)N*	3.0×3.9	17.5×5.0	N2、N4、N6、N8、T0、T2、T4、T6	10.5
	ZYM/ZYN350-2EB(**)N*	1.8×2.2	7.4×8.5	N2	
	ZYM/ZYN1000-2EB(**)N*	2.3×2.7	8.6×7.2	N2	
	ZYM/ZYN1000-3EB(**)N*	2.7×3.2	9.8×8.4	N2	
	ZYM/ZYN350-2EB-A(**)N*	1.8×2.3	7.4×8.4	N2	
	ZYM/ZYN1000-2EB-A(**)N*	2.3×2.7	8.6×7.5	N2	
	ZYM/ZYN1000-2EB-BT(**)N*	1.8×1.8	7.9×5.2	T6	
	ZYM/ZYN1200-2EB-BT(**)N*	1.8×1.8	7.9×5.2	T6	
	ZYM/ZYN350-1FG-L0(**)N*	1.5×2.0	16.0×6.2	T0	
	ZYM/ZYN350-2FG-L7(**)N*	2.0×1.9	13.4×6.4	T1	
	ZYM/ZYN350-2FG-L8(**)N*	2.0×1.9	14.3×6.4	T0	
	ZYM/ZYN1000-3FG-L0(**)N*	3.0×2.5	17.4×6.4	N6、T8	
	ZYM/ZYN1000-3FG-L12(**)N*	3.1×2.3	18.6×6.8	N0、T8	
	ZYM/ZYN350-2FG-AL6(**)N*	2.0×2.2	11.9×7.1	T0、N4、N6、N8、T4	6.0
	ZYM/ZYN350-3FG-AL0(**)N*	3.0×2.0	17.2×6.6	N6	10.5
	ZYM/ZYN1000-2FG-AL0(**)N*	2.1×2.6	16.9×7.4	T1、T6、T8	10.5
	ZYM/ZYN1000-3FG-AL0(**)N*	3.1×3.2	17.9×8.4	N2、N6、T0、T2、T4、T6	10.5
	ZYM/ZYN1000-3FG-AL14(**)N*	3.0×2.1	20.5×6.8	N6、T1、T6、T0	14.0
	ZYM/ZYN1000-3FG-AL12(**)N *	3.1×2.9	19.4×8.4	T8	12.0

ZYM/ZYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	ZYM/ZYN350-1FG-BL6(**)N*	1.5×2.2	9.3×6.1	T0、N4	6.0
	ZYM/ZYN350-1FG-BL0(**)N*	1.5×2.5	13.9×6.4	N0、T0、T8	10.5
	ZYM/ZYN400-1FG-BL68(**)N*	1.5×2.4	9.8×6.1	T8	6.8
	ZYM/ZYN500-2FG-BL6(**)N*	2.1×2.2	9.7×5.8	T8	6.0
	ZYM/ZYN1000-1.5FG-BL0(**)T*	3.0×2.8	13.8×6.9	T8	10.5
	ZYM/ZYN1000-2FG-BL6(**)N*	2.1×2.7	9.8×6.9	N4、N8、T0、T4、T8	6.0
	ZYM/ZYN1000-2FG-BL0(**)N*	2.1×2.8	14.4×6.9	N2、N6	10.5
	ZYM/ZYN1000-3FG-BL0(**)T*	3.1×2.8	15.5×6.8	T2	10.5
	ZYM/ZYN1000-3FG-BL6(**)T*	3.0×2.5	11.0×6.4	T2	6.0
	ZYM/ZYN1100-2FG-BL0(**)N*	2.1×2.8	14.4×6.9	N2、T8	10.5
	ZYM/ZYN1100-2FG-BL6(**)N*	2.1×2.8	9.8×6.8	N2	6.0
	ZYM/ZYN1200-3FG-BL7(**)N*	3.0×2.6	12.0×6.8	T0	7.0
	ZYM/ZYN2000-2FG-BL0(**)N*	2.0×3.3	14.3×7.8	T8	10.5
	ZYM/ZYN350-1FG-CL6(**)N*	1.5×2.2	9.2×6.0	T0	6.0
	ZYM/ZYN350-1FG-CL68(**)N*	1.5×2.4	9.8×6.2	N2	6.8
	ZYM/ZYN350-1FG-CL0(**)N*	1.5×2.2	13.9×6.4	T2	10.5
	ZYM/ZYN1000-2FG-CL6(**)N*	2.1×2.9	9.8×6.9	T0、T2、T4	6.0
	ZYM/ZYN1000-3FG-CL0(**)N*	3.1×2.8	15.3×7.0	N2、N6、T0、T4	10.5
	ZYM/ZYN1100-2FG-CL6(**)N*	2.1×2.8	9.6×6.8	N2	6.0

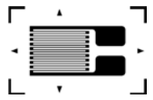
Notes:

1. N* in the strain gauge model refers to Available creep codes. Different numbers have different creep values.
2. The strain gauge model is the pitch code. For example, LO means the pitch is 10.5mm, and L6 means the pitch is 6.0mm.
3. For strain gauges with sensitive gate structures of FG and EB: When nominal value = 350Ω, resistance range: 350±50Ω, bridge zero balance ⩽ 0.5mV/V. When the nominal value is ⩾ 10000, the resistance range is: 1000±10%, and the bridge zero point balance is ⩽ 1.0mV/V.
4. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern; the actual size of the strain gauge base is 0~0.6mm larger than the design size; please select the appropriate size strain gauge according to the patch area when selecting the strain gauge. meter model.
5. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

HIGH RESISTANCE STRAIN GAUGES

ZYM/ZYN Series High Resistance Strain Gauges

▶ It is laminated with Karma foil and special polyimide film, with a fully sealed structure and temperature self compensation and creep self compensation functions;
▶ It can be applied in the manufacturing of small-sized and high resistance strain gauges, as well as the production of high resistance and low power consumption products;
▶ ZYM/ZYN series solder pad copper plated strain gauges and ZYN series solder pad gold plated strain gauges enhance welding reliability and stability;
▶ ZYM/ZYN series elastic modulus compensation strain gauge;
▶ Suitable for high-precision sensors of C3 and above levels.

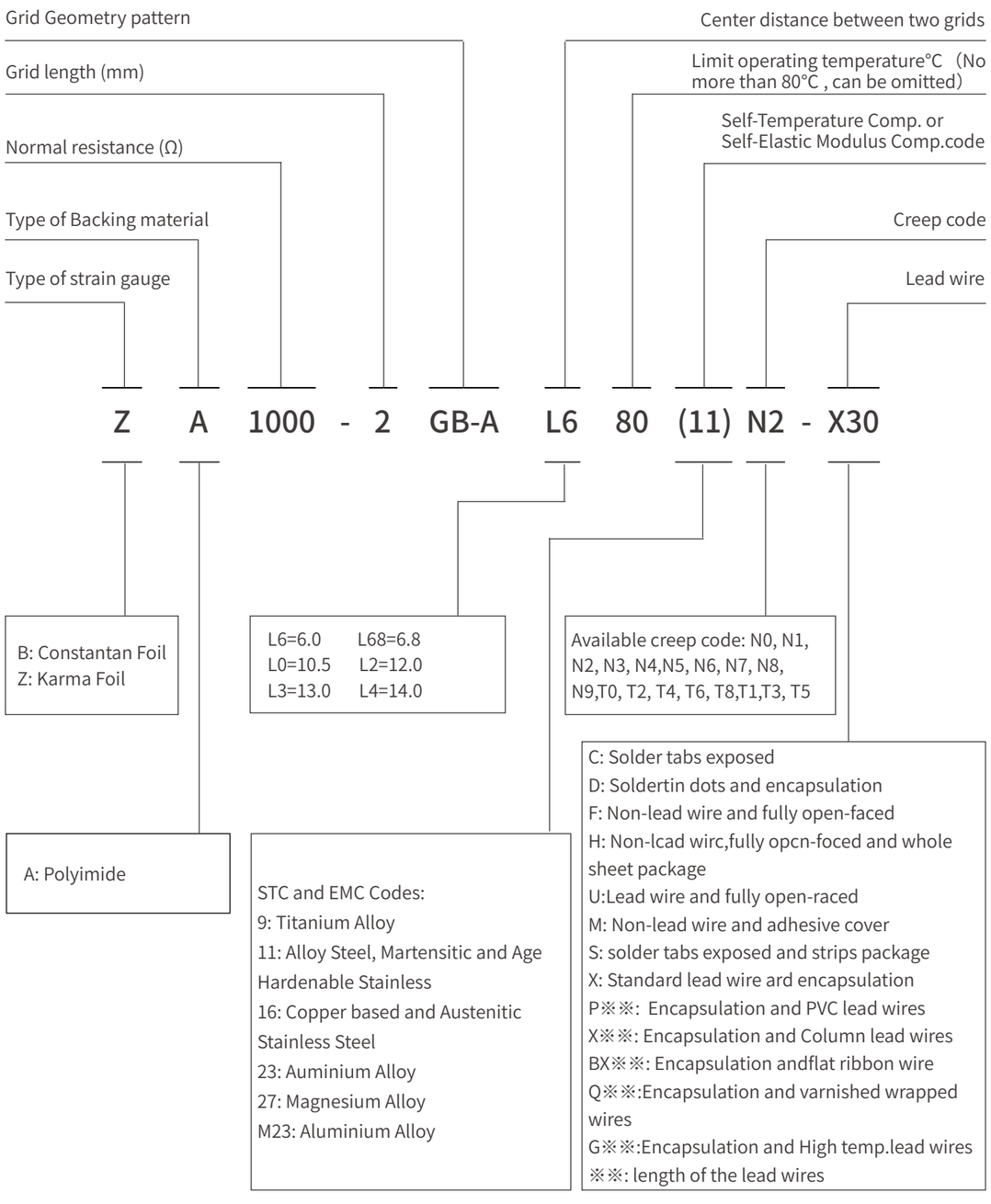
Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZYM/ZYN2000-1.3AA(**)	1.3×1.7	4.2×2.5	T2
	ZYM/ZYN2500-1.3AA(**)	1.3×1.7	4.2×2.5	T2
	ZYM/ZYN2500-3AA(**)N*	3.2×3.2	7.4×4.5	N2、N6、N8、T0、T1、T2、T3、T4、T5、T6、T7、T8
	ZYM/ZYN2500-6AA(**)N*	6.0×6.4	11.0×8.0	N0
	ZYM/ZYN3000-1.3AA(**)	1.3×1.7	4.2×2.5	T2
	ZYM/ZYN3000-5AA(**)N*	5.2×4.0	8.7×5.2	N6
	ZYM/ZYN3000-6AA(**)N*	6.1×3.9	9.8×5.2	T0、T4
	ZYM/ZYN4500-3.2AA(**)	3.2×3.1	7.2×4.4	T2
	ZYM/ZYN5000-3AA(**)N*	3.2×4.6	6.7×5.8	N6
	ZYM/ZYN5000-3.2AA(**)	3.2×3.1	7.2×4.4	T2
	ZYM/ZYN1000-05FG-BL2.2(**)	0.5×1.2	3.2×2.7	T5
	ZYM/ZYN2500-1FG-EL3.4(**)	1.0×1.8	5.7×4.6	T8
	ZYM/ZYN2000-1.1EB-BT(**)	1.1×1.7	5.0×5.0	T8

Marks:

1. The dimensions of the grid and backing listed in the table refer to the design dimensions of the strain gauge n, and the actual dimensions of the strain gauge backing should be increased by 0-0.6mm compared to the design dimensions; Please select the suitable size strain gauge model based on the sticking area.
2. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

NORMAL RESISTANCE STRAIN GAUGE

Strain gauge designation system



Characteristics of Normal Strain Gauge

BA Series

- ▶ Polyimide backing, made of copper foil, fully sealed structure;
- ▶ It can achieve both creep self compensation and temperature self compensation simultaneously;
- ▶ High elongation, good heat resistance, and wide temperature range for use;
- ▶ Applicable to sensor requirements within 150 °C .

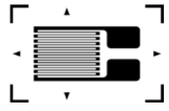
ZA Series

- ▶ Polyimide backing, made of Karma foil, fully sealed structure;
- ▶ It can achieve both creep self compensation and temperature self compensation simultaneously;
- ▶ High elongation, good heat resistance, and wide temperature range for use;
- ▶ Applicable to sensor requirements within 150 °C .

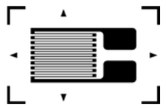
Technical specifications of strain gauges

Series of Strain gauge	Typical resistance (Ω)	Sensitivity coefficient	Sensitivity coefficient dispersion	Strain limit	(±1000με) fatigue life	Temperature self compensation coefficient	Operating temperature range (°C)
BA series	350、1000	1.86 ～ 2.20	⩽ ±1%	2.0%	10^7	9、11、16、23、27	-50 ～ +150
ZA series	120、350、1000	1.8 ～ 2.30					

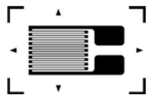
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA100-3AA-A(**)N*	3.0×2.6	8.3×4.7	
	BA100-3AA-B(**)N*	3.0×2.6	6.8×4.2	
	BA100-3AA-D(**)N*	3.0×2.6	6.4×3.4	
	BA100-4AA(**)N*	4.0×1.9	8.0×3.6	T0
	BA100-5AA-A(**)N*	5.0×3.6	11.8×5.9	

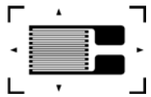
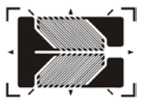
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA100-5AA-C(**)N*	5.0×3.6	9.6×5.3	
	BA100-10AA-A(**)N*	10.0×2.8	18.5×5.9	
	BA100-20AA-A(**)N*	20.0×3.4	29.5×4.7	
	BA120-05AA(**)N*	0.55×2.3	3.6×3.3	N6
	BA120-1AA(**)N*	1.0×2.2	4.3×3.5	T0
	BA120-1.5AA(**)N*	1.5×2.4	6.5×4.7	N6、T0
	BA120-2AA(**)N*	1.8×1.8	5.2×3.2	T0
	BA120-3AA(**)N*	2.8×2.0	6.4×3.5	T0、N0、N1、N3、N4、N6、N8
	BA120-3.4AA(**)N*	3.4×3.3	9.1×6.1	N4
	BA120-4AA(**)N*	4.0×3.3	7.9×4.6	N6
	BA120-5AA(**)N*	5.0×2.0	10.1×4.0	N0
	BA120-6AA(**)N*	5.9×2.7	9.8×4.3	N5
	BA120-10AA(**)N*	9.8×3.0	15.0×5.0	N0、N2
	BA120-20AA(**)N*	20.0×4.1	26.8×5.9	
	BA160-4AA-T(**)N*	4.0×3.4	8.6×5.8	N0、T0
	BA160-6AA-T(**)N*	5.7×6.0	11.4×8.8	N0、T0
	BA175-1AA(**)N*	1.5×2.6	4.6×3.6	N0、N6、N8
	BA175-2AA(**)N*	2.1×1.9	6.0×3.5	N6
	BA175-3AA(**)N*	3.0×2.4	6.8×3.5	N8、N0
	BA200-1AA-A(**)N*	1.0×3.0	6.0×4.7	
	BA200-2AA-A(**)N*	2.0×3.0	6.5×5.0	
	BA200-3AA-A(**)N*	3.0×2.3	8.3×4.7	
	BA200-4AA(**)N*	4.0×2.2	8.0×3.6	T0
	BA200-5AA-A(**)N*	5.0×2.2	11.8×5.9	
	BA200-6AA(**)N*	6.0×2.2	10.4×4.5	N0、T0
	BA200-10AA-A(**)N*	10.0×3.4	18.5×7.4	
	BA200-20AA-A(**)N*	20.0×2.7	29.5×4.7	
	BA240-3AA(**)N*	3.2×3.1	7.4×4.4	N8
	BA300-2AA-W(**)N*	2.0×2.0	3.8×2.8	T8

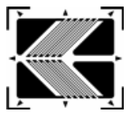
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA300-3AA-A(**)N*	3.0×1.9	5.5×2.5	T4
	BA350-1AA(**)N*	1.5×2.6	4.6×3.6	N0、N1、N2、N3、N4、N6、N7、N8、T0、T1、T2、T3、T4、T5、T6、T8
	BA350-1.5AA(**)N*	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8
	BA350-2AA（**)N*	2.5×3.3	6.4×4.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T5、T6、T8
	BA350-2AA-A(**)N*	2.4×3.0	4.9×4.0	N1、N4、N6、T4、T0
	BA350-2.2AA(**)N*	2.2×1.8	5.1×2.4	T8
	BA350-2AA-P(**)N*	2.0×2.4	5.0×3.5	N0、N2、N4、T0、T1、T2、T3、T4、T5、T6、T8
	BA350-3AA-A(**)N*	3.2×1.6	6.9×3.1	N0、N6、N8
	BA350-3AA(**)N*	3.2×3.1	7.4×4.4	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T5、T6、T8
	BA350-3AA-B(**)N*	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8
	BA350-4AA(**)N*	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6
	BA350-5AA(**)N*	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2
	BA350-6AA(**)N*	6.1×3.1	10.4×5.4	N0、N6、T0
	BA350-10AA(**)N*	9.4×4.1	15.4×6.1	N9
	BA400-2AA-A(**)N*	2.0×3.9	6.5×5.9	
	BA400-3AA-A(**)N*	3.0×3.0	8.3×4.7	
	BA400-5AA-A(**)N*	5.0×2.7	11.8×5.9	
	BA400-10AA-A(**)N*	10.0×4.1	18.5×8.1	
	BA400-15AA-A(**)N*	15.0×2.8	23.0×5.5	
	BA440-3AA(**)N*	3.2×3.3	7.4×4.4	
	BA500-4AA(**)N*	4.0×3.3	7.9×4.6	T0、N4、N6
	BA650-4AA-A(**)N*	4.0×3.2	7.8×4.2	N6
	BA650-4AA(**)N*	4.0×4.4	8.6×6.0	N6
	BA650-5AA(**)N*	5.0×3.9	9.0×5.6	N6
	BA650-6AA(**)N*	6.0×4.2	10.0×5.2	N6
	BA700-3AA(**)N*	3.2×3.1	7.4×4.4	N2、N4、N6、T0、N6
	BA700-3.2AA(**)N*	3.2×2.6	6.5×3.5	T0
	BA700-5AA(**)N*	5.0×3.9	9.0×5.6	N4、N6
	BA700-10AA-A(**)N*	10.0×4.7	18.5×8.1	
	BA840-4AA(**)N*	4.0×3.6	7.9×4.6	N6

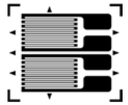
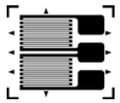
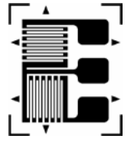
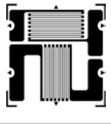
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA1000-2AA(**)N*	2.2×4.6	5.8×5.8	N0、N2、N6、T0、T1、T2、T4、T5、T6、T8
	BA1000-3AA(**)N*	3.0×5.3	6.7×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T1、T2、T3、T4、T6、T8
	BA1000-4AA(**)N*	4.0×4.2	7.7×5.4	N8
	BA1000-6AA(**)N*	6.0×4.0	9.9×5.4	N6
	BA1000-10AA(**)N*	10.0×4.2	14.8×6.0	N0
	BA175-2HA(**)N*	2.0×4.2	9.0×5.6	N4
	BA350-1HA(**)N*	1.2×5.0	8.0×4.0	N6
	BA350-2HA(**)N*	2.0×4.4	9.0×5.6	N2、N4、N5、N6、T0、T4
	BA350-3HA(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T3、T4、T8
	BA350-4HA(**)N*	3.8×4.2	9.0×7.8	N4、N6、T0、T4
	BA)350-6HA(**)N*	5.7×6.1	10.9×10.5	N4
	BA)700-3HA(**)N*	3.0×5.4	9.9×6.2	N4
	BA1000-3HA(**)N*	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8
	BA1000-4HA(**)N*	4.0×5.6	9.9×7.5	T0
	BA60-3HA-A(**)N*	3.0×4.1	9.4×6.5	N4
	BA175-2HA-A(**)N*	2.0×4.2	9.0×5.6	N4
	BA175-3HA-A(**)N*	3.0×4.4	9.4×6.4	N2
	BA350-2HA-A(**)N*	2.0×4.4	9.0×5.6	N2、N4、N6、T0、T4、T8
	BA350-3HA-A(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T4、T6、T8
	BA350-4HA-A(**)N*	3.8×4.2	9.0×7.8	N4
	BA350-6HA-A(**)N*	5.7×6.1	10.9×10.5	N8
	BA)400-3HA-A(**)N*	3.1×4.7	10.4×7.4	N8
	BA)700-3HA-A(**)N*	3.0×5.4	9.9×6.2	N4
	BA1000-3HA-A(**)N*	3.0×5.5	9.9×6.2	N2、N4、T2
	BA350-2HA-B(**)N*	2.0×2.5	7.2×6.3	N6、N8
	BA350-3HA-B(**)N*	3.1×4.0	9.5×7.8	N4、N6、N8、T0、T4
	BA350-5HA-B(**)N*	4.8×4.1	10.7×9.3	N4
	BA)500-3HA-B(**)N*	3.4×8.7	11.4×7.6	N2
	BA1000-5HA-B(**)N*	4.8×6.5	15.7×9.6	N4

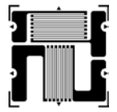
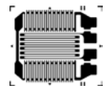
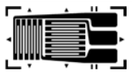
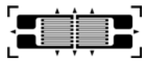
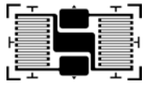
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA350-2HA-C(**)N*	2.0×2.5	7.2×6.3	N0、N2、N4、N6、N8、T2、T4、T8
	BA350-3HA-C(**)N*	3.1×4.0	9.5×7.8	N2、N4、N6、N8、N9、T0、T4、T6、T8、T9
	BA)350-8HA-C(**)N*	8.0×9.0	13.0×14.4	N0
	BA1000-3HA-C(**)N*	3.1×5.4	10.7×7.8	N4、N8、T0、T4
	BA120-2HA-D(**)N*	2.0×3.5	7.0×5.6	N8
	BA350-2HA-D(**)N*	2.1×4.3	8.9×5.7	N8
	BA350-3HA-D(**)N*	2.9×4.0	8.8×6.8	N4 、N8、T0、T1、T4
	BA350-4HA-D(**)N*	4.2×2.8	8.3×8.3	N4、N8
	BA350-6HA-D(**)N*	5.9×3.7	10.5×11.1	N8
	BA)400-3HA-D(**)N*	2.9×4.0	8.8×6.8	N4 、N8、T0、T1、T4
	BA350-2HA-E(**)N*	2.0×4.3	8.9×5.7	N8
	BA350-3HA-E(**)N*	3.0×3.9	8.8×6.8	N4、N8
	BA350-4HA-E(**)N*	4.2×2.8	8.3×8.3	N4、N8
	BA350-6HA-E(**)N*	5.9×3.7	10.5×11.4	N8
	BA)700-3HA-D(**)N*	3.4×6.3	8.5×7.6	N2
	BA60-3AB(**)N*	3.0×3.0	8.2×5.1	T0
	BA120-3AB(**)N*	3.0×3.0	8.4×4.8	T0
	BA120-3AB-B(**)N*	3.0×3.0	10.2×5.0	T0
	BA120-6AB(**)N*	5.8×5.8	9.7×7.4	N8
	BA175-2AB(**)N*	2.0×2.0	6.7×3.7	N8、T0
	BA175-3AB(**)N*	3.0×3.0	8.2×5.1	N8
	BA350-2AB(**)N*	2.0×2.0	6.7×3.7	N0、N4、N8、T3
	BA280-3AB(**)N*	3.0×3.0	8.2×5.1	N0
	BA350-3AB(**)N*	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5、N6、N8、T0、T6
	BA350-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	BA350-6AB(**)N*	5.9×5.9	12.0×8.3	N5
	BA350-8AB(**)N*	7.9×7.9	13.3×10.0	N8
	BA500-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	BA120-6AB-C(**)N*	5.8×5.8	9.7×7.4	
	BA175-2AB-C(**)N*	2.0×2.0	6.7×3.7	N6、N8
	BA175-3AB-C(**)N*	3.0×3.0	8.2×5.1	N1、N8
	BA350-2AB-C(**)N*	2.0×4.3	8.2×2.4	N8、T3
	BA350-2.1AB-C(**)N*	2.0×2.0	6.7×3.7	N8
	BA350-3AB-C(**)N*	3.0×3.0	8.2×5.1	N1、N2、N4、N6、N8、T6
	BA350-4AB-C(**)N*	4.0×4.0	9.1×5.8	N6、N7

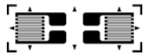
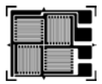
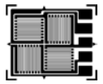
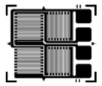
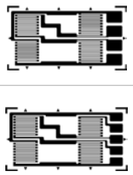
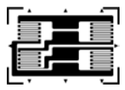
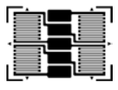
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BA120-2FB(**)N*	2.0×2.0	5.6×5.2	N2、T0
	BA350-2FB(**)N*	2.1×2.8	6.4×7.6	N6、T0
	BA350-3FB(**)N*	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、N6、N8、N9、T0、T2、T4、T8
	BA350-4FB(**)N*	4.0×2.4	7.8×6.2	N6、T0
	BA350-6FB(**)N*	5.9×2.8	9.8×7.3	N6
	BA350-10FB(**)N*	10.0×2.2	13.8×6.1	N8
	BA350-20FB(**)N*	20.0×3.6	24.7×8.8	
	BA1000-3FB(**)N*	3.0×5.3	12.1×6.7	T0
	BA350-3FB-A(**)N*	3.2×2.5	6.8×6.4	N2
	BA100-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BA120-2BB(**)N*	1.8×2.4	6.3×5.5	N2
	BA120-3BB(**)N*	2.8×3.3	8.5×6.5	N6
	BA120-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BA175-6BB(**)N*	5.4×6.2	13.8×9.4	N6
	BA240-4BB(**)N*	4.0×4.4	10.3×7.5	T0
	BA350-1BB(**)N*	2.4×2.1	5.5×5.5	N0
	BA350-2BB(**)N*	2.0×2.6	7.2×6.0	N8
	BA350-3BB(**)N*	3.0×3.3	8.6×6.6	N2、N8、T4
	BA350-4BB(**)N*	4.0×4.1	9.7×7.7	T0
	BA350-6BB(**)N*	6.0×6.0	13.8×9.7	T0
	BA480-3BB(**)N*	3.0×3.3	8.6×6.6	N2、N8、T4
	BA600-4BB(**)N*	3.9×4.1	9.7×7.7	N6、N0
	BA650-4BB(**)N*	4.0×4.4	10.3×7.9	N6
	BA120-2BB-A(**)N*	1.8×2.2	6.3×5.4	T0
	BA120-3BB-A(**)N*	2.8×3.3	8.5×6.5	N6
	BA120-4BB-A(**)N*	4.0×4.4	10.3×7.5	T0
	BA350-2BB-A(**)N*	2.0×2.7	6.9×6.0	T4、N0
	BA350-3BB-A(**)N*	3.0×3.4	9.8×6.8	N2
	BA350-4BB-A(**)N*	4.0×4.1	9.7×7.7	T0、N6
	BA350-6BB-A(**)N*	5.9×6.3	14.3×9.6	T0、N6
	BA800-2BB-A(**)N*	2.0×3.5	5.8×5.8	T0
	BA1000-4BB-A(**)N*	3.6×4.0	9.4×7.0	T0
	BA160-5BB(**)N*	4.9×3.0	9.6×9.8	N4
	BA600-5BB(**)N*	4.9×3.2	9.6×9.8	T0

BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	BA600-5BB-A(**)N*	4.9×3.2	9.6×9.8	N0、N1、N4、N6、N8、T0	
	BA700-5BB-A(**)N*	4.9×3.2	9.6×9.8	N0、N4、N6、N8、T0、T2	
	BA1000-5BB-A(**)N*	4.9×3.2	9.6×9.8	N6	
	BA200-3BB-B(**)	3.0×3.6	14.3×7.3		
	BA200-5BB-B(**)	5.0×6.0	22.1×9.5		
	BA200-10BB-B(**)	10.0×10.8	30.7×13.0		
	BA400-3BB-B(**)	3.0×3.4	14.3×7.3		
	BA400-5BB-B(**)	5.0×6.0	22.1×9.5		
	BA160-5BB-C(**)	5.2×2.6	9.4×8.1		
	BA350-5BB-C(**)	5.2×2.6	9.4×8.1		
	BA700-5BB-C(**)	5.2×2.6	9.4×8.1		
	BA350-2BB-L(**)N*	2.1×2.1	7.8×4.0	N4	
	BA700-5BB-L(**)N*	4.8×3.6	11.6×6.8	N0	
	BA350-2GB(**)N*	2.1×3.0	10.8×4.4	T0、N6	2.7
	BA350-3GB(**)N*	3.1×2.8	12.4×4.4	N4、N6	3.8
	BA350-4GB(**)N*	4.0×3.8	15.3×5.8	T0	5.0
	BA350-1GB-AL0(**)N*	1.5×2.5	13.8×3.8	T0	10.5
	BA350-1.5GB-AL12(**)N*	1.5×2.6	15.0×4.0	N4	12.0
	BA350-1.5GB-AL68(**)N*	1.5×3.1	9.8×4.3	N6	6.8
	BA350-2GB-AL0(**)N*	2.0×3.1	14.4×4.4	N1、N3、N4、N6	10.5
	BA350-2GB-AL5.5(**)N*	2.0×2.8	8.9×3.8	N8 、T0、T2、T6、T8	5.5
	BA350-2GB-AL6(**)N*	2.0×2.8	9.4×3.8	N6	6.0
	BA350-2GB-AL7(**)N*	2.0×3.1	10.8×4.4	N0、N2、N6、T0、T4、	7.0
	BA350-3GB-AL0(**)N*	3.0×2.9	15.4×4.2	N0、N2、N6、T0、T5	10.5
	BA350-3GB-AL12(**)N*	3.0×2.9	16.9×4.2	N2、N6、T0	12.0
	BA350-3GB-AL13(**)N*	3.2×4.2	19.0×5.6	T0	13.2
	BA350-3GB-AL14(**)N*	3.0×3.0	18.8×4.2	N0、T0	14.0
	BA350-3GB-AL15(**)N*	3.0×2.7	20.0×4.1	N2、N4、N8、T0、T2、T4	15.0
	BA750-3GB-AL0(**)N*	3.0×3.5	15.2×4.3	N8	10.5
	BA750-3GB-AL12(**)N*	3.0×3.5	16.7×4.3	T0	12.0
	BA750-3GB-AL14(**)N*	3.0×3.5	18.7×4.2	N0	14.0
	BA500-2GB-BL6(**)N*	2.1×5.0	9.8×6.0	N4	6.0
	BA500-2GB-BL8(**)N*	2.1×5.3	11.3×6.3	N0	8.0
	BA500-3GB-BL7(**)N*	3.0×4.1	12.0×5.5	T0	7.1
	BA500-4GB-BL7(**)N*	3.4×4.1	13.0×5.5	N6	7.2
	BA750-2GB-BL12.8(**)N*	2.5×5.2	16.9×6.0	N0	12.8
	BA1000-2GB-BL6(**)N*	2.5×5.0	10.1×6.0	N6	6.0
	BA1000-3GB-BL7(**)N*	3.0×5.5	11.7×6.5	N8、T4	7.0

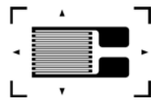
BA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	BA350-2GB-CL0(**)N*	2.5×3.3	14.7×4.5	N6、N8、T0、T8	10.5
	BA350-2GB-CL5(**)N*	2.0×4.1	10.3×5.5	T0	5.0
	BA350-2GB-CL8(**)N*	2.5×3.3	12.9×4.5	T2、T4	8.0
	BA350-3GB-CL12(**)N*	3.0×2.9	16.9×4.2	N0、T0	12.0
	BA240-2EB(**)N*	2.0×3.0	10.0×10.0	N2	
	BA350-2EB(**)N*	2.3×2.7	8.6×7.2	N2	
	BA350-2EB-A(**)N*	2.3×2.7	8.6×7.5	N2	
	BA350-1.8EB-B(**)N*	1.8×2.0	6.7×5.7	T6	
	BA350-2EB-B(**)N*	2.3×2.8	8.6×7.4	N2	
	BA350-2FG-L8.8(**)N*	2.0×2.7	14.5×6.5	N6	8.8
	BA350-2FG-L0(**)N*	2.0×2.7	16.2×6.5	N2、T2	10.5
	BA350-2FG-AL6(**)N*	2.0×2.2	12.0×7.1	N2、T0、T4、T8	6.0
	BA350-3FG-AL6(**)N*	3.0×2.1	13.0×6.8	T4	6.0
	BA350-3FG-AL0(**)N*	3.1×3.0	17.9×8.4	N2、T2、T6	10.5
	BA350-3FG-AL14(**)N*	3.0×2.1	20.5×6.8	N6、T1、T6、T0	14.0
	BA350-1FG-BL0(**)N*	1.5×2.7	13.7×6.9	T4、T6	10.5
	BA350-2FG-BL10(**)N*	2.6×2.7	14.8×8.0	N8	10.0
	BA350-3FG-BL0(**)N*	3.1×2.8	15.5×6.8	T2	10.5
	BA350-2FG-CL6(**)N*	2.1×2.9	9.8×6.9	T0、T2、T4	6.0
	BA350-3FG-CL0(**)N*	3.1×2.8	15.3×7.0	N2、N6、T0、T4	10.5
	BA350-1FG-DL0(**)N*	1.5×2.5	13.9×6.6	T0、T0、T8	10.5
	BA350-3FG-DL15(**)N*	2.8×2.3	19.0×6.0	T0	15.0

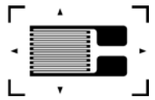
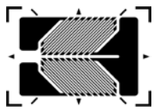
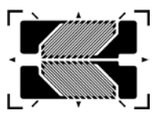
Notes:

1. N* in the strain gauge model refers to Available creep codes. Different labels have different creep values.
2. L* in the strain gauge model is the grid pitch code. For example, L0 means the grid pitch is 10.5mm, and L6 means the grid pitch is 6.0mm.
3. For strain gauges with sensitive gate structures of FG and EB: When nominal value =350Ω, resistance range: 350±50Ω, bridge zero balance ⩽ 0.5mV/V. When the nominal value ⩾ 1000Ω, the resistance range: 1000±10%, the bridge zero balance ⩽ 1.0mV/V.
4. In the product graphic structure, "HA-D" and "HA-E" strain gauges only provide strain gauges with leads (leads include silver-plated copper wire, enameled wire, etc.).
5. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 to 0.6mm larger than the design size; please check. To select a strain gauge, select a strain gauge model of appropriate size based on the patch area.
6. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

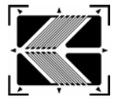
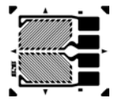
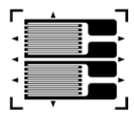
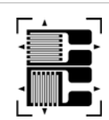
ZA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZA120-03AA(**)N*	0.3×2.1	2.7×2.7	
	ZA120-1AA-W(**)N*	1.0×1.5	4.0×2.7	
	ZA175-1AA(**)N*	1.0×1.8	4.5×3.0	T8
	ZA300-1AA(**)N*	1.1×1.2	3.6×2.2	T8
	ZA200-1AA-W(**)N*	1.0×0.5	2.8×1.8	T8
	ZA250-1AA-W(**)N*	1.1×1.0	2.9×2.0	T8
	ZA300-2AA-W(**)N*	2.0×1.0	3.8×2.0	T8
	ZA300-2AA-A-W(**)N*	2.0×2.0	3.8×2.8	T8
	ZA350-08AA(**)N*	0.8×1.6	3.1×2.6	
	ZA350-1AA-W(**)N*	1.1×1.0	2.9×2.0	T8
	ZA350-2AA-W(**)N*	2.0×1.0	3.8×2.0	T8
	ZA1000-2AA-W(**)N*	1.8×1.9	3.9×2.5	
	ZA120-3AA-A(**)N*	3.0×0.6	6.3×1.5	T0
	ZA350-1AA(**)N*	1.0×3.1	4.5×4.2	
	ZA350-1AA-A(**)N*	1.0×2.1	2.9×2.6	
	ZA300-3AA-A(**)N*	2.9×1.9	5.5×2.5	T4
	ZA350-2AA(**)N*	1.9×2.8	5.7×4.0	N0、N1、N3、N4、N6、N8、T0、T4、T6
	ZA350-3AA(**)N*	3.1×2.6	7.0×3.8	N1、N2、N3、N4、N5、N6、N0、T0、T2、T4
	ZA350-4AA(**)N*	4.0×2.5	8.0×3.9	N6
	ZA350-5AA(**)N*	5.0×2.3	9.0×3.7	N6
	ZA350-7AA(**)N*	7.0×2.6	10.8×4.0	N4
	ZA500-2AA-T(**)N*	2.3×0.7	4.2×1.4	
	ZA600-1.5AA(**)N*	1.5×1.8	4.0×2.5	
	ZA700-2AA(**)N*	2.5×3.3	6.4×4.5	
	ZA1000-1AA(**)N*	1.4×3.4	5.2×4.5	N4、N2、T0、T2、T4
	ZA1000-1.2AA(**)N*	1.2×3.6	4.5×4.5	T8
	ZA1000-1.5AA-A(**)N*	1.5×2.5	4.5×3.1	T4、T8
	ZA1000-1.5AA(**)N*	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8
	ZA1000-2AA-T(**)N*	2.1×3.3	5.8×4.5	N0、T4、T8
	ZA1000-2AA-A(**)N*	2.4×3.0	4.9×4.0	
	ZA1000-2AA(**)N*	2.5×3.3	6.4×4.5	N0、N2、N5、N6、T0、T1、T2、T3、T4、T6
	ZA1000-3AA-B(**)N*	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8

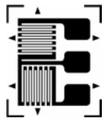
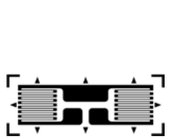
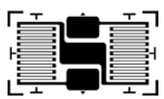
ZA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZA1000-3AA(**)N*	3.2×3.2	7.4×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2、T3、T4、T5、T6、T8
	ZA1000-4AA(**)N*	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6
	ZA1000-4AA-A(**)N*	3.8×2.5	8.2×4.2	
	ZA1000-5AA(**)N*	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2
	ZA1500-3AA(**)N*	3.2×3.2	7.4×4.5	N6、N4
	ZA2000-2AA-A(**)N*	2.1×4.2	5.4×5.2	T1、T6
	ZA2000-3AA(**)N*	3.2×4.0	7.4×5.3	N0、T4
	ZA2000-4AA(**)N*	4.0×4.4	8.6×6.0	N6
	ZA2500-3AA(**)N*	3.2×3.2	7.4×4.5	N2、N6、N8、T0、T1、T2、T3、T4、T5、T6、T7、T8
	ZA2500-6AA(**)N*	6.0×6.4	11.0×8.0	N0
	ZA3000-5AA(**)N*	5.2×4.0	8.7×5.2	N6
	ZA3000-6AA(**)N*	6.1×3.9	9.8×5.2	T0、T4
	ZA5000-3AA(**)N*	3.2×4.6	6.7×5.8	N6
	ZA350-2HA(**)N*	1.9×2.2	6.0×4.9	T0
	ZA350-3HA(**)N*	3.0×4.4	9.4×6.5	N1、N4、N8
	ZA350-4HA(**)N*	3.7×2.0	7.9×7.9	N3
	ZA700-4HA(**)N*	3.8×4.2	9.0×7.8	N5
	ZA1000-2HA(**)N*	2.0×4.4	9.0×5.6	N2、N4、N5、N6、T0、T4
	ZA1000-3HA(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T3、T4、T8
	ZA1000-4HA(**)N*	3.8×4.2	9.0×7.8	N4、N6、T0、T4
	ZA2000-3HA(**)N*	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8
	ZA350-3HA-A(**)N*	3.0×4.42	9.4×6.5	N4、N6、N8、T0
	ZA650-3HA-A(**)N*	2.9×4.0	8.5×6.3	T0
	ZA1000-2HA-A(**)N*	2.0×4.4	9.0×5.6	N2、N4、N6、T0、T4、T8
	ZA1000-3HA-A(**)N*	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、N7、N8、N9、T0、T2、T4、T6、T8
	ZA1000-4HA-A(**)N*	3.8×4.2	9.0×7.8	N4
	ZA2000-4HA-A(**)N*	4.0×5.7	10.8×8.0	N4
	ZA1000-2HA-B(**)N*	2.0×2.5	7.2×6.3	N6、N8
	ZA1000-3HA-B(**)N*	3.1×4.0	9.5×7.8	N4、N6、N8、T0、T4

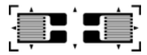
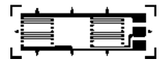
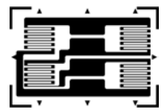
ZA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZA350-4HA-D(**)N*	3.9×2.3	8.3×8.3	N8
	ZA650-4HA-D(**)N*	3.8×2.5	7.5×7.5	N1、N8、T0
	ZA700-4HA-D(**)N*	3.8×2.5	7.5×7.5	N1、N8、T0
	ZA700-4HA-E(**)N*	3.8×2.5	7.5×7.5	N1、N8、T0
	ZA1000-2HA-T(**)N*	2.7×3.5	7.1×6.4	T0
	ZA200-05HA-W(**)N*	0.5×1.4	3.8×2.0	T4
	ZA250-1HA-W(**)N*	1.0×1.3	3.8×2.8	T4
	ZA300-2HA-W(**)N*	2.0×1.2	4.0×4.0	T8
	ZA350-1HA-W(**)N*	1.0×1.3	3.8×2.8	T4
	ZA350-2HA-W(**)N*	2.0×1.2	4.0×4.0	T8
	ZA350-3AB(**)N*	3.0×3.0	8.0×5.2	N8
	ZA1000-2AB(**)N*	2.0×2.0	6.7×3.7	N0、N4、N8、T3
	ZA1000-3AB(**)N*	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5、N6、N8、T0、T6
	ZA1000-4AB(**)N*	4.0×4.0	9.1×5.8	N8
	ZA350-3FB(**)N*	3.0×2.6	7.4×7.2	N6
	ZA350-4FB(**)N*	4.0×2.4	7.8×6.2	N6、N2
	ZA1000-2FB(**)N*	2.1×2.8	6.4×7.6	N6、T0
	ZA1000-3FB(**)N*	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、N6、N8、T0、T2、T4、T8
	ZA1000-4FB(**)N*	4.0×2.4	7.8×6.2	N6、T0
	ZA1000-6FB(**)N*	6.0×2.4	9.5×6.8	N2
	ZA1000-2BB(**)N*	2.0×2.6	7.2×6.0	N8
	ZA1000-3BB(**)N*	3.0×3.4	8.6×6.6	T4
	ZA1000-6BB(**)N*	6.0×6.0	13.8×9.7	T0
	ZA350-2BB-A(**)N*	1.5×2.0	5.9×4.5	T0
	ZA800-2BB-A(**)N*	1.7×3.2	5.4×5.4	T0
	ZA1000-2BB-A(**)N*	2.0×2.7	6.9×6.0	T4、N0
	ZA1000-2BB-A(**)-KR	2.6×2.2	5.4×5.4	N4

ZA Series Strain Gauges

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	ZA1000-3BB-A(**)N*	3.0×3.4	9.8×6.8	N2	
	ZA1050-3BB-A(**)N*	3.0×3.4	9.8×6.8	N2	
	ZA1000-4BB-A(**)N*	3.8×4.3	10.3×7.8	N4	
	ZA2000-3BB-A(**)N*	3.1×3.5	8.8×6.5		
	ZA350-1GB-AL68(**)N*	1.5×3.2	9.8×4.3	N0、N6、T0、T4	6.8
	ZA350-2GB-AL7(**)N*	2.0×2.7	10.8×3.9	N2、N4、N6、T0	7.0
	ZA350-1GB-AL8(**)N*	1.5×3.5	11.0×4.3	N2	8.0
	ZA350-2GB-AL0(**)N*	2.0×2.7	14.4×3.9	N0、N2、N4、N6、T0、T2、T8	10.5
	ZA350-2GB-AL12(**)N*	2.0×2.7	15.8×3.9	N0、N4	12.0
	ZA350-2GB-AL15(**)N*	2.0×2.7	18.8×3.9	N2、T4	15.0
	ZA750-2GB-AL12(**)N*	2.0×3.3	15.8×4.5	N0、T6、T8	12.0
	ZA1000-1.5GB-AL5.5(**)N*	1.5×2.5	9.1×4.3	N6	5.5
	ZA1000-1.5GB-AL9(**)N*	1.5×4.0	12.0×5.2	T2、T3、T8	9.0
	ZA1000-1.6GB-AL0(**)N*	1.6×3.9	13.7×5.1	T1、T4	10.5
	ZA1000-2GB-AL5(**)N*	2.0×3.3	8.9×4.5	N2	5.3
	ZA1000-2GB-AL5.5(**)N*	2.0×2.8	8.9×3.8	N6	5.5
	ZA1000-2GB-AL6(**)N*	2.0×2.8	9.4×3.8	N0、N2、N6、T0、T4、T6	6.0
	ZA1000-2GB-AL7(**)N*	2.0×3.1	10.8×4.4	N0、N2、N4、N6、T0、T5	7.0
	ZA1000-2GB-AL0(**)N*	2.5×3.3	14.7×4.5	N0、N2、N3、N4、N5、N6、N8、T1、T6	10.5
	ZA1000-3GB-AL7(**)N*	3.0×3.2	11.6×4.4	N2	7.0
	ZA1000-3GB-AL0(**)N*	3.0×3.2	15.4×4.4	N6、T0、T2、T4、T6、T8	10.5
	ZA1000-3GB-AL14(**)N*	2.9×3.0	18.7×4.2	N0、N1	14.0
	ZA1000-2GB-AL6(**)N*	2.0×3.0	9.4×4.0	N2	6.0
	ZA1000-2GB-AL0(**)N*	2.5×4.0	14.7×5.0	T0、T4	10.5
	ZA500-2GB-BL6(**)N*	2.1×5.0	9.8×6.0	N4	6.0
	ZA1000-1GB-BL6(**)N*	1.5×4.8	9.1×6.5	T6	6.0
	ZA1000-2GB-BL6(**)N*	2.1×4.1	9.7×5.5	N0、N2、N6、T0、T1、T2、T3、T4、	6.0
	ZA1000-2GB-BL7(**)N*	2.1×4.1	10.7×5.5	N6、T1、T3、T5、T8	7.0
	ZA1000-2GB-BL0(**)N*	2.1×4.1	14.2×5.5	T1、T3、T5	10.5
	ZA1000-3GB-BL6(**)T*	3.0×3.6	10.7×4.8	T0、T2	6.0
	ZA2000-2GB-BL6(**)N*	2.1×4.2	9.7×5.5	T6	6.0
	ZA2000-2GB-BL7(**)N*	2.1×5.4	10.8×6.4	N6、T0	7.0

ZA Series Strain Gauges

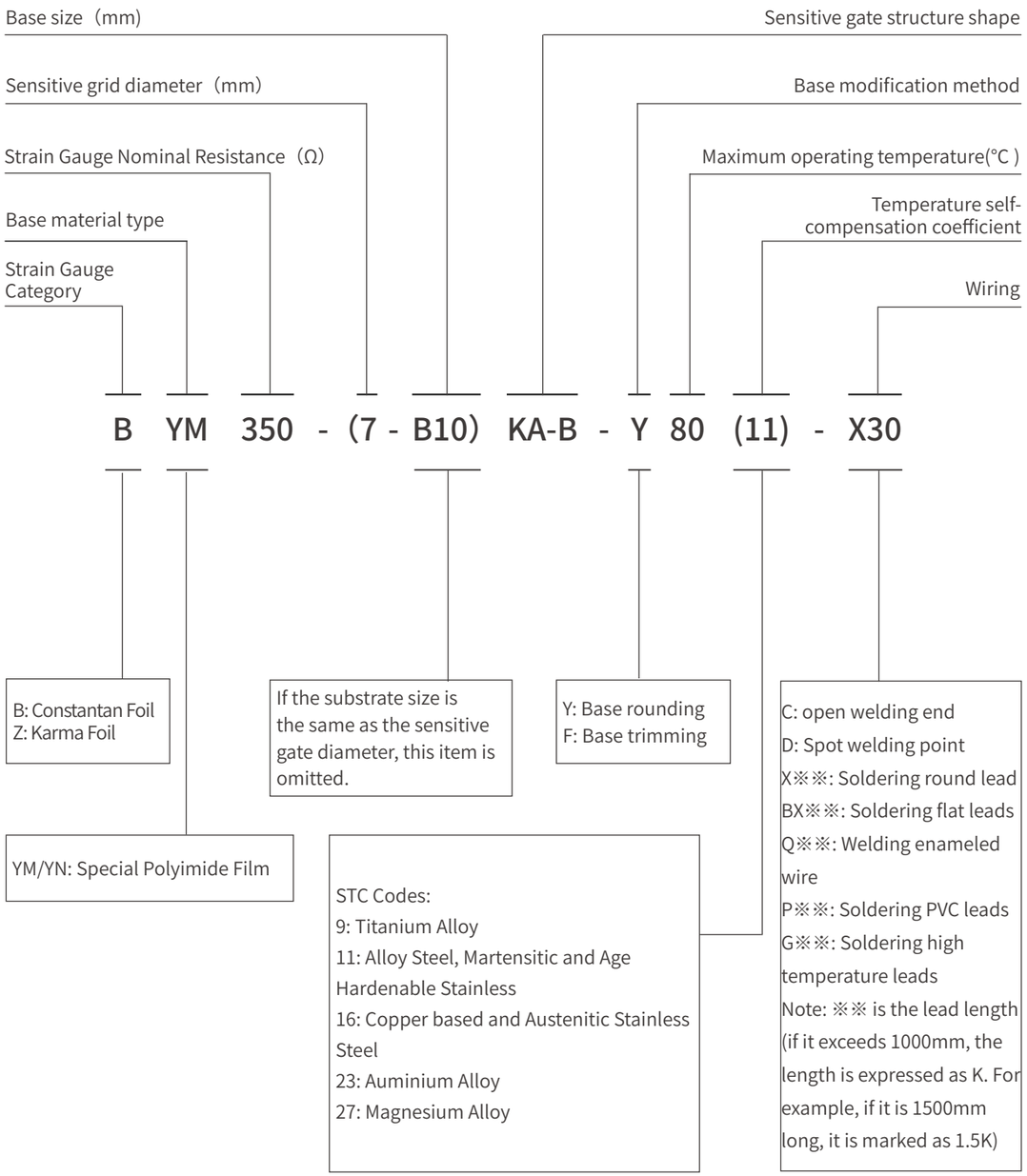
Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes	Pitch (mm)
	ZA650-4GB-CL6(**)N*	4.0×3.2	20.0×6.0	N6	
	ZA650-5GB-CL7(**)N*	5.0×2.4	27.0×4.0	T0	
	ZA1000-2GB-CL8(**)N*	2.5×3.3	12.9×4.5	N2、T1、T2、T4	8.8
	ZA1000-2GB-CL0(**)N *	2.5×3.3	14.7×4.5	T2、T4	10.5
	ZA350-3GB-L12(**)N*	3.0×3.3	20.3×4.2	N6	12.0
	ZA500-3GB-L0(**)N*	3.0×4.8	18.8×5.3	N6	10.5
	ZA500-3GB-L12(**)N*	3.0×4.8	16.8×5.3	N6	12.0
	ZA1000-2GB-L6(**)N*	2.1×3.4	11.7×5.2	T4	10.5
	ZA1000-3GB-L6(**)N*	3.0×3.8	13.2×4.8	T8	6.0
	ZA1000-3GB-L0(**)N*	3.0×3.8	17.2×4.9	N2、T2、T8	10.5
	ZA1000-3GB-L12(**)N*	3.1×3.9	18.5×4.9	N2	12.0
	ZA1000-4GB-L12(**)N*	4.0×2.5	19.5×4.5	N8	12.0
	ZA2000-3GB-L0(**)N*	3.0×2.8	17.8×4.4	T8	10.5
	ZA350-1FG-BL6(**)N*	1.5×2.2	9.3×6.1	T0、N4	6.0
	ZA350-1FG-BL0(**)N*	1.5×2.5	13.9×6.4	N0、T0、T8	10.5
	ZA400-1FG-BL68(**)N*	1.5×2.4	9.8×6.1	T8	6.8
	ZA500-2FG-BL6(**)N*	2.1×2.2	9.7×5.8	T8	6.0
	ZA1000-1.5FG-BL0(**)T*	3.0×2.8	13.8×6.9	T8	10.5
	ZA1000-2FG-BL6(**)N*	2.1×2.7	9.8×6.9	N4、N8、T0、T4、T8	6.0
	ZA1000-2FG-BL0(**)N*	2.1×2.8	14.4×6.9	N2、N6	10.5
	ZA1000-3FG-BL0(**)T*	3.1×2.8	15.5×6.8	T2	10.5
	ZA1100-2FG-BL0(**)N*	2.1×2.8	14.4×6.9	N2、T8	10.5
	ZA1100-2FG-BL6(**)N*	2.1×2.8	9.8×6.8	N2	6.0
	ZA1200-3FG-BL7(**)N*	3.0×2.6	12.0×6.8	T0	7.0
	ZA2000-2FG-BL0(**)N*	2.0×3.3	14.3×7.8	T8	10.5
	ZA350-1FG-CL6(**)N*	1.5×2.2	9.2×6.0	T0	6.0
	ZA350-1FG-CL68(**)N*	1.5×2.4	9.8×6.2	N2	6.8
	ZA350-1FG-CL0(**)N*	1.5×2.2	13.9×6.4	T2	10.5
	ZA1000-2FG-CL6(**)N*	2.1×2.9	9.8×6.9	T0、T2、T4	6.0
	ZA1000-3FG-CL0(**)N*	3.1×2.8	15.3×7.0	N2、N6、T0、T4	10.5
	ZA1100-2FG-CL6(**)N*	2.1×2.8	9.6×6.8	N2	6.0

Notes:

1. N* and T* in the strain gauge model are Available creep codes. Different labels have different creep values.
2. L* in the strain gauge model is the grid pitch code. For example, L0 means the grid pitch is 10.5mm, and L6 means the grid pitch is 6.0mm.
3. For strain gauges with sensitive gate structures of FG and EB: when nominal value =350Ω, resistance range: 350±50Ω, bridge zero point balance ⩽ 0.5mV/V. When the nominal value ⩾ 1000Ω, the resistance range: 1000±10%, the bridge zero balance ⩽ 1.0mV/V.
4. In the product graphic structure, "HA-D" and "HA-E" strain gauges only provide strain gauges with leads (leads include silver-plated copper wire, enameled wire, etc.).
5. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 to 0.6mm larger than the design size; please check.
6. Select the strain gauge and select the appropriate size strain gauge model based on the patch area.
7. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

STRAIN GAUGES FOR PRESSURE SENSORS (KA STRUCTURE)

Strain gauge model naming rules for pressure sensors (KA structure)



BYM BYN

Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	BYM(BYN)350-(8)KA(**)	Φ7.6	Φ8.0	
	BYM(BYN)350-(9)KA(**)	Φ9.6	Φ10.0	
	BYM(BYN)350-(9.9)KA(**)	Φ9.4	Φ10.0	
	BYM(BYN)350-(10)KA(**)	Φ9.4	Φ10.0	T0、T2、T6
	BYM(BYN)350-(12)KA(**)	Φ11.6	Φ12.0	
	BYM(BYN)350-(13)KA(**)	Φ12.4	Φ13.0	
	BYM(BYN)350-(15)KA(**)	Φ14.6	Φ15.0	
	BYM(BYN)350-(20)KA(**)	Φ19.2	Φ20.0	
	BYM(BYN)350-(8.1)KA(**)	Φ7.6	Φ8.0	
	BYM(BYN)350-(10.2)KA(**)	Φ9.4	Φ10.0	
	BYM(BYN)350-(12.1)KA(**)	Φ11.6	Φ12.0	
	BYM(BYN)350-(13.1)KA(**)	Φ12.4	Φ13.0	
	BYM(BYN)350-(14)KA(**)	Φ13.4	Φ14.0	T0、N3、N6
	BYM(BYN)350-(15.1)KA(**)	Φ14.4	Φ15.0	
	BYM(BYN)400-(25)KA(**)	Φ24.2	Φ25.0	
	BYM(BYN)500-(10.5)KA(**)	Φ10.1	Φ10.5	
	BYM(BYN)350-(8.5)KA-B(**)	Φ8.4	Φ9.0	
	BYM(BYN)350-(9)KA-B(**)	Φ8.4	Φ9.0	
	BYM(BYN)350-(18)KA-B(**)	Φ17.2	Φ18.0	
	BYM(BYN)500-(15)KA-B(**)	Φ14.4	Φ15.0	
	BYM(BYN)1000-(10.6)KA-B(**)	Φ10.2	Φ10.6	
	BYM(BYN)350-(20)KA-C(**)	Φ19.4	Φ20.0	
	BYM(BYN)350-(22)KA-C(**)	Φ20.4	Φ22.0	N4、T0
	BYM(BYN)350-(15-B17)KA-C(**)	Φ15.0	Φ17.0	
	BYM(BYN)350-(16-B18)KA-C(**)	Φ16.0	Φ18.0	
	BYM(BYN)350-(17-B19)KA-C(**)	Φ17.5	Φ19.5	
	BYM(BYN)350-(18-B20)KA-C(**)	Φ18.5	Φ20.5	
	BYM(BYN)350-(20-B22)KA-C(**)	Φ20.2	Φ22.2	
	BYM(BYN)1000-(20-B22)KA-C(**)	Φ20.2	Φ22.2	
	BYM(BYN)120-(10-B13)KA(**)	Φ9.4	Φ13.0	
	BYM(BYN)350-(7-B10)KA(**)	Φ7.2	Φ10.0	
	BYM(BYN)400-(25-B27)KA(**)	Φ24.8	Φ27.0	

ZYM ZYN

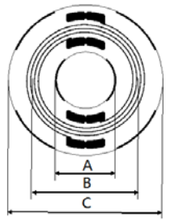
Geometry	Product code	Grid size Length (L) × Width (W) (mm)	Backing size Length (L) × Width (W) (mm)	Available creep codes
	ZYM(ZYN)350-(12)KA(**)	Φ11.4	Φ12.0	
	ZYM(ZYN)350-(14)KA(**)	Φ13.4	Φ14.0	
	ZYM(ZYN)1000-(8.1)KA(**)	Φ7.6	Φ8.0	
	ZYM(ZYN)1000-(10.2)KA(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)1000-(12.1)KA(**)	Φ11.6	Φ12.0	
	ZYM(ZYN)1000-(13.1)KA(**)	Φ12.4	Φ13.0	
	ZYM(ZYN)1000-(14)KA(**)	Φ13.4	Φ14.0	N6、N3、T0
	ZYM(ZYN)1700-(13.1)KA(**)	Φ12.4	Φ13.0	
	ZYM(ZYN)1700-(14)KA(**)	Φ13.6	Φ14.0	
	ZYM(ZYN)2000-(14)KA(**)	Φ13.6	Φ14.0	T0、T4
	ZYM(ZYN)2000-(15)KA(**)	Φ14.6	Φ15.0	
	ZYM(ZYN)3000-(14)KA(**)	Φ13.6	Φ14.0	
	ZYM(ZYN)350-(5)KA(**)	Φ4.6	Φ5.0	
	ZYM(ZYN)350-(9)KA(**)	Φ9.6	Φ10.0	
	ZYM(ZYN)350-(20)KA(**)	Φ19.4	Φ20.0	
	ZYM(ZYN)500-(5)KA(**)	Φ4.6	Φ5.0	
	ZYM(ZYN)700-(6)KA(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)1000-(9.8)KA(**)	Φ9.4	Φ9.8	
	ZYM(ZYN)1000-(10)KA(**)	Φ9.4	Φ10.0	T0、T2、T6
	ZYM(ZYN)1000-(10.1)KA(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)1000-(13)KA(**)	Φ12.4	Φ13.0	
	ZYM(ZYN)1000-(15)KA(**)	Φ14.6	Φ15.0	
	ZYM(ZYN)1000-(20)KA(**)	Φ19.2	Φ20.0	
	ZYM(ZYN)1500-(10)KA(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)1500-(11)KA(**)	Φ10.4	Φ10.8	
	ZYM(ZYN)2000-(17)KA(**)	Φ16.4	Φ17.0	
	ZYM(ZYN)2000-(18)KA(**)	Φ17.4	Φ18.0	
	ZYM(ZYN)2500-(20)KA(**)	Φ19.6	Φ20.0	
	ZYM(ZYN)350-(5-B10)KA(**)	Φ5.0	Φ10.0	
	ZYM(ZYN)350-(6-B10)KA(**)	Φ7.0	Φ10.0	
	ZYM(ZYN)1000-(10-B13)KA(**)	Φ9.4	Φ13.0	
	ZYM(ZYN)1000-(7-B10)KA(**)	Φ6.4	Φ9.9	
	ZYM(ZYN)1000-(7-B9)KA(**)	Φ6.4	Φ8.7	
	ZYM(ZYN)1200-(7-B10)KA(**)	Φ6.8	Φ9.9	
	ZYM(ZYN)1650-(10-B13)KA(**)	Φ9.8	Φ13.0	
	ZYM(ZYN)2000-(10-B13)KA(**)	Φ9.8	Φ13.0	

ZYM ZYN

Geometry	Product code	Grid size Length (L) ×Width (W) (mm)	Backing size Length (L)× Width (W) (mm)	Available creep codes
	ZYM(ZYN)350-(5)KA-B(**)	Φ4.6	Φ5.0	
	ZYM(ZYN)350-(6)KA-B(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)500-(6)KA-B(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)550-(6-B10)KA-B(**)	Φ5.6	Φ9.8	
	ZYM(ZYN)700-(6)KA-B(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)1000-(6)KA-B(**)	Φ5.4	Φ6.0	
	ZYM(ZYN)1000-(10)KA-B(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)2000-(12)KA-B(**)	Φ11.6	Φ12.0	
	ZYM(ZYN)350-(6.1)KA-B(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)350-(6.5-B10)KA-B(**)	Φ6.5	Φ10.0	
	ZYM(ZYN)500-(6.1)KA-B(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)350-(8-B10)KA-B(**)	Φ8.4	Φ10.0	
	ZYM(ZYN)1000-(6.5)KA-B(**)	Φ5.6	Φ6.5	
	ZYM(ZYN)1000-(9.9)KA-B(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)1650-(13)KA-B(**)	Φ5.6	Φ13.0	
	ZYM(ZYN)2100-(10)KA-B(**)	Φ9.4	Φ10.0	
	ZYM(ZYN)350-(8)KA-C(**)	Φ8.5	Φ9.0	
	ZYM(ZYN)350-(10)KA-C(**)	Φ9.6	Φ10.0	
	ZYM(ZYN)350-(20)KA-C(**)	Φ19.4	Φ20.0	
	ZYM(ZYN)1000-(20)KA-C(**)	Φ19.4	Φ20.0	
	ZYM(ZYN)350-(5)KA-C(**)	Φ4.6	Φ5.0	
	ZYM(ZYN)350-(5.5)KA-C(**)	Φ5.2	Φ5.5	
	ZYM(ZYN)350-(6)KA-C(**)	Φ5.6	Φ6.0	
	ZYM(ZYN)350-(9)KA-C(**)	Φ8.2	Φ9.0	
	ZYM(ZYN)350-(11.6)KA-C(**)	Φ11.0	Φ11.6	
	ZYM(ZYN)350-(15)KA-C(**)	Φ14.2	Φ15.0	
	ZYM(ZYN)500-(5.5)KA-C(**)	Φ5.2	Φ5.5	
	ZYM(ZYN)1000-(9.5)KA-C(**)	Φ8.9	Φ9.5	
	ZYM(ZYN)1000-(10)KA-C(**)	Φ9.4	Φ10.0	

1. N* and T* in the strain gauge model are Available creep codes. Different labels have different creep values.
2. In the above table, the Product code column such as ZYM350-14KA(**) indicates two series of strain gauges, namely ZYM350-14KA(**) and ZYM350-14KA(**). When selecting, please fill in the model number according to the required series.
3. Strain gauge for pressure sensor: The nominal value is 350Ω. The resistance range is: nominal value 350±2Ω. The resistance difference between the sensitive gates in the chip is ⩽ 0.8Ω.
4. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 to 0.6mm larger than the design size; please check. To select a strain gauge, select a strain gauge model of appropriate size based on the patch area.
5. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).
6. ZYM is suitable for high-precision pressure sensors, and ZYN is suitable for pressure sensors of level C3 and below.

STRAIN GAUGE FOR TORQUE RING SENSOR

Geometry	Product code	Grid size B(mm)	Backing size(mm)	
			Inside diameter A	Outside diameter C
	BYM1000-(38)JA-A	Φ34	Φ30.6	Φ37.4
	BYM1000-(50)JA-A	Φ45	Φ40.6	Φ49.4
	BYM1000-(60)JA-A	Φ55	Φ50.6	Φ59.4
	BYM1000-(80)JA-A	Φ75	Φ70.6	Φ79.4
	BYM1000-(100)JA-A	Φ95	Φ90.6	Φ99.4
	ZYM4000-(37)JA-A	Φ31.5	Φ26.6	Φ36.4
	ZYM4000-(55)JA-A	Φ49	Φ43.6	Φ54.4

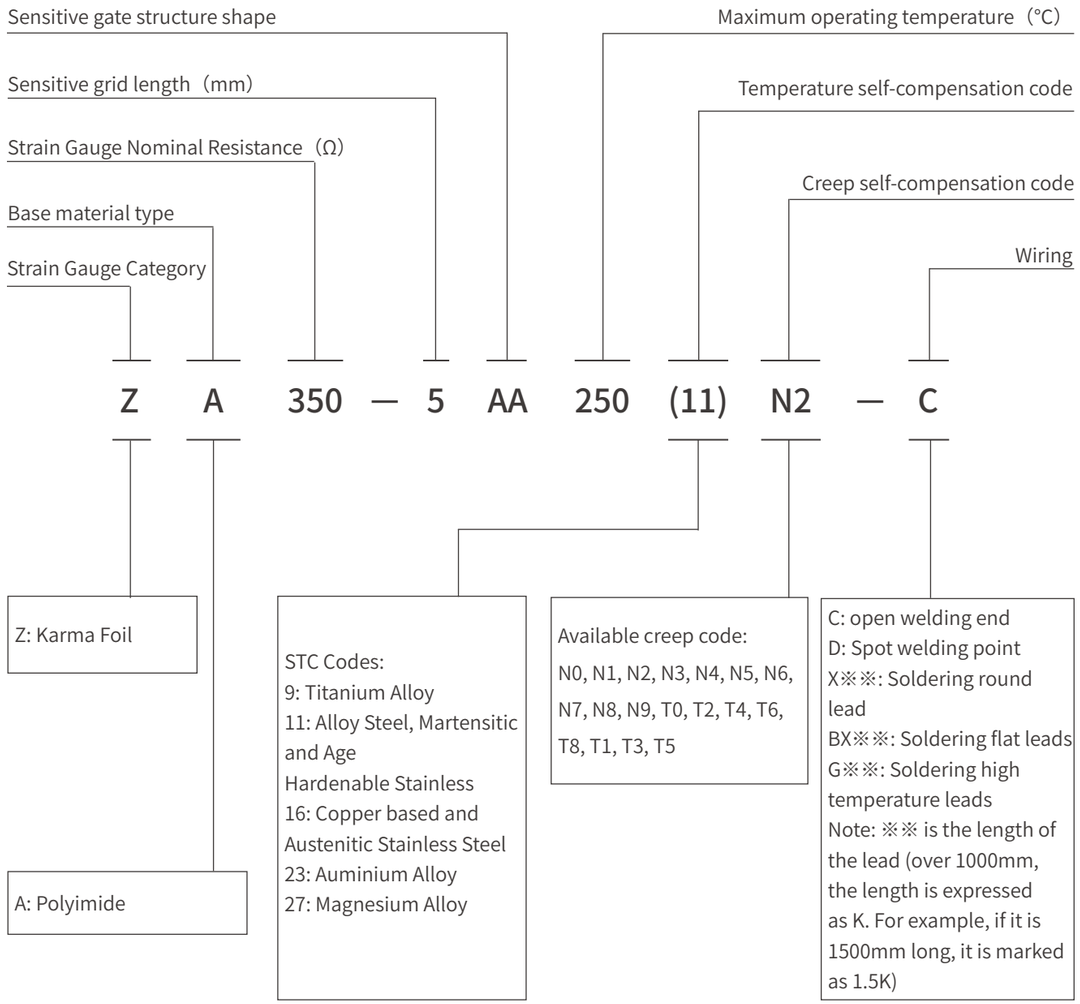
1. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 to 0.6mm larger than the design size; please select a strain gauge model of appropriate size based on the patch area.
2. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

MEDIUM TEMPERATURE STRAIN GAUGE

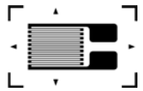
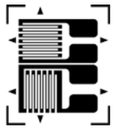
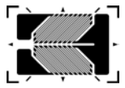
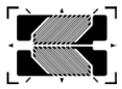
ZA (250°C) series medium temperature resistance strain gauge

The fully sealed structure resistance strain gauge is made of temperature-resistant polyimide glue and Karma alloy foil. After special processing (copper plating on the pad) and structural design, its performance in medium temperature environments has been improved. It has the characteristics of thin base, stable and reliable, strong insulation ability, not easy to be damaged, and high operating temperature. Improved high-temperature creep performance, suitable for sensor manufacturing and stress analysis needs in the range of -200° C~250° C.

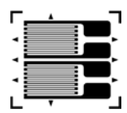
Medium temperature resistance strain gauge model naming rules



ZA(250°C)

Geometry	Product code	Grid size Length (L) ×Width (W) (mm)	Backing size Length (L)× Width (W) (mm)
	ZA300-1AA-W250(**)	1.1×1.0	2.9×2.0
	ZA300-2AA-W250(**)	2.0×1.0	3.8×2.0
	ZA300-2AA-A-W250(**)	2.0×2.0	3.8×2.8
	ZA300-3AA-A250(**)	2.9×1.9	5.5×2.5
	ZA350-1AA250(**)	1.0×3.1	4.5×4.2
	ZA350-2AA250(**)	1.9×2.8	5.7×4.0
	ZA350-3AA250(**)	3.1×2.6	7.0×3.8
	ZA350-4AA250(**)	4.0×3.7	8.0×4.9
	ZA350-5AA250(**)	5.0×4.1	9.4×5.7
	ZA650-4AA250(**)	4.0×4.4	8.6×6.0
	ZA650-4AA-A250(**)	4.0×2.7	7.2×3.8
	ZA1000-3AA250(**)	3.2×3.2	7.4×4.5
	ZA2000-4AA250(**)	4.0×4.4	8.6×6.0
	ZA120-3BB250(**)	2.8×3.3	8.5×6.5
	ZA120-4BB250(**)	4.0×4.4	10.3×7.5
	ZA350-1.5BB250(**)	1.5×2.0	5.1×4.6
	ZA350-2BB250(**)	1.9×2.5	6.4×5.5
	ZA350-3BB250(**)	3.0×3.4	8.8×6.8
	ZA350-4BB250(**)	4.0×4.3	10.0×7.8
	ZA350-5BB250(**)	4.7×5.2	11.6×8.3
	ZA350-3HA-C250(**)	3.0×3.8	9.5×7.8
	ZA350-3HA250(**)	3.0×4.4	9.4×6.5
	ZA350-3HA-A250(**)	3.0×4.4	9.4×6.5
	ZA350-4HA-A250(**)	4.0×3.6	8.8×7.8
	ZA1000-3HA-A250(**)	3.0×4.5	9.4×6.5
	ZA250-1HA-W250(**)	1.0×1.3	3.8×2.8
	ZA300-2HA-W250(**)	2.0×1.2	4.0×4.0
	ZA350-1HA-W250(**)	1.0×1.3	3.8×2.8
	ZA350-2HA-W250(**)	2.0×1.2	4.0×4.0
	ZA350-4HA-D250(**)	3.9×2.3	8.3×8.3
	ZA350-4HA-E250(**)	3.9×2.3	8.3×8.3
	ZA350-(6)KA-B250(**)	Φ5.6	Φ6.0
	ZA350-(6-B10)KA250(**)	Φ6.4	Φ10.0
	ZA350-(10)KA250(**)	Φ8.8	Φ10.0

ZA(250°C)

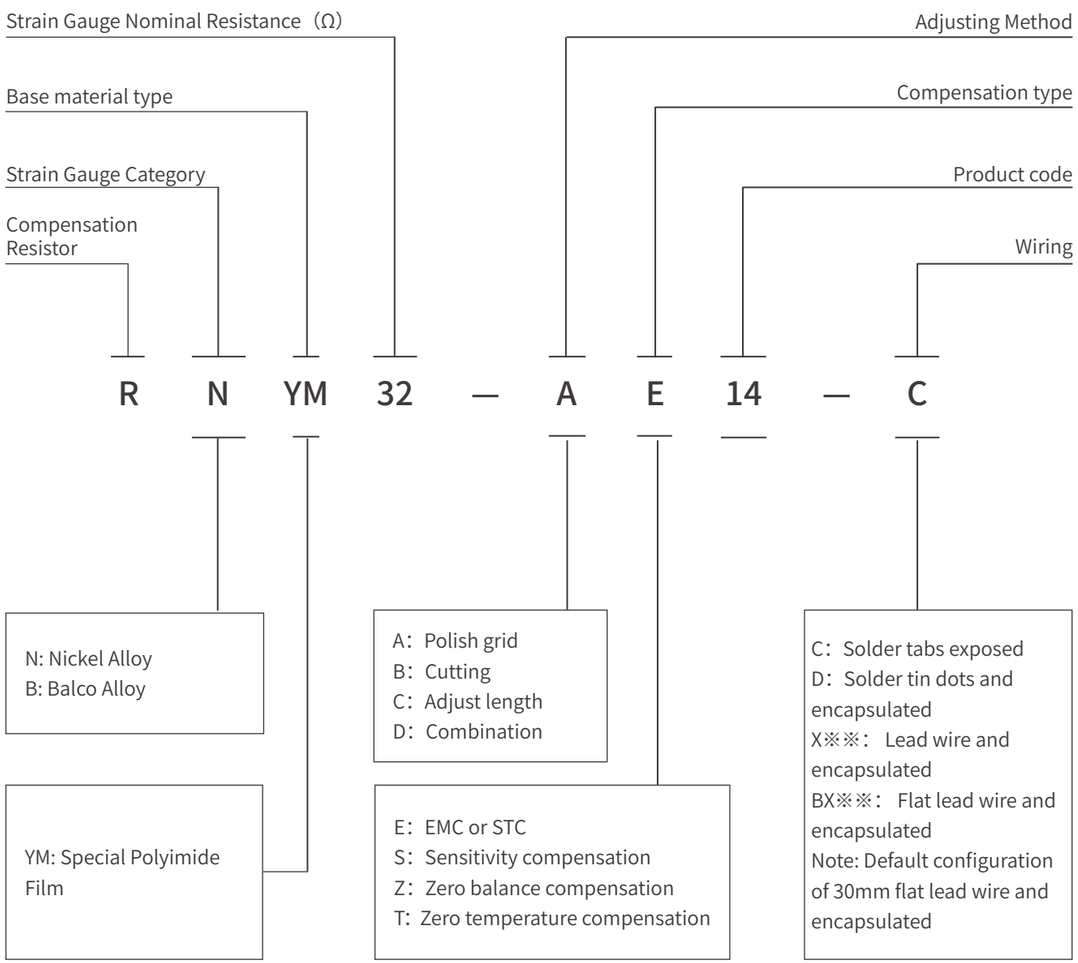
Geometry	Product code	Grid size Length (L) ×Width (W) (mm)	Backing size Length (L)× Width (W) (mm)
	ZA350-(13)KA250(**)	Φ12.4	Φ13.0
	ZA350-(15)KA250(**)	Φ14.0	Φ15.0
	ZA350-(20)KA250(**)	Φ18.6	Φ20.0
	ZA400-(10)KA250(**)	Φ8.8	Φ10.0
	ZA1000-(10)KA250(**)	Φ9.0	Φ10.0
	ZA1000-(10-B13)KA250(**)	Φ9.0	Φ13.0
	ZA1000-(14)KA250(**)	Φ12.8	Φ14.0
	ZA1000-(20)KA250(**)	Φ18.6	Φ20.0
	ZA1500-(11)KA250(**)	Φ10.4	Φ10.8
	ZA1650-(10-B13)KA250(**)	Φ9.8	Φ13.0
	ZA350-(10)KA-A250(**)	Φ9.2	Φ10.0
	ZA350-(20)KA-A250(**)	Φ19.2	Φ20.0
	ZA1000-(10)KA-A250(**)	Φ9.4	Φ10.0
	ZA350-2FB250(**)	2.0×2.0	5.2×5.6
	ZA1000-6FB250(**)	6.0×2.4	9.5×6.8
	ZA650-4GB-CL6250(**)	4.0×3.2	20.0×6.0
	ZA650-5GB-CL7250(**)	5.0×2.4	27.0×4.0

1. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 ~ 0.6mm larger than the design size. When selecting the strain gauge, please select the appropriate size according to the patch area.
2. In addition to the models listed in the table, shape and size of strain gauges can be designed and produced according to user requirements (drawings or samples).

COMPENSATION RESISTOR

Besides the high accuracy strain gauges, compensation and adjustment is also needed for high accuracy transducer manufacturing, in order to achieve expected specifications. R series compensation resistor is a kind of bondable and adjustable compensation resistor, which can be used to improve the transducers specifications, like output sensitivity, temperature effect on sensitivity, zero output, zero temperature drift and other technical specifications. In addition, the compensation resistors can be easily installed and adjusted, the temperature change is the same as the temperature change of the spring elements material due to the self-temperature compensation and can reach very high compensation accuracy.

Compensation resistor designation



Compensation resistor selection method

During the production of high accuracy transducers, a series of compensations should be done in order to improve the specifications of transducers, including compensation of the temperature effect on sensitivity, the overall sensitivity, zero balance and the temperature effect on zero balance. Following is an introduction to the possible compensation methods and a guide to choose the correct compensation resistor:

(1)Temperature effect on sensitivity compensation (i.e. Elastic Modulus Compensation)

When the transducers environmental temperature changes, the elastic modulus of the spring element and the strain gauges gauge factor will also change accordingly, which leads to incorrect measurements. This is the reason that for high accuracy transducers manufacturing, compensation is needed. In this case, where RNYM or RBYM series compensation resistors will be used, the method is as follows: To connect the compensation resistor in a serial connection with the input excitation circuit, the compensation resistor will change with the same temperature effect characteristics as the transducer will, but in opposite direction, which will therefore compensate the change back to a minimum. To know what compensation resistance value is necessary, this should be calculated with the following formula:

$$R_m \approx [(S_1 - S_2) \cdot R_{in}] / \{ [1+\alpha_c (T_1 - T_2)] \cdot (S_1 - S_2) \}$$

Wherein Rm refers to the resistance value of the compensation resistor, S_1 and S_2 refer to the transducers sensitivity at temperature values T_1 and T_2 respectively. Rin refers to the input resistance of the bridge when the temperature value is T_1. αc refers to the temperature resistance coefficient of the compensation resistor. These coefficients are as follows: For the RNYM resistors: 5.5 x 10^{-3}/°C and for the RBYM resistors: 4.3 x 10^{-3}/°C . Further, S (transducer sensitivity) is calculated as follows: S=E0/V in which E0 is the bridge output voltage and V is the supply excitation voltage. Generally, 20 Ω of RNYM series resistor can be used for steel transducer compensation, while 32 Ω of RNYM series resistor is suitable for aluminum transducer compensation. The specific compensation resistance value however, should be confirmed by testing and adjusting the compensation resistor according to the transducers' accuracy.

(2) Sensitivity compensation

RCF series compensation resistors or thin wires with a lower resistance temperature coefficient can be used for sensitivity compensation. Because of combination error of the elements material differences, process variation and gauge factor dispersion (which is usually lower than 1%), the dispersion between transducers sensitivity would occur and therefore make it harder to interchange transducers. During the production of transducers, the sensitivity of transducers is generally a little bit higher than intended. So that at the end of the process it can be adjusted to the correct value according to test results. The specific method is as follows: The compensation resistor with smaller resistance temperature coefficient into the excitation circuit with the intention to lower the real excitation voltage of the transducer will be connected into the input circuit. This way the sensitivity of the transducer is decreased. The compensation resistance value can be calculated with the following formula:

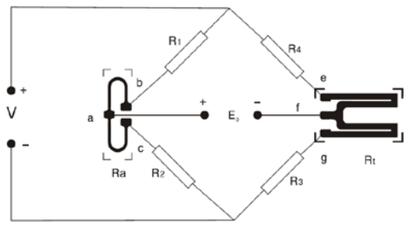
$$R_c \approx (S_1 - S_2) / S_1 \cdot R$$

R_c refers to the resistance value of the compensation resistor. S_1 and S_2 refer to the sensitivity before adjustment and the

sensitivity after adjustment. R refers to the input resistance of the bridge.

(3) Zero balance compensation

RCF compensation resistors or varnished wrapped wires with lower resistance temperature coefficient will be used for zero balance compensation. Usually the resistor is applied into one of the arms of the bridge to make sure the transducers' strain gauge bridge output is as close to zero as possible without any load applied. In this way measuring errors can be prevented and zero adjustments by indicators are easy to perform. Usually, polishable, cutable and length adjustable compensation resistors are used. This way, the bridge zero can be easily and neatly adjusted. Resistance value of polishable compensation resistors can be adjusted by carefully polishing the grid with an abrasive. Cutable compensation resistors can be adjusted by carefully cutting the grid on designated places. The resistance value of length adjustable compensation resistors can be adjusted by changing the length of the resistor. (Figure 5)
Assume strain gauge R_1 and R_3 receive compressive strain and R_2 and R_4 receive tensile strain, when zero output is positive, terminal A-B should be having an increased resistance. Meanwhile it is important to keep an eye on the bridge output. When zero output is negative, terminal A-C should be having an increased resistance. The intention is to get the bridge output to zero.
RCF5-AZ04 is recommended for zero adjusting.



(4) Zero temperature compensation

A RNYM series resistor, varnished wrapped pure copper wire or a varnished wrapped nickel wire with larger temperature resistance coefficient will be used for zero temperature compensation, usually the resistor will be applied into one of the arms of the bridge. With no load applied the output of the transducer should be close to zero. When a transducers' surrounding temperature and therefore the temperature of the transducer itself changes, the element, bonding adhesive and strain gauge itself will change and therefore the resistance will change. All those factors will affect the transducers zero output, even self-temperature compensating and full bridge setups can't prevent the signal to shift. This is because of a certain small dispersion between the strain gauges. This will affect the zero output and has to be compensated. The usual method to do this is as follows: The first thing to do is to test the transducer temperature performance, this means to see what the temperature coefficient is and what values the transducer has at certain temperature levels. After this is determined, a compensation resistor can be applied into one of the arms. The value of compensation resistor can be calculated with the formula below:

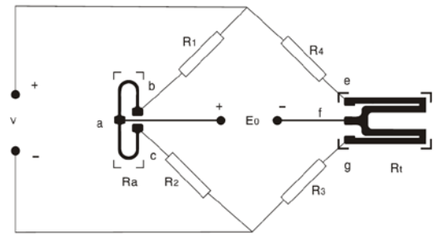
$$R_t = | R(U_2 - U_1) | / | 250 \alpha c U_{in} (T_2 - T_1) |$$

In this formula, R_t refers to the resistance value of the compensation resistor which should be used. R refers to the bridge resistance and Uin to the excitation voltage; αc refers to the temperature coefficient of the compensation resistor. U_1 and U_2 refer to the transducers zero output voltage at temperature values T_1 and T_2 respectively. Usually, polishable, cutable and length adjustable compensation resistors are used. The theory of zero temperature compensation is

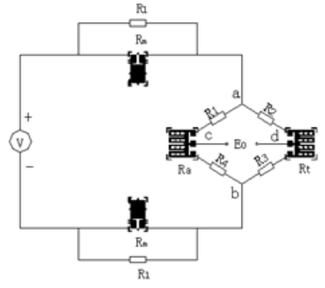
very similar to the zero balance compensation, however, the zero temperature must be adjusted during different temperature changes.

Assume strain gauge R_1 and R_3 receive compressive strain and R_2 and R_4 receive tensile strain, when zero temperature output is positive (The positive output is the difference between the zero output at normal temperature and at higher temperature), terminal F-G should be having an increased resistance. When zero temperature output is negative, terminal E-F should be having an increased resistance. Meanwhile it is important to keep an eye on the bridge output. The intention is to get the bridge output to zero.

RNYM1-AT02 is recommended for zero temperature adjusting. In Figure 6 R_t is the resistor for zero temperature compensation.



Basic drawing of transducers wiring compensation

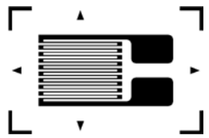


R_1 ~R_4 ------ Strain Gauges
R_t ------ Zero Temperature compensation resistor
R_a ------ Adjustable Zero output resistor
R_m ------ Temperature sensitivity compensation resistor (or elastic modulus resistor)
R_C ------ Linearity compensation resistor
V ------ Excitation voltage
E0 ------ Bridge output (or measuring output)

Compensation resistor specifications

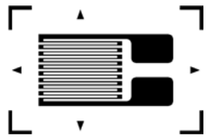
Specification	RNYM Sereis	RBYM Sereis
Resistance tolerance to average resistance (23 °C)	⩽ ±0.1Ω	
Resistance temperature coefficient	5.5×10^{-3}/°C	4.3×10^{-3}/°C
Temperature range (°C)	-30 ～ +80°C	
Adhesive	H-610、H600、H-611	
Wiring	X (omissibility/ Can be omitted) 、C、D	

RNYM、RBYM

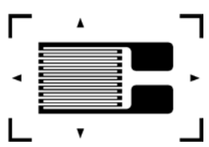
Geometry	Product code	Nominal resistance（Ω）	Backing size Length (L) × Width (W) (mm)
	RNYM(RBYM)15-AE95	15.0	5.5×3.6
	RNYM(RBYM)15-AE56	15.0	3.0×2.0
	RNYM(RBYM)17.5-AE136	17.5	6.8×4.4
	RNYM(RBYM)20-AE26	20.0	6.2×3.6
	RNYM(RBYM)25-AE05	25.0	6.2×3.9
	RNYM(RBYM)30-AE45	30.0	6.2×4.0
	RNYM(RBYM)35-AE45	35.0	6.2×4.0
	RNYM(RBYM)50-AE06	50.0	5.8×3.8
	RNYM(RBYM)60-AE07	60.0	5.9×3.8
	RNYM(RBYM)65-AE66	65.0	5.9×3.8
	RNYM(RBYM)70-AE08	70.0	6.0×3.8
	RNYM(RBYM)81-AE14	81.0	6.8×4.4
	RNYM(RBYM)90-AE14	90.0	6.8×4.4
	RNYM(RBYM)96-AE10	96.0	6.5×4.2
	RNYM(RBYM)100-AE11	100.0	6.8×4.0
	RNYM(RBYM)110-AE11	100.0	6.8×4.0
	RNYM(RBYM)130-AE22	130.0	7.1×4.2
	RNYM(RBYM)150-AE23	150.0	7.1×4.6
	RNYM(RBYM)180-AE25	180.0	7.1×4.6
	RNYM(RBYM)200-AE58	200.0	6.9×4.0
	RNYM(RBYM)200-AE13	200.0	7.6×4.8
	RNYM(RBYM)234-AE13	234.0	7.6×4.8
	RNYM(RBYM)330-AE74	330.0	12.0×6.0

1. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 ~ 0.6mm larger than the design size. When selecting the strain gauge, please select the appropriate size according to the patch area.
2. In addition to the models listed in the table, shape and size of compensation resistor can be designed and produced according to user requirements (drawings or samples).

RNYM、RBYM

Geometry	Product code	Nominal resistance（Ω）	Backing size Length (L) × Width (W) (mm)
	RNYM(RBYM)5-AE12	5.0	5.7×4.4
	RNYM(RBYM)5.5-AE12	5.5	5.7×4.4
	RNYM(RBYM)9-AE05	9.0	6.2×3.9
	RNYM(RBYM)10-AE05	10.0	6.2×3.9
	RNYM(RBYM)12-AE45	12.0	6.2×4.0
	RNYM(RBYM)12.5-AE45	12.0	6.2×4.0
	RNYM(RBYM)13-AE45	13.0	6.2×4.0
	RNYM(RBYM)13.5-AE97	13.5	8.0×5.0
	RNYM(RBYM)15-AE16	15.0	8.0×5.0
	RNYM(RBYM)16-AE16	16.0	5.6×3.8
	RNYM(RBYM)16-AE57	16.0	7.6×4.3
	RNYM(RBYM)18-AE06	18.0	5.6×3.8
	RNYM(RBYM)18-AE73	18.0	5.6×3.8
	RNYM(RBYM)19.5-AE07	19.5	5.9×3.8
	RNYM(RBYM)20-AE07	20.0	5.9×3.8
	RNYM(RBYM)20.5-AE07	20.5	5.9×3.8
	RNYM(RBYM)22-AE07	22.0	5.9×3.8
	RNYM(RBYM)23.5-AE66	23.5	5.9×3.8
	RNYM(RBYM)24-AE66	24.0	5.9×3.8
	RNYM(RBYM)25-AE66	25.0	5.9×3.8
	RNYM(RBYM)26-AE08	26.0	6.0×3.8
	RNYM(RBYM)26.7-AE08	26.7	6.0×3.8
	RNYM(RBYM)28-AE09	28.0	6.1×4.0
	RNYM(RBYM)29-AE098	29.0	8.0×5.0
	RNYM(RBYM)30-AE09	30.0	6.1×4.0
	RNYM(RBYM)31.4-AE14	31.4	6.8×4.4
	RNYM(RBYM)32-AE14	32.0	6.8×4.4
	RNYM(RBYM)32.5-AE14	32.5	6.8×4.4
	RNYM(RBYM)33.8-AE14	33.8	6.8×4.4
	RNYM(RBYM)35-AE10	35.0	6.5×4.2
	RNYM(RBYM)35.6-AE10	35.6	6.5×4.2
	RNYM(RBYM)38.1-AE11	38.1	6.8×4.0
	RNYM(RBYM)40-AE11	40.0	6.8×4.0
	RNYM(RBYM)40-AE112	40.0	5.7×3.5
	RNYM(RBYM)40.5-AE11	40.5	6.8×4.0
	RNYM(RBYM)43-AE11	43.0	6.8×4.0
	RNYM(RBYM)50-AE22	50.0	7.1×4.2
	RNYM(RBYM)53.5-AE60	53.5	5.2×4.8
	RNYM(RBYM)54-AE28	54.0	7.1×4.4

RNYM、RBYM

Geometry	Product code	Nominal resistance（Ω）	Backing size Length (L) × Width (W) (mm)
	RNYM(RBYM)58-AE23	58.0	7.1×4.6
	RNYM(RBYM)60-AE23	60.0	7.1×4.6
	RNYM(RBYM)62-AE23	62.0	7.1×4.6
	RNYM(RBYM)65-AE25	65.0	7.1×4.6
	RNYM(RBYM)70-AE25	70.0	7.1×4.6
	RNYM(RBYM)72-AE25	72.0	7.1×4.6
	RNYM(RBYM)76-AE13	76.0	7.6×4.8
	RNYM(RBYM)81-AE13	81.0	7.6×4.8
	RNYM(RBYM)90-AE13	90.0	7.6×4.8
	RNYM(RBYM)100-AE59	100.0	8.0×8.0
	RNYM(RBYM)110-AE61	110.0	6.5×3.9
	RNYM(RBYM)112-AE59	112.0	8.0×8.0
	RNYM(RBYM)120-AE61	120.0	6.5×3.9
	RNYM(RBYM)130-AE61	130.0	6.5×3.9
	RNYM(RBYM)137-AE84	137.0	7.6×5.3
	RNYM(RBYM)150-AE87	150.0	7.8×5.5
	RNYM(RBYM)160-AE86	160.0	7.8×5.6
	RNYM(RBYM)180-AE85	180.0	8.0×5.6
	RNYM(RBYM)220-AE135	220.0	9.0×5.3
	RNYM(RBYM)300-AE64	300.0	8.6×5.3

Notes:

1. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 ~ 0.6mm larger than the design size. When selecting the strain gauge, please select the appropriate size according to the patch area. meter model.
2. In addition to the models listed in the table, shape and size of compensation resistor can be designed and produced according to user requirements (drawings or samples).

TERMINAL TABS

Terminal tabs are made of copper foil with a polyimide, special polyimide film or glass fibre reinforced epoxy backing and are used for soldering the strain gauge to wires. Solder tabs can be used to attach larger lead wires to the strain gauge than would be possible if the lead wires are directly attached to the strain gauge itself.

DTA Series

The DTA Series are made out of a pure copper foil and have a polyimide backing. It has a high flexibility, good insulation and is humidity and heat resistant. It is highly reliable and can be used in relatively curved conditions.

DTB Series

The DTB Series are made out of a pure copper foil and have a glass fibre reinforced epoxy backing. It has a high resistance against breaking. In addition it has a good bonding performance.

DHA Series

The DTA Series are made out of a pure copper foil and have a special polyimide film backing. It has a high flexibility, good insulation and is humidity and heat resistant. It can be used at higher temperatures up to 250°C .

DTA、DTB、DHA

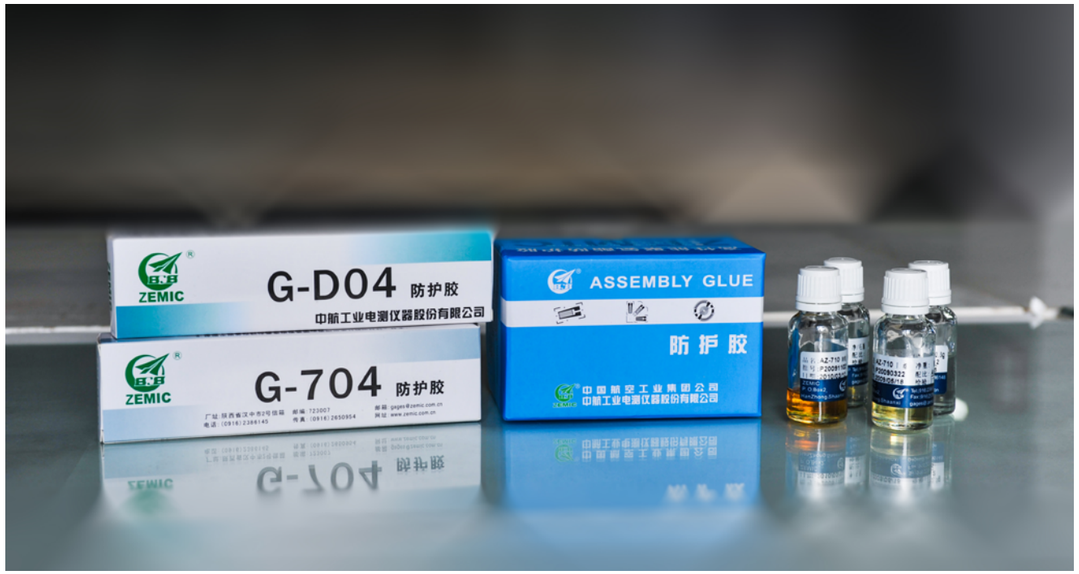
Geometry	Product code	Grid size Length (L) ×Width (W) (mm)	Backing size Length (L) × Width (W) (mm)
	DTA(DTB、DHA)0-G1	2.2×0.5	4.5×3.2
	DTA(DTB、DHA)1-G1	3.0×1.2	4.0×4.2
	DTA(DTB、DHA)2-G1	3.2×1.2	5.0×4.0
	DTA(DTB、DHA)3-G1	5.0×2.0	6.0×6.0
	DTA(DTB、DHA)6-G1	6.4×2.6	8.0×8.0
	DTA(DTB、DHA)10-G1	10.0×4.0	12.0×12.0
	DTA(DTB、DHA)3-G2	5.0×1.4	7.0×6.0
	DTA(DTB、DHA)4-G2	4.0×1.5	7.5×4.4
	DTA(DTB、DHA)5-G2	5.0×1.0	6.0×5.0
	DTA(DTB、DHA)6-G2	7.0×1.6	8.0×8.0
	DTA(DTB、DHA)7-G2	7.0×1.5	9.6×8.0
	DTA(DTB、DHA)10-G2	9.7×3.0	13.0×12.0

Geometry	Product code	Grid size Length (L) ×Width (W) (mm)	Backing size Length (L) × Width (W) (mm)
	DTA(DTB、DHA)3-G3	5.0×2.0	6.0×6.0
	DTA(DTB、DHA)6-G3	6.4×2.6	8.0×8.0
	DTA(DTB、DHA)10-G3	10.0×3.0	12.0×12.0
	DTA(DTB、DHA)3-G4	5.0×1.4	7.0×6.0
	DTA(DTB、DHA)6-G4	6.5×1.6	8.0×8.0
	DTA(DTB、DHA)10-G4	10.0×4.0	12.0×14.0
	DTA(DTB、DHA)3-G5	5.0×2.0	6.0×6.0
	DTA(DTB、DHA)6-G5	6.0×2.5	8.0×8.0
	DTA(DTB、DHA)10-G5	10.0×3.0	10.0×12.0
	DTA(DTB、DHA)3-G6	Φ1.0	5.0×3.0
	DTA(DTB、DHA)6-G6	Φ2.0	8.0×4.0
	DTA(DTB、DHA)10-G6	Φ4.0	12.0×6.0

Please note:

1. Among the models listed above, DTA (DTB, DHA)6-G6 represents three types of products, namely DTA6-G6, DTB6-G6 and DHA6-G6. Please specify them when ordering.
2. The sensitive grid size and base size listed in the table refer to the design size of the strain gauge pattern. The actual size of the strain gauge base is 0 to 0.6mm larger than the design size. When selecting the strain gauge, please select the appropriate size according to the patch area. meter model.
3. In addition to the models listed in the table, shape and size of terminal tabs can be designed and produced according to user requirements (drawings or samples).

BONDING ADHESIVE



provides high quality strain gauge bonding adhesives for load cell manufacturing.

No.	Model	Fuction	Type	Curing conditions	Applicable temperature range after curing
1	H-610	Adhesive	Two-component epoxy adhesive	High temperature	-226°C～ +200°C
2	H-600	Adhesive	Two-component epoxy adhesive	High temperature	-269°C～ +210°C
3	H-619	Adhesive ★	Two-component epoxy adhesive	High temperature	
4	H-611	Adhesive	Two-component epoxy adhesive	Room temperature	-30°C～ +60°C
5	F-614	Adhesive	Room temperature moisture absorption	Room temperature	-60°C～ +250°C
6	G-704	Protective adhesive	Single component silicone rubber	Room temperature moisture absorption	-50°C～ +250°C
7	G-D04	Protective adhesive	Single component silicone rubber	Room temperature moisture absorption	-70°C～ +200°C
Note: The adhesive with " ★ " is recommended for the production of C4 and above level sensor.					

H-610

Introduction

H-610 is a high performance two component adhesive, which is characterised by its low hysteresis, small creep, good repeatability, low viscosity, and a wide working temperature. The adhesive is mainly used for long term gauge bonding.

Application range

The operating temperature for this adhesive is:

- For long term: -269℃ up to +250℃
- For short term: -269℃ up to +300℃

H-610 is suitable for all strain gauges and compensation resistors. It is highly recommended for high precision transducer sensors for temperatures up to 250 ℃ . It is also suitable for TJ series underwater strain gauges and TA series strain gauges for great precision stress analysis.

How to use

1. Treat the surface of the test piece to be coated and clean it with cleaning solvent.
2. Use positioning tools to locate test points. Prepare polytetrafluoroethylene film, specialized adhesive pen, specialized tweezers, and resistance strain gauge to be attached.
3. Apply a thin layer of H-610 to the part of the test piece to be pasted, and then paste the resistance strain gauge within 2 minutes. When applying H-610, it should be formed in one go to avoid repeated strokes.
4. Use specialized tweezers to stick the strain gauge onto the test point, cover it with polytetrafluoroethylene film, and use fingers to squeeze out bubbles and excess glue along the axis of the strain gauge.
5. After covering the silicone rubber plate, place it in the fixture, apply a pressure of 0.1~0.3Mpa and maintain it constant, and then place it in an oven for curing treatment
6. Curing Procedure: Raise the temperature from room temperature to 135 ℃ at a rate of 2 ℃ per minute, hold for 2 hours, cool to room temperature with the oven, and then release the pressure. Raise the temperature to 165 ℃ at the same rate, hold for 2 hours, and cool to room temperature with the oven.

Storage

H-610 adhesive is provided in two components: A and B.

The storage period of a single component at 24 ℃ is 8 months, and the storage period at around 4 ℃ is 12 months.

The sealed adhesive after mixing can be stored for 7-10 days at room temperature, with a storage period of 1 month at around 4 ℃ .

Caution

1. Take it out of the refrigerator at least 2 hours before use, and wait for the temperature of the glue to balance with the outside temperature before opening the bottle cap.
2. When preparing the adhesive, the B component should be completely poured into A component (if not poured completely, it will cause imbalance in proportion and affect the bonding force), and the A and B components should be fully mixed by shaking to ensure the uniformity of the adhesive.
3. During usage, the adhesives bottle should be as far away from heat and light sources. This is due to the adhesive solvent reacting with higher temperature and light to volatize faster.
4. After using the adhesive each time,the bottle cap should be tightened in a timely manner to avoid solvent evaporation and solidification agent precipitation, which may cause small particles in the adhesive and affect future use.
5. The dedicated glue applicator should be cleaned after use to avoid bringing external impurities into the glue bottle and causing glue contamination.
6. When each bottle of glue is about to be used up, due to the solvent volatilization during use, the glue will become more viscous, or dust in the air will fall into the glue bottle, causing glue with small particles in the liquid, and the adhesive at this time is no longer suitable for pasting resistance strain gauges, but can be used for compensating resistors or wiring terminals with low requirements for pasting quality.
7. H-610 adhesive is suitable for use in environments with relative humidity less than 60%.

H-600

Introduction

H-600 adhesive is the latest adhesive with high-performance two component epoxy ,developed by Lipid , with low creep, low hysteresis, good repeatability, low viscosity, and wide working temperature range , short placement cycle, and it is convenient to use.

Application range

Operating temperature range:

Long term: -269 ℃ ~+210 ℃ Short term: -269 ℃ ~+370 ℃

H-600 adhesive is particularly recommended for high-precision sensors.

How to use

1. Treat the surface of the test piece to be coated and clean it with cleaning solvent.
2. Use positioning tools to locate test points. Prepare polytetrafluoroethylene film, specialized adhesive pen, specialized tweezers, and resistance strain gauge to be attached.

3. Apply a thin layer of H-610 to the part of the test piece to be pasted, and then paste the resistance strain gauge within 2 minutes. When applying H-610, it should be formed in one go to avoid repeated strokes.
4. Use specialized tweezers to stick the strain gauge onto the test point, cover it with polytetrafluoroethylene film, and use fingers to squeeze out bubbles and excess glue along the axis of the strain gauge.
5. After covering the silicone rubber plate, place it in the fixture, apply a pressure of 0.1~0.3Mpa and maintain it constant, and then place it in an oven for curing treatment.
6. Curing Procedure: Raise the temperature from room temperature to 135 ℃ at a rate of 2 ℃ per minute, hold for 2 hours, cool to room temperature with the oven, and then release the pressure. Raise the temperature to 165 ℃ at the same rate, hold for 2 hours, and cool to room temperature with the oven.

Storage

H-600 adhesive is provided in two components: A and B.
The storage period of a single component at 20-25 °C is 6 months, and the storage period at around 4-8 °C is 12 months.
The sealed adhesive solution after mixing can be stored for 7-10 days at 20-25 °C , with a storage period of 25 days at around 4-8 °C .

Caution

1. Take it out of the refrigerator at least 2 hours before use, and wait for the temperature of the glue to balance with the outside temperature before opening the bottle cap.
2. When preparing the adhesive, the B component should be completely poured into A component (if not poured completely, it will cause imbalance in proportion and affect the bonding force), and the A and B components should be fully mixed by shaking to ensure the uniformity of the adhesive.
3. During usage, the adhesives bottle should be as far away from heat and light sources. This is due to the adhesive solvent reacting with higher temperature and light to volatize faster.
4. After using the adhesive each time,the bottle cap should be tightened in a timely manner to avoid solvent evaporation and solidification agent precipitation, which may cause small particles in the adhesive and affect future use.
5. The dedicated glue applicator should be cleaned after use to avoid bringing external impurities into the glue bottle and causing glue contamination.
6. When each bottle of glue is about to be used up, due to the solvent volatilization during use, the glue will become more viscous, or dust in the air will fall into the glue bottle, causing glue with small particles in the liquid, and the adhesive at this time is no longer suitable for pasting resistance strain gauges, but can be used for compensating resistors or wiring terminals with low requirements for pasting quality.
7. H-600 adhesive is suitable for use in environments with relative humidity less than 60%.

H-619

Introduction

H-619 adhesive is the latest high-performance two component epoxy resin adhesive developed by our company. It has small creep, low hysteresis, good repeatability, low viscosity, wide working temperature range, short SMT cycle, and is very convenient to use. Specially recommended for C4 and above level sensor chip production.

Application

Operating temperature range: Long term: -269 °C ~+210 °C ; Short term: -269 °C ~+370 °C
H-619 adhesive is particularly recommended for the production of high-precision sensors of grade C4 and above.

How to use

1. Mix and shake the two components A and B in a mass ratio of A: B=1:1; Treat the surface of the test piece to be coated and clean it with cleaning solvent.
2. Use positioning tools to locate the test points. Prepare polytetrafluoroethylene film, specialized adhesive pen, specialized tweezers, and resistance strain gauge to be attached.
3. Apply a thin layer of H-619 to the part of the specimen to be attached, and then stick the strain gauge within 2 minutes. Attention: When applying H-619, it should be formed in one go to avoid repeated strokes.
4. Use specialized tweezers to stick the resistance strain gauge onto the test point, cover it with polytetrafluoroethylene film, and use your fingers to squeeze out bubbles and excess glue along the axis of the resistance strain gauge.
5. After covering the silicone rubber plate, place it in the fixture, apply a pressure of 0.1~0.3Mpa and maintain it constant, and then place it in an oven for curing treatment.
6. Curing Procedure: Raise the temperature from room temperature to 135 °C at a rate of 2 °C per minute, hold for 2 hours, cool to room temperature with the oven, and then release the pressure. Heat up again at the same rate to 165 °C , hold for 2 hours, and cool to room temperature with the oven.

F-614

Introduction

F-614 adhesive is a single component medium to high temperature adhesive made by copolymerizing phenolic resin and epoxy resin with fillers. It has advantages such as strong adhesion, outstanding insulation performance, high temperature resistance, good stability, and a wide temperature range for use. Mainly used for bonding resistance strain gauges for medium to high temperature use.

Application

Operating temperature range: -60 ℃ ~+250 ℃

F-614 adhesive is mainly used for pasting medium temperature strain gauges in our company's BA (150 ℃) series, BAB series, BB series, ZAB (250 ℃) series, ZYM (210 ℃) series, etc.

How to use

1. Prepare polytetrafluoroethylene film, specialized adhesive pen, specialized tweezers, cleaning solvents (alcohol, butanone), F-614 patch adhesive, and resistance strain gauge to be applied.
2. Grind or sandblast the surface of the test piece to be coated, and clean it with cleaning solvent.
3. 3Use positioning tools to locate the test points.
4. Before using this glue, cover the bottle cap and shake it or use a glue brush to stir until the glue color is uniform and consistent. When using, use a special adhesive pen to apply a thin layer of F-614 adhesive to the adhesive area. When applying, it should be formed in one go to avoid repeated strokes.
5. Use specialized tweezers to stick the resistance strain gauge onto the test point, cover it with polytetrafluoroethylene film, and use your fingers to squeeze out bubbles and excess glue along the axis of the resistance strain gauge.
6. After covering the silicone rubber board, place it in the fixture, apply pressure of 0.1~0.3Mpa and maintain stability, and then place it in an oven for curing treatment.
7. Curing procedure: Heat up to 100 ℃ at 2 ℃ /min, hold for 1 hour, then heat up to 150 ℃ , hold for 2 hours, cool to room temperature with the oven, and then release the pressure. Raise the temperature to 250 ℃ at 2 ℃ /min, hold for 4 hours, and cool to room temperature with the oven.

Caution

1. Take it out of the refrigerator at least 2 hours before use, and wait for the temperature of the glue to balance with the external temperature before use.
2. Due to the phenomenon of sediment layering after the adhesive solution is left for a long time, which is a normal phenomenon. Before use, it is necessary to cover it and shake it vigorously for 20 seconds to avoid affecting the bonding effect.
3. During use, the glue bottle should be kept away from heat sources to avoid shortening the shelf life of the glue solution under high temperatures.
4. The gluing tool should be cleaned thoroughly after use to avoid bringing external impurities (such as crystals from solvent evaporation) into the glue bottle and causing glue contamination.
5. F-614 adhesive is suitable for use in environments with a relative humidity of less than 60%.

G-704

Introduction

G-704 silicone rubber, a white flowing adhesive, is a single component room temperature vulcanized silicone rubber with good adhesion, high strength, solvent-free, and corrosion-free properties. It absorbs water vapor from the air for solidification at room temperature. It has excellent electrical insulation performance, sealing performance, and aging resistance, not only with an outstanding high and low temperature resistance, but also with excellent adhesion. It can widely bond various metals, non-metals, plastics, and rubber. Long storage period and stable performance make it an ideal material for sealing and protecting strain gauges and sensors.

Application

Operating temperature range: -50 ℃ ~+250 ℃

G-704 silicone rubber is suitable for the protection of all series of strain gauges and compensation resistors in our company after pasting, and is particularly recommended for thermal and mechanical damage protection of high-precision sensors.

How to use

1. Clean the surface of the adhesive or coated material and remove rust, dust, and oil stains.
2. Unscrew (or peel) the cap of the rubber tube, squeeze the glue onto the cleaned surface, distribute it evenly, and fix the adhered surface together.
3. Place the parts that have been glued or sealed in air and let them naturally solidify. The curing process is a process of curing from the surface to the inside. Within 24 hours (at room temperature and 55% relative humidity), the adhesive layer will cure to a depth of 2-4mm. If the location is deep, especially in areas that are not easily in contact with air, the complete curing time will be extended. If the temperature is low, the curing time will also be extended.
4. Before further processing or packaging the bonded components, it is recommended that users wait long enough to ensure that the firmness and integrity of the bonding are not affected.
5. The longer the time left at room temperature, the better the bonding effect.
6. For temperature resistant components, after the adhesive layer is completely cured, they can be placed in an oven at 50 ℃ to 150 ℃ for 4 to 12 hours to achieve better results.

Storage

Seal and store in cool and dry place. The storage period at 20-25 ℃ is 12 months.

Caution

1. As G-704 silicone rubber absorbs moisture and solidifies in the air at room temperature, the unused glue should be immediately tightened and sealed for storage after each operation is completed.
2. When re-using, if there is a small amount of scaling at the sealing area, it can be removed without affecting normal use.
3. During use, if the time interval between two adhesive applications is long, the bottle cap should be tightened immediately after the first operation is completed.
4. Unopened G-704 silicone rubber may also experience a small amount of solidification at the nozzle during storage. After removal, it can be used normally without affecting the product performance.

G-D04

Introduction

G-D04 adhesive is a moisture cured one component room temperature vulcanized silicone rubber product with excellent electrical properties, wide bonding surface, neutral, non corrosive (dealcohol type), and opaque. It is a good mechanical protective layer for resistance strain gauges, wiring terminals, and testing circuits.

Application

Operating temperature range: -70 °C ~+200 °C

G-D04 room temperature vulcanized silicone rubber is suitable for the protection of all series of strain gauges and compensation resistors in our company after bonding, and is particularly recommended for thermal and mechanical damage protection of high-precision sensors.

How to use

1. Clean the surface of the adhesive or coated material and remove rust, dust, and oil stains.
2. Unscrew (or peel) the cap of the rubber tube, squeeze the glue onto the cleaned surface, distribute it evenly, and fix the adhered surface together.
3. Place the parts that have been glued or sealed in air and let them naturally solidify. The curing process is a process that develops from the surface to the interior. Within 24 hours (room temperature not less than 5 °C), the adhesive layer will cure to a certain depth. If the location is deep, especially in areas that are not easily exposed to air, the complete curing time will be extended. If the temperature is low, the curing time will also be extended.
4. Before further processing or packaging the bonded components, it is recommended that users wait long enough to ensure that the firmness and integrity of the bonding are not affected.
5. Room temperature moisture absorption curing, with a sufficient curing time of over 24 hours.
6. The longer left at room temperature, the better the bonding effect.

Storage

Seal and store in cool and dry place. The storage period at 20-25 °C is 12 months.

Caution

1. As G-D04 silicone rubber absorbs moisture and solidifies in the air at room temperature, the unused glue should be immediately tightened and sealed for storage after each operation is completed.
2. When re-using, if there is a small amount of scaling at the sealing area, it can be removed without affecting normal use.
3. During use, if the time interval between two adhesive applications is long, the bottle cap should be tightened immediately after the first operation is completed.
4. Unopened G-D04 silicone rubber may also experience a small amount of solidification at the nozzle during storage. After removal, it can be used normally without affecting the product performance.

BONDING AND PROTECTION OF STRAIN GAUGES

For strain gauge installation, the most common way is strain gauge bonding with an adhesive. The quality of the bonding is one of the key factors to influence the strain test to be a success or not. Therefore, when bonding a strain gauge, strongly advise to follow the bonding procedures.

1. Strain gauge bonding process

1)Selecting strain gauges → 2)Selecting Bonding adhesive → 3)Sanding elements → 4)Surface cleaning → 5)Lining and location → 6)Gauge cleaning → 7)Applying adhesive → 8)Gauge bonding → 9)Heat curing → 10)Quality check after curing → 11)Soldering lead wires → 12)Quality check of soldering → 13)Temperature and loading performance testing → 14)Applying protection

2. Strain gauge bonding process method

There are differences in the techniques for bonding strain gauges using different adhesives. Here we only introduce some of the common contents.

2.1. Selecting strain gauges

(1) Strain gauge inspection includes appearance inspection and resistance value inspection

The appearance inspection mainly checks whether the base and cover are damaged, whether there are rust spots on the grid, whether the leads are broken, whether the grid is arranged neatly, whether there are short circuits, gaps, broken grids, scratches and deformations, and whether there are bubbles, wrinkles, and pits on the base; resistance inspection is to measure the resistance value of the strain gauge to see if it is in the resistance value range marked on the strain gauge packing case (resistance value accurate to 0.1Ω).

(2) Strain gauge surface treatment

Before use, the strain gauge should be wiped with absorbent cotton soaked in anhydrous ethanol. Pay attention to cleaning both sides; for strain gauges without layer, gently scrub in the direction of the grid. After cleaning, use an infrared lamp or other drying device to dry the surface of the strain gauge.

2.2 Selecting bonding adhesive

Adhesive selection refers to the adhesive introduction table. It is recommended to use high-performance adhesive H-610 or H-600 for load cell bonding.

2.3 Sanding elements

In order to make the strain gauge stick firmly, the bonding surface needs to be mechanically and chemically treated, and the treatment area is about 3 to 5 times the area of the strain gauge; according to the material of the specimen, sandpaper with a grit size of 220 to 400 is used for polishing, and cross stripes at an angle of 45° to the direction of the patch are made to remove oil stains, rust spots, oxide films, coatings, coatings, etc. on the surface of the specimen.

2.4 Surface cleaning

For surface cleaning, organic solvents such as acetone, absolute ethanol, trichloroethane, and isopropyl alcohol can be used to clean the polished part in one direction, and then clean with absolute ethanol until no stains are visible on the cotton ball. The cleaned surface should be protected from re-contamination (such as blowing with mouth) and touching with hands. Place the patch immediately after the solvent on the surface has evaporated and is completely dry.

Note: When scrubbing, proceed in one direction and do not wipe back and forth alternately.

2.5 Lining and location

The bonding area can be marked with laser markings or with a 3H drawing pencil, oil-free ballpoint pen, scribe needle and other tools as positioning marks.

2.6 Gauge cleaning

Take out the strain gauge and place it on a clean polytetrafluoroethylene film. Use a cotton swab dipped in a small amount of absolute ethanol to gently scrub the two surfaces of the strain gauge. Leave the adhesive side facing up to dry and set aside.

2.7 Applying adhesive

Many adhesives require priming and appropriate heat curing. The primer area is approximately 1.5 times the area of the strain gauge. The primer generally uses the same adhesive as the patch adhesive. The thickness should be controlled at 0.01 ~ 0.03mm and fully cured according to the corresponding curing parameters. On the premise of meeting the adhesion and insulation strength, the thinner the bonding layer (including primer), the better, because this can maintain a strong ability to transmit strain, reduce the unevenness of the adhesive layer, and reduce creep and sensitivity coefficient dispersion. Some adhesives do not require the application of primer, such as H-600, H-610, etc. These adhesives have strong adhesion, high insulation strength, and small creep, and are particularly suitable for making load cells and precision stress testing.

2.8 Gauge bonding

The strain gauge bonding is the most important step in the whole process and has an absolute impact on test accuracy. Before bonding, clean the required tools and measuring tools (such as tweezers, blades, glass plates) with acetone, put on clean spun gauze gloves, and use a cosmetic pen to apply adhesive on the surface of the specimen and the base of the strain gauge respectively and let dry for a while. When the glue becomes slightly tacky, align the center line of the strain gauge with the positioning line of the specimen and accurately attach it. Cover it with a layer of polytetrafluoroethylene film and use it along the axis of the strain gauge. Cover with a layer of polytetrafluoroethylene film, roll it with your fingers along the axis of the strain gauge for 1 to 2 minutes, drain out the air bubbles and squeeze out excess glue, dry naturally for an appropriate time according to the requirements of the adhesive used, and then peel off the polytetrafluoroethylene film. Note that strain gauges with leads should be lifted up from the end without leads, and the force direction should be as parallel as possible to the bonding surface to prevent the strain gauge from being lifted up. After bonding, the strain gauge must be carefully inspected. If any problems are found, such as the base is damaged, the sensitive grid is deformed, broken, or short-circuited, the patch position is incorrect, there are bubbles, some parts are not bonded, and the insulation strength is insufficient, etc., they should be eliminated in time or removed and re-pasted.

2.9 Heat curing

At present, most of the adhesives commonly require heating and curing. Temperature, time and pressure are the three elements of curing, and these three should be guaranteed in strict accordance with the corresponding curing process specifications of the adhesive. The strain gauge is generally pressurized by laying down polytetrafluoroethylene film and silicone rubber plate in sequence, and then using clamps or pressing blocks to pressurize. For complex surfaces, special clamps can be used to pressurize, and sandbags and strapping are also often adopted. In order to effectively eliminate internal stress, the temperature is generally raised to about 30° C higher than the pressure curing temperature after pressure relief, and the temperature is kept for 1 to 2 hours for stabilization. For specific bonding curing parameters, please refer to the corresponding bonding adhesive introduction. , such as H-610, the patching process is: initial curing, pressurize 0.1 ~ 0.3MPa, heat to 135° C, hold for 2 hours, then cool to room temperature to relieve pressure, then heat to 165° C, hold for 2 hours, and then drop to room temperature is fine.

2.10 Quality check after curing

After heating and solidification, the bonding quality of the strain gauge must be carefully inspected. The inspection items include:

① Changes in resistance value before and after the strain gauge is bonded;
② Insulation resistance;
③ Whether there are any residual bubbles in the piece;
④ Whether the bonding position is accurate or not;
⑤ Check whether there is an open circuit, short circuit or grid deformation.

2.11 Soldering lead wires

If soldering is done on the surface of the strain gauge, before soldering, use water-based sandpaper or sand-containing rubber to gently wipe away the residual adhesive and oxides on the surface of the soldering end, and clean them to facilitate soldering and avoid damaging the soldering end; the soldering temperature should not be too high(the strain gauge at normal temperature cannot exceed 250°C), the soldering time should not be too long and should be soldered quickly to avoid damage to the soldering end of the strain gauge due to high temperature and reduction in insulation strength. The soldering lead should be made of soft, not too hard wire to prevent the wire from being damaged or falling off when stressed for a long time; try to leave a stress relief ring on the connection line between the soldering end of the strain gauge and the terminal block to avoid internal stress concentration on the connection line when the test piece or elastomer is stressed for a long time or the temperature changes in a large range and pull it off to break the bridge or circuit. After soldering, the flux should be cleaned without any residue to avoid affecting the insulation strength and resistance of the strain gauge. After completion, the insulation strength should be measured again.

2.12. Quality check of soldering

Inspect the strain gauge after assembly, mainly by checking whether there is solder, solder oil residue, knotted leads, false soldering, etc. on the surface of the strain gauge.

2.13. Temperature and loading performance testing

(1) Loading performance test
The load cell clamping is accurate and there is no looseness; the loading point is accurate and there is no shift, preferably point-to-point loading; the loading instrument loads automatically, and the test instrument adopts an automatic inspection method to reduce the influence of human factors; the line connections are intact and there is no bad contact, soldering and other phenomena.
(2) Temperature performance test
The temperature control accuracy of the temperature equipment in the simulated environment must be high, meet the requirements of load cell testing, and have no temperature gradients, transients, etc.; the holding time is determined based on the size of the load cell, and the internal temperature of the load cell under test must be uniform and constant to reach the required temperature value. Avoid temperature steps inside the load cell element; for testing under hot and humid conditions, the temperature and humidity of the surrounding environment must meet the specified requirements.
(3) Environmental requirements
Indoor environmental conditions must meet national standards to reduce the impact of the environment on the load cell.

2.14. Protection measures

Taking reliable and practical protective measures for installed strain gauges is an effective way to ensure the normal operation of the strain gauges and improve test accuracy. The fundamental way to protect the strain gauge is to use certain materials or media to isolate the strain gauge and its accessories from the harsh environment. Therefore, first of all, during the installation and use of the strain gauge, operating it cautiously and carefully, and keeping direct contact without hands is an effective protective measure; secondly, it is to use a protective coating to protect the strain gauge. Generally, AZ-709 glue is used to protect the exposed parts. It needs to be applied evenly, and then covered with G-704, G-D04 and other silicone rubber.

MOST COMMON PROBLEMS WITH STRAIN GAUGES AND COUNTERMEASURES

1. Zero drift

The most common problem which can occur after the application of strain gauge is the drifting of the zero value. It may be affected by various factors and the key is to find the cause of the problem.

I. Effect of insulation resistance

The insulation resistance is an important specification for strain gauges. Zero drift could be caused due to the insulation resistance being low or gone as a whole. The insulation resistance refers to the resistance between the gauges grid and the tested object or element. If the insulation is decreased, the current which runs through the grid leaks to the element. This way the output value changes and zero drift occurs.
a. A reason why the insulation resistance is diminished could be due to not properly cleaning the strain gauge after installation. An example of this is flux which is in fact an acid, if not properly cleaned, bites through the backing of the gauge and eventually makes the grid touch the test object or element.
b. If the soldering is not done correctly, it could cause the soldering iron tip to burn through the backing which will cause the insulation resistance to be lower or completely disappear. To make sure this does not happen, the soldering iron can't be over 250°C and can't be used more than 2 seconds at once.
c. When the strain gauges have been in contact with moisture, it is possible that current in the grid leaks to the test subject or element through moist. To prevent this, it is key to protect the strain gauge and to make sure that the strain gauge doesn't get in contact with moist before protecting it. In addition, the humidity in the area of use shouldn't be higher than 65%.
d. During installation, a sharp object or a fingernail could have penetrated the backing of the strain gauge which will cause electrical leakage.

II. Effects caused by defects of strain gauge bonding process

These are the effects on the zero drift due to process which could have happened during the bonding process and caused zero shift.
a. If the backing is not bonded completely flat on the test object or element, this could cause zero shift. For example, when an eyelash is under the backing of a strain gauge, there is a small dent under the back this could cause the zero value to change. If the backing is not being stuck onto the element completely, when a temperature change would occur, the heat transfer from the element or test object will not be homogeneously transferred to the strain gauge and this will cause a zero drift.
b. When too much adhesive is used, this could cause the backing of the strain gauge to be not completely flat. This could, in the same way as described above, affect the strain gauges performance. This phenomenon is mainly manifested as a layered feeling on the back of the strain gauge, a lot of residual glue, glue edges and bulges after curing. The main reason is that the surface of the component is not clean, there are particles or uneven coating of glue or too much glue.

III. Zero drift caused by grid floating or a fallen off encapsulation

a. The strain gauge grids are twisted or deformed, this can only be checked under a microscope and is therefore hard to ascertain. When the gauge has been in contact with water or, the cleaning solvent contained too much water, this could result in the grid lines to shift or twist which will cause the zero value to drift.
b. The encapsulation of the strain gauge has fallen off. This could happen because the strain gauge and the encapsulation has not bonded correctly due to unequal heat dispersion during the curing of the encapsulation.

2. Resistance change after bonding

Usually the resistance of a strain gauge only changes very little after bonding. However in some cases the resistance value changes too much. Possible causes of this problem are displayed below:
I. Pressure applied during the curing process has been too high. When the strain gauge is installed and not under the proper amount of pressure during the curing process, grid-lines might expand a little, which will encourage the resistance value to change. It is recommended to use a pressure of 0.15 up to 0.3 MPa during the curing process.
II. Pressure during the curing process has not been evenly divided over the gauge and has caused deformation in the grid. The main cause is that the fixture has not been used properly or the fixture is not correct for the strain gauges.
III. The curvature radius of tooling design is not consistent with the component, resulting in strain gauge deformation or bulging and abnormal resistance value.
IIII. The resistance changes after some time, this could be caused by air bubbles behind the grid or dents or holes underneath the backing of the strain gauge.

3. Surface defect after bonding

From the above content, it can be seen that the main defects of the bonding process include a void, bulge, uneven adhesive layer, too thick adhesive layer, rubber edge, pressure pit, deformation, etc. Among them, bulge and pressure pit can be used as long as they are not in the stressed part of the sensitive grid. In view of these defects, it is necessary to carry out appearance inspection after bonding, remove the defects, and ensure the quality of the bonding process. At the same time, the resistance value and insulation resistance of the strain gauge should be checked to avoid waste of the latter process.